Development of Road Quality Report System

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Abstract: Nowadays, people face many problems with road conditions and sometimes they do know how to react to road damage. The goal of this project is to develop a prototype capable of aiding in the solving of one of the major problems in urban, suburban, and rural communities which is bad road conditions. The function of this project is to report the road condition to the road maintenance's company without sending a letter or typing a long email to inform them. After one-click after the civilian see the poor road condition, the information will reach by the road maintenance company. The exact location for the terrible road condition is also known by them and in less than 24 hours that road will be repaired. The database of the road report will save in google firebase and the location will be shown on Twitter through the IoT platform. Efficiency in accessing the exact location for poor road conditions that have been reported by the civilians can save thousands of lives all around the world. In a conclusion, the project goal has been successfully achieved in all aspects

Keywords: Road Condition, Road Quality, Hazardous Bumps, Repair, IoT

1.0 INTRODUCTION

The Development of Road Quality Report Button is used to report the poor road condition either holes or hazardous bumps on the road with one click to the road repair's company. The road quality problem may occur in many areas in this world. While this problem occurs for some reason, at that time the maintaining or repairing process related to that road is difficult due to not knowing the exact location of the road problem [1]. The purpose of the project is to detect the exact location of the road problems and repair the road within 24 hours. Within these studies, it is important to learn about the system problem, because it needs to be solved by creating a new system with technology, innovation, and growth. Work on the project needs to be recognized in-depth and explicitly to recognize the barrier to implementing this project in others[2].

One of the benefits of this project is can reduce the time taken for road maintenance or servicing companies to find the real location to repair if the user did a manual road report such as using calling with the cellphone. For some reason, it is necessary to develop methods to ensure a better and qualitative output that also helps analysis, research, and training in the power generation sector. Other than that, these approaches will also help to develop and improve the road reporting system with the exact location and ensure fast road maintenance or repair that can reduce many roads accident caused by potholes[3]. Besides, many drivers believe that reduced traffic is safe and do not know how to handle the challenges of driving at night, but they are sometimes unaware of bumps and holes in any road. Driving at night may cause a lack of vision within 10 to 20 meters when high beam is off and can see within 30 to 35 meters if high beam is on. With speed 100 km/h, the road user may not see what hazardous wait them in front at night. People also sometimes when they drive too long it can distract their focus and this is lead to much accident cases nowadays. That is why this initiative is being planned to keep people at ease with the services user need to have [4]. Figure 1 shows the top view of the prototype.

(a) Handphone Set

(b) Prototype Project

Figure 1: The top view of the prototype.

2.0 MATERIAL AND METHODS

This section will discuss the topics related to the methodology used for The Development of Road Quality Report Button. The implementation of this project must consider all the processes and hardware that will be discussed in this chapter. The software that used for this project is Arduino IDE for coding, Blynk App, Twitter, and Google Firebase.

2.1 MATERIALS

Following are the main material used in this project.

a) NodeMCU

The NodeMCU ESP8266 in Figure 2 is used for the development board that comes with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS, operating at an adjustable clock frequency of 80MHz to 160 MHz. To store data and programs NodeMCU has 128 KB of RAM and 4MB of Flash memory. The high processing capacity with built-in Wi-Fi and Bluetooth features and Deep Sleep Operating make it suitable for IoT ventures.

A microcontroller has one or more CPUs processor cores, along with memory and programmable peripherals for input and output. It is used for automating the operation of car engines, implantable medical equipment, office computers, appliances, power tools, toys and so on. NodeMCU is regulated 3.3V can be supplied to this pin to power the board and can be powered through the USB port. The board has 15 Digital I/O pins, 1 Analog Input pin, also other pins with various functions and Arduino IDE is programmable with C++ language.

Figure 2: NodeMCU ESP8266

b) Push Button

A Push Button in Figure 3 is a type of switch that consists of either a simple electrical mechanism or an a switch mechanism to turn on or off something. Depending o the model they could operate with the function of momentar or latching action. This means that when a button is presse it can cause the release of another button. In this project th aim of using the push button is to act as a remote control t provide microcontroller information about road report. Th remote control will ease the control process of

a microcontroller as function by the coding from Arduino IDE. By pushing the button, the information about the road report will reach the NodeMCU and go-to IoT platform.

Figure 3: Push Button

2.2 METHODS

This section will explain the methods in the development of this project.

a) Block Diagram

Methodology specifics are provided when creating the 'Development of Road Quality Report Button'. This methodology explains the overall project block diagram as shown in Figure 4.
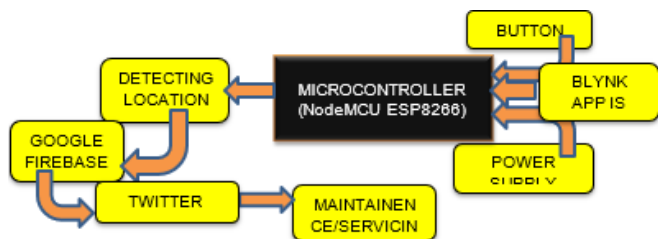

Figure 4: Overall Block Diagram

First, the power supply must be connected to the NodeMCU ESP8266 for the block diagram steps to make it work. The C++ language coding from the PC will be transferred or upload to NodeMCU ESP8266 to control this project's system. All the programs came from the PC. By using the Arduino IDE software to make the ladder coding as well as to monitor the automatic detection mechanism of the exact location of the user when they push the button, the google firebase and twitter coding also in it. It is also important to manage troubleshooting from the PC if a program error occurs. The data will be moved to the NodeMCU ESP8266 after all the software is finished and free from an error to send the machine the order.

Besides, by using the Blynk App to create an IoT platform for updating status of exact location on Twitter. The user needs to click the button that already connected with NodeMCU ESP8266, it will transfer data which is the exact location of the user by collaboration with Google Map. Next, the NodeMCU ESP8266 will appear the blinking of blue light on its RGB LED meaning that the data was successfully

receive by it. After that, NodeMCU ESP8266 will transfer the data through Internet of Things (IOT) platform which is Google Database and the data will read by Blynk Apps again [5]. By then, that data will convert into a status of user's exact location with coordinates by Google Maps. Next, the maintenance and servicing company such as Jabatan Kerja Raya (JKR) will notice the status. Lastly, they will know the exact location for the hazardous bumps and potholes to make some service or maintenance on that poor road.

b) Flowchart of Project

The device is being to start-up which the NodeMCU ESP8266 is connected to the power supply which is power bank and blinking of blue light means that the device is ready to go on next stage. The microcontroller is detecting the Wi-Fi for connecting with IOT platform. If Wi-Fi is successfully connecting by the NodeMCU ESP8266 then Blynk app can connect with the device thought phone. If it is failed to connect with the Wi-Fi the process on detecting Wi-Fi and connecting with Blynk app will be looping until it is successful. After that, the information will transfer from the microcontroller after the button being pressed to IoT platform which is Google Firebase. Finally, the firebase converts the information become the coordinator of location and update the status on Twitter as Google Maps location. The above explanation can be described in Figure 5.
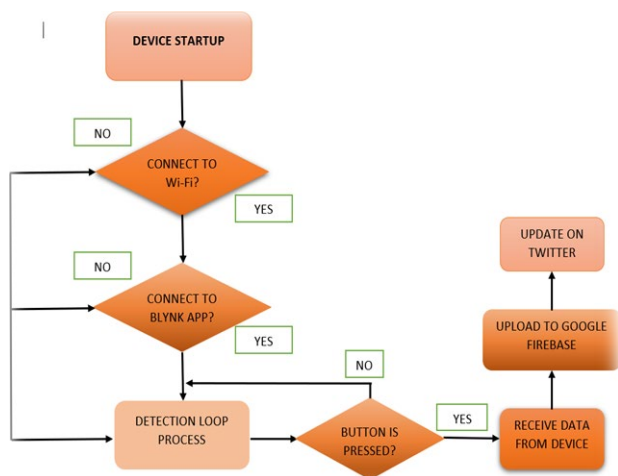

Figure5: Flowchart

c) Circuit Diagram

NodeMCU in Figure 6 is defined as microcontroller or main board for this project and connected with push button. So, pin G at Wi-Fi module is used as ground for push button, while S2 pin is used for live wire also for push button. Furthermore, USB port acted as platform to transfer C++ language coding in computer which is Arduino IDE software into the NodeMCU. This USB port is also used as power supply for this microcontroller which is 5V.
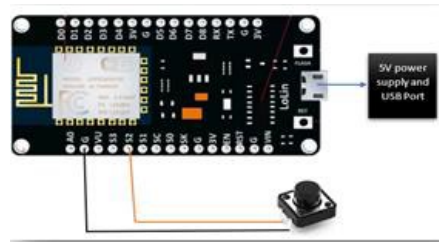

Figure 6: Wiring Diagram of Road Quality Report Button

3.0 RESULT

Figure 7: NodeMCU connection with Push Button

This section explains the result of the electronic circuit component constructed to operate the project hardware. The microcontroller 's connection with the push button must be carefully checked to prevent incorrect connection. This figure shows that the connection of microcontroller which was NodeMCU and push button connection. The push button ground wire which was blue and black wire is connected to G pin. While the live wire of push button which was yellow and red is connected to S2 pin a NodeMCU.

This is the production outcome for the project from the research that has been carried out. Basically, the push button functioned as reporting platform data for the road quality problem. So, when push button was clicked the information will send to the google firebase and the data stay permanent until the user deleted it. The result of this project shown in Figure 8, 9, 10, 11 and 12.
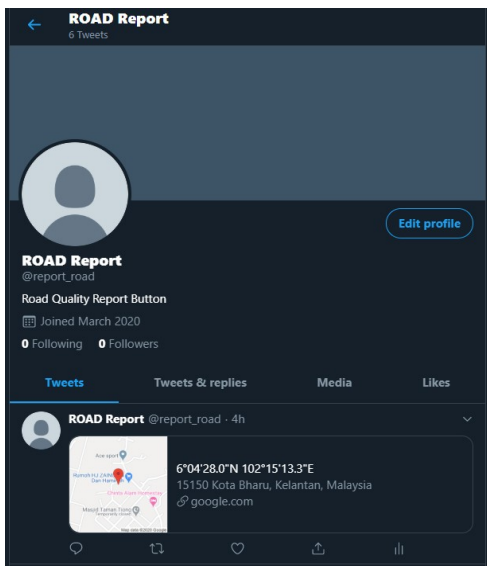
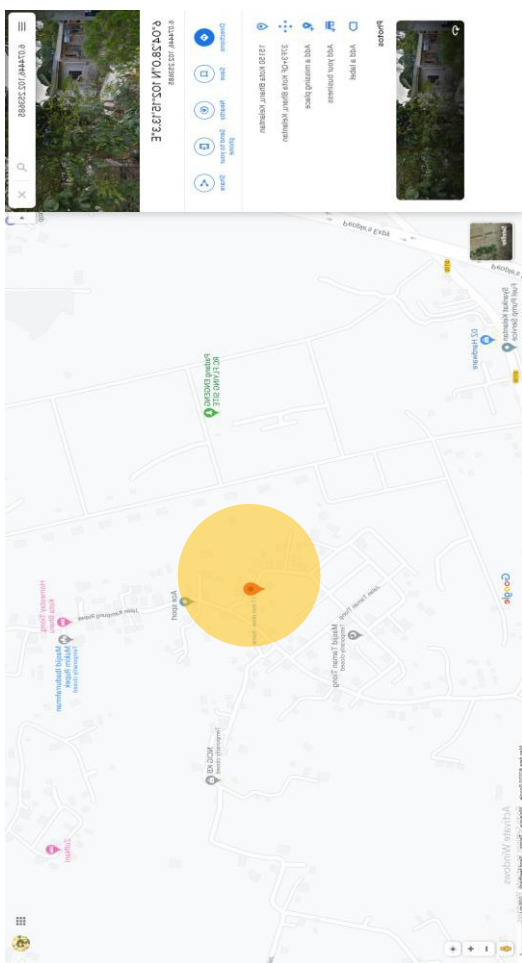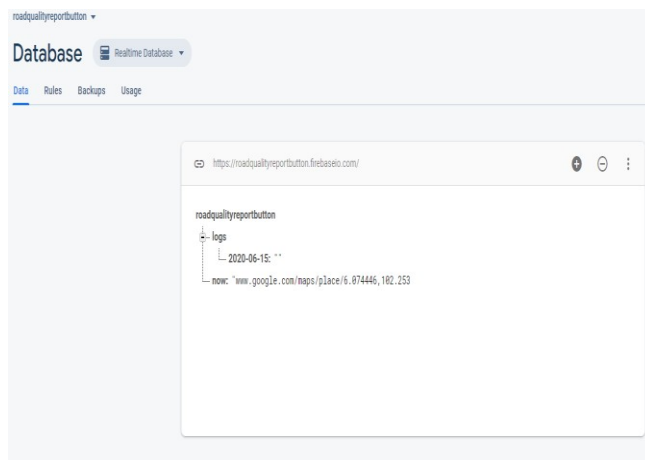*Figure 8: The Twitter platform after button*

Figure 10: Firebase shown that the coordinated for road report.
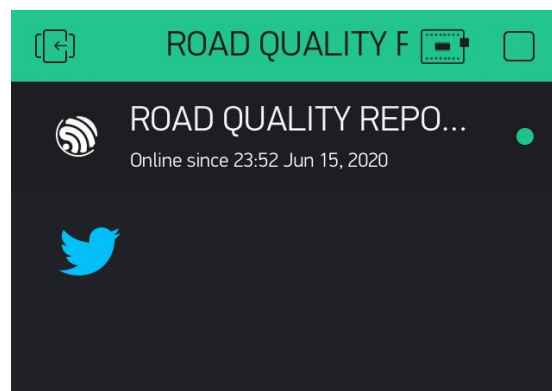
Figure 11: Blynk App related to NodeMCU to create report platform status on Twitter is Online.

Figure 9: The real location of road report on google map at yellow part

4.0 DISCUISSION

Based on this project, the result is gained when Arduino IDE project software and microcontroller coding produces successful results and creates an exact location for the road report. The power supply from power bank gave only 5V to on the microcontroller. The push button connected with the G or ground pin and live wire is connected with S2 at the NodeMCU acted as report platform. Thus, Figure 4.4.1 shows that the project named The Development of Road Quality Report Button system which has already been carried out by the prototype 's thesis, testing and implementation. All the result obtained had solved the statement of problem stating at the beginning of the chapter.

By existing this project in every land type of transport especially car can minimize the poor road condition with one click from the push button, it created the exact location for bad condition of the road. This project will also save many lives from accidents by hitting the pothole on some roads,

particularly in urban areas, as most of them are driving fast. Besides, with this project's road report, a repair or road service can be generated within 24 hours, as the Jabatan Kerja Raya or other road services company knows the exact position for bad road conditions. The explanation can be illustrated in Figure 12.
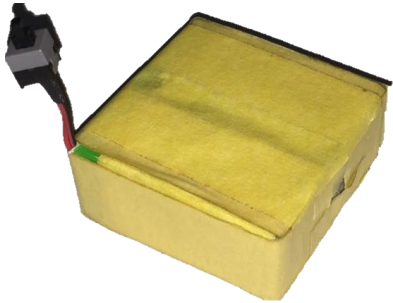

Figure 12: The Development of Road Quality Report Button

5.0 CONCLUSION

It can be inferred from this report that ' The Development of Road Quality Report Button 'has been created to ease the road services company like Jabatan Kerja Raya (JKR) to know the exact location for the poor road condition to be repaired. This project is very important to ensure safety for road users through quick road repair services within 24 hours, the road is being repaired. It also underscored everything important. This project operational is successful and the result and discussion benefit from the production project. The process and the flow of the system operations that made the project work successful is also explained.

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