

# Factors Affecting Students Performance - Transportation

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**Abstract**—A study was carried out to examine the perceptions and preferences of students on choosing the type of transportation for their travels in university campus. This study focused on finding factors influencing student's preferences. Overall a set of 16 questionnaires were distributed to 100 students for conducted a research to investigate the choices of transportation mode preferences. Consequently, UNIKL MIIT and UKM students as respondents been used to identify the factors that affect the determination of the choice of transportation mode. Results indicated that preferences of using transportation among UNIKL MIIT students are mixed mostly due to accessibility. This study revealed positive aspects is needed for students to be able choose the best way possible to go the campus.

**Keywords**—*transportation; performance;*

## I. INTRODUCTION

This introduction will describe about the background information of our study that is preferences on means of transportation among Universiti Kuala Lumpur Malaysian Institute of Information Technology (UNIKL MIIT) and Universiti Kebangsaan Malaysia (UKM) students. Besides that, we also discuss about the objective of our study and the questions that we researched about. These all are commonly surveyed about the topics like the factors, solutions and effects of transportations preferences.

## II. BACKGROUND OF THE STUDY

UNIKL MIIT and UKM provides hostel for most of the students from the first year to the final year students. However, two of the hostels are situated far from the academic buildings and other facilities around the campus. So, most of the students intend to stay either near to or far from campus. This arise problems to those who did not own any transport. They had to walk more daily due to far distance from student hostels to LRT station and the campus. They also need to face unpredictable weather conditions and hectic daily schedule. For that reason, we decided to do a research to know the reasons why UNIKL MIIT and UKM students prefer on using transportation between their own transport or public transport and time taken for travelling back and forth between their residence and campus which occur the higher allocations.

## III. STATEMENT OF THE PROBLEM

UNIKL MIIT and UKM focusing on the areas of Information Technology, Multimedia and Animation, offers an easy-going, urban campus lifestyle to a total of 3,000 students. Located in the center of the metropolis, the residence complexes are situated far from the academic buildings and other facilities around the campus. This issue will lead to preferences on means of transportation among UNIKL MIIT students due to the environmental impacts. During peak hours, overcrowded vehicles also create anxiety among students. Therefore, UNIKL MIIT and UKM students tend to face difficulties in attending class and reaching other facilities around the campus due to the transportation mode.

## IV. OBJECTIVE OF THE STUDY

The objectives of the study are:

- To identify distance students' house to the college.
- To identify factors that affect students' preferred mode of transportation.
- To know whether attendance in class can effect on academic performance.

## V. RESEARCH QUESTIONS

The main research questions of this research are:

- How far students' live from college?
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## VI. SIGNIFICANCE OF THE STUDY

Until now, there is no written report that there are problems regarding the distance of student's residents with the academic building and other facilities. So, this study might be important

to help finding factors influencing student's preferences. If this problem persists, UNIKL MIIT and UKM students will be able to choose the best way possible to go to the campus.

## VII. RESEARCH METHODOLOGY

### A. Introduction

This chapter discusses the methodology of this research. The main purpose of this research is to identify UNIKL MIIT and UKM student's preferred mode of transportation. The second purpose is to identify factors that affect student's preferred mode of transportation. From this research, recommendation for the best choice of transportation can be proposed. Data collected through questionnaire.

### B. Research Instruments Used

This research utilized quantitative and qualitative research methodology as primary data. The instruments used to collect data were questionnaire using by 'Google Form'. A set of questionnaires containing 16 questions were prepared. The questionnaire used different question-types, such as category, choice, yes/no, scale and open-ended were used in the questionnaire.

### C. Respondents of the study

The respondents of the questionnaire were all level year undergraduate students from different courses at Universiti Kuala Lumpur and Universiti Kebangsaan Malaysia. In 31st March to 20th April 2018, 16 questions were distributed to all students for 14 days. A total of 100 students from various courses which 50 male students and 50 female students are chosen to be the respondents.

### D. Data Analysis

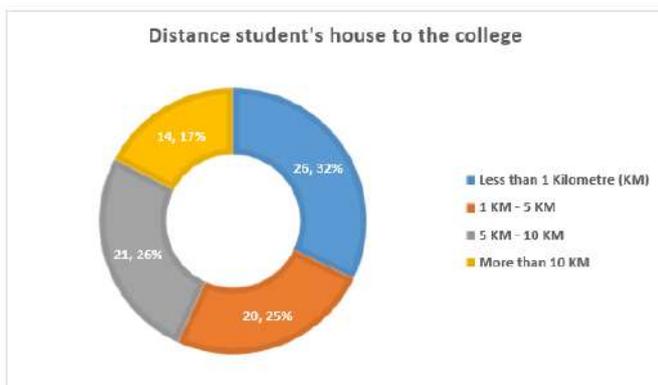


Figure 1 : Distance student's house to the college

Figure above shows, distance student's house to the college. Some students live at hostel, rent house, parent's house or relative's house. Most of students live at near college which is less than 1 kilometre from their college. Secondly, 26% students live range about five kilometre to ten kilometre away from the college. Thirdly, 25% students live range about a kilometre to five kilometre away from college. Lastly, only 14% students live far from college which is more than ten kilometres.

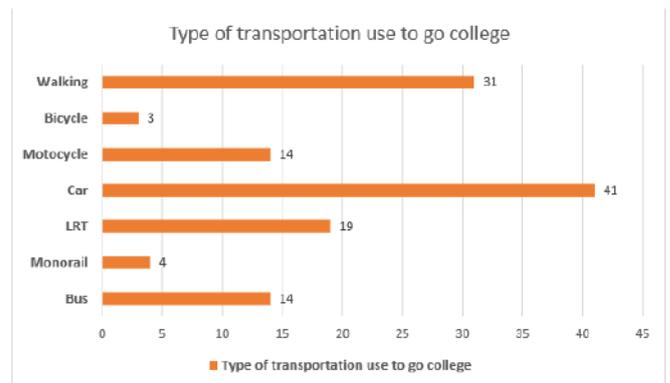


Figure 2 : Type of transportation use to go college

Figure shows, type of transportation that students use to travel to college. Most of the famous transportation that students use is travel by car and walking to go college. At the same time, students also choose public transport as their medium to go college such as LRT, monorail, and bus.

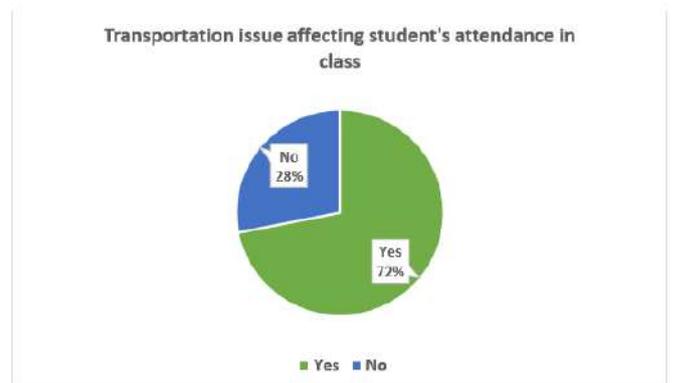


Figure 3 . Transportation issue affecting student's attendance in class

Figure 3 above shows that, 72% students voted yes transportation issue affecting student's attendance in class and others 28% voted no. It shows, when students do not have transportation to attend class it will affect academic performance. Student will be left behind in learning session.

## VIII. RECOMMENDATIONS BASED ON THE FINDINGS

Based on the findings and conclusions of the study, here are several recommendations to be considered:

### 1. Make Interchanging Easy for Public Transport

Since most public transport aim at linking areas that are outside a city to the city center, it is also imperative to link outlying areas together. Doing this is beneficial in two ways. In the first instance, it helps people who shouldn't be at the city center but needed to pass through because the outlying areas are not connected together to keep off and, hence, reduce congestion at the center. Also, connecting the outlying areas provide a backup for the public transport system in case of a problem which often happen.

### 2. Minimize the Number of Stops/Stations

Stops and stations improves the efficiency of public transport but there should be a balance between enabling accessibility with more stops or stations and reducing the costs of operation by increasing transit speed or ensuring trips are covered in time. Therefore, care should be taken to ensure that stops and stations are located on streets to balance accessibility by commuters on one hand and reduce operating costs on the other hand.

### 3. Giving Priority to Public Transport at Traffic Signals

Giving priority to public buses and trams at traffic signals is an excellent way to improve the operating efficiency by increasing the travel time of these means of public transport. This could be done by deploying traffic engineering mechanism whereby a traffic signal turns green at the sight of a public transport at an intersection.

### 4. Discounts for off-peak travel

As for the issue of overcrowding which is the norm during peak hours, the service operators can offer commuters an incentive to travel during off-peak hours. The aim is to spread out the crowd over a longer period of time. The morning peak hour overcrowding can be alleviated by giving discounts to those who exit in the morning before 7.45 am and those travelling after 9.00 am. The same concept can be applied for the evening crowd. There is a catch, however. This solution is only a short-term one because the number of commuters will only increase in the coming years.

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Start by buying new buses or at least repairing the old ones. Making a new, more accurate, schedule which would include several new bus lines connecting areas of the towns, which otherwise are not connected in any way, is another good idea. Also, reducing the price of the tickets would be beneficial for all the passengers.

## IX. RECOMMENDATIONS FOR FUTURE RESEARCH

Since this study had only focused on UNIKL MIIT and UKM students, it is recommended that further studies be carried out on students from other universities in the findings. Furthermore, in our discussion, we identify that many UNIKL MIIT and UKM students are using public transport compare to their own transport. They mostly agreed that by using public transport it is more convenient and faster went they go to the campus than by using their own transport. In addition, they can, avoid the traffic congestion at peak times when they were going back from classes at UNIKL MIIT and UKM campus. In their opinion, using public transport more frequently was better than own transportation because there were cheaper and does not have fuel maintenance such as using LRT or buses. The service of public transportation was satisfied, and we can use it easily and more comfortable.

## ACKNOWLEDGMENT

A special thanks to my helpful supervisor and UniKL for supervision and support from beginning until the end. Thank you for giving opportunity and providing the feasibility to finish this paper.

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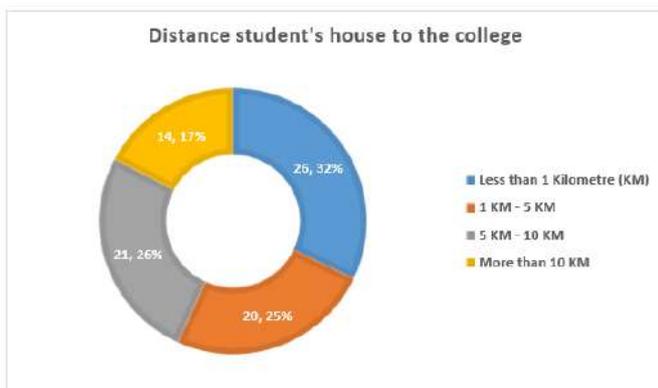


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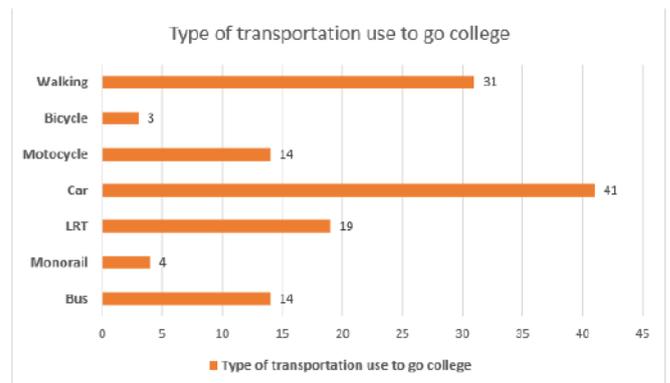


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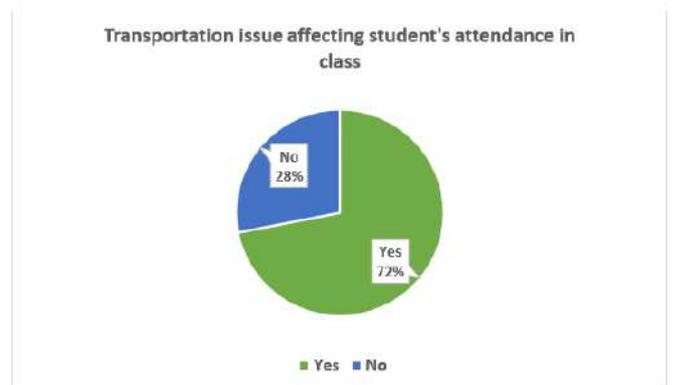


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# Internet Addiction Among Adolescents

Suraya Sedik

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Kuala Lumpur, Malaysia

**Abstract**—Internet addiction among adolescents based on research evidence. The timing of this study coincides with the growing rate of penetration of Internet service across the country and with current plans to improve this service. This study investigates Internet usage among adolescents, who are the most vulnerable to Internet addiction in the population. The main method in analysing the data collected is through Microsoft Excel and the in-built analysis system in Google Form. Google Form provides all the answers that the respondents have answered into one single spreadsheet. Then, it has to analyse each single statement and question and relate to the problem statement, which is that university students are mostly addicted to the internet. Mostly, adolescents not use the Internet more for information and research, but they use more for the entertainment.

**Keywords**— Addiction, Internet User, Adolescents

## I. INTRODUCTION

Information and Communication Technologies (ICT) refers to the technologies that provide access to information through telecommunications. Its same with Information Technology (IT), but it more focuses on communication technologies. The ICT are includes the Internet, wireless networks, cell phones, and other communication mediums. Before that, the information and communication technologies have provided society with a vast array of new communication capabilities. For example, people can communicate in real-time with others in different countries using technologies such as instant messaging, voice over IP (VoIP), and video-conferencing. Social networking websites like Facebook allow users from all over the world to remain in contact and communicate on a regular basis. Now, modern information and communication technologies have created a "global village," in which people can communicate with others across the world as if they were living next door. Because of this, the ICT is often studied in the context of how modern communication technologies affect society.

The internet is an exciting new medium that is evolving into an essential part of everyday life all over the world. It has opened a new domain in social interactivity with the promise of increasing efficiency and worldwide understanding. Though devised primarily to facilitate research, information seeking, interpersonal communication, and business transactions, for some Internet users it has become the central focus of their lives and a temptation that is hard to resist. With the increasing importance of the Internet and online usage increasing dramatically, pathological Internet use Internet addiction is becoming more common in society (Nalwa & Anand, 2003).

Internet addiction is described as an impulse control disorder, which does not involve use of an intoxicating drug and is very similar to pathological gambling. Some Internet users may develop an emotional attachment to on-line friends and activities they create on their computer screens. According to (Weinstein & Lejoyeux, 2010), internet addiction is characterized by a maladaptive pattern of Internet use leading to clinically significant impairment or distress. Besides that, Internet use is portrayed as an inclusive medium without differentiating the types of online activities and applications that might be engaged by the users (Király, Nagygyörgy, Koronczai, Griffiths, & Demetrovics, 2015). Internet addiction can be defined as a maladaptive and persistent use of the Internet that can have a detrimental influence on any or all facets of an individual's life (Chou, Condrón, & Belland, 2005;

Young, 1998).

## II. LITERATURE REVIEW

In this project, Internet addiction have problem belong to internet addiction. One of the leading causes of internet addiction is mental health. (Holden, 2001; Kuss, 2012) say that Internet addiction leads to symptoms traditionally associated with substance related addictions, namely mood modification, salience, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005). In that case, (Wu et al., 2016) say that internet addiction has emerged as a rapidly growing problem in young people and has attracted worldwide attention. When compared to adults, adolescence is a critical period for addiction vulnerability (Pallanti, Bernardi, & Quercioli, 2006). Adolescents have a natural tendency towards the Internet and are more likely to adopt patterns of internet addiction (Tsitsika et al., 2009). In terms of specific applications, gaming has been extensively researched as an online application with a high addictive potential (Huang, 2006; Kuss & Griffiths, 2012; Leung, 2004). Moreover, the use of social applications, namely online chatting (Huang, 2006; Leung, 2004), social networking sites (SNSs) (Kuss & Griffiths, 2011; Leung & Lee, 2012), such as Facebook (Kittinger, Correia, & Irons, 2012), and online instant messengers (Leung, 2004; Yuen & Lavin, 2004) have been found to be associated with Internet addiction. Besides that, frustration and other difficulties encountered in real life may contribute to internet addiction because the Internet provides an escape from negative affect (Tang et al., 2014). Problems in adolescent relationships at school may be important risk factors. The relationship between adolescents and their classmates or

teachers could greatly influence their psychological condition, and thus possibly influence internet use. The internet not only affects mental but also affects academic problems.

Fifty-eight percent of students reported a decline in study habits, a significant drop in grades, missed classes, or being placed on probation due to excessive internet use (Young, 1999). The purposes of the study were to document the prevalence of internet addiction among adolescent, to collect descriptive information about the ways that adolescents use the Internet, and to identify risk factors including personal factors like gender and age, family (parenting way, the relationship between parents), and social factors such as peer relationship, academic performance for internet addiction among adolescents (Xin, 2018). This results may help educational agencies and mental health organizations design suitable internet addiction prevention programs geared toward among adolescent (Lin, Wu, You, Hu, & Yen, 2018). Hence, the influence of the facilities available on the Internet is one it is a big problem to identify whether university students become addict to the Internet or not.

### III. RESEARCH METHODOLOGY

In this chapter, we will discuss the research methodology that is involved in this research study. This includes the research design, the area of study, population, sampling technique, sample of the population, data collection instrument, questionnaire validation, administration of the instrument and data analysis method.

#### A. Research Design

After discussing with our group members, we decided to choose a survey research design because it is best served to answer all the questions and the study purposes. Survey research is a specific type of field study that involves the collection of data from a sample of elements (e.g., adult women) drawn from a well-defined population (e.g., all adult women living in the United States) through the use of a questionnaire (Reis & Judd, 2014). According to Check & Schutt, survey research is defined as "the collection of information from a sample of individuals through their responses to questions". This type of research allows for a variety of methods to recruit participants, collect data, and utilize various methods of instrumentation (Ponto, 2015). Survey research can use quantitative research strategies such as using questionnaires with numerically rated items, qualitative research strategies such as using open-ended questions, or both strategies such as mixed methods, in which we decided to use for our research study. As mentioned by Singleton & Straits, surveys are frequently used in social and psychological research as it is often used to describe and explore human behaviour (Ponto, 2015).

#### B. Population Of The Study

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#### C. Sampling Techniques

For the sampling technique, we have decided to choose the selective sampling. This type of sampling occurs where the researcher decides to sample in a particular locale or seek particular types of people. In this case, we decide to sample from university students. Again, this is driven by rational thought rather than convenience or bias. For this research, we decided to take samples from 340 students. We assume that the number of students here in Malaysia is around 1.27 million people. With the confidence level of 99% and the average error margin of 7%, we calculated and the sample size we got is 340.

Sample Size Calculator

How many people do you need to take your survey? Even if you're a statistician, determining survey sample size can be tough.

Want to know how to calculate it? Our sample size calculator makes it easy. Here's everything you need to know about getting the right number of responses for your survey.

Calculate Your Sample Size:

Population Size: 127000

Confidence Level (%): 99

Margin of Error (%): 7

CALCULATE

Sample Size: 340

### IV. PREPARE YOUR PAPER BEFORE STYLING

Before you begin to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

B. Units

- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as “3.5-inch disk drive.”
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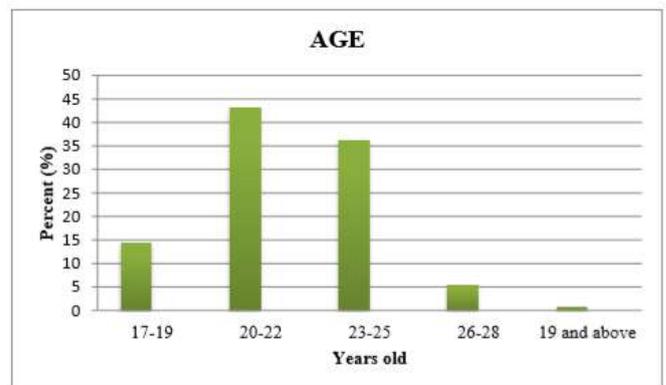
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V. PRELIMINARY FINDINGS

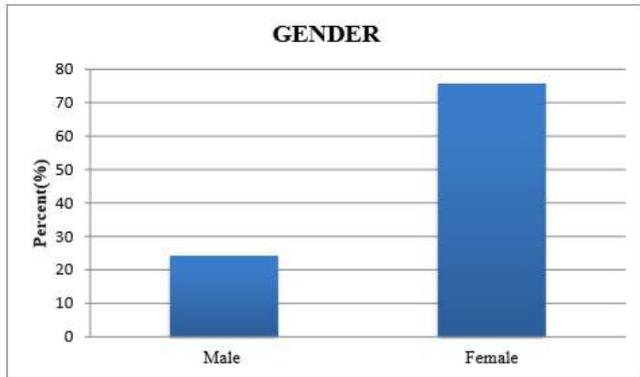


Graph 1: Age of Respondent

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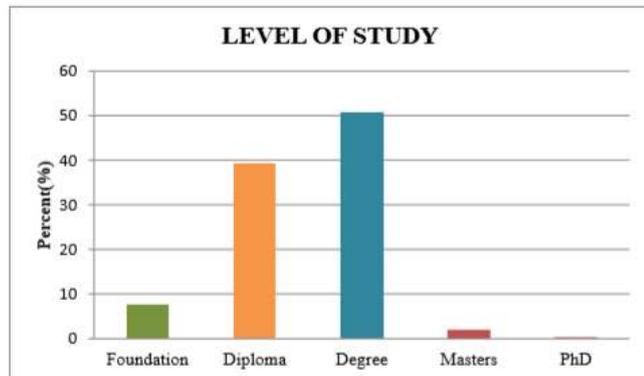
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23 to 25 are the second highest age range that had answered the questionnaire. It is followed up with 14.4 percent or 51 people by respondents from the age of 17 to 19. Then, 19 people are those from the age of 26 to 28 and 3 people are 29 and above with a percentage of 5.4 percent and 0.8 percent respectively.



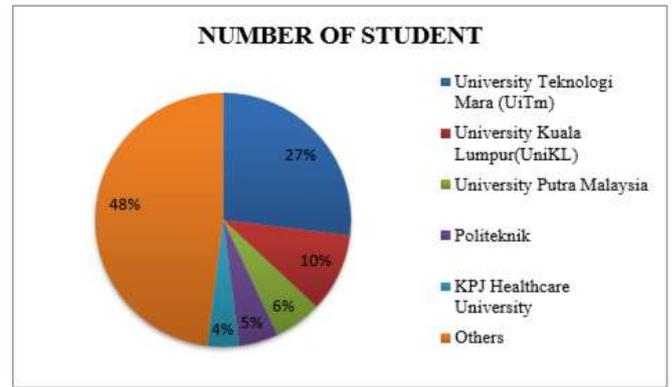
Graph 2: Gender of Respondent

The graph shows the gender of respondent in university. It shows that the number of female who answered the questionnaire are way higher compared to those who are male that is 75.9 percent which is 267 are female while the other 24.1 percent which is 85 people are male. However, one person did not mention his/her gender.



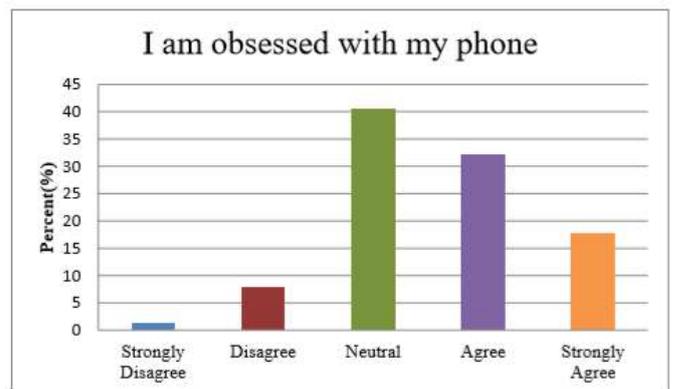
Graph 3: Level of Study

The graph shows that the level of study. Its shows that half of the respondent or 178 people (50.6 percent) to be exact who had answered the questionnaire are those who have or currently taking a degree. 139 people (39.5 percent) have the level of study of diploma. 7.7 percent which is 27 people are from foundation, 2 percent or 7 people have the level of study of masters and 0.2 percent which is one person are from PhD.



Graph 4: Number of Student

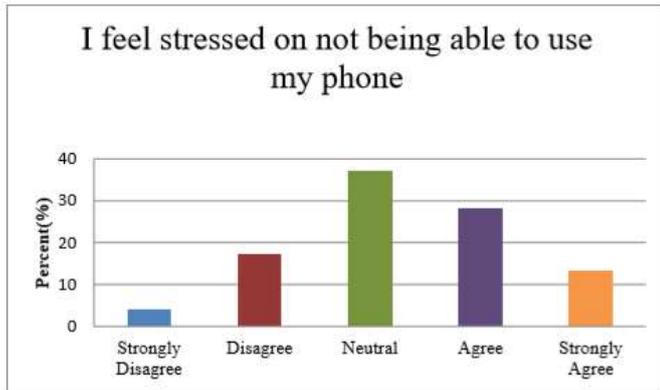
The graph shows the number of students in some university answered my questionnaire. The data show that 352 respondents who take part in this questionnaire. From that number of student, it also show that are approximately 70 institutions involved or attended by them. The highest number of students are those who are from Universiti Teknologi Mara (UiTM) with 93 respondents (27 percent). The second highest are students who are from University Kuala Lumpur (UniKL) which is 36 people (10 percent). Next are those who are from Universiti Putra Malaysia with 21 people (6 percent). 19 respondents (5 percent) are from Politeknik and 15 respondents (4 percent) are from KPJ Healthcare University. The other 168 respondents (48 percent) are from other institution including two schools for Form 6 students.



Graph 5: I am obsessed with my phone

For the general knowledge of internet addiction, the graph shows the answer given by the respondent based on the questionnaire I have provided. Based on the question "I am obsessed with my phone" the results shown in the above it indicates that most of the respondents gave neutral responses that is 40.51 percent along with 143 respondents in this question. While, 40.51% along with 114 of respondents agree with the question and it is the second higher for this question. Then, 17.85% are strongly agree that is 63 of respondents followed by 7.92% along with 28 of respondent disagree with

this question. However, just 5 of respondent that is 1.42% choose strongly disagree with this question.



Graph 6: I feel stressed on not being able to use my phone

The graph shows the answer given by the respondent based on the second question "I feel stressed on not being able to use my phone". The results shown that most respondents' neutral response to the statements in this section that is 37.11 percent along with 131 respondents in this question. While, 28.33 percent along with 100 of respondents agree with the question and it is the second higher for this question. Then, 17.82 percent are disagreed that is 61 of respondents followed by 13.31% along with 47 of respondent strongly agree with this question. However, just 14 of respondent that is 3.97 percent choose strongly disagree with this question.

## VI. CONCLUSION

This study has collected data to meet the objective of the study. This study was conducted using google form to make it easier for me to gather information about internet addiction problem among adolescents in some universities. Of the research that has been done many things related to the study can be concluded for identifying any internet addiction problems that occur in adolescents. The results obtained from the respondents include information such as age, gender and status of study. In addition, it also includes some questions to respond to respondents like I am obsessed with my phone, I feel stressed on not being able to use my phone, I tried hard and failed to control my addiction on my phone, I used my phone longer than I intended and I feel comfortable in the virtual world than the real world. For the general knowledge of internet addiction section, based on the 5 questions that have been prepared to answer by the respondent. The results obtained were that the respondent gave a neutral answer which was the highest for the five questions. Based on the 5 questions that have been prepared to answered by the respondent. The results obtained were that respondents gave a neutral answer which was the highest for the five questions with 40.51 percent each for the "I am obsessed with my phone" question, 37.11 percent "I feel stressed on not

being able to use my phone", 39.66 percent "I tried hard and failed to control my addiction on my phone", 31.44 percent "I used my phone longer than I intended" and 35.13 percent "I feel comfortable in the virtual world than the real world". Therefore, this is proven that most of the people generally has good knowledge and exposure about internet addiction and it is clearly shown that most people nowadays are quite addicted to the internet. The students are well aware of this problem but they might not realize and admit it. For the effects of internet addiction section, it is about the overall part regarding our study of internet addiction among university students. Based on the results from the diagram above, most of the respondents choose the neutral and agree answers. For instance, in the question Stated that "i believe that internet addiction is related to mental health issues such as Depression and anxiety" most of the respondents choose the agree answer. Therefore, we can conclude that students actually know the close relationship between mental health and Internet addiction. For the solution to the internet addiction section, we have provided three Suggestions of solving the problem in the questionnaire. The suggestions are, do more Outdoor activities, internet rehab treatment and counselling. Based on the results, majority of the responses chooses the "do more outdoor activities" as Their best solution in order to cure them of internet addiction. However, we also provided open Ended question if there are any other suggestions from the respondents that are relevant in Solving the internet addiction. Fortunately, we obtained few interesting answers from the Respondents that suggests the way to solve internet addiction. These suggestions made by the Respondents are acceptable and logical. The answers include:

1. Create a better world that we people will think that no internet will be needed anymore
2. Restrict the usage of internet to a certain limit. Don't allow any usage of gadgets in the Classroom unless it is necessary.
3. Restrict the internet quota to a certain limit. Try to be more discipline to use the internet Wisely.
4. Reading books
5. Money is the cure to involve with more outdoor activities
6. Spend more time with family.
7. Socializing with good people in a good environment.
8. Better companions and better life
9. Play more games
10. Have a boyfriend/girlfriend

For the sampling technique, we have decided to choose the selective sampling. This type of sampling occurs where the researcher decides to sample in a particular locale or seek particular types of people. In this case, we decide to sample from university students. Again, this is driven by rational thought rather than convenience or bias.

Based on the analysis of all the collected data, I can conclude that university students in Malaysia are addicted to the internet. The problem statement is in line with the analysis that I have. With the analysis, I also managed to find out that university students are actually well aware of the presence of internet addiction and its severity.

#### ACKNOWLEDGMENT

A special thanks to my helpful supervisor for supervision and support from beginning until the end. Thank you to Univerisiti Kuala Lumpur for giving opportunity and providing the feasibility to finish this paper.

#### REFERENCES

- [1] (n.d.). Retrieved April 24, 2018, from [https://www.google.com/search?ei=2MbkWvuIIsnSvASw6aWQDw&q=data analysis definition&oq=data analysis &gs\\_l=psy-](https://www.google.com/search?ei=2MbkWvuIIsnSvASw6aWQDw&q=data+analysis+definition&oq=data+analysis+&gs_l=psy-)
- [2] Clause, C. (n.d.). Content Validity: Definition, Index & Examples. Retrieved April 10, 2018, from <https://study.com/academy/lesson/content-validity-definition-indexexamples.html>
- [3] Flora, K. (n.d.). Internet addiction disorder among adolescents and young adults: The picture in Europe and prevention strategies. *Perspectives on Youth*, 119-132. Retrieved March 25, 2018, from [http://pjpeu.coe.int/documents/1017981/8422373/120\\_chapter\\_10.pdf/2707f2a7-32cc-43cebb15-3a92b7b42f43](http://pjpeu.coe.int/documents/1017981/8422373/120_chapter_10.pdf/2707f2a7-32cc-43cebb15-3a92b7b42f43)
- [4] Gezgin, D., Cakir, O., & Yildirim, S. (2018). The Relationship between Levels of Nomophobia Prevalence and Internet Addiction among High School Students: The factors influencing Nomophobia. *International Journal of Research in Education and Science*, 215-225. doi:10.21890/ijres.383153
- [5] ICT. (n.d.). Retrieved April 25, 2018, from <https://techterms.com/definition/ict>
- [6] Kuss, D., Griffiths, M., & Binder, J. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior*, 29(3), 959-966. doi:10.1016/j.chb.2012.12.024
- [7] Lin, M., Wu, J., You, J., Hu, W., & Yen, C. (2018). Prevalence of internet addiction and its risk and protective factors in a representative sample of senior high school students in Taiwan. *Journal of Adolescence*, 62, 38-46. doi:10.1016/j.adolescence.2017.11.004
- [8] Nalwa, K., & Anand, A. (2003). Internet Addiction in Students: A Cause of Concern. *CyberPsychology & Behavior*, 6(6), 653-656. doi:10.1089/109493103322725441
- [9] Ponto, J. (2015). Retrieved April 11, 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4601897/>
- [10] Reis, H. T., & Judd, C. M. (2014). *Handbook of research methods in social and personality psychology*. New York, NY: Cambridge University Press.
- [11] Robertson, T., Yan, Z., & Rapoza, K. (2018). Is resilience a protective factor of internet addiction? *Computers in Human Behavior*, 78, 255-260. doi:10.1016/j.chb.2017.09.027
- [12] Sireci, S. G. (1998). The Construct of Content Validity. *Social Indicators Research*, 45(1-3). doi:10.1023/A:1006985528729
- [13] Thomas, S. D., Hathaway, D. K., & Arheart, K. L. (1992). Face Validity. *Western Journal of Nursing Research*, 14(1). doi:10.1177/019394599201400111
- [14] Xin, M., Xing, J., Pengfei, W., Houru, L., Mengcheng, W., & Hong, Z. (2018). Online activities, prevalence of Internet addiction and risk factors related to family and school among adolescents in China. *Addictive Behaviors Reports*, 7, 14-18. doi:10.1016/j.abrep.2017.10.003
- [15] Xiuqin, H., Huimin, Z., Mengchen, L., Jinan, W., Ying, Z., & Ran, T. (2010). Mental health, personality, and parental rearing styles. *Addiction*, 13(4), 401-406. Retrieved March 28, 2018
- [16] Young, K. (1999). Internet addiction: Symptoms, evaluation, and treatment. *Innovations in Clinical Practice*, 17(17), 19-31. doi:10.1007/s10879-009-9120-x

# Internet Addiction Among Adolescents

Suraya Sedik

Universiti Kuala Lumpur Malaysian Institute of Information Technology  
Kuala Lumpur, Malaysia

**Abstract**—Internet addiction among adolescents based on research evidence. The timing of this study coincides with the growing rate of penetration of Internet service across the country and with current plans to improve this service. This study investigates Internet usage among adolescents, who are the most vulnerable to Internet addiction in the population. The main method in analysing the data collected is through Microsoft Excel and the in-built analysis system in Google Form. Google Form provides all the answers that the respondents have answered into one single spreadsheet. Then, it has to analyse each single statement and question and relate to the problem statement, which is that university students are mostly addicted to the internet. Mostly, adolescents not use the Internet more for information and research, but they use more for the entertainment.

**Keywords**— Addiction, Internet User, Adolescents

## I. INTRODUCTION

Information and Communication Technologies (ICT) refers to the technologies that provide access to information through telecommunications. Its same with Information Technology (IT), but it more focuses on communication technologies. The ICT are includes the Internet, wireless networks, cell phones, and other communication mediums. Before that, the information and communication technologies have provided society with a vast array of new communication capabilities. For example, people can communicate in real-time with others in different countries using technologies such as instant messaging, voice over IP (VoIP), and video-conferencing. Social networking websites like Facebook allow users from all over the world to remain in contact and communicate on a regular basis. Now, modern information and communication technologies have created a "global village," in which people can communicate with others across the world as if they were living next door. Because of this, the ICT is often studied in the context of how modern communication technologies affect society.

The internet is an exciting new medium that is evolving into an essential part of everyday life all over the world. It has opened a new domain in social interactivity with the promise of increasing efficiency and worldwide understanding. Though devised primarily to facilitate research, information seeking, interpersonal communication, and business transactions, for some Internet users it has become the central focus of their lives and a temptation that is hard to resist. With the increasing importance of the Internet and online usage increasing dramatically, pathological Internet use Internet addiction is becoming more common in society (Nalwa & Anand, 2003).

Internet addiction is described as an impulse control disorder, which does not involve use of an intoxicating drug and is very similar to pathological gambling. Some Internet users may develop an emotional attachment to on-line friends and activities they create on their computer screens. According to (Weinstein & Lejoyeux, 2010), internet addiction is characterized by a maladaptive pattern of Internet use leading to clinically significant impairment or distress. Besides that, Internet use is portrayed as an inclusive medium without differentiating the types of online activities and applications that might be engaged by the users (Király, Nagygyörgy, Koronczai, Griffiths, & Demetrovics, 2015). Internet addiction can be defined as a maladaptive and persistent use of the Internet that can have a detrimental influence on any or all facets of an individual's life (Chou, Condrón, & Belland, 2005;

Young, 1998).

## II. LITERATURE REVIEW

In this project, Internet addiction have problem belong to internet addiction. One of the leading causes of internet addiction is mental health. (Holden, 2001; Kuss, 2012) say that Internet addiction leads to symptoms traditionally associated with substance related addictions, namely mood modification, salience, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005). In that case, (Wu et al., 2016) say that internet addiction has emerged as a rapidly growing problem in young people and has attracted worldwide attention. When compared to adults, adolescence is a critical period for addiction vulnerability (Pallanti, Bernardi, & Quercioli, 2006). Adolescents have a natural tendency towards the Internet and are more likely to adopt patterns of internet addiction (Tsitsika et al., 2009). In terms of specific applications, gaming has been extensively researched as an online application with a high addictive potential (Huang, 2006; Kuss & Griffiths, 2012; Leung, 2004). Moreover, the use of social applications, namely online chatting (Huang, 2006; Leung, 2004), social networking sites (SNSs) (Kuss & Griffiths, 2011; Leung & Lee, 2012), such as Facebook (Kittinger, Correia, & Irons, 2012), and online instant messengers (Leung, 2004; Yuen & Lavin, 2004) have been found to be associated with Internet addiction. Besides that, frustration and other difficulties encountered in real life may contribute to internet addiction because the Internet provides an escape from negative affect (Tang et al., 2014). Problems in adolescent relationships at school may be important risk factors. The relationship between adolescents and their classmates or

teachers could greatly influence their psychological condition, and thus possibly influence internet use. The internet not only affects mental but also affects academic problems.

Fifty-eight percent of students reported a decline in study habits, a significant drop in grades, missed classes, or being placed on probation due to excessive internet use (Young, 1999). The purposes of the study were to document the prevalence of internet addiction among adolescent, to collect descriptive information about the ways that adolescents use the Internet, and to identify risk factors including personal factors like gender and age, family (parenting way, the relationship between parents), and social factors such as peer relationship, academic performance for internet addiction among adolescents (Xin, 2018). This results may help educational agencies and mental health organizations design suitable internet addiction prevention programs geared toward among adolescent (Lin, Wu, You, Hu, & Yen, 2018). Hence, the influence of the facilities available on the Internet is one it is a big problem to identify whether university students become addict to the Internet or not.

### III. RESEARCH METHODOLOGY

In this chapter, we will discuss the research methodology that is involved in this research study. This includes the research design, the area of study, population, sampling technique, sample of the population, data collection instrument, questionnaire validation, administration of the instrument and data analysis method.

#### A. Research Design

After discussing with our group members, we decided to choose a survey research design because it is best served to answer all the questions and the study purposes. Survey research is a specific type of field study that involves the collection of data from a sample of elements (e.g., adult women) drawn from a well-defined population (e.g., all adult women living in the United States) through the use of a questionnaire (Reis & Judd, 2014). According to Check & Schutt, survey research is defined as "the collection of information from a sample of individuals through their responses to questions". This type of research allows for a variety of methods to recruit participants, collect data, and utilize various methods of instrumentation (Ponto, 2015). Survey research can use quantitative research strategies such as using questionnaires with numerically rated items, qualitative research strategies such as using open-ended questions, or both strategies such as mixed methods, in which we decided to use for our research study. As mentioned by Singleton & Straits, surveys are frequently used in social and psychological research as it is often used to describe and explore human behaviour (Ponto, 2015).

#### B. Population Of The Study

The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

#### C. Sampling Techniques

For the sampling technique, we have decided to choose the selective sampling. This type of sampling occurs where the researcher decides to sample in a particular locale or seek particular types of people. In this case, we decide to sample from university students. Again, this is driven by rational thought rather than convenience or bias. For this research, we decided to take samples from 340 students. We assume that the number of students here in Malaysia is around 1.27 million people. With the confidence level of 99% and the average error margin of 7%, we calculated and the sample size we got is 340.

Sample Size Calculator

How many people do you need to take your survey? Even if you're a statistician, determining survey sample size can be tough.

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Calculate Your Sample Size:

Population Size: 127000

Confidence Level (%): 99

Margin of Error (%): 7

CALCULATE

Sample Size: 340

### IV. PREPARE YOUR PAPER BEFORE STYLING

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Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

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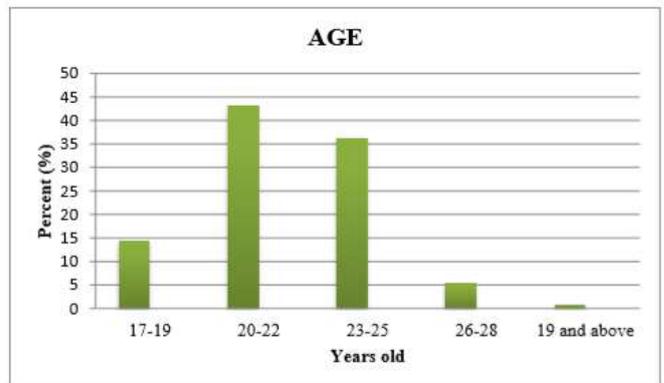
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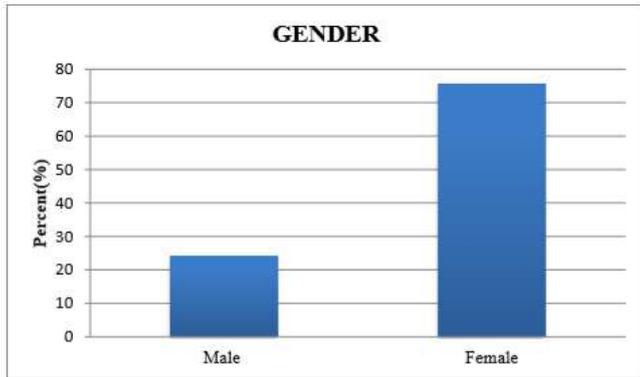


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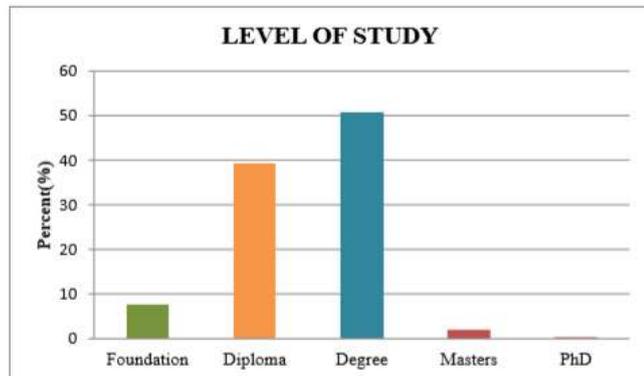
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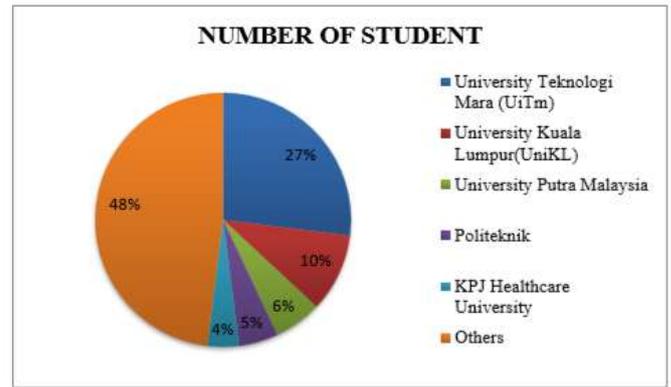
Graph 2: Gender of Respondent

The graph shows the gender of respondent in university. It shows that the number of female who answered the questionnaire are way higher compared to those who are male that is 75.9 percent which is 267 are female while the other 24.1 percent which is 85 people are male. However, one person did not mention his/her gender.



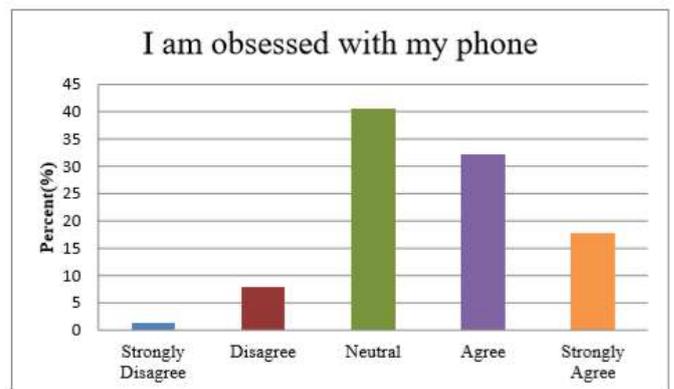
Graph 3: Level of Study

The graph shows that the level of study. Its shows that half of the respondent or 178 people (50.6 percent) to be exact who had answered the questionnaire are those who have or currently taking a degree. 139 people (39.5 percent) have the level of study of diploma. 7.7 percent which is 27 people are from foundation, 2 percent or 7 people have the level of study of masters and 0.2 percent which is one person are from PhD.



Graph 4: Number of Student

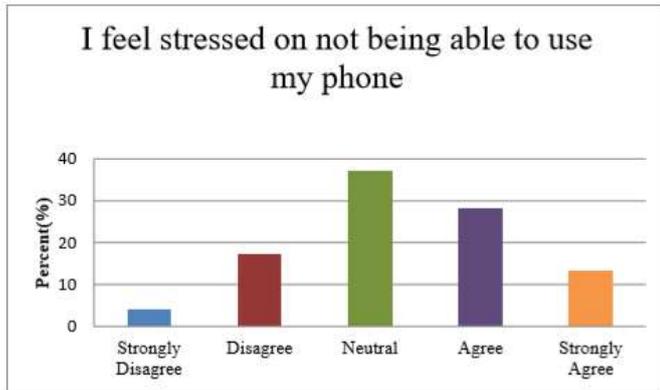
The graph shows the number of students in some university answered my questionnaire. The data show that 352 respondents who take part in this questionnaire. From that number of student, it also show that are approximately 70 institutions involved or attended by them. The highest number of students are those who are from Universiti Teknologi Mara (UiTM) with 93 respondents (27 percent). The second highest are students who are from University Kuala Lumpur (UniKL) which is 36 people (10 percent). Next are those who are from Universiti Putra Malaysia with 21 people (6 percent). 19 respondents (5 percent) are from Politeknik and 15 respondents (4 percent) are from KPJ Healthcare University. The other 168 respondents (48 percent) are from other institution including two schools for Form 6 students.



Graph 5: I am obsessed with my phone

For the general knowledge of internet addiction, the graph shows the answer given by the respondent based on the questionnaire I have provided. Based on the question "I am obsessed with my phone" the results shown in the above it indicates that most of the respondents gave neutral responses that is 40.51 percent along with 143 respondents in this question. While, 40.51% along with 114 of respondents agree with the question and it is the second higher for this question. Then, 17.85% are strongly agree that is 63 of respondents followed by 7.92% along with 28 of respondent disagree with

this question. However, just 5 of respondent that is 1.42% choose strongly disagree with this question.



Graph 6: I feel stressed on not being able to use my phone

The graph shows the answer given by the respondent based on the second question "I feel stressed on not being able to use my phone". The results shown that most respondents' neutral response to the statements in this section that is 37.11 percent along with 131 respondents in this question. While, 28.33 percent along with 100 of respondents agree with the question and it is the second higher for this question. Then, 17.82 percent are disagreed that is 61 of respondents followed by 13.31% along with 47 of respondent strongly agree with this question. However, just 14 of respondent that is 3.97 percent choose strongly disagree with this question.

## VI. CONCLUSION

This study has collected data to meet the objective of the study. This study was conducted using google form to make it easier for me to gather information about internet addiction problem among adolescents in some universities. Of the research that has been done many things related to the study can be concluded for identifying any internet addiction problems that occur in adolescents. The results obtained from the respondents include information such as age, gender and status of study. In addition, it also includes some questions to respond to respondents like I am obsessed with my phone, I feel stressed on not being able to use my phone, I tried hard and failed to control my addiction on my phone, I used my phone longer than I intended and I feel comfortable in the virtual world than the real world. For the general knowledge of internet addiction section, based on the 5 questions that have been prepared to answer by the respondent. The results obtained were that the respondent gave a neutral answer which was the highest for the five questions. Based on the 5 questions that have been prepared to answered by the respondent. The results obtained were that respondents gave a neutral answer which was the highest for the five questions with 40.51 percent each for the "I am obsessed with my phone" question, 37.11 percent "I feel stressed on not

being able to use my phone", 39.66 percent "I tried hard and failed to control my addiction on my phone", 31.44 percent "I used my phone longer than I intended" and 35.13 percent "I feel comfortable in the virtual world than the real world". Therefore, this is proven that most of the people generally has good knowledge and exposure about internet addiction and it is clearly shown that most people nowadays are quite addicted to the internet. The students are well aware of this problem but they might not realize and admit it. For the effects of internet addiction section, it is about the overall part regarding our study of internet addiction among university students. Based on the results from the diagram above, most of the respondents choose the neutral and agree answers. For instance, in the question Stated that "i believe that internet addiction is related to mental health issues such as Depression and anxiety" most of the respondents choose the agree answer. Therefore, we can conclude that students actually know the close relationship between mental health and Internet addiction. For the solution to the internet addiction section, we have provided three Suggestions of solving the problem in the questionnaire. The suggestions are, do more Outdoor activities, internet rehab treatment and counselling. Based on the results, majority of the responses chooses the "do more outdoor activities" as Their best solution in order to cure them of internet addiction. However, we also provided open Ended question if there are any other suggestions from the respondents that are relevant in Solving the internet addiction. Fortunately, we obtained few interesting answers from the Respondents that suggests the way to solve internet addiction. These suggestions made by the Respondents are acceptable and logical. The answers include:

1. Create a better world that we people will think that no internet will be needed anymore
2. Restrict the usage of internet to a certain limit. Don't allow any usage of gadgets in the Classroom unless it is necessary.
3. Restrict the internet quota to a certain limit. Try to be more discipline to use the internet Wisely.
4. Reading books
5. Money is the cure to involve with more outdoor activities
6. Spend more time with family.
7. Socializing with good people in a good environment.
8. Better companions and better life
9. Play more games
10. Have a boyfriend/girlfriend

For the sampling technique, we have decided to choose the selective sampling. This type of sampling occurs where the researcher decides to sample in a particular locale or seek particular types of people. In this case, we decide to sample from university students. Again, this is driven by rational thought rather than convenience or bias.

Based on the analysis of all the collected data, I can conclude that university students in Malaysia are addicted to the internet. The problem statement is in line with the analysis that I have. With the analysis, I also managed to find out that university students are actually well aware of the presence of internet addiction and its severity.

#### ACKNOWLEDGMENT

A special thanks to my helpful supervisor for supervision and support from beginning until the end. Thank you to Univerisiti Kuala Lumpur for giving opportunity and providing the feasibility to finish this paper.

#### REFERENCES

- [1] (n.d.). Retrieved April 24, 2018, from [https://www.google.com/search?ei=2MbkWvuIIsnSvASw6aWQDw&q=data analysis definition&oq=data analysis &gs\\_l=psy-](https://www.google.com/search?ei=2MbkWvuIIsnSvASw6aWQDw&q=data+analysis+definition&oq=data+analysis+&gs_l=psy-)
- [2] Clause, C. (n.d.). Content Validity: Definition, Index & Examples. Retrieved April 10, 2018, from <https://study.com/academy/lesson/content-validity-definition-indexexamples.html>
- [3] Flora, K. (n.d.). Internet addiction disorder among adolescents and young adults: The picture in Europe and prevention strategies. *Perspectives on Youth*, 119-132. Retrieved March 25, 2018, from [http://pjpeu.coe.int/documents/1017981/8422373/120\\_chapter\\_10.pdf/2707f2a7-32cc-43cebb15-3a92b7b42f43](http://pjpeu.coe.int/documents/1017981/8422373/120_chapter_10.pdf/2707f2a7-32cc-43cebb15-3a92b7b42f43)
- [4] Gezgin, D., Cakir, O., & Yildirim, S. (2018). The Relationship between Levels of Nomophobia Prevalence and Internet Addiction among High School Students: The factors influencing Nomophobia. *International Journal of Research in Education and Science*, 215-225. doi:10.21890/ijres.383153
- [5] ICT. (n.d.). Retrieved April 25, 2018, from <https://techterms.com/definition/ict>
- [6] Kuss, D., Griffiths, M., & Binder, J. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behavior*, 29(3), 959-966. doi:10.1016/j.chb.2012.12.024
- [7] Lin, M., Wu, J., You, J., Hu, W., & Yen, C. (2018). Prevalence of internet addiction and its risk and protective factors in a representative sample of senior high school students in Taiwan. *Journal of Adolescence*, 62, 38-46. doi:10.1016/j.adolescence.2017.11.004
- [8] Nalwa, K., & Anand, A. (2003). Internet Addiction in Students: A Cause of Concern. *CyberPsychology & Behavior*, 6(6), 653-656. doi:10.1089/109493103322725441
- [9] Ponto, J. (2015). Retrieved April 11, 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4601897/>
- [10] Reis, H. T., & Judd, C. M. (2014). *Handbook of research methods in social and personality psychology*. New York, NY: Cambridge University Press.
- [11] Robertson, T., Yan, Z., & Rapoza, K. (2018). Is resilience a protective factor of internet addiction? *Computers in Human Behavior*, 78, 255-260. doi:10.1016/j.chb.2017.09.027
- [12] Sireci, S. G. (1998). The Construct of Content Validity. *Social Indicators Research*, 45(1-3). doi:10.1023/A:1006985528729
- [13] Thomas, S. D., Hathaway, D. K., & Arheart, K. L. (1992). Face Validity. *Western Journal of Nursing Research*, 14(1). doi:10.1177/019394599201400111
- [14] Xin, M., Xing, J., Pengfei, W., Houru, L., Mengcheng, W., & Hong, Z. (2018). Online activities, prevalence of Internet addiction and risk factors related to family and school among adolescents in China. *Addictive Behaviors Reports*, 7, 14-18. doi:10.1016/j.abrep.2017.10.003
- [15] Xiuqin, H., Huimin, Z., Mengchen, L., Jinan, W., Ying, Z., & Ran, T. (2010). Mental health, personality, and parental rearing styles. *Addiction*, 13(4), 401-406. Retrieved March 28, 2018
- [16] Young, K. (1999). Internet addiction: Symptoms, evaluation, and treatment. *Innovations in Clinical Practice*, 17(17), 19-31. doi:10.1007/s10879-009-9120-x

# Factors Affecting Students Performance – Time Management

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**Abstract**—A study was carried out to examine the perceptions and preferences of students on how they manage their time while on study. This study focused on finding factors influencing student's preferences. Overall a set of 16 questionnaires were distributed to 100 students for conducted a research to investigate the factor that effect on how the student manage their time. Consequently, UNIKL MIIT and UKM students as respondents been used to identify the factors that affect their time. This study revealed positive aspects is needed for students to be able choose the best way to manage their time to study.

**Keywords**— *time management, student performance*

## I. INTRODUCTION

This introduction will describe about the background information of this study that is to know how students manage their time while on study among Universiti Kuala Lumpur Malaysian Institute of Information Technology (UNIKL MIIT) and Universiti Kebangsaan Malaysia (UKM) students. Besides that, we also discuss about the objective of our study and the questions that we researched about. These all are commonly surveyed about the topics like the factors, solutions and effects of the time management.

UNIKL MIIT and UKM were choose in this study is because other researchers shown high percentages on students that don't know on how to manage time properly. The purpose of the study described in this research report was to know what are the factors that causes MIIT students to manage time and to investigate if students have tried any tactics to overcome their lacks of time in study. If the student manage their time properly can it effect their grade on academic or else.

UNIKL MIIT and UKM focusing on the areas of Information Technology, Multimedia and Animation, offers an easy-going, urban campus lifestyle to a total of 3,000 students. Located in the center of the metropolis, the residence complexes are situated far from the academic buildings and other facilities around the campus. The issue will lead to on how student manage their time to get good grade in each semester. Beside the location of the campus itself, will the student find difficulties to manage their time and ignore the distraction from others.

Until now, there is many report that there are problems regarding the time management in student studies So, this study might be important to help finding others factors influencing student's preferences. If this problem persists, UNIKL MIIT and

UKM students will be able choose the best way possible to manage their time and get good grade on study.

## II. LITERATURE REVIEW

The aim of this study is to determine the significance levels on time management skills for student according to gender and course. Using the purposive sampling method, respondents were selected from University Kuala Lumpur MIIT students from different course and semester. Time is the indefinite continued progress of existence and events in the past, present and future regarded as a whole (Oxford Dictionary, VOL 5). The term "Time" means a nonstop process (Smith, 1998). The increase in time pressure on people raises the significance of time management (Erden Kocabas, 2003). Proper time management is key to success in college. As one of the most frequent complaints made by students about their lecture is that they dont have enough time to carry out all the task assigned to them.

First, is to understand and practice the attitude and abilities of time management doesn't solve the person's problems but it helps them to achieve effective solutions and results (Alay and Koçak, 2003). Timpe (1987) suggests that, the effective use of time affects person's productivity and performance (Yilmaz et al, 2010). The effective and productive use of time is important. Although this attitude can vary according to the job each person does, nowadays the increase in the professional and educational knowledge and ability that are expected from people reveal the importance of attitude and ability in time management and the need for the effective use of time to be successful.

Second, to assess the effectiveness of time management training on academic time management of students. The students usually point out that there are many classes, projects, reading assignments, exam preparations and etc. that require constant dedication over a long period of time (Rafael Garcia & et al, 2004). In trying to read all the books and chapter assigned, meet paper deadlines and participate in extracurricular activities college students may become overwhelmed with feelings that there is not enough time to complete all their work adequately. This seems particularly true of students who hold part-time jobs as well as attend school (Gall 1988; Longman & Atkinson, 1988; Walter & Siebert, 1981).

Third, the researcher want to find out how much time do the students really invest in their studies, what changes occur in

time investment over a full academic term, and finally, how is study time related with students' daily study satisfaction? Many students claim that they have too much to do and too little time in which to get everything done, leading them to become discouraged (Schulmeister & Metzger, 2011). In the workplace, individuals are typically required to invest a specific, pre-defined amount of time for which they are paid (e.g., 40 hours a week). Similarly, in the European Union, the Bologna Process (European Union, 2015) provides a framework for university students' expected time investment.

Next, to compress instruction time into fewer school years without lowering education levels. German students were typically aged 19 or 20 and among the oldest students across all OECD countries to acquire the qualifications needed to study at university. Peers in the UK, the US and Japan typically earn the equivalent qualifications at age 17 or 18 (OECD, 2008, p. 498).

Furthermore, describe university employed assessors' perceptions of the human influences that impact their experiences of grading students' performances in clinical practice and other assessments within clinical courses when that performance is marginal; not a clear pass or fail. Nursing programmes are designed to prepare nurses capable of providing safe and proficient patient care. However, there is ampacity of information on assessment of nursing student clinical performances which are of marginal quality.

Moreover, The relationship between educational attainment and health is well established; newer evidence suggests that the quality of the educational experience may also be associated with health (Cohen & Syme, 2013). So far, two experimental analyses in a single study population from the 1980s have estimated the association between class size and health outcomes, with mixed results (Muennig et al., 2011 Wilde et al., 2011).

Next, To describe the design of an integrated pharmaceuticals course sequence and to assess the sequence by evaluating both student performance and perceptions. Educational activity and setting. The importance of pharmaceuticals-related concepts to the practice of pharmacy has been well documented, particularly with regard to pharmaceutical calculations and pharmacy compounding (Shrewsbury, Augustine, Birnie, 2012).

Lastly, using data mining methods to study the performance of undergraduate students. Two aspects of students' performance have been focused upon. First, predicting students' academic achievement at the end of a four year study programmed. Second, studying typical progressions and combining them with prediction results. Two important groups of students have been identified: the low and high achieving students.

### III. RESEARCH METHODOLOGY

This chapter discusses the methodology of this research. The main purpose of this research is to identify UniKL MIIT student factors that affecting performances such as gaming, transportation, lifestyle and finances. From this research, data collected through questionnaire.

#### A. Research instruments Used

This research utilized quantitative and qualitative research methodology as primary data. The instruments used to collect data were questionnaire using by 'Google Form'. A set of questionnaires containing 16 questions were prepared. The questionnaire used different question- types, such as category, choice, yes/no, scale and open-ended were used in the questionnaire.

#### B. Respondent of the study

The respondents of the questionnaire were all level year undergraduate students from different coursed at Universiti Kuala Lumpur and Universiti Kebangsaan Malaysia.

#### C. Research Procedure

Before the actual data were collected, a set of questionnaires were prepared by using 'Google Form' and was shared to media social among UNIKL MIIT and UKM Students. Respondents were approached with an initial question of what factor affecting their performances before the questionnaire was given to them.

## IV. RESULT

Based on Figure 1 "In average, how many hours per week do you study?" Most of the answer pick by respondent is 3-4 hours per week with 40%. Follow with 31% of 100 respondent agree that they only study 1-2 hours per week. Students everyday routine not always the same. But the result show hours per week they study. Moreover, there are 19% of 100 respondent study more than 5 hours per week and also there are 10% of the respondent never study at all.

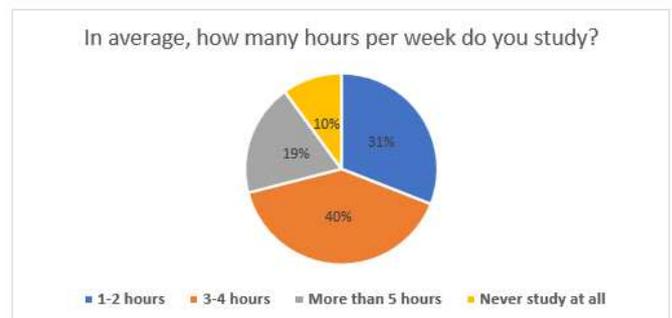


Figure 1: In average, how many hours per week do you study?

Based on question "I set a consistent study time" 40% of respondent agree that they set time consistent for study time per week" and 34% strongly agree with this statement. 16% disagree with this statement and 10% strongly disagree. This

shows that management time as student different for every respondent.

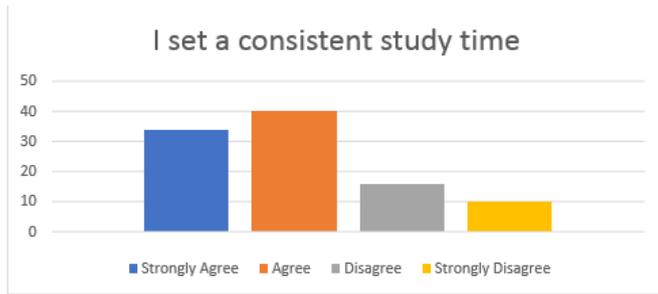


Figure 2: I set a consistent study time

For this question 33% strongly disagree and 30% disagree that they sleep before 12 a.m. This is maybe that they study during the time (late night). 17% strongly agree that they sleep before 12am. The other 20% agree.

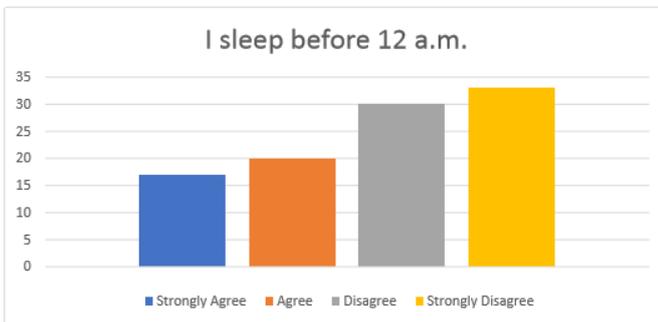


Figure 3: I sleep before 12 a.m.

This Figure about how the student set an alarm for morning wake up. Half of 100 response were agree with this statement. 19% of the response appear to disagree with this statement and follows by 10% response who strongly disagree with this statement.

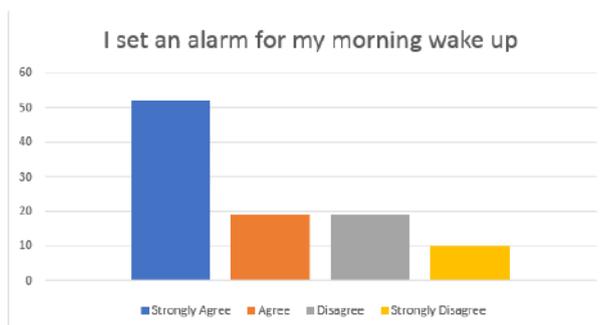


Figure 4: I set an alarm for my morning wake up

## V. REVIEW FINDING

The following conclusions can be shown based on the findings of the study:

1. All data are examined by Microsoft Excel Software
2. By using the descriptive analysis, the time management among the UNIKL MIIT and UKM students is examined.
3. The majority of the student know how to manage their time like they set consistent time to study, sleep early and set alarm for morning wake up.
4. This show that the student agree that the time management effect their study time and grade

## VI. RECOMMENDATIONS BASED ON THE FINDINGS

Based on the findings and conclusions of the study, here are several recommendations to be considered:

1. Student need to make timetable to study Student will find some classes require more time than others. Studies have shown that the recommended "prep time" for every hour spent in class is two to three hours a week. For this issues student need to make timetable to be more prepare during class time and study the chapter before class begin. For a student, managing time has its own special twists and turns that have to be negotiated. Time management helps you to meet deadlines and be responsible. It helps you fit all the different pieces of your life together and complete class assignments and projects without the added stress of an approaching deadline.
2. Schedule rewards you need to treat yourself when you do the right thing. Take a few minutes out of every hour to take a break and do something you enjoy, like go for a walk or watch some TV. The break will also allow your brain to relax and be more productive when you return. However, whatever you do, make sure you don't overindulge until you have completed your tasks.

## VII. RECOMMENDATIONS FOR FUTURE RESEARCH

Since this study had only focused on UNIKL MIIT and UKM students, it is recommended that further studies be carried out on students from other universities in the findings. Furthermore, in our discussion, we identify that there are still minor student that do not manage their time properly.

## ACKNOWLEDGMENT

This paper is based on the final year project that the authors completed in 2019. We would like to express our sincere thanks to the entire academic team of the Universiti Kuala Lumpur (UniKL) for the life-changing learning journey. To all the lecturer who we met in the workshops and online tutorials, thank you for challenging us to think deeper, broaden our horizons, and use new approaches through different perspectives.

## REFERENCES

- [1] Bowman, B., & Hillary, A. (2017). An evaluation of student performance and perceptions within an integrated pharmaceuticals course sequence. 1-13.
- [2] Cohen, A. K. (2018). An instrumental variables approach to assess the effect of class size reduction on student screen time. 63-70.
- [3] Karim, Nader, Nasser, & Hasan. (2014). The Study Efficacy of Time Management Training on Increase Academic Time Management of Students. 134-138.
- [4] Lynda, Amy, & Mitchell, M. L. (2017). Human influences impacting assessors' experiences of marginal student performances in clinical courses. 1-7.
- [5] Ozsoy, D. (2014). University students' in the examination of skills and attitudes of Time Management. 358-361.
- [6] Patrick, Henrik, & Bernhard. (2017). What makes a good study day? An intraindividual study on university student's time investment by means of time-series analyses. 1-12.
- [7] Raheela, A., Agathe, M., Syed, A. A., & Najmi, G. H. (2017). Analyzing undergraduate students' performance using educational data mining. 177-194.
- [8] Stefanie, Johanna, S. Q., & Guido, H. (2017). Does the transition into daylight saving time affect students' performance? 130-139.

# 360-degree video Virtual Reality : One Day Trip in Kuala Lumpur

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**Abstract**— Virtual reality (VR) offers powerful new ways to experience and explore stories. Bringing the experience of the environment and the ambience of the attraction spot among tourists in 360-degree video Virtual Reality (VR). Providing information about the attraction spot to the tourists via virtually interacting with the interface. In Malaysia, there is still an apparent lack of 360-degree Virtual Reality (VR) application as a medium. The application will work around using interactive Virtual Reality (VR) interface in 360-degree view. The aim is to make the tourists feel as if they are really at that place, even though they may actually be on the real life.

**Key words:** *Virtual Reality, 360-degree video, tourism, mobile application, interactive, historical, architecture*

## I. INTRODUCTION

As the years pass, technology has made such incredible progress. Advancements in technology have been made for everything which is from educational, gaming, healthcare, travel and tourism, film, TV and broadcasting. Virtual Reality (VR) [1] allows people to see the surrounding world in other dimension and to experience things that are not accessible in real life or even not yet created. At the beginning of 1990s the development in the field of Virtual Reality became much stormier and the term Virtual Reality itself became extremely popular. Most virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays [2] Virtual reality may also include auditory stimulation through speakers or headphones. Virtual reality (VR) applications create immersive, environments that are so realistic, users physically and mentally react the same way they would if the scenario was in real life. Virtual Reality (VR) is able to look around, allow the user to enter and interact with alternate realities. It seems clear that virtual reality has now reached a tipping point and is here to stay. Undoubtedly VR has attracted a lot of interest of people in last few years. Being a new paradigm of user interface, it offers great benefits in many application areas. It provides an easy, powerful, intuitive way of human-computer interaction. The

user can watch and manipulate the simulated environment in the same way we act in the real world, without any need to learn how the complicated (and often clumsy) user interface works.

360-degree video and Virtual Reality (VR) are powerful technique for giving viewers a sense of 'Being There' and are becoming increasingly popular [3] However, giving the viewer the freedom to look around also results in a reduced ability for filmmakers to direct the viewer's attention, a serious impediment to successfully telling a story within a 360° environment. VR video which is 360-degree video, represents an entirely new way to consume content. Users gain the ability to step inside the video frame and control their viewing experiences. To engage the complete human sensory perception such as sight, sound, smell and touch, 360-degree video is the key part of the experience.

### A. Virtual Reality vs Augmented Reality

Augmented reality is the integration of digital information with the user's environment in real time. Unlike virtual reality, which creates a totally artificial environment, augmented reality uses the existing environment and overlays new information on top of it. One of the first commercial applications of AR technology was the yellow "first down" line that began appearing in televised football games sometime in 1998.

In Virtual Reality, the computer uses similar sensors and math. However, rather than locating a real camera within a physical environment, the position of the user's eyes is located within the simulated environment. If the user's head turns, the graphics react. Virtual Reality (VR) completely immerses the user in an artificial environment, while Augmented Reality (AR) introduces artificial elements into the user's real environment. These distinctions make VR the clear choice for 3D games and 3D video, and AR more suited for real-world applications where a contextual overlay of information is presented in real time as the user continues to interact with the real world. Moreover, the hardware use for both of them are exactly different. Virtual Reality (VR) literally gave more impact on immersive, sense of realistic and react on (3D sound).

### B. What is 360-degree video

Earth is round in shape but unfortunately, we always see a part of it through photos or videos. 360° video is a revolutionary invention to media, because it is capable of showing you every direction of the surrounding. A single video shows you up, down, and all around you in every angle you want to see. 360° video is the only way to see the real world and the events without being in real places, in other words virtually. A 360° video is a collection of normal equirectangular videos mapped into a sphere to play. 360° video covers all the inner view of a sphere pointing from center. 360° videos are videos which have been shot with multiple cameras mounted in a particular rig to capture an entire panoramic view from a particular fixed point. 360° video covers all the footage that appears around the camera except the cameras itself. In simple words the final product of 360° video is a combination of video footages from different cameras mounted in a way to capture different views at the same time.

360-degree video and Virtual Reality (VR) are powerful technique for giving viewers a sense of 'Being There' and are becoming increasingly popular. However, giving the viewer the freedom to look around also results in a reduced ability for filmmakers to direct the viewer's attention, a serious impediment to successfully telling a story within a 360° environment. They have evaluated these techniques in a user study in which participants viewed these clips using a head-mounted display (HMD). Unconstrained by a prescribed view, the viewer experiences a video environment in a way that correlates more closely to real life. VR video which is 360-degree video, represents an entirely new way to consume content. Users gain the ability to step inside the video frame and control their viewing experiences. To engage the complete human sensory perception such as sight, sound, smell and touch, 360-degree video is the key part of the experience.

## II. RELATED WORKS

This section summarizes the literature related to this research. It starts off with the concept of Virtual Reality and 360-degree video in documentary and tourism.

### A. Virtual Reality in Tourism

The great potential that VR has in the area of tourism promotion is mostly recognized as the ability to provide sensory experiences to the customers. What destinations are trying to sell are so called 'confidence goods', essentially implying that under normal circumstances it is not possible to sample the tourist product. Tourism is a service industry where services are produced as they are consumed. A customer's decision can therefore only be based on all the descriptive texts and videos a destination traditionally provides with traditional methods. VR applications, however, enable tourism marketers to actually provide a sample of the product to potential customers, making

them more informed about the destination. If clients are better informed about a destination, their expectations tend to be more realistic, ultimately leading to more satisfying holidays [4] VR is based on numerous technologies, several concepts and different theories. Naturally, the uses of VR are equally as numerous. As it is common for new advancements in the Information & Communications Technology (ICT) sector, the technology is originally built for a very specific industry and then later adapted to other specific industries in more general applications.

### B. 360-degree Video in Virtual Reality

Virtual reality, strictly defined, requires the generation of a fully digital environment, generally has greater opportunities for interactivity in the experience, and cedes control over the story experience to the viewer. 360° video, however, is a live action capture of a real-world event or setting, without the need for a pre-rendered digital environment with headsets is a fully immersive experience which allows a user to take part in the action and control it. 360 videos are an immersive experience as well, but it can be viewed without a headset. 360-degree video and Virtual Reality (VR) are powerful technique for giving viewers a sense of 'Being There' and are becoming increasingly popular. The aim is to make the tourists feel as if they are really at that place, even though they may actually be on the real life. The 360-degree view will also provide (3D audio) of the environment selected enhancing the immersion by using VR box as a medium. Virtual Reality Headsets still a nascent technology, headset usage is becoming more popular. These range from budget technologies like Google Cardboard and the Google Daydream (which piggyback off playback on a mobile device) to premium dedicated headsets like the Oculus Rift and HTC Vive, which are dedicated hardware specifically for VR experiences.

## III. METHODOLOGY

This research went through the full cycle of Virtual Reality and 360-degree video development, which goes a long way. Therefore, it needs a proper way of identifying whether all the research and development that has been done throughout this project actually reached its initial research objective and also problem statement. Furthermore, the research method in getting the data is verified and certified via a proper channel with proper presentation and calculation in the management of data input through the feedback that's given in succession of this research paper and project as a whole respectively.

### A. Quantitative Research Approach

The aim of this project is to encourage the development of 360-degree Virtual Reality (VR) application in local scene and to provide immersion to the tourist spot via Virtual Reality (VR)

application. Quantitative research methods are research methods dealing with numbers and anything that is measurable in a systematic way of investigation of phenomena and their relationships [5] Thus, quantitative research methods are ideal for this project to determine the awareness of Virtual Reality(VR) in tourism sector or daily usage. The researcher will issue a questionnaire to the public of Malaysia of age range 18-27-year-old in order to receive information and data on two major subject matters; Knowledge and usage of Virtual Reality, and knowledge of immersion in 360-degree video Virtual Reality(VR).

**B. Questionnaire**

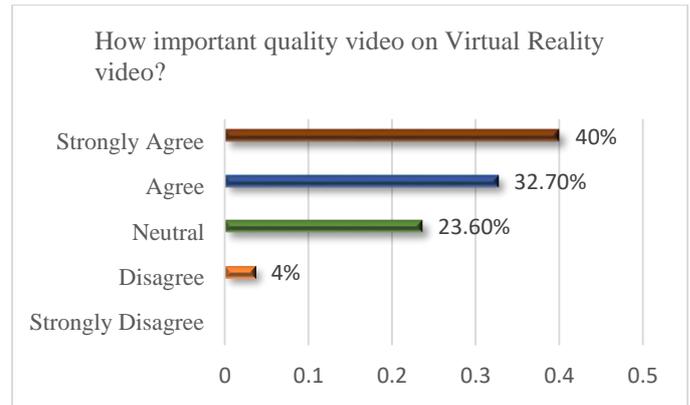
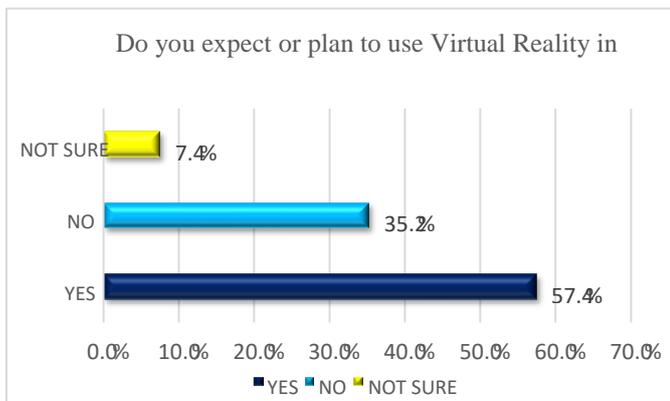
Questionnaires are categorized into five types: internet-mediated questionnaire, postal questionnaire, delivery and collection questionnaire, telephone questionnaire, and structured interview [6] The question in questionnaires, are divided into two parts: background questions and questions about Virtual Reality and device use regularly/ common. Six background questions involving gender, age, occupation, duration and frequency of using smartphone per daily were included. Since the aim of the study to create immersion of Virtual Reality.

**IV.RESULTS AND FINDINGS**

This section covers the results from the questionnaire done during and right after of final prototype session was taken place.

Final prototype is done by setting up the respondents to view the 360-degree video with VR headset, and questions were asked during and right after the sessions for feedback. The respondents for the testing may include all or one of the criteria as stated below:

- Malaysians of age range 18 – 28 years old
- UNIKL MIIT students



Also, apart from this simple questionnaire, we had an informal interview with the respondents regarding my suggestions to add to the final prototype based on their experiences. The results are as follows.

TABLE I. List of suggestions

SUGGESTIONS
3 out of 10 respondents suggests addition of start/end destination of places
All of the respondents suggest addition of narration
2 out of 10 respondents suggest addition of instructions how to use the VR headset

From these suggestions has been added to the applications answering the feedback from the user.

**V. CONCLUSION**

360-degree video is an engaging and immersive type of video content which has gained popularity in recent months with the likes of Facebook and YouTube. It allows the viewer to move around the camera without limits, giving them control of what they see. In conclusion, by developing Virtual Reality and 360-degree video application for tourism and documentary, it is a good approach to give a new experience to try out the new dimension of technology to the users. This technology offers an opportunity to walk around any destination and soak up the sights and sounds of the surrounding area, making it much easier to decide where viewers would like to visit, how the places look alike and feels the moment while taking a journey from one places to another places.

Virtual reality allows the user to feel present in the scene. This project explored VR documentary in depth. However, just as long-form documentary is not the only worthwhile form inside that medium, the journalism industry may find value in

fast-turnaround Virtual Reality, live Virtual Reality, Virtual Reality data visualization, game-like Virtual Reality, and many other forms. In future, the developer would use the high end 360-degree camera to give a more powerful and high definition quality of videos and images to give more immersive experience for the users.

#### REFERENCES

[1] Alia Sheikh, A. B. (2016). *DIRECTING ATTENTION IN 360-DEGREE VIDEO*. UK : BBC Research and Development.  
[2] Watson, Z. (2017). *VR FOR NEWS: THE NEW REALITY*. Oxford.

[3] *Virtual and Augmented Reality*. (2017, October 12). Retrieved from nextgen interaction:  
<http://www.nextgeninteractions.com/virtual-and-augmented-reality/>

[4] Stuart, H. (2017). *Visualise*. Retrieved from Visualise - VR and 360 Production Studio:  
<http://visualise.com>

[5] Mandal, S. (April 2013). Brief Introduction of Virtual Reality & its. *International Journal of Scientific & Engineering Research*, Volume 4, Issue 4.

[6] McGriff, S. J. (2000). Instructional System Design (ISD): Using the ADDIE Model. *Instructional System Design (ISD): Using the ADDIE Model*, 2.

# Early Warning System For A Strawberry Farm Using Soil Moisture, Temperature, Humidity and Light Intensity Sensors

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*Abstract— Early Warning System is a system made with Arduino Uno R3 that is focusing on a strawberry farm to alert the farmers by monitoring the idle soil moisture, temperature, humidity and light intensity of the strawberry plant. The system detects the sensors of the surrounding environment and stores the data collected into Ubidots Cloud. Meanwhile, if the values of soil moisture, temperature, humidity and light intensity of strawberry plant is abnormal, the farmers will take action if the parameters values are not suitable for the plant's condition. The tests were conducted in three different places, in Level 6 UniKL City Campus, outside housing area and inside housing area. Outside and inside area were conducted in three different times which is on the morning, noon and evening. Ethernet shield is used in this system for sending the sensors values to the cloud. Ubidots cloud showed the data collected and graphs of three sensors used with four variables which are Soil Moisture, Temperature, Humidity and Light Intensity. For this system, the time taken to read every single sensor is 60 seconds and to send the values to the cloud is two seconds. The main reason for the early warning system is to monitor the plant health status to make sure it grows healthy and produce fruits in good condition.*

**Keywords—** Temperature Sensor, Humidity Sensor, Soil Moisture Sensor, Light Intensity Sensor, Early Warning System, Ubidots Cloud, Arduino Uno R3.

## I. INTRODUCTION

Early Warning System is a system to determine the idle soil moisture, temperature, humidity and light intensity of strawberry plant. This study was tested on Albion Strawberry. Most places in Malaysia have different types of soil for plants. All farmers want their work to be more accessible. They need to know the type of land in

Malaysia and its uses. As we know, plant fertility also depends on the type of soil used. Some new farmers do not take into account the temperature, humidity, light intensity and soil moisture required for tree fertility as well as crops to be produced as food and for export purposes. Perhaps, they only know the type of soil, but they do not know the soil moisture to make the plants grow healthier. This system consists of several prototypes which are Arduino, Ethernet shield, Temperature Humidity Sensor, Soil Moisture Sensor and Light Intensity Sensor. The parameters values is stored to the cloud which is using Ubidots Cloud Platform. The cloud interfaces showed the values and graph of the data sensors.

## II. SYSTEM DESIGN

### A. Hardware System Design

#### 1) Arduino Uno R3

The Arduino Uno, as illustrated in Fig. 1, is a microcontroller board based on the ATmega328. It has digital input or output pins, 6 analogue inputs, 16 MHz ceramic resonators, a USB connection, a power jack, an ICSP header, and a reset button.

### III. RELATED WORK

Research Title	Description	Features	Advantages
"Arduino-based System for Soil Moisture Measurement" research by <a href="#">Yuk Radman</a> and <a href="#">Muhidin Radonić</a> (2017) [8]	This paper is creating an alert system for soil moisture by using <a href="#">Arduino Uno</a> and they are using <a href="#">Rosetta</a> software to measure and monitoring soil moisture. This research is focused on two types of soil, which is clay, and sprinkled soil.	<ul style="list-style-type: none"> <li>• <a href="#">Arduino Uno</a></li> <li>• Watermark 200SS</li> <li>• Mobile communication module, GSM/GPRS SIMCOM 900</li> <li>• <a href="#">Rosetta</a> software</li> </ul>	The system provides SMS notification that alert the user and monitor the data collected on <a href="#">Rosetta</a> software.
"Measurement and Monitoring of Soil Moisture using Cloud IoT and Android System" research by <a href="#">P. Divya Vani</a> and <a href="#">K. Raghavendra Rao</a> (2016) [7]	This paper is to create a system for measuring and monitoring soil moisture. They using <a href="#">SimpleLink</a> Wi-Fi module as a sensing unit that connected to the Wi-Fi router. <a href="#">Blynk</a> application is used on mobile phone to display the sensor data.	<ul style="list-style-type: none"> <li>• CC3200</li> <li>• <a href="#">LaunchPad</a></li> <li>• FC-28 Soil Moisture Sensor</li> <li>• AT&amp;T's M2X Cloud Computing</li> <li>• <a href="#">SimpleLink</a> Wi-Fi module</li> <li>• <a href="#">Blynk</a> Application</li> </ul>	The system use <a href="#">SimpleLink</a> Wi-Fi module to sensing unit that connected to the Wi-Fi router. They are using <a href="#">Blynk</a> as a mobile application for Android or IOS mobile devices that use to control hardware and displays the sensor data.
"Wireless Monitoring of Soil Moisture, Temperature & Humidity Using Zigbee in Agriculture" research by <a href="#">Prof C. H. Chavan</a> and <a href="#">Mr. P. V. Karande</a> (2014) [9]	This research is about creating a smart wireless sensor network (WSN) for an agricultural environment. They are using temperature, humidity, soil moisture and pH sensor to get the information about the soil and analyze the acid level of the soil. This paper investigates a remote monitoring system using <a href="#">Zigbee</a> . These nodes send data wirelessly to a central server and sent to the client mobile.	<ul style="list-style-type: none"> <li>• 8-bit AVR</li> <li>• Bluetooth module</li> <li>• LM35 temperature sensor</li> <li>• Humidity</li> <li>• Soil moisture sensor</li> <li>• LCD</li> <li>• pH sensor</li> <li>• <a href="#">Zigbee</a> Protocol</li> </ul>	This system provides a wireless monitoring of temperature, humidity, soil moisture and pH level in agriculture. It will send data wirelessly to a central server, which collects the data, stores and analyzed it then displayed as needed and can also be sent to the client mobile.

Sets of digital and analogue input/output (I/O) pins are equipped on the board to be interfaced to various expansion boards (shields) and other circuits such as Arduino Wi-Fi Shield.



Fig. 1. Arduino Uno R3

#### 1) Arduino Ethernet Shield W5100

The Arduino Ethernet Shield allows an Arduino or Arduino compatible board to be connected to the internet. It is based on the [Wiznet W5100](#) ethernet chip. The [Wiznet W5100](#) provides a network (IP) stack capable of both TCP and UDP. It supports up to four simultaneous socket connections. Use the [Ethernet](#) library to write sketches which connect to the internet via a standard RJ45 Ethernet jack using the shield. [Arduino Ethernet shield W5100](#) is shown in [Fig. 2](#).



Fig. 2. Arduino Ethernet Shield W5100

#### 2) Temperature and Humidity Sensor DHT11

A [DHT11](#) temperature and humidity sensor is a composite sensor contain a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and NTC temperature measurement devices and connected with a high-performance 8-bit microcontroller. [Fig. 3](#). shows the temperature and humidity sensor [DHT11](#).



Fig. 3. Temperature and Humidity Sensor DHT11

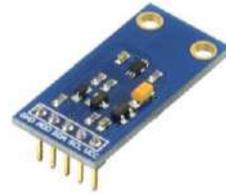


Fig. 5. Light Intensity Sensor

### 3) Soil Moisture Sensor YL-69

The soil moisture sensor uses capacitance to measure the water content of soil by measuring the dielectric permittivity of the soil, which is a function of the water content. The sensor is made up of two electrodes. This soil moisture sensor reads the moisture content around it. A current is passed across the electrodes through the soil, and the resistance to the current in the soil determines the soil moisture. Soil moisture sensor YL-69 is shown in Fig. 4.

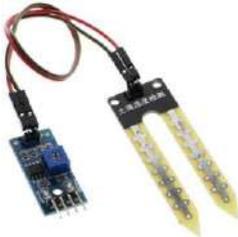


Fig. 4. Soil Moisture Sensor YL-69

### 4) Light Intensity Sensor

Light intensity sensor module with built-in a 16-bit AD converter generating a digital signal. The data from this module is light intensity in lx (lux meter). It communicates with microcontroller board through the I2C bus. In this project, this sensor is used for measure the receiving of a light source such as from sunlight. Example of a light intensity sensor is shown below in Fig. 5.

## B. Software System Design

### 1) Arduino Software (IDE)

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control the physical world. For programming, the microcontrollers, the Arduino platform provides an integrated development environment (IDE) based on the Processing project, which includes support for C, C++ and Java programming languages. The open-source Arduino Software (IDE) makes it easy to write the code and upload it to the board. This software runs on Windows, Mac OS X, and Linux.

### 2) Ubidots IoT Cloud

Ubidots is a codeless IoT Platform designed to empower the prototype and scale of IoT projects to production while improving and economising the world with sensor data. It provides users with real-time data and visualisation of sensor inputs using a secure cloud. The platform supports most hardware options, connectivity protocols, and a time-series backend to generate a full IoT Platform ranging from prototypes IoT Imagineering to entire sensor ecosystems. It also allows System Integrators to customise their own IoT application, manage customers and users, and even code their HTML/JS visualisations on top of it.

## IV. METHODOLOGY

To achieve the objectives, There are several tasks to be conducted. It is divided into three stages which are prototype development, data collection and data analysis.

### A. Prototype Development

In this stage, the prototype is developed by using the software and hardware that is in the

system design requirement. The Arduino is connected to the sensors and Ethernet shield, according to the topology in Fig. 6 below. Temperature humidity sensor, a soil moisture sensor, and a light intensity sensor are connected to the Arduino. Besides, the soil moisture sensor is be inserted into the soil. Ethernet shield will send the values of temperature, humidity, soil moisture and light intensity to be uploaded to the cloud and it can be seen on Ubidots IoT cloud platform.



Fig. 6. A topology of Early Warning System for Strawberry Farm

### B. Data Collection

Data collection for the project is done in three different places. The first place is in Level 6 UniKL City Campus. Next, the testing is done in an outside area of the terrace house. Thirdly, the testing is done in an inside housing area.

Both outside and inside housing area were tested with three different times; morning, noon and evening. All sensor's value was uploaded and recorded.

### C. Data Analysis

The collected data in the data collection stage were analysed in this stage. All the data collected is stored and shows in the Ubidots cloud for user references.

## V. RESULT AND DISCUSSION

The purpose of this project is to set up a warning system and analyse the values of the sensors detected. After that, an analysis should be made based on all the data collected to produce results.

### A. Prototype Testing Result

The Arduino is turned on and configured with complete program code in Arduino IDE software. Then, the command compiles and upload to Arduino to run the prototype.

Next, all the sensors will detect the value of the strawberry plant, and it is sent to the cloud every 60 seconds. Soil moisture sensor will detect the moisture of strawberry soil used, and the value must exceed 50% to get the ideal and proper growth of a plant. The temperature and humidity sensor is to detect the current value on the surrounding environment such as the inside area of a building or outside the area. Light intensity sensor will sense the value of light received on the strawberry plant and mostly the value of light received of full sunlight is 400lx.

Ubidots cloud platform shows the values and graphs of each sensor connected to Arduino. The values can be stored in the cloud for up to six months. For this testing, it is tested on the Albion Strawberry which is a lowland type of strawberry. The ideal temperature for Albion Strawberry is 4 to 32 degree Celsius while the light received must more than 400lx for six hours of full sunlight or 16 hours of light if they are planted in an inside area.

### B. Sensors Result

#### 1) Testing Result in Level 6 UniKL City Campus

The test is performed in the evening in the same area by using the wired internet connection in Level 6 UniKL City Campus. Based on Table 1, the Date column is the date and time where the sensors detect all the parameters of the strawberry plant which is temperature, humidity, soil moisture and light intensity. During this test, the value of light intensity shows the detected light in the building which depends just on the present light. Strawberry plant should get the full sunlight during the day to make it grow healthy. Based on the result, the temperature during the test has not changed, and it is because of the constant temperature of the air conditioner at Level 6 UniKL City Campus. The light intensity received for the strawberry plant is between 335 lx to 348 lx. It is low than ideal light received because it just depends on the present light in the building. The difference values between the soil moisture results

are 1.76%. For soil moisture result in this testing is ideal because it is more than 50% for standard moisture of plant soil. The graph in Fig. 7. shows the results data within 24 hours, and Ubidots cloud can store all the data for up to six months.



Fig. 7. Graph of detected sensors on the strawberry plant (Level 6 UniKL City Campus)

Table 1: Strawberry Plant Testing Result (Level 6 UniKL City Campus)

Date	Light-intensity (lx)	Soil-moisture (%)	Humidity (%)	Temperature (°C)
2018-10-16 18:07:38-08:00	338.87	67.84	63	16
2018-10-16 18:08:41-08:00	338.87	67.94	63	16
2018-10-16 18:09:44-08:00	335.94	67.94	63	16
2018-10-16 18:10:48-08:00	337.89	67.94	63	16
2018-10-16 18:11:51-08:00	337.89	67.94	63	16
2018-10-16 18:12:54-08:00	344.73	67.16	63	16
2018-10-16 18:13:58-08:00	343.75	67.16	63	16
2018-10-16 18:15:01-08:00	345.7	67.25	63	16
2018-10-16 18:16:06-08:00	340.82	67.25	64	16
2018-10-16 18:17:09-08:00	340.82	67.25	64	16
2018-10-16 18:18:13-08:00	341.8	67.25	64	16
2018-10-16 18:20:34-08:00	340.82	67.25	64	16
2018-10-16 18:21:40-08:00	343.77	67.25	64	16
2018-10-16 18:22:43-08:00	342.82	67.25	64	16
2018-10-16 18:23:46-08:00	341.8	67.25	64	16
2018-10-16 18:24:50-08:00	348.63	66.18	64	16

## 2) Testing Result in an Outside Housing Area

The tests were conducted at three different times; morning, afternoon and evening in the same area using wired internet connection outside the residential area. Based on Table 2, the Date/Time column is the date and time in which the sensor detects all the strawberry plant parameters; temperature, humidity, soil humidity and light intensity in every 60 seconds. The temperature value at noon is the highest value compared to morning and evening. The humidity percentage at noon is the highest, due to higher temperatures at noon. Based on the result, the highest light received for the plant is 447 lx, and the lowest is 446 lx. It reaches ideal light for strawberry plants. Acceptable ideal light must exceed 400 lx for six hours of full sunlight or 16 light hours if they are planted in the room area. If the average light received for plants is less than 400lx in a month,

then the plant can produce the diseased fruit. The soil moisture column shows a low percentage value of 43 to 54%. Soil moisture must exceed 50% to ensure it is healthy. The graph in Fig. 8. shows the results of all parameter values in time between 9 am, 12 noon and 5 pm.

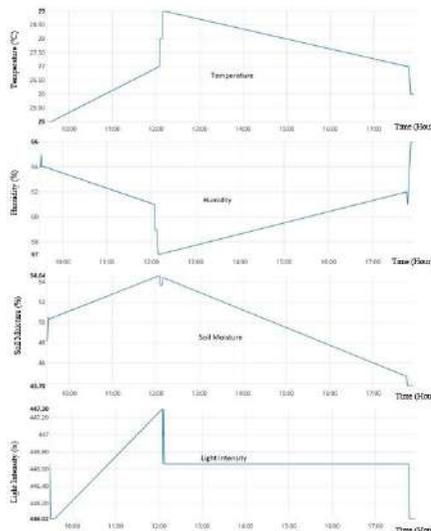


Fig. 8. Graph of detected sensors on the strawberry plant (Outside Area)

Table 2: Strawberry Plant Testing Result (Outside Area)

Date/Time	Humidity (%)	Light-intensity (lx)	Soil-moisture (%)	Temperature (°C)
2018-10-30 09:29:03+08:00	64	446.66	48.39	25
2018-10-30 09:30:07+08:00	64	446.02	48.39	25
2018-10-30 09:31:10+08:00	65	446.02	50.44	25
2018-10-30 09:32:14+08:00	64	446.02	50.44	25
2018-10-30 09:33:17+08:00	64	446.02	50.44	25
2018-10-30 12:04:37+08:00	61	447.3	54.64	27
2018-10-30 12:05:17+08:00	59	446.66	54.06	28
2018-10-30 12:06:20+08:00	59	447.3	53.67	28
2018-10-30 12:07:24+08:00	59	446.66	53.76	28
2018-10-30 12:08:27+08:00	58	446.66	53.76	28
2018-10-30 17:46:06+08:00	62	446.66	44.67	27
2018-10-30 17:47:10+08:00	61	446.02	43.79	27
2018-10-30 17:48:13+08:00	62	446.02	43.79	27
2018-10-30 17:50:35+08:00	65	446.02	43.7	26
2018-10-30 17:51:39+08:00	66	446.02	43.7	26

## 3) Testing Result in an Inside Area

This test is conducted at three different times; morning, night and night in the same area using the wired internet connection in the residential

area. During the test, the plant received full sunlight, but it was a test in the room area meaning sunlight received through the window of the room. Based on Table 3, the Date/Time column is the date and time in which the sensor detects all parameters of the strawberry plant; temperature, humidity, soil humidity and light intensity every 60 seconds. The temperature value is the same even if they are tested in the morning or evening. The temperature value for the room area is ideal as long as it is below 32 degrees Celsius. The percentage of humidity in this area is slightly changed due to the temperature value. Based on the result, the highest light received for the plant is 447 lx, and the lowest is 446 lx. The light intensity received is the same as the test outside the residential area; it can cause the plant to completely absorb the sun even through the window of the room. The soil moisture column shows a low percentage value of 42 to 53%. Moisture must exceed 50% to ensure it is healthy. The graph in Fig. 9. shows the results of sensor values between 10 am, noon and 5 pm.

Table 3: Strawberry Plant Testing Result (Inside Area)

Date/Time	Humidity (%)	Light-intensity (lx)	Soil-moisture (%)	Temperature (°C)
2018-10-30 10:12:30+08:00	66	446.02	47.51	25
2018-10-30 10:13:30+08:00	66	446.02	46.94	26
2018-10-30 10:14:30+08:00	66	446.02	46.43	25
2018-10-30 10:15:40+08:00	66	446.02	46.04	25
2018-10-30 10:16:44+08:00	66	446.02	46.53	25
2018-10-30 12:19:39+08:00	59	447.95	53.47	27
2018-10-30 12:20:55+08:00	59	447.3	53.22	27
2018-10-30 12:21:59+08:00	59	447.3	53.08	27
2018-10-30 12:23:02+08:00	59	447.3	52.88	27
2018-10-30 12:24:06+08:00	61	447.3	52.69	26
2018-10-30 17:32:52+08:00	64	446.66	42.82	27
2018-10-30 17:33:55+08:00	64	446.66	42.91	27
2018-10-30 17:34:59+08:00	64	447.3	42.42	27
2018-10-30 17:36:02+08:00	64	446.66	42.52	27
2018-10-30 17:37:06+08:00	64	446.66	42.52	27

### C. Discussion

Based on the results shown in the previous part, Albion strawberry is suitable to be planted in outside and inside of housing area because its need full sunlight to make sure it grows healthy and produce fruits in good condition. Based on my findings, the strawberry plant needs at least 50% of the moisture of soil, and the temperature of the surrounding environment is 4 to 32 degrees Celsius.

Based on the related works in Chapter 2, there are comparisons between the three previous projects related to this study. One of the previous research works is to design the system for soil moisture by using Arduino and sending a warning message to the user's mobile phone. For this project, research objectives are to identify soil moisture, temperature, humidity and light intensity for strawberry farms and to monitor soil moisture, temperature, humidity and light intensity and store in Ubidots cloud. Both research objectives have been achieved.

## VI. CONCLUSION

Early warning system for strawberry farm using sensors to determine the idle soil moisture, temperature, humidity and light intensity is a beneficial project because it is focusing on the sensors detect for the strawberry plant. Meanwhile, it will also help the farmers to monitor the health status as we know a few of new farmers do not take into account the temperature, humidity, light intensity and soil moisture required for tree fertility as well as crops to be produced as food and for export purposes. With these devices, they can access and monitor the situation on the strawberry farm as long as the devices are connected to the internet.

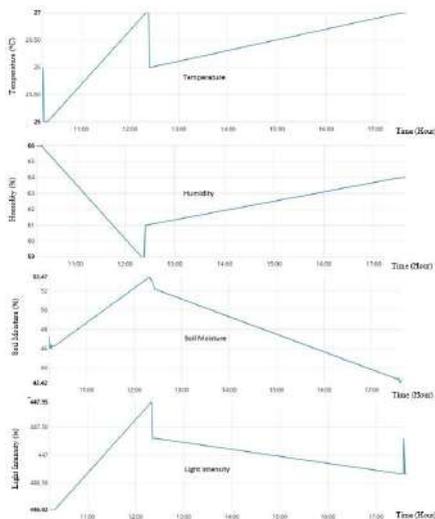


Fig. 9. Graph of detected sensors on the strawberry plant (Inside Area)

REFERENCES

- [1] Strawberry crop guide: Growing strawberries, (2014). Retrieved from [http://www.haifagroup.com/spanish/knowledge\\_center/crop\\_guides/strawberry/growing\\_strawberries/](http://www.haifagroup.com/spanish/knowledge_center/crop_guides/strawberry/growing_strawberries/)
- [2] Malaysian Strawberries, (2009). Retrieved from <http://blog.tourism.gov.my/malaysian-strawberries-2/>
- [3] Gilkey, S. L. (2009). What is the Best Soil for Strawberry Plants? Retrieved from <http://www.strawberries-for-strawberry-lovers.com/what-is-the-best-soil-for-strawberry-plants.html>
- [4] What is the difference between the AVR PIC 8051 and Arduino? Retrieved May 19, 2015, from <https://www.quora.com/What-is-the-difference-between-the-AVR-PIC-8051-and-Arduino>
- [5] Rouse, M. (2012, July). Sensor Retrieved from <https://whatis.techtarget.com/definition/sensor>
- [6] Nedelkovski, D. (2016, March 3). DHT11 & DHT22 Sensors Temperature and Humidity Tutorial using Arduino. Retrieved from <https://howtomechatronics.com/tutorials/arduino/dht11-dht22-sensors-temperature-and-humidity-tutorial-using-arduino/>
- [7] Vani, P. D., & Rao, K. R. (2016). Measurement and monitoring of soil moisture using cloud IoT and android system. Indian Journal of Science and Technology, 9(31).
- [8] Radman, V., & Radonjić, M. Arduino-based system for soil moisture measurement.
- [9] Chavan, C. H., & Karande, P. V. (2014). Wireless monitoring of soil moisture, temperature & humidity using Zigbee in agriculture. Int. J. Eng. Trends Technol, 11(10), 493-497.
- [10] Gilkey, S. L. (2016). What is the Best Soil for Strawberry Plants? Retrieved from <http://www.strawberries-for-strawberry-lovers.com/what-is-the-best-soil-for-strawberry-plants.html>
- [11] Gurukul, S. (Director). (2015, July 29). HOW TO MAKE WATERFALL MODEL, Retrieved from <https://www.youtube.com/watch?v=LHcpEwvps>
- [12] Rouse, M. (2012, March 21). Microcontroller. Retrieved from <https://internetofthingsagenda.techtarget.com/definition/microcontroller>



# Internet-Based Hospital Health Monitoring System for Patients

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**Abstract**— the improvements of medical technologies, medicine and techniques in developing countries has resulted an extraordinary increase in the life expectancy of these countries. This project takes a look at the development of a straightforward device that will be equipped for exchanging the information or data of a patient's body internal changes which is the heart beat rate to a wireless device. The need of this project is to reduce the trouble that is experienced by the doctors and staff of the hospital in observing different patients simultaneously. This project will empower them to observe patients without being physically present at the patient's ward, be it in the hospital or in their home. A patient's heart beat rate are wired transferred through an operator, which is the Wi-Fi module.

**Keywords**—pre-emption, emergency vehicles,

## I. INTRODUCTION

The improvements of medical technologies, medicine and techniques in developed countries has resulted in a great increase in the life expectancy of in these countries. These technologies can be helpful especially for doctors to handle their patients. Normally, patients are not comfortable with the treatment which doctors normally use for finding the heartbeat count. So there's should be a device to track the heart beat count in the human body.

The heart beat count must be monitored and recorded by the doctors and also the staff of the hospital. A devices is created to help the doctors and staff of the hospital to monitor and record the patient heartbeat. It is quite easy to use, portable, light weight and also small in size.

## II. LITERATURE REVIEW

In [1], monitoring system that has the capability to monitor physiological parameters from multiple patient bodies where it consists of several wireless relay nodes which are responsible for relaying the data sent by the coordinator node and forward them to the base station

In [2], Remote sensing of parameter of the body mostly heart rate and temperature. The parameter are detected and checked remote utilizing remote sensors. Also online checking is proposed to keep sharp perception on

customary wellbeing status of patient's. The database will be detected consistently and will use for to address future issue conceivable determination. Additionally web based monitoring is proposed to keep keen observation on regular health status of patient.

In [3], extending the human physical limitation of information processing. The availability, accessibility and flexibility of information as well as the tools to access this information lead to a vast amount of opportunities. It developed a web-based database system of patients' information repository for effective and timely access to information when and where it is needed. The design uses the three-tier web model architecture.

Lastly in [4], Wireless architecture, many-to-many relationship between client (patient) and server (doctor) are established and various types of communication scheme are used between them. Transmission of the digital data over internet is done using general packet radio service to web server where database are stored.

## III. METHODOLOGY

The methodology used in this project is SDCL Model which is shown below.

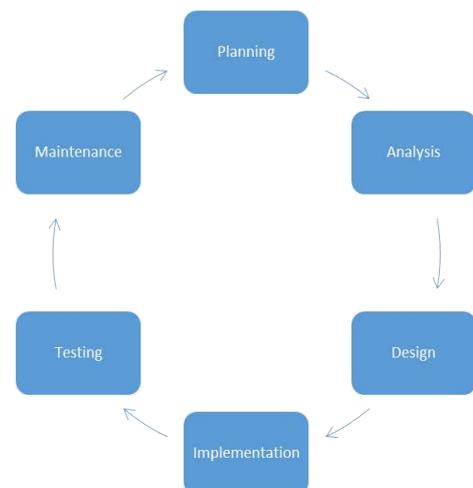


Fig. 1. SDCL Model Methodology

The schematic diagram and the system flowchart are shown in Fig. 2- Fig. 3.

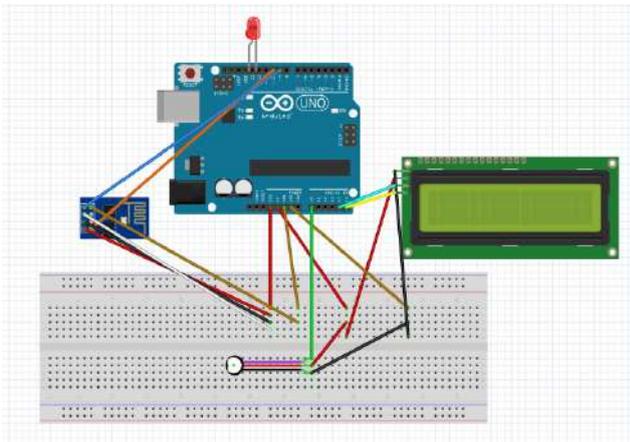


Fig. 2. Schematic Diagram.

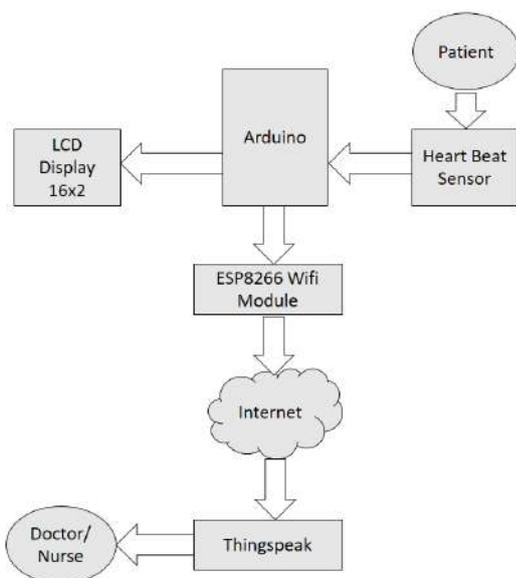


Fig. 3. System flowchart

### Arduino Hardware

The Arduino Uno can be powered by USB cable or directly supplying 9-12v from the barrel jack. The circuitry operates at 5v dc which in case input more than that is regulated with the help of 7805 voltage regulator. The 7805 voltage regulator IC is used regulate the voltage supplied to the Arduino board and manage it through processor and other elements which as shown in Fig. 4.



Fig.4. Arduino hardware

### Heart Beat Sensor

The Heart Beat Sensor is a plug-and-play heart-rate sensor for Arduino. It can be used by students & mobile developers who want to easily incorporate live heart-rate data into their projects. Essence it is an integrated optical amplifying circuit and noise eliminating circuit sensor. Clip the Heart Beat Sensor to the fingertip and plug it into the Arduino, it can ready to read heart rate. The heart beat sensor is shown in Fig.5.

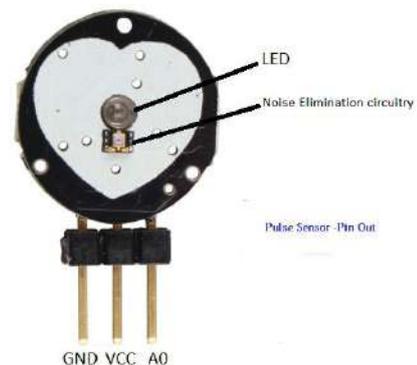


Fig.5. Heart Beat Sensor

### ESP8266 Wi-Fi Module

ESP8266 can be used as an external Wi-Fi module, using the standard AT Command set Firmware by connecting it to any microcontroller using the serial UART, or directly serve as a Wi-Fi-enabled micro controller, by programming a new firmware using the provided SDK. It is shown in Fig.7. The GPIO pins allow Analog and Digital IO, plus PWM, SPI, and I2C.



## Monitoring Platform (Thing-Speak) Result

The information is transferred to the server where the information is stored, so as any doctors or staff of the hospital can view the patient information frequently. The information were to refresh routinely giving the degree for continuous monitoring of the patient. This make it simple for the doctor and staff of the hospital to be aware with the patient regardless of whether the patient is out reach. From the monitoring platform (Thing-Speak), it shown the information coming from the pulse sensor that are attached to the patient as per Fig.11.

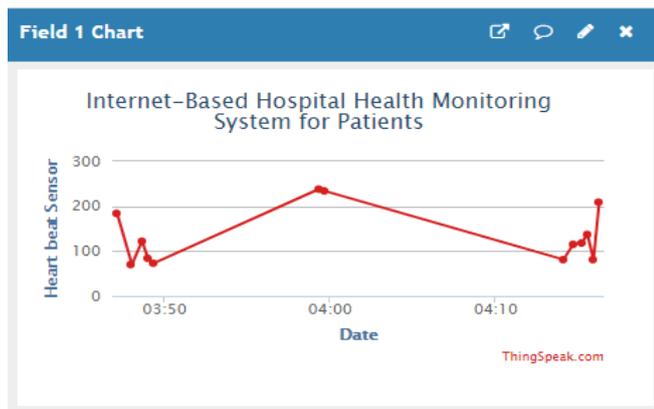


Fig.11 Information from the monitoring platform (Thing-Speak)

## REFERENCES

- [1] Aminian, M., & Naji, H. R. (2013). A hospital healthcare monitoring system using wireless sensor networks. *J. Health Med. Inform*, 4(02), 121
- [2] Amruta, Y. R. P. M. S., Jayashri, R. V. R. S. M., & Shirsat, K. Web Based Health Monitoring System.
- [3] Gayathri V Panicker, Bharathi. V., Geethu. P., and Bommanna Raja. K (2014). Studies on Web Based Patient Support System for Health Monitoring and Quality of Life
- [4] Agrawal, M. P., Hingway, S. P., & Dharaskar, B. P. (2013). Innovative approach for wireless health monitoring system using Client-Server architecture

## V. CONCLUSIONS/RECOMMENDATION

At first, the project been started by studying and finding different sensors and devices for healthcare monitoring system in Internet over Things. The proposed solution for Internet-Based Internet Health Monitoring System for Patient is based Arduino pulse sensor. It can be conclude that the project is slightly successful, where it needs more proper devices or components to use for the project to create a solid wireless healthcare monitoring system.

### Recommendation

For future research and work, this prototype can be additionally improved by interfacing different other biomedical sensor with Arduino. The information received can be sent by means of monitoring platform (Thing-Speak) to any distinctive cloud storage or the hospital cloud storage for an easy entry by the doctors and staff of the hospital. Furthermore, a collaborative communication can be made by including two way communication conventions for Internet over Things so doctors can screen and exhortation patients on the web. It can also be developed to receive the information via mobile application. Other than that, is to make sure the accurate heart rate or beats per minute are receive. Additional testing can be performed to a bigger number of individuals with various ages.

# Securing Access Using Proxy Integrated with Antivirus

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**Abstract**— *These days, web surfing is important in our daily life. We used search engine such as google, msn or yahoo to search something. Most of students of University Kuala Lumpur Malaysian Institute Information Technology (Unikl MIIT) will browse to the internet to search document or any references that related to their assignment, but not all of them browse to the secure URL or web page. This project aimed to manage blacklist and block any URL from student to access using squid proxy integrated with clam antivirus. Other than manage and block any website to access, this project also aimed to improve the squid proxy log by using Web GUI instead of view from the common log file format. It will ease the administrator to manage and analyse the log file. The embedded server is used as a main hardware platform to install Centos 7 Operating System. To configure and integrate with antivirus, the developer used squid proxy as a server and used clamAV database as the antivirus. The testing is implemented using the several lists of websites and also downloaded the virus file. It shows the system worked well as it blocked the website from being access. The administrator also can manage and view the user's activities from the squid access log dashboard.*

**Keywords**—URL filtering; Squid; Proxy; Server; Antivirus;

## I. INTRODUCTION

The Internet has rapidly become one the most important parts of our lives. It's also constantly growing with more devices and websites being added each day. Along with this exponential growth, the potential online threats are also increasing. Furthermore, malicious URLs have become a common channel to facilitate Internet criminal activities such as drive-by-download, spamming and phishing. Many attackers try to use these websites for spreading malicious programs or stealing identities.

To stay safe and to keep our networks secure, the security measures that we used also need to change and adapt. Implementing URL filtering on your network can be used to achieve these goals. URL filtering is a process that involves controlling what URLs (Uniform Resource Locators) or web addresses your employees or students can and can't access. This not only prevents and limits web browsing for personal use, but also ensures that your staff visit only websites already cleared for security risks.

URL filtering tools work by categorizing websites based on their actual URL or content. For instance, if employees search for URL of a website that is seemed unsafe, they will be notified via web browser that the website is not permitted for access. It sounds simple enough, but many businesses opt for complex URL filtering mechanisms that do more than just block inappropriate or unsafe websites.

The process of final year project is to implement proxy server that act as URL filtering using open source application that called squid proxy. The purpose of this project is to filter any blacklisted URL and preventing users or students to access it. Also, the developer would like to improve the squid proxy log function.

## II. PROBLEM STATEMENTS

Nowadays, web surfing is important in our daily life. We used search engine such as google, msn or yahoo to search something. In UniKL, most of students will browse to the internet to search document or any references that related to their assignment, but not all of them browse to the secure URL or web page. Most of students may not be aware that by visiting non-education-related websites or clicking links from suspicious emails, they're exposing your network to various cyber threats. Most of the viruses or malware are spread via web page, and using this URL filtering, at least we could prevent the virus or malware being spread to others. On this project also, we will improve the log instead of using command line or CLI, we will convert the log and utilization to web GUI. This could make IT admin easier to manage the URL filtering.

## III. RELATED WORKS

Several relevant related projects been made by developers previously that related to the implementation of the URL filtering such as [1,2,4]. Most of the project focusses on filtering. Various methods used by the developers to develop the products such as proxy, firewall and etcetera. Following are some of the related works:

### A. *URLfilterDB* [1]

Developer [1] has developed the ufdbGuard. UfdbGuard is stand for URL Filter Database Guard. It is an internet filter that has safety features to make browsing safer and to block remote access. It's quite similar with this project. However, developer [1] add some configuration of groups with different web access policies, SafeSearch enforcement, SSH tunnel detection, safer HTTPS traffic, time-based access rules and etcetera. The URL filter blocks Tor, UltraSurf, SSH tunnels, VPN tunnels and remote access software used to connect to a PC at home whilst at work. It is also work with squid web proxy since it is free open source software. For URLfilterDB, the developer offers internet filtering software. This program resides on proxy server and blocks undesired web pages on the internet based on web page URLs. However, this software focuses on filtering consumer websites of our employees or students visit for personal interest. It does not block any sites that our organization need to access for daily business. The developer concluded that blacklist blocking is the best compare to content scanning because it does not require web page

downloading to decide whether to block it. While, the content scanning requires downloading the pages first, this will consume extra time and bandwidth. The limitation of this product is the installation and the price. To use ufdbguard, we need to install URLfilterDB but we need to buy the license and a little bit price.

### B. *DansGuardian* [2]

Developer [2] has developed web content filtering proxy filter for Linux, NetBSD, FreeBSD, OpenBSD, and Solaris that uses Squid to do all the fetching. The features developed by developer such as the filtering including URL and domain filtering, content phrase filtering and content (AV) scanning. The developer produced the log report in text-pages based rather than graphical user interface (GUI) to reduce redundant information such as every image on a page. The filtering has configurable domain, user and source IP exception lists. SSL tunnelling is supported. But the major limitation for this web filtering is it can filter only supported on destination domain due to encrypted nature of HTTPS request.

### C. *SafeSquid* [4]

SafeSquid based Secure Web Gateways enable users to safely access the web. The developer [4] developed the product that let users block certain file types, such as audio, video, and Flash. The feature of this filtering is can block inappropriate content such as pornographic sites and offered protection against the malware, spyware, viruses, worms and etcetera. The extra features web caching which is used for storing web data in a cache also added in this SafeSquid. It can modify the contents of Web pages, for example, removing potentially untrustworthy JavaScript content before a user views a page. The installation of of SafeSquid can be done on both linux and windows. However, the advantages of deploying SafeSquid on Linux are overall higher because the Linux operating system is better suited for servers. The developer specifically designed the SafeSquid to provide maximum protocol, and payload security. It also has the static reporting which is can monitor users' activities using an automated data mining engine with deeper data analysis. But the configuration of this SafeSquid is quite complicated because the user needs to register and create the account on SafeSquid's self-service portal. After that, the registered user will be provided the product activation key. Plus, the user also needs to download the SafeSquid Appliance Builder to install the package. In addition, if a user wants to use HTTPS inspection, the user needs to configure it first. The limitation of this product is the installation

steps is quite complicated which is can be troublesome to the user.

Based the project that developed by the developers in [1,2,4], this URL filtering project can help to overcome most of the previous developer project limitations in term of cost, easy configuration and user friendly. Project [1] is advance in filtering performance although it just does the blacklist blocking rather than content filtering but the cost is quite expensive. While project [2] almost offered same features with project [1] but it can do the content scanning plus it can generate the log report in text-based page. In other hand, this project has all the project [2] features but with a little enhancement, we improve the log report which can be viewed in GUI. So, from there, we can monitor the user's activities. Although this project is not as advance as project [4], but the function is enough for filtering, scanning the viruses and the most important things is this project does not require user to going through the complicated installation with the activation key. Although this project has a few disadvantages which is does not support HTTPS web traffic, but with future studies it can be solved.

#### IV. APPROACH

The methodology and Approach I used in this project is Rapid Application Development (RAD) model as shown in Figure 1. The model is suitable for the project since we need to continuous implementation. The model has 7 phases:

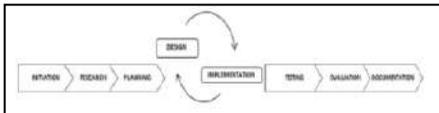


Fig 1: RAD Model

##### 1) *Initiation Phase*

In the initiation stage, a several things that must be defined to achieve the goal by the end of the project. The beginning of process involves brainstorming and discussion that regarding to the topic on this project. Thus, in this stage the problem statement, objective and scope are defined. The topic of the project that is created entitled Securing Access Using Proxy Integrated with Antivirus.

##### 2) *Research and Analysis Phase*

The research and analysis phase are conducted based on the collected data from previous phase. Analysis phase is one of the important phases to implement a project. This project needs to configure the proxy server and integrate with the anti-virus. Hence, drafting the configuration command is a must before proceeding to the next step. Centos is the operating system used which meet the requirement of the project.

##### 3) *Planning Phase*

The stage of planning is the process to understand the problem arise along with the malicious URL. It also determines how the project will go for future use based on building the information system. The software and hardware of this stage will drive how the project will be built. This phase involves of planning document to help guide through the project delivery. The documentation includes research methodology, Work Breakdown Structure, Gantt chart and budget listing of the project. The timeline to develop the project is estimated in the Gantt chart and the budgeting is discussed based on the needs of the project.

##### 4) *Design Phase*

During this phase, the network design is prepared. This phase helps in defining the overall system process, architecture, network infrastructure and other important factors in the system network environment.

##### 5) *Implementation Phase*

Based on the network design, the system is implemented in this phase. The implementation phase starts by preparing the laptop and installing the centos OS. In this phase, the configuration commands are developed and used to configure the proxy server and integrated with the clam antivirus where this part is the most critical part and consuming more time and resources usage. This phase consists of seven stages.

- I. First stage: Software Installation  
Download and install Centos 7 in the network appliance.
- II. Second stage: Install squid to configure Proxy server

- III. Third stage: Install Squid Clamav and Configure Proxy Server
- IV. Fourth stage: Install Clamav Scanner
- V. Fifth stage: Set proxy to Client's PC
- VI. Sixth stage: Configure Squid and SquidGuard to set contents filtering
- VII. Seventh stage: Install LightSquid to generate log report

#### 6) Testing and Evaluation Phase

Testing and evaluation phase are the process where the complete project is tested in achieving the stated objectives. Before analyzing the results, system will go through troubleshoot process of the errors and make some modification to the command until the problem is solved.

#### 7) Documentation Phase

This phase is the last phase in which the result in testing and evaluation phase will be validated whether the objectives is achieved or not. The conclusions and some improvement suggestion can be made after we have analyzed the data. Correction and amendment are made.

### V. RESULT AND ANALYSIS

In this section, the results of several tests are collected and analyzed. The testing that have been made is the system testing.

#### A. Connectivity between Client and Server

In this section, the connection between client and proxy server is tested. Client and proxy server have to connect with the same wi-fi connection. The connection between client and proxy server is shown as Figure 2 and Figure 3 below.

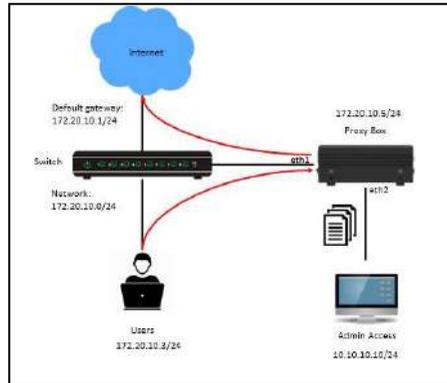


Fig. 2. The first method of connectivity between client and squid proxy server

Figure 2 above shows the connection between client and server using the first method. First, users and proxy box will connect to the UniKL switch to make sure they got internet connection and then users need to setup the proxy setting of their web browser and key in the ip address of the proxy 172.20.10.5/24 and proxy port 3218. All the http connection will be redirect to port eth1. Proxy will do scanning and block the connection if match with blacklist url. If the url is not match with blacklist url, the users can browse to that website. On this port also, packet will be scan with clam antivirus. The users can browse to that website if the website url is not being blacklist by proxy. If they visit the blacklist url, they will redirect to blocking page. At port eth2, system administrator could monitor log for proxy, and the users' activities.

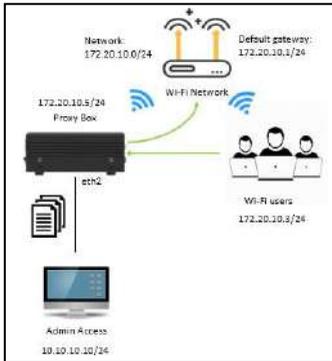


Fig. 3. The second method of connectivity between client and squid proxy server

Figure 3 above shows the connection between client and server using the second method. First, users and proxy box will connect to the same Wi-Fi connection to get internet connection. Then, users need to setup the proxy setting of their web browser and key in the ip address of the proxy 172.20.10.5/24 and proxy port 3218. All the http connection will be redirect to proxy box. Proxy will do scanning and block the connection if match with blacklist URL. If the URL is not match with blacklist URL, the users can browse to that website. On this port also, packet will be scan with clam antivirus. The users can browse to that website if the website URL is not being blacklist by proxy. If they visit the blacklist URL, they will redirect to blocking page. At port eth2, system administrator could monitor log for proxy, and the users' activities.

### B. The blacklist URL list and the result

In this section, the blacklist URL list will be tested. The users will try to browse to the blacklist URL to make sure the blocking is worked. Figure 4 below shows the list of blacklist URL.



Fig 4. Blacklist URL List

Figure 4 above shows the list of the blacklist URL that have been configured by the developer. The list can be customized according to developer's preference. This project can block and inspect the HTTP URL only. So, the developer must to make sure that the configured list is the HTTP URL.



Fig 5. The Blocking Page

Figure 4.4 shows that the blocking page result when users try to access the blacklist URL www.utar.edu.my is in the configured list as shown in Figure 4.3. it will be redirect to the blocking page that the developer has been setup and design the in the squid configuration.

### C. The result of virus scanning

In this section, the virus scanning will be tested. The users will try to download the file that contain virus to make sure the virus scanning is worked and the blocking page will be displayed to protect from virus.

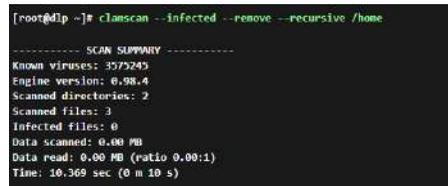


Fig 6. The Result of ClamAV antivirus scanning

Figure 6 show the summary scan result of antivirus scanning. There are a few files that being scanned and the result showed there is no infected files. The time of scanning estimated in 10 seconds.

### D. Test Virus File

The developer has been setup and configured the icap, users will be redirect to the blocking page if they downloaded the virus file.



Fig 7. Site to download virus file

Figure 7 shows the site to test download the virus file. The users will browse this site to download the virus files by clicking the download area using standard protocol http. It consists the text file, zip file and etc.



Fig 8. Virus Blocking Page

Figure 8 shows the virus blocking page. This page will redirect or display when users try to download the virus file. This blocking page have been configured by the developer in squid configuration.

### E. Monitoring the Squid Proxy Server and Client's Log

In this section, the log access file into readable format will be monitored. The developer used ELK stack. ELK stand for Elastic search, Logstash and Kibana. These three are the open source project.

```
systemctl start c-icap
systemctl enable c-icap
systemctl restart squid
systemctl restart elasticsearch
systemctl restart kibana
systemctl restart filebeat
systemctl restart metricbeat
systemctl restart logstash
```

Fig 9. List of Command to restart services

Figure 9 shows that list of command to restart all the services before tested the system. C-icap used for scanning

virus while squid will redirect to blocking page. Elastic search used for search and analytic engine. Logstash will absorb data from various sources, transforms it and send it to Elastic search. While Kibana is used for visualize the data in graphs and charts. Filebeat and metricbeat used for collecting, parsing and visualize common log formats. To view the squid proxy client's log, the administrator from the eth2 port will access to Kibana dashboard with the 10.10.10.10:5601. In order to view the log, the administrator need to restart all the services shown in Figure 9 above.



Fig 10. Kibana Squid dashboard

Figure 10 above shows the Kibana Squid dashboard which is used to monitor the squid proxy server. It could monitor the CPU usage, memory usage, disk used, inbound and outbound traffic of the server. It also could monitor the squid proxy access. It displays the squid method, squid request status, squid HTTP status code in chart instead of view from raw common log. This could ease the administrator to monitor users 's activities.



Fig 11. Squid Proxy Access Log

Figure 11 above shows the squid proxy access log. It displays the squid access source ip address which means the ip users and also their visited URL based on the date and time. The administrator also could filter the certain of ip address that want to monitor instead of scrolling down the list of ip address. This Kibana dashboard is customizable according the administrator's preferences. The administrator could add, edit or delete the information.



Fig 12. Squid Server and Squid Proxy Access's Log in Bar Graphs

Figure 12 above shows the bar graphs of the interfaces by incoming and outgoing traffic. It showed the packet size from incoming and outgoing traffic. The administrator also could analyse the traffic behaviour. Besides, it also displayed the top process by CPU and Memory. This tool could ease the administrator to monitor the server and also the clients.

## VI. CONCLUSION

Based on the researches, testing and comparison made to the existing projects [1][2][4], this project is good as the existing projects. It provides most of the features that the existing projects offered. Plus, it has extra features such as block website and also can view the common raw log data into readable format which is in charts and graphs. It eases the administrator to monitor user's activities such as which websites that users have visited, the downloaded files, the duration of their activities and so on. Not only it can display the user's log, this project also can monitor server as well. The administrator also can monitor the CPU, memory and disk consumption of the server. It necessary to restart all the services to ensure the services is up. Sometimes, the services may be crashing or stalled or maybe the load of the process on the server is too high.

During the implementation of this project, there are a few limitations founded. At the beginning of this project, this project going to use UniKL network as the source of internet. But, UniKL network cannot be used because this project required to open proxy port 3128 and this port is being closed or blocked by network UniKL for security reason. Not only cannot use port 3128, UniKL network or most of education network already have their own URL and

web content blocking. Thus, it is not allowed by the UniKL. To solve this problem, this project used another network such as mobile hotspot to show this project can block specific URL and page.

For the future implementation, it is recommended to improve the inspection of traffic. The current existing squid proxy server is inspecting HTTP traffic only. It is recommended to inspect HTTPS traffic, users need to install SSL certificate and upgrade the hardware because nowadays, majority of the websites now actively redirect to HTTPS.

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## REFERENCES

- [1] Retrieved from: <https://www.urlfilterdb.com/products/comparison.html>
- [2] Retrieved from: <https://linux.die.net/man/8/dansguardian>
- [3] Informasi, J. S., & Surabaya, S. (2010). Implementasi Squid Sebagai Proxy Server. *SNASTI*, 12–15.
- [4] Retrieved from: [https://docs.safesquid.com/wiki/Getting\\_Started](https://docs.safesquid.com/wiki/Getting_Started)
- [5] Choi, H., Zhu, B. B., & Lee, H. (2011). Detecting malicious web links and identifying their attack types. *WebApps*, 11. <https://doi.org/10.1109/IUCS.2010.5666254>
- [6] C. Phakoontod and B. Limthanmaphon, "Malicious web page detection based on feature classification," 2012 7<sup>th</sup> International Conference on Computing and Convergence Technology (IC CCT), Seoul, 2012, pp. 66-71. Retrieved from: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6530301&isnumber=6530282>
- [7] Retrieved from: <https://www.wingate.com/products/wingate/index.php>
- [8] Lee, J., & Lee, H. (2014). GMAD: Graph-based malware activity detection by DNS traffic analysis. *Computer Communications*, 49, 33–47 <https://doi.org/10.1016/j.comcom.2014.04.013>



# REDUNDANT FOR FIRE MONITORING SYSTEM USING RASPBERRY PI AND ARDUINO UNO

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**Abstract**— In general, it is hard for them to know whether the temperature inside the house is in a normal or abnormal state. Two LM35 temperature sensors are used to produce a redundancy concept to increase feedback functionality which senses both of the temperature sensors which will be tested inside the room. The values collected are uploaded by Raspberry Pi alternately into the Cloud at regular intervals of time through NodeMCU Wi-Fi module. Thingspeak platform is used, where the user also can see the uploaded values in the graphical term. This project used Arduino Uno, NodeMCU and Raspberry Pi to install all programs that give instructions to conduct this system properly. Lastly, the function of the buzzer sensor in this project is to trigger an alert when the temperature exceeds the desired range to alert the user to check if there is any fire accident occur and take some precautions to avoid the accident from happening.

**Keywords**—LM35 sensor, buzzer sensor, Arduino, NodeMCU, Raspberry Pi, temperature, Cloud, Thingspeak platform

## I. INTRODUCTION

Nowadays, a fire accident often happened in our country. It can happen unexpectedly anywhere and anytime which can cause serious injury and major damage to personal property. Many accidents occur from faulty electrical equipment and human error for example because of a short circuit, plug extensions that are overloaded, someone could accidentally spill water on the electrical equipment or fire from leaving the kitchen stove lighted. Therefore, home dwellers or workers should be concerned about fire safety awareness at their places to avoid accident.

Redundant for Fire Monitoring System Using Raspberry Pi and Arduino Uno is a prototype that

provides a system for detecting high temperature to minimize any related fire accidents from happening. This prototype introduces redundancy concept for duplication of critical components or functions to increase feedback functionality. It consists of two LM35 temperature sensors for detection purpose that will enable to provide a failsafe approach to the system.

The alert system will be developed using Raspberry Pi that acts as a server, microcontrollers equipped with the sensors and NodeMCU with built-in Wi-Fi module. From both Arduino Uno microcontrollers, the temperature values are uploaded from Raspberry Pi to the Thingspeak cloud platform at regular interval of time through NodeMCU which can provide the Arduino Uno to access the Wi-Fi network to communicate with Raspberry Pi. Next, the buzzer sensor is triggered and alert the users inside the house if the temperature exceeds a certain threshold which could lead to an accident. From the cloud, both temperature sensors can be seen graphically on the cloud by the authorized users so they can view the data and take some precautions to avoid fire accidents.

### A. Problem Statement

In 2017, according to the Fire and Rescue Department's statistics, between 120 and 150 people perished in fires annually due to lack of fire safety awareness among home dwellers.

Besides, recent projects attempt to detect fire and gas leakage, when the gas leak has occurred, the system senses the leakage and alert sends an SMS notification to the registered user and turn on the buzzer, other precautionary measures like switching on exhaust fan will take place in the

system controlled by Arduino Uno. However, the current fire alarm system only uses one sensor to detect the fire and gas without having backup sensors which can cause an accident to occur if the available sensors does not function. Also, manual monitoring is troublesome because it is difficult for the users to monitor the temperature manually in each room inside the house.

### B. Research Objectives

- To develop a redundant for fire monitoring system by using Raspberry Pi and Arduino Uno.
- To detect changes in temperature using LM35 temperature sensor and alert user when the temperature exceeds a threshold.

## II. LITERATURE REVIEW

This topic discusses the connected scopes and areas regarding the project title, Redundant for Fire Monitoring System Using Raspberry Pi and Arduino Uno. In this chapter, there will be various research that is related to a fire alarm system with different implementations and approaches. Plus, the information that has been collected by reading journals of the research papers by other researchers and also from websites are discussed in this chapter.

For example, Md Saifudaulah [5] proposed a development of a fire alarm system using Raspberry Pi as a master device and Arduino as a slave device. The authors used a SIM900 GSM shield to enable SMS to send a notification to alert the firefighter alongside the web-camera to capture the location to prevent false alert to the firefighter. The sensor used is QM-NG1 which is a sensor to detect the presence of smoke. A webpage shows the image captured and it requires a login ID to prevent false alert. If the sensor detected the increasing level of coal gas, it will capture the location image and the user will have to press the submit button to send it to firefighters.

Rajendra Nayak, Neema Shetty, Srishty & Shreya [6] is creating a smart home monitoring system using Raspberry Pi which the user who has access the web that connected to the Raspberry Pi. User can access the home automation system when any intrusion happen which was detected by the motion sensor. The camera captures the image of the intruder and sends it to the user's e-mail and the user can monitor the live streaming by logging into the web page. When fire threats are detected, the fire sensor senses the fire and alerts the people at

home through the buzzer and automatic water supply will put out the fire using the water pump. Automated home gardening will automatically supply water to the plants when the soil gets dried up and stop when the moisture content in the soil is detected. When the temperature inside the room rises, the curtain will automatically be drawn to allow the fresh air to come in and cool the room.

Last but not least, Ahmad Hasanul Amin & Amirul Azri [7] proposed the development of fire and gas detector system with GSM to monitor gas and temperature in a room and respond accordingly when flammable gas is detected or temperature is above the safe threshold. This project focuses on the Hospital or Petrol Station that would give big impact if an explosion occurs. The objective of this project is to reduce the time taken to alert the first responder team and to improve the current alarm system to adapt to the increasing number of a mobile device in the world nowadays. The author used GSM Sim900A module, Arduino Uno processor, LM35 Temperature sensor and MQ-2 Gas Sensor. This project was a success, the alarm system worked as intended during the test and the project presentation. The time taken to send a text message to the phone is 10 seconds for gas detection and 19 seconds for smoke detection.

## III. RESEARCH METHODOLOGY

Methodology is important because every research should have a procedure to guarantee the exploration is consistent in the advancement of the system. The methodology used in this project is Waterfall Model. It is utilized as a guideline within the procedure of the system improvement. There are seven fundamental stages in this methodology as shown in the Figure 1:

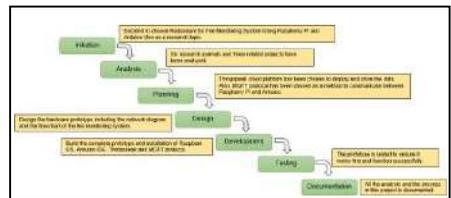


Fig. 1. Waterfall Model

Figure 2 shows the block diagram or the process development of the system. All the units are responsible for the Redundant for Fire Monitoring System Using Raspberry Pi and Arduino Uno. In fact, the NodeMCU is the interface between the

Raspberry Pi and the Arduino Uno microcontroller. The functions of NodeMCU is to give the microcontroller network access and the data collected are transferred to the Raspberry Pi and it will upload to the Cloud. After that, the data will be analyzed graphically on Thingspeak platform. The buzzer produces a sound when it detects the temperature that exceeds a threshold to alert the user inside the house to take further actions.

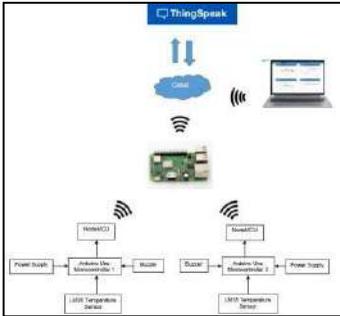


Fig. 2. Block Diagram of the Project

#### IV. RESULT AND ANALYSIS

##### A. System Testing

The testing had been done using LM35 sensor and the buzzer sensor. The software also had been tested with the codes of the sensors and the NodeMCU Wi-Fi module system whether it can connect to the Raspberry Pi and also the Raspberry Pi itself can connect to the Thingspeak platform or not. The codes in Raspberry Pi has been tested and run successfully without error while the codes in Arduino are uploaded to the Arduino Uno microcontroller board using USB cable connected to the computer when the codes are compiled and verified without any error. Next, the system is tested inside the room in a house.

A testing phase normally comes after the design and installation of the prototype. At this point, testing can be made with a period of refinement, bug fixing, and final installation before the project is completed successfully. An alternative to a fixed period of time on the project schedule for testing is continuous testing.

##### B. Hardware Testing

###### 1) Testing Result for Esp8266

When the hardware and software are connected successfully, the testing phase is ready to begin. Then, the next procedure is to place both of the system inside the room that will detect the temperature changes for testing purpose. The test is conducted inside the room as shown in Figure 3. After that, in Figure 4, both of the systems will be tested with lighter to detect temperature changes between both of the sensors. The lighter must not be placed near the sensor because it might damage the sensor.

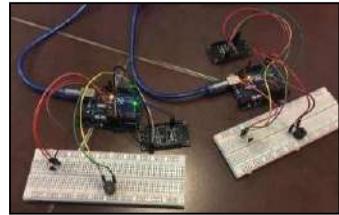


Fig. 3. Both System Test Inside the Room



Fig. 4. Testing Situation to Detect Temperature Changes

The data collected for both temperatures by the LM35 sensors can be viewed in the next figure. Figure 5 shows the graph of temperature in Thingspeak application in field 1 and field 2 respectively.

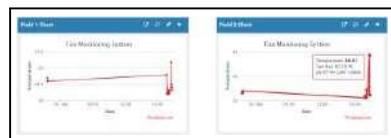


Fig. 5. Graph of Temperature Esp8266 Exceeds Threshold

The data for temperature can be exported in an Excel format as shown in Table 4.1. The table consists of time and date, entry id and also the value collected by the sensor in field 1 and field 2. Raspberry Pi can only read one data at a time. As a consequence, field 1 and field 2 displayed the reading of each data are updated in the Thingspeak platform every one minute alternately.

Table 1 Data of Temperature Esp8266 Exceeds 30 °C

Date and Time	Entry_id	Temperature °C	
		Field 1	Field 2
2019-04-30 20:13:53 +0800	412	21.51	
2019-04-30 20:36:17 +0800	413	21.99	
2019-04-30 20:36:41 +0800	414	22.48	
2019-04-30 20:37:27 +0800	415	25.9	
2019-04-30 20:37:44 +0800	416		38.61
2019-04-30 20:38:35 +0800	417		25.42
2019-04-30 20:39:04 +0800	418		23.95
2019-04-30 20:40:09 +0800	419	22.48	
2019-04-30 20:40:25 +0800	420	22.48	
2019-04-30 20:40:41 +0800	421		22.48
2019-04-30 20:40:59 +0800	422		22.48
2019-04-30 20:41:21 +0800	423	22.48	
2019-04-30 20:41:43 +0800	424		22.48
2019-04-30 20:42:01 +0800	425	21.99	
2019-04-30 20:42:21 +0800	426	21.99	
2019-04-30 20:43:24 +0800	427	21.99	
2019-04-30 20:43:47 +0800	428		21.99
2019-04-30 20:44:20 +0800	429	21.99	
2019-04-30 20:45:03 +0800	430	21.99	

From Table 1 above, the temperature for Esp82661 is stabilized from 20.13pm until 20.45pm at 21.51 °C to 21.99 °C. For field 2, it shows that during 20.37pm the reading for Esp8266 is the highest temperature which exceeds 30 °C with a reading of 38.61 °C as shown in Figure 4.6. The temperature increased to 38.61 °C because the lighter was test near to the LM35 sensor of Esp8266 to detect changes for higher temperature. During this test, the buzzer is set to respond when the temperature exceeds 30 °C because the average temperature in the room is between 22 °C to 26 °C. Hence, the buzzer did trigger an alert at 20.37pm because the temperature for Esp8266 exceeds 30 °C.

## 2) Testing Result for ESP82661

The second NodeMCU which is Esp82661 was tested exactly the same as the first test which the buzzer was set to respond when the temperature exceeds 30 °C because of the average temperature

in the room. So, the buzzer did trigger an alert at 22.42pm because the temperature exceeds 30 °C with a reading of 37.63 °C as displayed in Figure 6 indicating the testing in field 1. The data for temperature reading in Excel format is shown in Table 2.

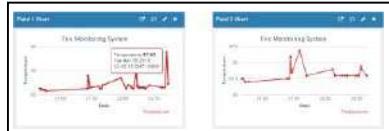


Fig. 6. Graph of Temperature Esp82661 Exceeds Threshold

Table 2 Data of Temperature Esp82661 Exceeds 30 °C

Date and Time	Entry_id	Temperature °C	
		Field 1	Field 2
2019-04-30 22:20:04 +0800	471	22.97	
2019-04-30 22:20:25 +0800	472	22.97	
2019-04-30 22:20:40 +0800	473	22.97	
2019-04-30 22:21:00 +0800	474		22.97
2019-04-30 22:21:59 +0800	475	22.48	
2019-04-30 22:25:37 +0800	476	23.95	
2019-04-30 22:29:11 +0800	477		22.97
2019-04-30 22:29:32 +0800	478		22.97
2019-04-30 22:31:57 +0800	479		22.97
2019-04-30 22:34:23 +0800	480		24.44
2019-04-30 22:34:40 +0800	481		23.95
2019-04-30 22:37:24 +0800	482	22.97	
2019-04-30 22:38:28 +0800	483	22.97	
2019-04-30 22:39:52 +0800	484		22.97
2019-04-30 22:40:33 +0800	485	22.97	
2019-04-30 22:42:13 +0800	486	37.63	
2019-04-30 22:43:38 +0800	487	24.44	
2019-04-30 22:45:33 +0800	488	22.97	
2019-04-30 22:46:24 +0800	489	22.97	

From Table 2 above, the temperature is stabilized for both temperature sensors from 22.20pm until 22.40pm at 22.97 °C. The temperature reading for Esp82661 in field 1 increased to 37.63 °C because it was tested with a lighter to detect the high temperature for the sensor and the buzzer is triggered. After that, the temperature drops and back to normal again when the lighter is taken away from the sensor.

## C. Discussion

The test has been made many times to make sure the system is fully functional. From the test, both of the temperature sensors sense the reading inside the room and the readings are uploaded into

the Cloud and can be seen graphically in Thingspeak platform. When the buzzer sensor detects the temperature exceeds its desired range which is above 30 °C, it produced a sound to alert the user to see if there is any problem or fire accident occurred inside the room to ensure the room or other section inside the house in safe and sound condition. This project has successfully achieved its objectives which are to develop a redundant for fire monitoring system using Raspberry Pi and Arduino Uno and to detect changes in temperature using LM35 and alert user when the temperature exceeds a threshold.

## V. CONCLUSION

As a conclusion, this “*Redundant for Fire Monitoring System Using Raspberry Pi and Arduino Uno*” is the best way to help users to be more alert and be more serious about fire accidents and also help reduce the major injuries in the society caused by fire. With continuing effort and determination towards this project, all objectives were successfully achieved. For the development processes, the LM35 sensor connected with the buzzer sensor and NodeMCU module were combined and the Raspberry Pi that has been used in order to complete the project as a whole.

This project may bring a lot of benefits and impacts upon its implementation. It really can help the user to reduce their effort for checking the temperature manually. In order to make sure this project is successfully completed before reaching the due date, time management and full commitment are needed and to be prepared physically and mentally. Overall, the project was a complete success. All the functionalities proposed in the initial design have been achieved. This project can be commercialized since it will benefit society and can be employed in any high-risk places such as hospital and schools with the quite low in cost.

### A. Recommendation for Future Works

Since the system has its own weaknesses, there are needs of some enhancement to improve the system. As for recommendation and improvement

for the prototype in the future, these few suggestions may help to evolve this project into a brand new innovation. This project can be upgraded by applying a notification system to notify the user when the user is away from home and can take further action to save their personal property from damage due to the fire accident. Lastly, this project also can be enhanced by implementing the system using different technologies for network communication between both prototype and Raspberry Pi to identify the better performance of the communication process for a fire monitoring system.

## ACKNOWLEDGEMENT



My name is Nurul Lyana Binti Mohamed Sazali. I am currently a final year student studying at Universiti Kuala Lumpur (MIIT) in Bachelor of Engineering Technology in Networking System. I feel very proud to myself for complete my final year project successfully. I hope to achieve my dreams as a Network Engineer and grow as a successful person in the future.



Dr. Ahmad Sharafidz Bin Khalid is a senior lecturer with 18 years of working experience in the education industry. He graduated with a Doctorate degree from ENSEEIHT, Toulouse, France in the Security and Privacy of IoT. Apart from lecturing, Dr. Ahmad is also involved in the curriculum development and management. He has been with the Cisco Networking Academy since its inception in Malaysia in the year 2000, where he had been the President of the Cisco Malaysia Quality Council for 5 years responsible in overseeing the quality of the program. Last but not least, he had

trained the Cisco Academy instructors in various institutions.

REFERENCES

- [1] Christensson, P. (2011, November 23). "Redundancy Definition". Retrieved 2018, Oct 20, from <https://techterms.com>
- [2] "How Fire-Detection Systems Work". (2009, January 7). Retrieved October 20, 2018, from <https://www.buildings.com/article-details/articleid/8627/title/how-fire-detection-systems-work>
- [3] Nuttal, B. (2018, February). "What is a Raspberry Pi?". Retrieved October 20, 2018, from <https://opensource.com/resources/raspberry-pi>
- [4] Agarwal, T., & Edgefx Technologies Pvt Ltd. (2014, July 22). "Arduino Uno Board with Real-Time Application Projects". Retrieved October 20, 2018, from <https://www.edgefx.in/arduino-uno-board-tutorial-and-its-applications/>
- [5] Bahrudin, M. S., Abu Kassim, R., & Buniyamin, N. (2013). "Development of Fire Alarm System Using Raspberry Pi and Arduino Uno".
- [6] Nayak, R., Shetty, N., Srishty, & Shreya. (2016). "Secured Smart Home Monitoring System Using Raspberry Pi".
- [7] Zamani, A. H., & Azmi, A. A. (2017). "The Development of Fire and Gas Detector System with GSM".
- [8] Rouse, Margaret, and Peter Waher. "What Is MQTT (MQ Telemetry Transport)? - Definition from WhatIs.com." IoT Agenda, Feb. 2018, <https://internetofthingsagenda.techtarget.com/definition/MQTT-MQ-Telemetry-Transport>
- [9] Cope, Steve. "How MQTT Works - Client Connections." Steves Internet Guide, 2019, [www.steves-internet-guide.com/mqtt-](http://www.steves-internet-guide.com/mqtt-)



# ARDUINO – SMART HOME FIRE SENSOR

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**Abstract**— Fire outbreak are regularly disasters in Malaysia happen due to the carelessness or weather. Instant fire alerting system is important to make sure the fire outbreak will not spread widely. Arduino - Smart Home Fire Sensor is an automatic fire alerting system which are capable to detect fire, smoke, body movement, and GPS that can provide the location of the incident. Arduino Mega has been used to integrated with all the sensor. The system will be calling for emergency immediately and sending message to alert the fireman and it can recognize the signaling to identify fire ahead of schedule as to initiate various action. This project used GSM module to send the message Via SMS from the Arduino board, then nodeMcu used for getting data to transmit to firebase database. Lastly, this prototype has been successfully developed in achieving the objectives of this project.

**Keywords**—SMS; Prototype Model; Arduino Mega 2560, GSM module, Firebase Web Server;

## I. INTRODUCTION

Fire outbreak are regularly disasters in Malaysia happen because of the carelessness or bad weather. Instant alerting to the fire department is necessary to ensure the fire outbreak will not spread widely before it can lead to damage of property and deaths by accident. Every minute can save many lives in such situations. This project will propose an automatic fire alerting system that instantly and automatically alerts the fire department and informs about the situation so that immediate action can be taken.

This project is call “smart house fire sensor” is built for the automatic fire alarm system that can give the alert message instantly by using Arduino mega 2560 that can read the rising of temperature, sense smoke, and can sense human body movement inside the house. In this era, most of the house are not outfitted with these devices, which it cannot send the message directly to the fireman to inform the house is in threat or harms by flames in

the house. It really suitable for people who are rarely at the house or always outstation doing their job. Furthermore, to prevent the fire start spreading, this project provides the device that can notify about the fire to alert from the precautions to save our property in the house before getting damage by fire

## II. RELATED PROJECT

### A. IoT Based Fire Alarm and Monitoring [1]

The successor has planned an internet of Things (IoT) using the Galileo Board unit for fireplace alarm and observance system to responds to the instruction on sensors best fitted to industrial and residential applications. the objectives in this article is to develop the programmable Galileo Board primarily fire alarm and monitoring based with sensible sensors. The main component of fireplace is extending exponentially accordingly time detection of fireplace is important for fend off a serious accident. During this paper, an IoT platform will integrates with this system to sense smoke, flames, and the increase in temperature and remotely send to a far-away observance station through GSM to come up with needed directions for the activates. Lastly, the sensors are installed in three difference location to notify the precise of fireplace hazards that has taken places

### B. Fire Detection System With GSM Using Arduino

In this project, the successor research about the home security fire related risk needed to special attention. An ideal gas detector will be used to discover the presence of a dangerous LPG leak in anywhere like cars, service station of cylinders, tank, homes etc. however this detector senses flammable gases like isobutene, propane, LNG and cigarette smoke [3]. It is used the LPG sensor sense explosive gas leakage, then the output of the sensor increases, and the high signal is monitored by using

Arduino Uno and will analyze the increasing high temperature. During this paper, An Arduino is employed that is interfaced with parts like exhaust fan, buzzer, G.S.M module, L.E.D. and the MQ-5 device. The Arduino is set up in such a way that just in case of outflow, it is detected by the microcontroller and it provides a sign via buzzer, L.E.D. and a message is distributed to individual mobile variety when a delay up to 5 seconds. This Arduino Transmitter Pin (Tx) will connect to the Receiver Pin (Rx) of GSM to make a connection between both devices and the other way is Ground Pin (GND) of each is shorted [3]. Lastly, in this project is about the sending message of GSM by using Arduino. This can be good example of the project to send the message to the mobile if the microcontroller active.

### III. RESEARCH METHODOLOGY

The research methodology that been use after all the action and design are using the waterfall model because it is full method of software system that develop in this project. The waterfall model required one by one step which are planning, analysis, Design, Coding, Testing and Deployment. Besides that, using this model is straightforward and easy to use when one section acts because the input for the subsequent section consecutive.

This model easy to use and straightforward to understand and it is easy to manage due to the specification of the model that is every section has specific deliverables of the method. Moreover, during this model sections there are processed and has completed to one at a time and also the phase is not overlap from one.

#### A. Phase 1: Requirement

Requirements phase is the first phase for Waterfall development model. There are focusing on defining and capturing the needs and problems in this fire alarm system. There are focusing on defining and capturing the needs and problems in this fire alarm system.

#### B. Phase 2: Analysis

This phase has been done by working through the details of each requirement, studying and analyze the latest system and defining and set up the project requirements all of the work to be done. Although, in this phase it is to identify which is the hardware and software resource requirements, and research model is identified, along with the strategy process to implement the project

#### C. Phase 3: Design

The purpose on this system is at designing and implementing an IoT on fire alarm system by using Arduino, as the capability to the functionalities work on the system. During the design phase, this are the topology for the fire alarm system that is designed and architecture topology for the system is created

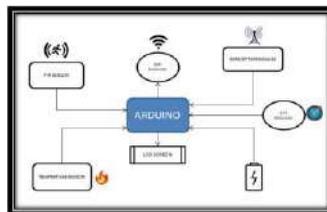


Figure 1: Basic Framework

The proposed of fire alarm system is to prove reliable for critical safety system like continuous monitoring and control of heat and humidity parameters of the temperature and it has several functions that can be deployed in the house to collect data from the environment, such as temperature, body movement, and house conditions. In addition to the sensing capabilities, the main function of Arduino is to detect the temperature and detect human body.

#### D. Phase 4: Coding

The purpose of the coding or construction phase is to implement the requirements according to the design made during the design phase for the fire alarm system that give a target to the sensor that implement in this project. This is the coding phase in which the realization of the abstract ideas and concepts takes place. Besides that, it is use Arduino IDE to do the configuration to catch the signal from sensors

### E. Phase 5: Testing

For testing phase, aim for the testing of software to ensure that the devices and application are complies and correctly implements the requirements given. The testing is also about to search and capture the function in the application required to fire alert system by using Arduino microcontroller.

### F. Phase 6: Deployment

The last phase is about the deployment of the fire alert system, Once the functional and non-functional testing is done, the product is deployed in the user environment which is leads the users to use the system and to prevent for some mistake that can broke the system. There also will have some modification to this fire alarm system until it will run successfully and should be verified to identify whether the data and the design implemented meets the requirements of the project system or not. Lastly, for the conclusions can be made based on the correctness and completeness of development and operation in testing phase process of the system.

### G. Network Diagram

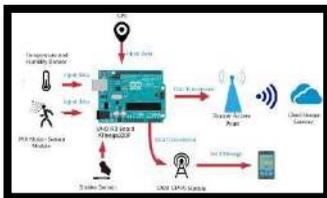


Figure 2: Network Topology

In this project, Arduino board will be the main brain for the project and connected to several hardware modules and power supply will connected to the Arduino board using cables. Temperature sensor will monitor the temperature surroundings of the house, PIR sensor will detect the human body movement, The GSM/GPRS modules will send the message, GPS will get the coordinates of longitude and latitude and send it to GSM/GPRS and firebase web server. Arduino Microcontroller also will be connected to the Access Point that consist of Internet Connection using Wi-Fi module. The client will be connecting

to the cloud storage gateway from the Local Area Network. To use the gateway, client need to login by using their email to access for authentication to get through the internet. Lastly, LCD Screen will display after the data is transmit

### H. Project Development Flow

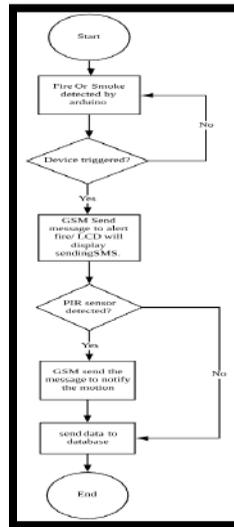


Figure 3: Flowchart

## IV. RESULT AND DISCUSSION

In this chapter, the testing and result of this project will be showed, and it will be discussed. After all the software and hardware are completely assembly, installed and programmed. Every output or result are obtained will be carefully evaluate and verified by data collection, analysis and discussion. The project testing phase is conducted to make sure the prototype function accordingly and all the devices assembly to achieve this project's goal. After that, all the data formed when the prototype is finalizes and its collected to see the result after the prototype being test. This project has been done indoor and the analysis is included after the result has been displayed. The prototype has been programmed to send the message if the smoke or temperatures are reached its limit and when PIR sensor detect the human

motion. Which are the temperatures has been read above 40°C and the smoke has reach 400.



Figure 4: Final Prototype

Figure 4 shows the final prototype, all the hardware that are implemented is put into the box and ready to use to collect the data. This prototype will be place on the area that can be easily to detect the fire outbreak such as kitchen, living room and bedroom. For the data to be receive, the temperature reading need to be rise to above 40°C or smoke value above 400. The Arduino board will be triggered and send the data, GSM module will transmit the data by sending the alert that contain the alert message. Last temperatures reading and coordinates of GPS that use in google maps link will display at the firebase web server.



Figure 5: Temperature and humidity reading of surrounding inside the house

Based on the Figure above, it shows the reading of temperatures and humidity of surrounding area. By default, the room temperatures will be on 30 and above, and if the temperatures drop to 30°C the humidity reading will drop to 60% and below. The emergency alert message will be sending when the temperatures verge to above 40°C or smoke value has reach above 400. The reading in this Figure show the temperatures may be lower than 35°C and the humidity percentage can be low than 70%. In that case, the reading output it definitely sure that the house is on safe condition.



Figure 6: GSM module sending message to alert fire

Figure 4.3 shows the GSM module sending message to alert the fire outbreak, the sensor continuously reads the temperature until it detects the abnormal heat and the temperatures has reach their limit. The GSM modules will transmit the data to alert message by sending message to authorities for help, the LCD will be display as “Sending SMS” for the action by Arduino board.



Figure 7: The display show detecting for motion inside the house

Based on the Figure above, after the fire or smoke has been detected, it will continue with the motion detection surrounding the area by using PIR sensor. The sensor will be searching for heat of human body in 7 meters away from the sensor. After that, if the motion has been detected, it will send the message to notify that the house has the human motion.

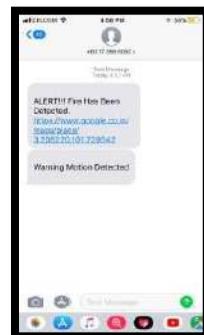


Figure 8: Message received from GSM Module

Figure 8 show that the message received to authorities' number by alerting the fireman about the fire outbreak. First, if the temperatures are reach its limit or its sense the smoke, it will get the first message that alert to the fireman and the longitude and latitude location will show through google maps. The reading of the GPS may not too accurate as the actual incident location, it is about 5m-10m from the exact location. After its sense the fire, it will be detecting human body heat to notify about the people who are need help inside the house. After the motion has been detected. The GSM modules will send another message to the fireman. So, the fireman will know about the situation inside the house and various action can be made.



Figure 9: Log Data from Firebase Web Server

The following Figure 9 above, this project will use firebase Web Server as a database that store the data from Arduino board. This is the log data that has been tested in real area where there are two places In Kuala Lumpur. First, it needs to register the user by their Gmail to access the firebase web server. Then, it shows the log data of the incident which are the temperatures and humidity value, the PIR sensor Value, and longitude and latitude. In this Figure, if the value of PIR is reach 700 above, it means it has been able to detect body temperature inside the house and transmit data from the sensor.



Figure 10: Target Area Location

Based on Figure 10, it shows the pinpoint GPS location that has been transmit from Arduino to get the target area on google maps browser. the actual place is at tar villa apartment at Setapak, the GPS point on the location is not too accurate but it is easy to find the location of the incident

#### A. Analysis

In analysis phase, for the motion sensor had been done by collecting the data from the sensor and compare it with the distance.

Distance between PIR sensor and Object (Meter)	Motion Sensor
1 Meter	Yes
2 Meter	Yes
3 Meter	Yes
4 Meter	Yes
5 Meter	Yes
6 Meter	Yes
7 Meter	Yes
8 Meter	No

Table 1: Result of Motion Sensor

From the table its show the result of the comparison between Distance between PIR sensor and Object that has been collected. Besides that, it can conclude the best placement of these prototypes 3-5 meters from door and window room in case some of victims try to escape.

#### v. CONCLUSION AND RECOMMENDATION

Throughout the project development, all the sensor that implement in this project are successfully function effectively which are the temperature and humidity to measuring the temperatures surrounding the house. The output of the temperatures reading clearly shown in LCD display. Besides that, the GSM modules successfully send the alert message into an authorized phone number via SMS. The location of the incident also included in that message and it can be view by google map website or apps. In this project, firebase is a web server that can stored the data of the incident which are the temperatures and humidity value, PIR sensor value and the longitude and latitude of the incident.

REFERENCES

- [1] [1] Tiwari, S., & Bandopadhaya, S. (2017). IoT Based Fire Alarm and Monitoring System. Shuvabrata Bandopadhaya International Journal of Innovations & Advancement in Computer Science IJIACS ISSN.
- [2] [2] Rajani, S. U., & Kadari, A. A. (2017). GSM Based Home Security System Using PIR Sensor. International Journal of Electronic and Communication Technology.
- [3] [3] Simmi Sharma, M., Singh, D., Singh Rathore, S., & Bansal, P. (2017). Fire Detection System with GSM Using Arduino. Imperial Journal of Interdisciplinary Research.
- [4] [4] Zandamela, A. A. AN APPROACH TO SMART HOME SECURITY SYSTEM USING ARDUINO.
- [5] [5] Imteaj, A., Rahman, T., Hossain, M. K., Alam, M. S., & Rahat, S. A. (2017). An IoT based Fire Alarming and Authentication System for Workhouse using Raspberry Pi 3. In ECCE 2017 - International Conference on Electrical, Computer and Communication Engineering. <https://doi.org/10.1109/ECACE.2017.7913031>
- [6] [6] Healey, G., Slater, D., Lin, T., Drda, B., & Goedeke, A. D. (1993, June). A system for real-time fire detection. In Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (pp. 605-606). IEEE.
- [7] [7] Vujović, V., & Maksimović, M. (2015). Raspberry Pi as a Sensor Web node for home automation. Computers & Electrical Engineering, 44, 153-171.
- [8] [8] Erden, F., Toreyin, B. U., Soyer, E. B., Inac, I., Gunay, O., Kose, K., & Cetin, A. E. (2012). Wavelet based flickering flame detector using differential PIR sensors. Fire Safety Journal, 53, 13-18.
- [9] [9] Pedersen, R. D., & Lemelson, J. H. (1998). U.S. Patent No. 5,832,187. Washington, DC: U.S. Patent and Trademark Office.
- [10] [10] Zhang, J., Li, W., Han, N., & Kan, J. (2008). Forest fire detection system based on a ZigBee wireless sensor network. Frontiers of Forestry in China, 3(3), 369-374.
- [11] [11] Chen, T. H., Yin, Y. H., Huang, S. F., & Ye, Y. T. (2006, December). The smoke detection for early fire-alarming system base on video processing. In 2006 International Conference on Intelligent Information Hiding and Multimedia (pp. 427-430). IEEE.
- [12] [12] Lee, Y. M., & Sohn, K. R. (2015). Fabrication of smart alarm service system using a tinyflame detection sensor based on a Raspberry Pi. Journal of the Korean Society of Marine Engineering, 39(9), 953-958.

# REHABILITATION STROKE ARDUINO SYSTEM THERAPY GLOVE

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**Abstract**— Nowadays, stroke has become one of the leading causes of adult incapacity and stroke is also the top ten causes for hospitalization in Malaysia. Nevertheless, stroke is a disease with a huge concern of sickness in the patients. Arduino Therapy Glove is a device that is used by the patient so it can serve as an assistant device and provide feedback while performing stroke rehabilitation therapy both at home and hospital. Arduino UNO, Arduino Nano, two Bluetooth, and three types of sensors will be used in this project. The main function of the sensor unit is to provide the main unit with information from all sensors that has been connected to the Arduino microcontroller board. The three sensors that connected directly to the Arduino, which are an accelerometer, force sensitive resistor, and flex. Accelerometer function is to measure the perimeter related to force generated from arm movement. Next, the flex sensor will provide the device with the information needed regarding the angle value between lower and upper arm. After that, force sensitive resistor is suitable to detect the muscle force due to muscle flexion and an extension activity.

## I. INTRODUCTION

Stroke is one of the well-known factors of long adult incapacity and also the top ten factors for hospitalization in Malaysia. Furthermore, stroke is a disease with a huge concern of sickness in the patients. Patients can also have a risk of getting another stroke increases and also the probability of suffering a heavy incapacity when the patients survive the first stroke. However, with medical and technological advances nowadays, patients can cope and recover easily with their help. One of the effective ways for stroke patients is occupational therapy because it's the way stroke survivors can to restore their mobility and reduce future liability. Rehabilitation long-term goal is to improve the function of the hand so that the stroke survivor can

become as independent as possible when doing work in their daily lives.

In this project, low budget Arduino Therapy Glove had been used so it can serve as an assistant device and provide feedback while performing stroke rehabilitation therapy both at home and hospital. Furthermore, based on people nowadays, Arduino was used because of the hardware and software are easy to use. To read inputs, a finger on a button, light on a sensor, turning on LED, activating a motor, publishing something online by transferring a set of information of what we needed to the microcontroller on the board.

The main operation of the sensor unit is to supply the main unit with data from all sensors that have been connected to the Arduino microcontroller board. There are two sensors that connected directly to the Arduino, which is an accelerometer, force sensitive resistor, and flex. Accelerometer function is to measure the perimeter related to the force generated from the arm movement. Next, the flex sensor will provide the device with the information needed regarding the angle value between the lower and upper arm. After that, force sensitive resistor is suitable to detect the muscle force due to muscle flexion and an extension activity.

Therefore, this project can read the feedback of all the activities that the patients do during the rehabilitation therapy using PLX-DAQ. It is a software that been used by displaying the information that has been collected from the Arduino board. Furthermore, the software also can be used to display the real-monitoring statistic of the exercises.

## II. RELATED PROJECTS

### A. *Arduino Based Arm Rehabilitation Assistive Device*

The work represented during this paper concerned the appliance of many sensors and therefore the portable data logging method of development within the development and design of monitoring device for home-based arm rehabilitation. They intend to provide a system that's can assist the rehabilitation for upper limb related patients or post-stroke patients by gaining the needed results that might also encourage them by making sure they to further use the device for their exercises. The portable data logging capabilities could enable clinicians to provide an organized set of data on a daily basis each time the user does the workout at their home and try to remote monitoring

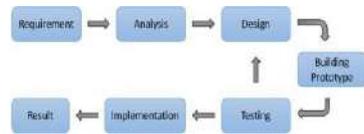
### B. *Interactive Glove for Mobility Training and Rehabilitation after Stroke*

This thesis describes creating a glove using a repetitive design method, which might implement many hand exercises to manage a computer mouse and keyboard. The core of the glove is that the Arduino Leonardo microcontroller, that is connected to completely different sensors stitched into the glove for the exercises. Hand exercises, like wrist joint extension and flexion or finger lifting, are accustomed to control the computer in a simple means as possible. For instance, to simulate an arrow key keystroke, the user should apply pressure on his/her fingertips where force sensors are situated within the glove.

### C. *A Kinect-based Monitoring System for Stroke Rehabilitation*

Therapists can analyze and monitor the stroke patient's motor skills with clinical tests to individualize clinical interventions. During a clinical session, a therapist will create a task-oriented exercise for a patient and request self-reporting of the patient's adherence to exercise plan. However, outpatients, who cannot receive feedback, sometimes show low attachment to these exercises, resulting in sparse self-reports. It is tough for therapists to follow the patient's progress. To manage this challenge, this paper defines a Kinect-based monitoring system that can evaluate performance and provides real-time feedback for four-stroke rehabilitation exercises.

## III. RESEARCH METHODOLOGY



### A. *Phase 1: Requirement*

Requirement Phase is the step for understanding what needed for the development of this project. The requirement phase will compromise the objective that needed to be completed at the end of this project.

### B. *Phase 2: Analysis*

Analysis Phase is the next step is to identify the concept of this project and understanding what this project is about. Next, this phase also involves identifying what the hardware and software and lastly estimate the costing budget for it. Furthermore, this phase categories what method of methodology needed to be used in this project and to estimate the time needed to finish this project.

### C. *Phase 3: Design*

The design Phase involves the development of the layout of the overall system and network design that needed to be deployed. The design phase is further used to analyze the status of the system by building the feedback between the end user. For the implementation of this project, various type of exercises will be tested to integrated with the system so the end user comfortable when doing exercises.

### D. *Phase 4: Building Prototype*

This phase involves building the first prototype with involvement with the end user. After the layout of the overall system and network finish, the process of developing the prototype will be implemented according to the requirement needed by the end user. Furthermore, during the implementation of the prototype, the end user will give a lot of feedback on the system because the end user is the main factor for completing the requirement needed for the prototype.

### E. Phase 5: Testing

This phase will involve the testing of the prototype. In this phase, we will check the overall status of the system for any problem that might occur during the testing phase with the end user. If there is any problem that occurs during the testing, we will move to analyze what the problem is and try to solve the problem and record them for future reference. Furthermore, this phase also involves for checking if the requirement for the project has been met or not, and if the requirement does not been met, we will go to the design phase back to check the requirement needed to be met.

### F. Phase 6: Implementation

The implementation phase involve the complete prototype that has to meet the requirement of the end user. This phase also where all the sensor and system work perfectly to integrate with the real monitoring device for the end user to see. Next, a detail testing phase will also be implemented to check and analyze all the delay, error or any type of problem. So, using the prototype methodology in this project, the implementation phase will take place a lot of tests to try and error.

### G. Phase 7: Result

In this phase, the outcome of the result of the complete prototype has been finalized and all the objectives of this project have been met. The result then will be concluded and ready to execute. The end product has been completed and ready to be used by the end user.

## IV. RESULT AND DISCUSSION

This chapter was carried out to get the result of the output that has been required by testing the prototype in the project. The result of this output can be obtained through analysis, discussion, and data gathering. After the hardware has been assembled and the software installation has been completed without any problem, the system testing can be conducted. After that, when the data had been produced by the prototype, the data will be collected to get the result of the testing. The flex sensor, accelerometer, and force sensitive resistor (FSR) sensor had been programmed to collect all the data needed for analysis during the therapy glove exercise activity. This project has been developed based on the stroke patient rehabilitation therapy case study. All the stroke patient hand

condition needs to be collected so that the result that's been needed can be obtained.

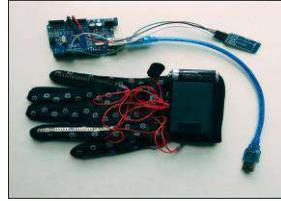


Figure 4.1: The Hardware of the Prototype

Based on Figure 4.1, the hardware has been connected between all the modules and sensors and has been put in the casing to collect the data needed for the activity. The prototype will be put on hand to collect the data for the movement of the hand during the exercise activity that has been given. To collect the data needed, the user needs to bend and grip the finger, put pressure on the palm and the wrist area, and lastly move the hand up, down, right and left. The example of the hand movement has been shown in the figure below for better understanding.

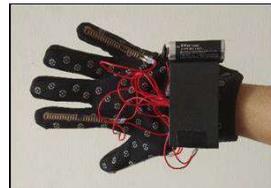


Figure 4.2: The Therapy Glove Prototype

Referring to Figure 4.2, before the user starts to do the exercises activity, the user needs to connect the power of the Arduino Nano board the battery that had been implemented besides the casing. The battery power needed to power-up the Arduino board is 9 volts. When the Arduino board has been power-up, then the exercises activity can be started



Figure 4.3: Accelerometer Sensor Movement

Based on Figure 4.3, to collect data using the Accelerometer sensor, the user must follow the set movement that had been shown. The value of data will be shown as Accelerometer X for left-hand movement, Accelerometer Y for right-hand movement and Accelerometer Z for up and down hand movement. Figure 4.4 below show the data of the accelerometer and real-monitoring statistic value when doing the exercise activity.

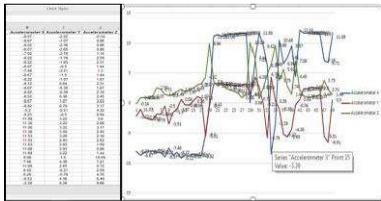


Figure 4.4: Data logging and Real-monitoring Statistic in Excel

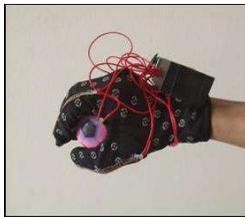


Figure 4.5: Force Sensitive Resistor (FSR) Sensor Movement

Following Figure 4.5, this is another handset movement for force sensitive resistor (FSR) sensor. This type of exercise had been conducted to collect data on the pressure that had been put on the palm and the wrist area. The value of the data will be shown as Force Sensor 1, for palm and Force Sensor 2, for the wrist. Figure 4.6 below shows the data of the force sensitive resistor and the value of the real-monitoring statistic.

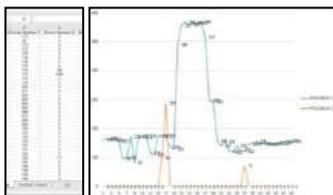


Figure 4.6: Data logging and Real-monitoring Statistic in Excel

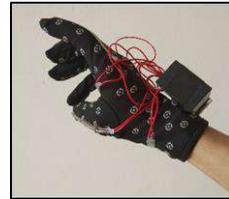


Figure 4.7: Flex Sensor Movement

Next is the testing for the flex sensor. Similar to accelerometer and force sensitive resistor sensor, Figure 4.7 also shows the handset movement for the force sensor. There three flex sensors that had been implemented into the therapy glove and the respective value will be shown as Flex Sensor 1, for thumb finger, Flex Sensor 2, for the index finger and Flex Sensor 3 for the pinky finger. Below, Figure 4.8 show the data for the flex sensor and real-monitoring statistic value.

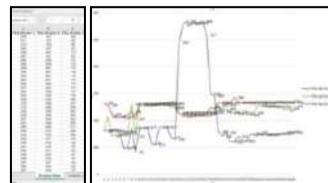


Figure 4.8: Data Logging and Real-monitoring Statistic in Excel

## V. CONCLUSION

This project is designed for a stroke patient who has a hand problem to do the exercises activity during rehabilitation therapy using the therapy glove that has been developed. This is because with therapy glove, the therapist or doctor that specialist for this therapy can get the data needed to see the improvement or any discomfort during the stroke patient do the exercises activity. However, the potential seems not to meet all the requirements needed for data activity but meet the requirement for user feedback. Apart from that, the therapist or doctor can check the flexibility of the fingers, pressure when gripping the finger or ball that had been provided, and lastly movement of the hand such as up, down, right and left. This prototype ready to be tested on real stroke patients that required them to check the data feedback of their exercises.

REFERENCES

- [1] Kooi, C. W., Peng, H. C., Aziz, Z. A., & Looi, I. (2016). A review of stroke research in Malaysia from 2000-2014. *Med J Malaysia*, 71, 58-69.
- [2] Global (2018). Arduino UNO. Retrieved from [https://en.wikipedia.org/wiki/Arduino\\_Uno](https://en.wikipedia.org/wiki/Arduino_Uno)
- [3] Ambar, R., Ahmad, M. S., Ali, A. M., & Jamil, M. A. (2011). Arduino based arm rehabilitation assistive device. *Journal of Engineering Technology*, 7(2011), 5-13.
- [4] Hiob, M. (2016). Interactive glove for mobility training and rehabilitation after stroke. Certec report
- [5] Lee, M. H., Siewiorek, D. P., Smailagic, A., & Bernadino, A. (2019, March). Learning to assess the quality of stroke rehabilitation exercises. In *Proceedings of the 24th International Conference on Intelligent User Interfaces* (pp. 218-228). ACM.
- [6] Jacobson, Anne McCarthy PT, DPT, MS (2011). Stroke Recovery and Rehabilitation: *Journal of Neurologic Physical Therapy*. 47-48.
- [7] Lipovsky, H. Ferreira (2015). Hand therapist: A rehabilitation approach based on wearable technology and video gaming. Retrieved from <https://ieeexplore.ieee.org/document/7088817/keywords#keywords>
- [8] Leo Louis (2016). Working Principle of Arduino And Using it As a Tool For Study And Research: *International Journal of Control, Automation, Communication and Systems (IJACS)*. 1:2.
- [9] Jirapon Sunkpho, Chaiwat Ootamakorn (2011). Real-time flood monitoring and warning system: *Songklanakarin Journal of Science and Technology*. 33:227-235.
- [10] National University of Singapore (2017). Smart, ultra-thin microfibre sensor for real-time healthcare monitoring and diagnosis. Retrieved from <https://www.sciencedaily.com/releases/2017/11/171116092411.html>



# UBUNTU NETWORK PLATFORM FOR NETWORKING STUDENT (NETSYS OS)

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*Abstract— Nowadays, the networking students don't have any operating system that focuses for learning section. Moreover, studies related to the ability for the students navigate the type of platform operating system between Window and Linux are scant. This research aims to develop an operating system that be able to integrate with networking tools based on Ubuntu. The project has installed with the necessary software needed throughout the Networking System Course, new Graphical User Interface and has developed Live USB distributions to simplify the installation process. This project can eliminate licensing cost software and save time to download required tools by the networking student of University Kuala Lumpur Malaysian Institute Information Technology (UniKL MIIT). Verification & Validation model is used in this research to develop this project because it is related to develop a software or application step by phase and do the clear requirement analysis that needed from networking students. User Testing is implemented during testing phase to measure of how this project can meet the requirement by the networking students. Extensive formal documentation and guideline to use NetSys Operating System were developed to improve the student's experience.*

**Keywords—Linux; Ubuntu; Operating System; Live USB; User Testing; Antivirus; Intrusion Detection System**

## I. INTRODUCTION

NetSys OS is coming out as the application that can be used by students in the conjunction of the networking system program. NetSys OS is a very useful project especially for learning use. Through NetSys OS, the students will never complain about the Internet Connection problem and their own computer failure such as that a program is not responding during shutdown process to lose valuable and often irreplaceable information.

Key research question that demands an answer is: how is NetSys OS perceived by students in terms of usability, integration of functionality and need for technical support in UniKL MIIT when compared to currently Windows Operating System? To address these questions, user testing is conducted to examine the factors among students and lecturers regarding NetSys OS

NetSys OS will be compressed into Live USB. The main function of NetSys OS is to prepare complete tools and programs that will be used by Networking System student from Semester 1 until 7 under one operating system. The applications that developed are more on networking system core programs. The applications in NetSys OS comprises are hacking, computer forensics, programming, packet tracer tools, and others. Besides, NetSys OS also will be add-on the lesson plan based on networking system learning. NetSys OS moreover be implemented with IDS to ensure the students are running a specific program is secure.

The rest of this journal is structured as follows. First, identification of the operating system as learning platform, Ubuntu Linux as main platform in NetSys OS and User Testing are outlined. Next, a brief review of the tool testing used for the study and result testing are provided. The study concludes with recommendations for future research.

## II. LITERATURE REVIEW

### A. *Operating System as Learning Platform in Higher Education Environment*

The Learning platform is a tool that provides lecturers, students and administrators get access to the resource, communication tools, and information not just within the universities but outside organization too. An operating system is a program that permits a computer to run and execute the programs. It is knowing as the main program in a computer which can control the computer's operation and make other programs to function. According to Silberschatz and Galvin (1994), "An operating system defined as a middle program between the users and the computer's hardware" [1].

Nowadays increasing of demanding labor market and a technology inventive society, computer skills are more important than ever. Previous studies have reported basic operating system skills are gradually increasingly taken for approved (Joao Dias, Sandro Tavares, Amparo Carves, 2012). As [2] argues that the students cannot install any additional software in the computer at college for security purpose even they have their own private login authorizations. If they need new applications, they must make a formal request to the IT department and it can lead to time-consuming. This shows that the free operating system needs to be created for education purpose and can get access by students in higher education

### B. *Ubuntu Linux as Main Platform in NetSys OS*

The Linux operating system has become the famous choices of the operating system compared to the Microsoft Corporation which is installed on almost all new personal computers. Usage of Linux Operating System (OS) in the class is increasing (Maurice Dawson; Brittany DeWalt; Simon Cleveland ,2016). This shows that higher education preferred to use Linux Operating system compared to Window Operating system.

Ubuntu is an operating system (OS) based on the Debian GNU distribution which is open source software. Ubuntu integrates with the features of a Unix OS with customizable GUI, which makes it popular among student's universities and organization

Ubuntu is a complete Linux based operating system targeted for higher education [4]. This show Ubuntu Operating System is a perfect platform that can use as a platform in this project for students in higher education.

### C. *User Testing as a method to test NetSys OS with the users*

Testing is the phase after the implementation phase to test the software or application. This phase is a very important step to make a sure customer satisfied with the software.

In this research, User Testing is chosen as a testing tool to test this operating system with the students in higher education. J.M. Christian Bastien (2008) concludes the user testing to specify or clarify the test procedures and at defining and developing tools to help conduct user tests. It seems the usability evaluation in user testing to ensure that interactive systems are adaptive to the users, the tasks and no negative outcomes of their usage

## III. RESEARCH METHODOLOGY

This research used qualitative research methodology. The instruments used to collect the data were Survey Monkey questionnaire online and User Testing. The qualitative data for the research came from the User Testing. The testing method was utilized to confirm the findings from the questionnaire as well as to triangulate the data collection methods.

Twenty-three respondents were involved in the User Testing. Ten questions were prepared after using and testing the operating system. This testing method further explored the acceptance and need of an operating system for educational purpose among of Networking Students in UniKL MIIT

In March 2019, the Live USB NetSys Operating System is distributed through pen drive. A total of 23 respondents which are 5 lecturers and 18 students from Networking System Section at UniKL MIIT tested the operating system. Of these numbers, 12 were male students while the rest 11 were female.

During the User Testing, there are five variables will be used to analyze the data which are integration, technical support, the performance of an operating system, usability and security.

#### IV. INSTRUMENT

This study used the Monkey Online Statistics by combining some of questions from System Usability Scale (SUS) template to guess the usability, integration and need for technical support of each component in NetSys OS. By having the statistics of user testing, can evaluate whether NetSys OS can be implemented in UniKL MIIT as supplementary education to the student and lecturers.

In this study, the respondents were asked the following 7 questions with responses ranging from Excellent to Very Poor on a 5-point Likert Scale

1. How do you rate the functionality of NetSys OS in terms of performance?
2. How do you rate the graphical user interface design (GUI) of NetSys OS?
3. How do you rate NetSys OS in term of user friendliness?
4. What do you think of the useful of NetSys OS in term of education purpose?
5. How do you rate the functionality of Nets ' Anti-Vir in term of graphical user interface and usability of each function?
6. How do you rate the functionality of Nets ' IDS in term of graphical user interface and usability of each function?
7. How do you rate the Welcome of NetSys OS start-up application in term of user-friendliness?

Besides, the respondents were asked the following other 6 questions with responses YES/NO scale

1. Do you think NetSys OS can be implemented in class/computer lab for learning purpose of Networking System Student?
2. Do you think NetSys OS can help the students to save their time to download required tool during the class or assignment?
3. Did you find the various functions in NetSys OS well integrated?
4. Do you prefer NetSys OS can be implemented for learning purpose?
5. Do you think you need any guide or technical support to be able to use NetSys OS?
6. Did you encounter any difficulty while using NetSys OS?
- 7.

The analysis of testing data will be recorded into the Monkey Survey. The results will be presented through descriptive statistics.

#### V. RESULT & ANALYSIS

Commissioning and testing covered the activities in preliminary tests, functional performance test and the commissioning of newly installation and existing after major alteration. All the listed the software and tools in NetSys OS that have been undergo commissioning and testing process. The purpose of commissioning and testing is to verify proper functioning of all the software after installation and performance of installed software met with the function through the test and adjustments.



Figure 1 Integrated Application

The menu application as in Figure 1 provided in NetSys OS if the users clicked on Networking System Tab



Figure 2 Syllabus

Under Syllabus, NetSys OS provide the syllabus notes for networking system core program and sort by semester

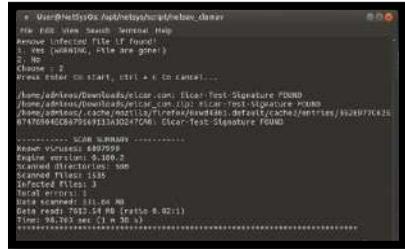


Figure 5 Result Nets Anti-Vir

Nets Anti-Vir based on ClamAV able to detect many types of malicious software include virus and generate scan summary after scanning



Figure 3 Welcoming Screen

Welcoming Screen as in Figure 3 will pop up automatically. There are several buttons that can aid the users in using NetSys OS



Figure 6 Nets IDS



Figure 4 Nets Anti-Vir

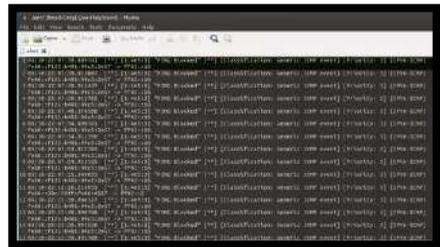


Figure 7 Result of Nets IDS

Nets'IDS based on Snort can aid the users to detect any alert from illegal intruders

## VI. ANALYSIS USER TESTING

Live USB have been distributed to the 5 lecturers and 18 students from Networking System Section in UniKL MIIT. Of these numbers, 11 were female respondents while the rest 12 were male. Live USB of NetSys OS have been tested by 23 respondents in the duration for 1 hour each person. The respondents are given the link of online questionnaire to get the result of user testing of NetSys OS

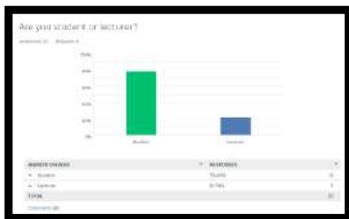


Figure 8 The Respondents

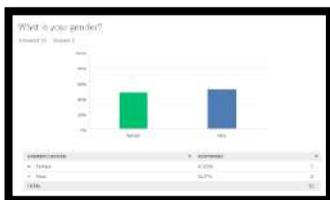


Figure 9 Gender of Respondents

While NetSys OS is easy to learn because it is different from traditional operating system. Interface of NetSys OS has been developed with features of Ubuntu that make it easily adoptable by Window's users (Noyes,2011). While both interfaces appear different, certain GUI feature remain similar. This study found that majority of respondents (60%) considered NetSys OS is not complex

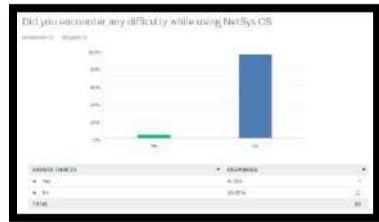


Figure 10 Level Difficulty NetSys OS

In term of difficulty to use, based on the Figure 8, the results showed that nearly one fifth (4.35%) found the NetSys OS is not easy to use over whole (95.65%) where undecided. It can be argued that NetSys OS's interface lacks complexity.

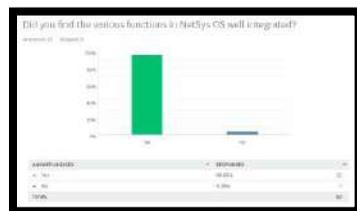


Figure 11 Integration Application/Function

Moreover, most of 95% respondents agreed as shown in Figure 9, in their perception that various function in NetSys OS were well integrated.

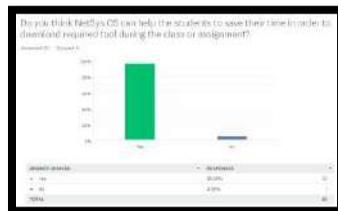


Figure 12 Save Time During Learning Session

Other than that, the respondents (95%) also agreed that by having NetSys OS can help them to save their time in download the tools required by the students as shown in Figure 10.



Figure 13 The Likert Scale of Applications NetSys OS



Figure 14 Result 1 of Likert Scale



Figure 15 Result 2 of Likert Scale

In NetSys OS also has own customized antivirus, Nets-Vir and IDS, Nets'IDS. The respondents also experienced to use both applications. Majority of respondents stated that the applications is easy to use and not complex at all by having simple Graphical User Interface.

Other than that, the Welcome of NetSys OS start-up application has majority good responses due to its user-friendliness. (Refer to Figure 11, 12 & 13)

Usability is considered as usefulness, effectiveness and fulfilment specified when users achieve specific goals in an environment (Bevan,2009). Research has proposed several

methods to measure usability. These includes product-oriented and user-oriented such as user performance and user interaction (Bevan,2009). In this study, the usability of NetSys OS was approached from the perspective of the user-oriented approach which consider who the users are, what they know and how they learn.

In this study, Human User Interface (HUI) and Graphical User Interface (GUI) were have been overserved as the main perspective integration of the operating system. User interface means a way for the users to interact with application or website.

While, In NetSys OS using Ubuntu 16.04 Mate environment. The interface for Networking System Section placed in the listed in Application Menu tab. The user just clicks on Application button, then next go to Networking System Bar, all the networking or related tools are there. There is no need to scroll up or down for it. On the other hand, interface of Nets-Vir and Nets'IDS ease the users to use them just click any button as simple

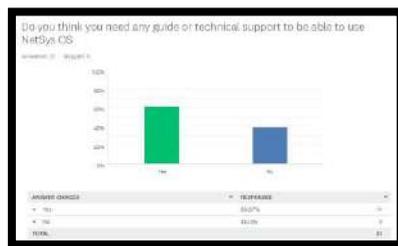


Figure 16 Technical Support

Technical support is defined as providing representative to help the users in solving some common problems in system. In this study, technical support is consultation and helping the users during installation of operating system on installed and virtual environment. Moreover, higher need for technical support can be regarded as a negative factor toward cost reduction and ease of use

In term of technical support analysis, Figure 4-29 stated that the respondents (60%) agreed with the statement that they would need the

support of technical person to be able to use NetSys OS.

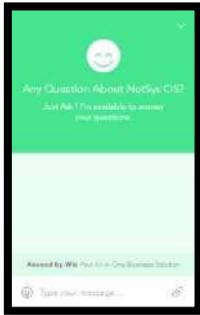


Figure 17 Live Chat

Live Chat is created after majority of respondents require technical support.

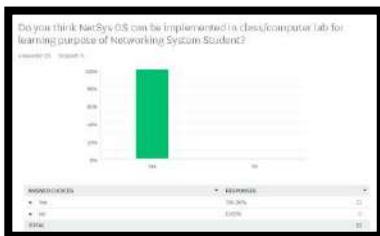


Figure 18 Implementation in class

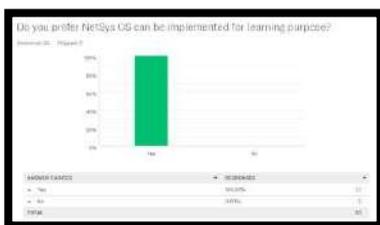


Figure 19 Implementation for Learning purpose

The most important findings of this study were that 100% of the respondents strongly agreed with the statement that NetSys OS can be implemented in computer lab/class for learning purpose in UniKL MIIT as shown in Figure 16 & Figure 17

In a future study, the researchers will replicate the study using random larger sample and include structured interviews to improve reliability of the results.

## VII. CONCLUSION

NetSys OS serves as education platform that aid by Nets Anti-Vir and Nets IDS which can be filtered any threats that detected in system NetSys OS. NetSys OS also go through several network tools, security tools and syllabus that can assist the students in learning process take place. This project help to understand the concept of network and security.

Throughout this project, there were few research questions had been attempted: How NetSys OS can be perceived by the users in term of usability, integration of functionality that have been developed and need for the technical support in UniKL MIIT when compared to Windows 10. For this purpose, several factors from NetSys OS were examined (mainly performance, usability, integration, technical support and security).

While the findings demonstrate the users require technical support and NetSys OS can't be converted to ISO, the study is limited. Since NetSys OS have been developed to help the students and lecturers in learning and teaching session, majority of the users agree NetSys OS to be implemented as supplementary for education Networking System Study. Future studies should attempt to examine the factors through prism of different instruments and with a greater number of subjects.

For the future recommendations NetSys OS to have NetSys OS own server. By having this feature can help the users to download and update the latest version from the server. Besides, NetSys OS is implemented in Virtual Desktop Infrastructure (VDI) to ease the user can access future NetSys OS at any time anywhere if there is network connectivity.

## VIII. REFERENCES

- [1] Silberschatz, A., Galvin, P. B., and Gagne, G. (2013). *Operating system concepts* (Vol. 8). Wiley.
- [2] Joao Dias, Sandro Tavares, Amparo Carvas and Pedro Sa Silva. (2012). Open source Operating System for students: EOS Project. OSDOC '12 Proceedings of the Workshop on Open Source and Design of Communication, 79-83
- [3] Dawson, Maurice; DeWalt, Brittany; and Cleveland, Simon (2016). The Case for UBUNTU Linux Operating System Performance and Usability for Use in Higher Education in a Virtualized Environment. *SAIS 2016 Proceedings*. Paper 23
- [4] Abhimanyu Sharma, Bhuwan Mukhia, Neha Thapa, Ravi Kr Prasad and Arvind Lal. (2016). A review on Linux Distribution as Future Operating System. *International Journal of Scientific & Engineering Research*, Volume 7, Issue 4.
- [5] J.M. Christian Bastien. (2010). Usability testing: A review of some methodological and technical aspects of the method. *International Journal of Medical Informatics* 79, (e18-e2)



# LoRaWAN – WATER METERING SYSTEM

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**Abstract—** LoRaWAN (Long Range Wide Area Network) is designed to allow low-powered devices to communicate with Internet-connected applications over long-range wireless connections. Smart water metering system is to read water usage using a smartphone or laptop by accessing the open-source cloud. The water supply companies are having difficulties to consistently send workers on site to read and calculate the customers' water meter every month. Thus the main reason is to develop smart water metering system uses LoRaWAN as the medium. A software development model is defined for this project which is the Prototype model. It is developed based on the currently known requirements. It also enables the user to interact with the product to understand the requirements of the desired system. The system critically analyzed by the conducted tests. There are two tests conducted which is remotely read the water meter by using smart devices and to test the range of communication between LoRa Node and LoRa Gateway. The tests show that the range between the LoRa Node and LoRa Gateway can communicate is 320 meters and it can remotely read data from the water meter by using smart devices. The analysis shows that it met the water metering system's objectives. The prototype has been proven that it can be useful for the workers of water supply companies.

## I. INTRODUCTION

To measure how much water was used will require a device that is called the water meter. Water meter is similar to gas or electricity meter. By using the water meter, the water supply companies can read and calculate how much to charge for water used and sewerage services. The amounts that need to pay depend on how much water has been used. The traditional way of reading and calculate the usage of water is a waste of energy and resources. Every month the workers of the water supply companies need to visit each house to read and calculate the reading on the water

meter and then the water supply companies will send a bill for the charges. It can be improved by implementing the Smart Water Metering System using Long Range (LoRa).

LoRa is a wireless technology that has been developed to enable low data rate communications to be made over long distances by sensors and actuators for machine-to-machine (M2M) and Internet of Things, (IoT) applications [1].

In this project, it used a low-cost budget LoRa Node. LoRa Node consists of Arduino and LoRa module combined together. Then the sensor installed to it. Arduino is an open-source computer hardware and manufactures single-board microcontrollers for building digital devices that can sense and control objects in the physical and digital world. Arduino boards are available commercially in preassembled form or as a do-it-yourself kit.

Therefore, this project can read and calculate how much to charge for water used monthly by using a Cloud-Based system. It can remotely read the water usage.

## II. EASE OF USE

### A. *Managing the water distribution network with a Smart Water Grid*

This paper [6] implement a Smart Water Grid system that supplies good water 24/7 to its customer by supports the Public Utilities Board (PUB)'s mission which is located in Singapore. The PUB is the Singaporean statutory board of the Ministry of the Environment and Water Resources responsible for ensuring a sustainable and efficient water supply. The Smart Water Grid equipped with sensors and analytic tools that are deployed island-wide to provide decision support system and real-

time monitoring. Next, the Smart Water Grid system also enables PUB to manage the water supply network efficiently. This will ensure that all Singaporeans will continue to enjoy a sustainable and reliable water supply for generations to come. Moreover, the main aspects of the Smart Water Grid system are the customers' end (automated meter reading and water conservation) and water distribution system (asset management, leak management, water quality monitoring). Implement real-time sensing methods and data analytical tools in the network operations to achieve real-time monitoring and modeling of water quality in the entire water distribution system. The aspect of the customer's end and water distribution are what the PUB seeks

### B. Smart Water Meter System for User-Centric Consumption Measurement

This paper [7] introduces the water management system based on wireless sensor networks (WSN). To create a robust and intelligent system it uses the IEEE 802.15.4 standard embedded in ContikiOS LibCoAP as an open-source application. Visualization and monitoring of the system can be gain by following the development of a web-based system and through Pandora FMS. This paper implements a smart water management system to assist users in obtaining real-time data for real-time analysis. A real-time data for water consumption provided to the user since it monitors consumption as a whole while creating various visual graphs of the collected data and represents them in a readable manner to the customer. Focus on the continuous development of analogue water meters for greater accuracy or to consider how the raw data can be linked to the billing utility are not allowed for the scope of the paper. Smart water meter systems increase time efficiency and adequacy, by reducing less human interaction for the traditional method of acquiring the water meter measurement. This system can be adapted for use in other domains like gas or electricity it can be count as an advantage.

### C. Web-Based Knowledge Management System: Linking Smart Metering To The Future Of Urban Water Planning

This paper [8] discusses the potential role of smart metering for the future of water planning and management in Australian cities. To make it happen, a Web-Based Knowledge Management System (WBKMS) is proposed that integrates

smart metering to get the information of end-use water consumption data. It is also a wireless communication network and information management system in order to provide real-time information on how, when and where water is being consumed for the consumer and utility.

There are two distinct factors on the concept of smart metering which is the meter that use new technology to capture water use information and communication system that can capture and transmit water use information as it happens or almost as it happens. Three functions are performed by smart water meter that is they automatically and electronically capture, collect and communicate up-to-date water usage readings on a real-time basis. As an addition to the existing architecture of the smart water metering system, comes the development of WBKMS. The WBKMS can monitor water consumption and provide real-time information about what, when and how water is consumed. The main functions of WBKMS are collecting real-time water consumption data through a smart water metering system, transferring and storing the data into a knowledge repository and analyzing the data and producing a wide range of reports that can be accessed online by a broad range of users. WBKMS allows the end user to login into their web page to be view when they feel like it. The WBKMS have online alarms that will be generated to indicate potential causes for excessive water use which will help consumers to take corresponding water saving actions.

## III. RESEARCH METHODOLOGY

### 3.1 Network Diagram

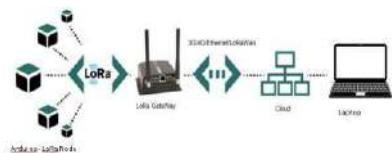


Figure 3.1 Network Diagram

Arduino – LoRa Node configured to connect to the LoRa Gateway using LoRa. Use the water flow sensor to detect water usage. The connection is to let the water flow data send from Arduino – LoRa Node to the Cloud (ThingSpeak). From the LoRa Gateway to the Cloud can use connection such as

3G/4G/Ethernet/LoRaWAN. The user (Laptop) can check the water flow data by accessing the Cloud (ThingSpeak).

### 3.2 Flowchart

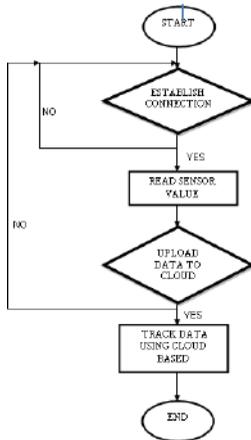


Figure 3.2: Flowchart

Figure 3.2 describes on establishing the connection after switch on the LoRa Node and LoRa Gateway. The connection can be checked using the terminal on Raspberry Pi. If there is no connection established, the coding need to be check again to make sure it is properly configured. After the connection well established, start reading the sensor value on the Arduino IDE serial monitor function. The sensor triggers if there is water flowing through it. Then the data sent to the LoRa Gateway and the next step is upload to the cloud-based which is ThingSpeak. Lastly, track the data by monitoring the graph on ThingSpeak.

### IV. RESULT AND DISCUSSION

After the development process, the output obtained by running the prototype. The output displayed on cloud-based ThingSpeak and showed on the graph. System testing conducted when all of the hardware and software has been integrated. The collected output analyzed based on the graph. This project is developed based on a smart water meter system.

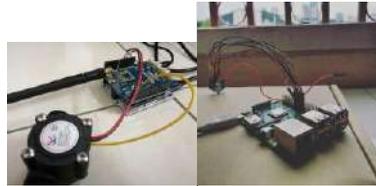


Figure 4.1: The Hardware Prototype

Figure 4.1 shows that the LoRa Gateway has been gone through modifications from time to time. It is because of the RFM95W Transceiver Module 915Mhz does not fully functional. The Transceiver Module has been re-soldered. Two extra wires just in case if there is any re-modification needed. Then the LoRa Gateway can be put in a casing. Hence, for LoRa Node there is no modification needed. It only needed pipe for the flowing of water and casing for Cytron Uno and LoRa Shield.

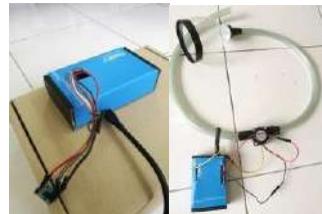


Figure 4.2: Final Prototype.

Figures 4.2 shows the final stage of prototype, all of the hardware put in the casing for safety of the hardware. It would be bad if the water pour accidentally drop onto the hardware. On the left side is LoRa Gateway and on the right side is LoRa Node. The first simulation is to remotely read the water meter by using smart device such as Laptop and Smart Phone. Turn on both hardware and start pouring the water from funnel to let the water flow to the end of pipe. At the end of pipe, there is a bucket waiting to be filled with water. The result showed on ThingSpeak (cloud-based) by referring to the graph. ThingSpeak can be used on Laptop and Smart Phone. The second simulation is to test the range of signal that links the two devices, LoRa Gateway and LoRa Node. LoRa Gateway put in a house near balcony where the radio frequency has won't be block by any obstacle near it. LoRa Node placed far from house to test the range of

communication. LoRa Node powered up by using power bank



Figure 4.3: Data Entry Chart From LoRa Node To LoRa Gateway.

Figure 4.3 shows two types of simulation has been done. The left chart is to remotely read the LoRa Node. It stated the Date, Time and Reading of the sensor. The value for water is in milliliter (ml). In every 20 seconds, the data is sent from LoRa Node to LoRa Gateway. The right chart is to test the range of communication between LoRa Node and LoRa Gateway. Compared on the left graph this one has more data entry because of data sent in every 10 seconds. By testing the range of communication there is no need to pour any water into the pipe. The confirmation of communication can be seen by referring to the entry of data on the graph.

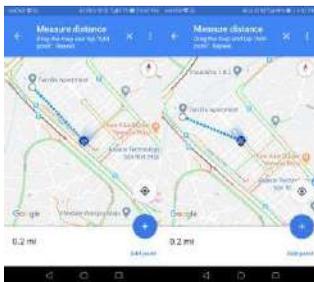


Figure 4.4: Measured Distance From LoRa Node To LoRa Gateway

Figure 4.4 shows that the LoRa Gateway was placed at level 6 Tarvilla Apartment. It is in a house on a balcony. LoRa Gateway powered up from a plug while LoRa Node powered up with a power bank. The first test held at the ground floor of Tarvilla Apartment. The communication is a success until it reaches the maximum range which is 0.2 miles (320 meters). There is no more

communication between LoRa Node and LoRa Gateway when it passed the maximum range. It can be concluded that is the range limit of the communication between these two prototypes. From the figure above it also can be concluded that it is cover in 320 meters radius.

## V. CONCLUSION

The conclusion is the prototype successfully achieved both of the objectives. The water flow sensor installed on LoRa Node can read the water usage. The water usage can be read remotely because of the LoRa technology used. It was successfully communicated between the LoRa node and LoRa Gateway on a far distance which is 320 meters. The pinpoint location for LoRa Node and LoRa gateway can be seen on Google Map apps. The prototype is ready to be used in a real environment to read water usage.

## REFERENCES

- [1] Poole, I. (2015). LoRa Wireless | LoRa Long Range M2M IoT. Retrieved from <https://www.radio-electronics.com/info/wireless/lora/basics-tutorial.php>
- [2] Yan, J. (2014). *Machinery Prognostics and Prediction Oriented Maintenance Management. Machinery Prognostics and Prediction Oriented Maintenance Management.* <https://doi.org/10.1002/9781118638743>
- [3] Zlatanov, N. (2016). Arduino and Open Source Computer Hardware and Software Arduino and Open Source Computer Hardware and Software, (November 2015). <https://doi.org/10.13140/RG.2.1.1071.7849>
- [4] What is Open-Source Cloud? - Definition from Techopedia. (n.d.). Retrieved from <https://www.techopedia.com/definition/29856/open-source-cloud>
- [5] The Things Network. (n.d.). The Things Network. Retrieved from <https://www.thingsnetwork.org/>
- [6] Water, S. (2016). Managing the water distribution network with a Smart Water Grid. *Smart Water*, 1(1), 4. <https://doi.org/10.1186/s40713-016-0004-4>
- [7] Mudumbe, M. J., & Abu-Mahfouz, A. M. (2015). Smart water meter system for user-

- centric consumption measurement. In *Proceeding - 2015 IEEE International Conference on Industrial Informatics, INDIN 2015* (pp. 993–998). <https://doi.org/10.1109/INDIN.2015.7281870>
- [8] Stewart, R. A., Willis, R., Giurco, D., Panuwatwanich, K., & Capati, G. (2010). Web-based knowledge management system: Linking smart metering to the future of urban water planning. *Australian Planner*, 47(2), 66–74. <https://doi.org/10.1080/07293681003767769>
- [9] (n.d.). Retrieved from <https://www.realvnc.com/en/>
- [10] A DIY low-cost LoRa gateway. (n.d.). Retrieved from <http://cpham.perso.univ-pau.fr/LORA/RPIgateway.html>
- [11] Aqib, M. (2018, October 21). Raspberry Pi Sending data to ThingSpeak | Simplest Raspberry Pi IOT Project. Retrieved from <https://electronics hobbyists.com/raspberry-pi-sending-data-to-thingspeak-simplest-raspberry-pi-iot-project/>
- [12] CongducPham. (2019, May 22). CongducPham/LowCostLoRaGw. Retrieved from <https://github.com/CongducPham/LowCostLoRaGw#installing-the-latest-gateway-version>
- [13] ChrisSamuelson. (2018, March 25). LoRa - Raspberry Pi - Single Channel Gateway - Cheap! Retrieved from <https://www.hackster.io/ChrisSamuelson/lora-raspberry-pi-single-channel-gateway-cheap-d57d36>
- [14] Instructables. (2017, September 27). How to Use Water Flow Sensor - Arduino Tutorial. Retrieved from <https://www.instructables.com/id/How-to-Use-Water-Flow-Sensor-Arduino-Tutorial>



# POWER TRIP MAIN SWITCH CONTROL THROUGH NETWORK COMMUNICATION SYSTEM

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**Abstract**— Power trip main switch control through network communication system is a project to control and monitor the electrical main power for home and industry. It is a safety system that apply to minimize damage for home electrical equipment, humans & animals due to electric shock. The main idea is to control the system of main switch ELCB which also able to monitor the current state of the main switch ELCB. Nowadays most of all buildings especially at residential area and shoplot are equipped with a main switch ELCB. With this project, when the main switch ELCB cut off automatically, it will send notification via phone so that the user is notified and gain fast respond to switch it back on just by using the phone at anywhere around the world. There is lack of IoT project for main switch controller in the market, so with this prototype, it will lead towards more opportunity in the market to bloom. This project consist of 4 main component, database log(thingspeak), ELCB motor controller, micro-controller(arduino), UPS(uninterruptible power supply).

## I. INTRODUCTION

As we know today ELCB is managed manually by mechanical switch which or by hand itself and have a constrained characteristic which might be can't distinguish and cannot notify the user if it permanent or temporary fault had occur. The main problem comes when there is no one home at home whenever the power of main switch ELCB trip took place.

Electricity continuity and reliability are very critical and so crucial to a domestic building. The electrical home appliance which need to be constantly turned ON. And if the occupants leave the building for a certain time of period, fridge, and aquarium air flow gadget need to stay ON. When some of gadget and devices are disconnected or turned OFF, it will cause some troublesome for the owner.

This project is aimed at switching on the main switch or mainly known as an ELCB that is 'kicked' or power off automatically at domestics. In this project when the main switch gets high load capacity, such as thunder lightning or high burden household goods it will trip off and cut all the electricity. By using the application, a notification will send to the smartphone via android apps to notify the user that a power trip had occur. The notification will help the user to react fast to turn the switch back on. The project is integrated with android applications through this application the main switch can communicate to notify the user.

## II. EASE OF USE

- A. *Development of Earth Leakage Circuit Breaker to operate automatic Reclosed Using PIC Microcontroller*

This paper discussed the ELCB of incorporated the use of the GSM modem, Then the consumer be alerted for the scenario of the ELCB at domestic. In

the course of the main switch ELCB power tripped, and the LCD monitor will display the power is off. The greatest of downside GSM modem was more than one customer shares the identical bandwidth. And with enough of customers, all the transmission can come across many kinds of sort interference. Some of other disadvantage of GSM modem is that it can intrude with certain amount electronics. Such interference is due to the reality that GSM makes use of a pulse transmission generation. As an end result, many places like hospitals and airplanes require mobile phones to be turned off.

### B. Development of Auto Re-Closer Earth Leakage Circuit Breaker

This paper gives an overview of by developing an AR-ELCB unit if there were faulty occurred, ELCB will close back automatically after three seconds. But if the faulty is eternal/permanent fault like from electrical, electronic device or short circuit ELCB will eternally trip and the permanent warning light will on until the fault root cause is cleared and the switch is “on” back by someone again. Perhaps the greatest disadvantage of this project is that without knowing the condition of any faulty trip of ECLB and automatically power on itself are quite dangerous. This can cause serious damages in the future if it continues power back on without knowing or keep track of the power tripping.

### C. Development of Earth Leakage Circuit Breaker with an Auto Recloser Unit

This paper gives an overview of by developing an AR-ELCB unit if there were faulty occurred, ELCB will close back automatically after three seconds. But if the faulty is eternal/permanent fault like from electrical, electronic device or short circuit ELCB will eternally trip and the permanent warning light will on until the fault root cause is cleared and the switch is “on” back by someone again. Perhaps the greatest disadvantage of this project is that without knowing the condition of any faulty trip of ECLB and automatically power on itself are quite dangerous. This can cause serious damages in the future if it continues power back on without knowing or keep track of the power tripping. This paper explains how PSpice works and help to combine with ELCB. PSpice is a software circuit and virtual logic simulator program that operate inside Microsoft operating systems. At some stage

in the primary ELCB power tripped, the LCD monitor will show the main switch power is tripped.

PSpice permits consumer to choose particular additives with enterprise preferred part wide variety and specs. searching for those additives can take up extra of the consumer’s time whilst building the circuit. Within the situation without the power backup supply can be a huge problem.

## III. RESEARCH METHODOLOGY

### 3.1 Network Diagram

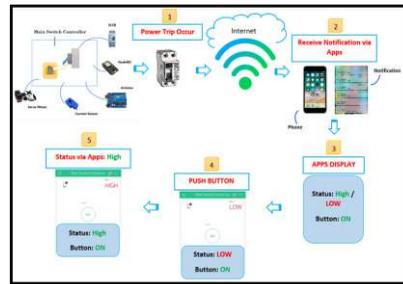
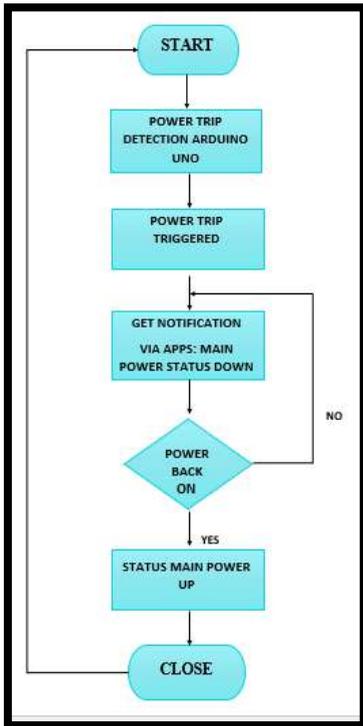


Figure 3.1 The basic framework of the device operation

Base on Figure 3.1 the focus on developing a main ELCB IoT device consists of 4 main components, database log(ThingSpeak), ELCB motor controller, micro-controller(Arduino Uno), UPS (uninterruptible power supply). Application setup with the micro-controller of the ELCB. In this system, it can integrate between ELCB with the servo motor and the notification will help the user to react fast to turn the switch back on. The project is integrated with android applications through this application the main switch can communicate to notify the user.

### 3.2 Flowchart



3.2: Flowchart

Figure 3.2 show about the project flowchart. Turning on the devices will activate all the modules to online. First of all, after the power trip has occur the microcontroller will detect through the current sensor. Later the user will get notify via application. The status on the application will display “Low” equal to down. User be able to control the power back on by using the application. If it successful, the ELCB will turn back on. The current status on the application will show “High” equal to up. If it does not succeed if will turn back to the step before and will get the notification back and start the process back. And process will keep refresh every 15 second before proceeding to the starting cycle.

### IV. RESULT AND DISCUSSION

Within this chapter, the result is about result that has been acquired by testing the project. The output can be obtained by data gathering, analysis, and discussion. System testing is conducted after all the hardware assembly and software installation is complete and fully functional. After that, the data produced by the prototype were collected to see the result after being a test. This prototype project is developed based on two main environments which are a type of weather such as a lightning storm or faulty home electrical appliance. All of the environment needs to be simulated so that the result can be obtained.

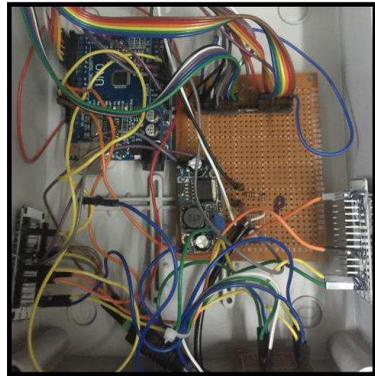


Figure 4.1: The Connected of prototype

Refer to Figure 4.1, it is shown that the hardware that has been connected between all the module and sensor before putting in on the casing for more organized. For the first time execution, after the power tripping occurs, the data will transmit between the ELCB to the application which by using Arduino Uno communicate with the NodeMCU. The status within an application will show either the power is a trip or not. For testing purpose, this system has been tested in a simulated area. The prototype has been installed at domestic places which is apartment indoor area.



Figure 4.2: Completed Prototype.

Refer to Figure 4.1 the final prototype. The prototype all the hardware that has been assembled been put together into a box and casing also attach to the wooden block. The prototype prepared by combining all the hardware and installing all important software programs that needed to run the programming code to complete the end product. The prototype will execute with different main created environment setup which is if there a thunderstorm and faulty home electrical appliance. But if there's any other environment can make this testing works it will be considered.



Figure 4.3: Blynk apps notification.

A notification was received through Blynk application as soon after the ELCB has been trip. This communication takes place within the micro-controller which is Arduino Uno and interact with the Wi-Fi module which is NodeMCU by sending the data that has been received to the application on the user smartphone. Figure 4.3 represent the notification of the Blynk apps.



Figure 4.4: Blynk apps interface.

Based on the Figure 4.4 the interface of the Blynk application that has been set up to interact with the user. The main component consists of this prototype are notification, status, and button. Notification is among crucial component the application interface for notifying a user if there any power trip occurs. Besides that, component status for indicating the real-time, if it shows "High" means the power is up and if it shows "Low" means the power is down. Last but not least button component for the user to interact to switch back power back on if there's any power trip occur.

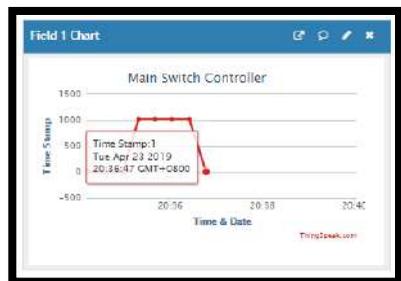


Figure 4.5: Chart of Time Stamp Down.

The prototype will continuously transmit the data to ThingSpeak even the ELCB wasn't tripped. The Web Server will receive the data and display it as a graph in real time. In the graph will show the time stamp of the power is up or down. Moreover, then speak keeps the data and can export the data to excel for more information. Besides using the application, as the user, they also can monitor through the web server. If the ELCB was tripped, the graph will drop down and will update every 15 until 20 seconds as shown the figure 4.5 above.



Figure 4.6: Chart of Time Stamp Up.

When the prototype has been turning back on, as we can see in Figure 4.6 above, the graph will rise back, indicates that the power ELCB has turned back up. The graph will continue updating itself every 15 until 20 seconds. Based on the graph it easily as a user to keep track the date and time when the power trip happens if it rarely or frequently happens. With the data has been collected it's easier for a user to analyze and come out with findings.

## V. CONCLUSION

Throughout all the way project development, the prototype has been successfully and achieved all the objective that has been discussed in the early of this report. The notification will help the user to react fast to turn the switch back on by using a smartphone also with the help of the application and web server, they can always monitor the status of the main switch ELCB. I have concluded that the project can display and analyze the data as well as the application of the main switch can communicate to notify the user.

## REFERENCES

- [1] Ayub, M., & Anuar, M. (2013). Automatic earth leakage circuit breaker with backup supply (Doctoral dissertation, Universiti Tun Hussein Onn Malaysia).
- [2] Coheq, V. (1996). Electrical shock and fire hazard protection conquering the limitations. *Water and Energy International*, 53(2), 61-66.
- [3] Accardo, D. (2012). *Lightning Protection*. Wiley Encyclopedia of Composites, (October). <https://doi.org/10.1002/9781118097298.weoc124>
- [4] Use of Rcb As Advanced Protection in Low Voltage. (n.d.), 1-7. Retrieved from <https://github.com/ladisk/pyDIC>
- [5] Boylestad, R. L., & Nashelsky, L. (2012). *Electronic devices and circuit theory*. Prentice Hall.
- [6] Mohd Azraie, S. (2007). Automatic tester device for earth leakage circuit breaker (ELCB) (Doctoral dissertation, Universiti Malaysia Pahang).
- [7] Wan Mahmood, W. R. (2008). Development of Earth Leakage Circuit Breaker Using solenoid. Universiti Teknologi Malaysia: Bachelor thesis.
- [8] Earth Leakage Circuit Breaker. catalog. Retrieved from [www.peopleelectric.cn](http://www.peopleelectric.cn)

