Journal of Engineering Technology Vol. 10(1): 119-124, 2022
ISSN 2231-8798

Development of Ultraviolet (UV) Light and Photocatalyst Mosquito Trap System

Auni Afiqah Khalid, Azliza Mohamad Arshad
Section of Electronics Technology
Universiti Kuala Lumpur British Malaysian Institute

Corresponding email: azlizaa@unikl.edu.my

Abstract: The Aedes mosquito is one of the most dangerous insects to humans because of its ability to spread the dengue virus. Dengue viruses can potentially spread in tropical countries like Malaysia, where they contribute to the number of deaths of dengue patients. As a result, developing the most effective mosquito protection is critical to reducing dengue virus transmission and disease risk. Existing mosquito-eradication products and methods contain unsafe inhaled chemicals and may cause breathing problems. Furthermore, mosquito surveillance for dengue control employs sticky traps and lacks real-time data for remote monitoring. The goal is to develop an intelligent trap-monitoring system to provide real-time data for remote monitoring. To create an effective mosquito trap, an ultraviolet light and zapper circuit is combined with a mosquito attractant that emits carbon dioxide. This project also incorporates Internet of Things (IoT) technology to create an intelligent monitoring system. The findings show that the prototype effectively captured many mosquitoes and gave real-time data on the number of mosquitoes trapped. As a result, this project can aid in effectively capturing mosquitoes.

Keywords: Mosquitoes Trap, Internet of Things (IoT), Blynk Application

1.0 INTRODUCTION

Mosquitoes are common flying insects that can be found in almost every part of the world, with over 3,500 different species. A mosquito is an insect that bites humans and other animals and feeds on their blood. Female mosquitoes need blood meals to develop viable eggs that will hatch, while male mosquitoes only consume nectar. Itching and swelling are the most common reactions people have when they are bitten by mosquitoes. Mosquitoes may function as vectors in some cases. A vector is an animal, insect, or tick that transmits pathogens (germs) from one person to another. Mosquitoes transmit germs (viruses and parasites) that can make people sick.

The findings of this project are partly driven by how dangerous and risky the dengue fever outbreak was where cumulative dengue cases reached 7443 from December 2020 to April 2021, with four people dying from January 2021 to April 2021 in Malaysia (iDengue Portal) [1]. It is critical to detect the increase of mosquito species so that the Entomology Unit can accurately track the growth or fall of larvae and adult mosquito populations. However, mosquito surveillance for dengue prevention utilizes sticky traps and lacks of real-time data collection to allow for remote tracking of data collection. Manual inspection is used to monitor mosquitoes in current mosquito surveillance thus, this project will significantly contribute to increased mosquito surveillance efficiency.

The modern ways of destroying or eradicating mosquitos and other insects that have now reached the market have gone big with so many innovations. All of these gadgets came on a small scale, were not chemical-free, and required a lot of electricity. As a result, this project aims to improve and incorporate existing mosquito traps and chemical mosquito repellent products. It is important to find a cure and a safer way to kill mosquitos without endangering humans.

2.0 LITERATURE REVIEW

The previous related study which is Effectiveness of Environmentally Friendly Mosquito Trap Contained Sugar Yeast Solution discussed about the most efficient sugar yeast solution to increase the sustainability of the mosquito traps. Because the relatively low-cost output of CO2 isn't always possible to produce, it will be very expensive and difficult to make a longer period of time to use the population as a supply of carbon dioxide to draw mosquitoes into the trap. The research shows that the

plastic bottle mosquito trap with a sugar yeast solution traps mosquitos more effectively than water and controls. This proves that CO2 is very effective as a mosquito's attractant [2].

Tseng, Yuan, Hsiao, Chan, Chen, Ma, Lee (2018) have done research that uses the UV Mosquito Trapping System, which is solar-powered outdoors aims to extend the spectrum of mosquito trapping and identify means of capturing mosquitos with greater efficiency. A photocatalyst (titanium dioxide) coating is also used on mosquito traps to mimic CO2 concentrations in a living environment and improve mosquito trapping effectiveness. A study on mosquito trap system growth measures two 365 nm and 395 nm LED mosquito trapping effects to conclude that, the shorter the light energy's wavelength, the greater the energy. Three conditions, including visions, smells, and temperatures is the key cause of mosquito-attractant. As an ideal configuration module, the two-reflection reflectors and 395 nm UV LED strips have been chosen [3].

Chaiphongpachara, Laojun, Kunphichayadecha (2019) have made a study about the Effectiveness of Ultraviolet (UV) Insect Light Traps for Mosquitoes Control in the Coastal Area of Samut Songkhram Province, Thailand. This paper is investigating the efficacy of UV or blacklight traps in coastal regions. In areas 2 and 4 kilometers from the sea, UV insect light traps to monitor mosquito vectors. Mosquitoes were trapped more effectively in the UV insect light trap 2 km from the sea than in the UV insect light trap 4 km from the sea. This was due to the fact that the environments in both areas were very different. There were saline and brackish water sources 2 kilometres from the sea, which are suitable habitats for coastal mosquitoes. The findings of this study can be used to help prepare and deploy UV insect light traps in mosquito population management [4].

Another related study conducted previously is IoT Based Smart Mosquito Killing System. This paper proposed a system to reduce the population of mosquitoes by using UV light, an electric fence, and an ultrasonic sensor. Ultrasonic sound waves have a recurrence frequency of more than 20 kHz, making them inaudible to humans. It shows that the system can kill up to 35% of mosquitos. It is a low-cost and portable process. It will be accomplished by the use of a web-based site. The main benefit of this device is that it can be controlled through the internet. This device can also be programmed to turn on and off at specific times. UV light is used to attract mosquitos, and a high-voltage electric fence is used to zap them. All of the units are linked to a Raspberry Pi that is connected to the internet. The Raspberry Pi 3 can be controlled wirelessly through the Adafruit cloud [5].

The Enhancement of Mosquito Trapping Efficiency by Using Pulse Width Modulated Light Emitting Diodes discussed a light-driving bug zapper in this study for effectively controlling diseases spread by insects such as mosquitoes. Pulse width modulated light emitting diodes (PWM-LED) combined with a solar power module are proposed and implemented to make the device effective in trapping insect pests in off-grid areas. It has been discovered that by using specific PWM electric signals to drive the LED, the ability to catch insects and the consumed power efficiency can both be improved. When the PWM method is used in the bug zapper experiments, 40% of the UV LED consumed power and 25.9% of the total load power consumption can be saved, and the trapped mosquitoes can be increased by about 250% [6].

3.0 MATERIALS AND METHODS

Essentially, this section contains methodology and studies of mosquito eradication on how exactly this product kill mosquitoes.

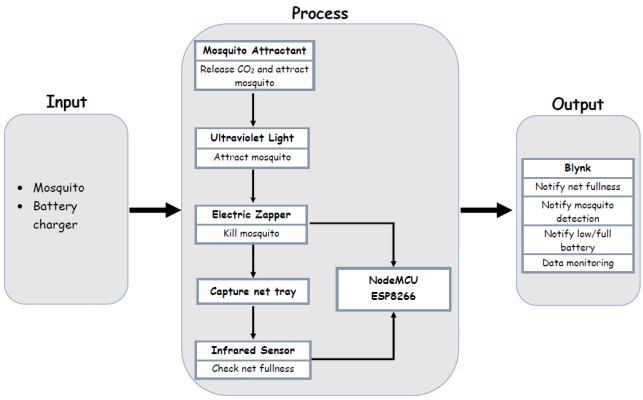


Figure 1: Block Diagram for the entire project.

The main components in the project are an electric zapper, ultraviolet light, and a mosquito attractant that emits carbon dioxide. Ultraviolet light works to attract mosquitoes but if used alone, it is not very effective in attracting blood-sucking mosquitoes and Aedes mosquitoes so, mosquito attractant is added. Mosquitoes are attracted to the carbon dioxide humans and other animals emit so, attractant that emit carbon dioxide will be placed near the ultraviolet light. This lure will mimic human exhalation by releasing carbon dioxide in the area thus, it is toxic free and safe for humans.

In the IoT part of the project, it used the Wi-Fi Module NodeMCU ESP8266 as the microcontroller. This is because the ESP8266 can host its Wi-Fi network and also can act as microcontroller. The size is also small so, perfect for placing it in the battery compartment. This mosquito trap is rechargeable and when the battery is low or full it will notify through the Blynk application on mobile

phones. An infrared sensor is used to detect when the tray is full of mosquitoes and needs to be cleaned and placed in the net tray. When the mosquito is full, it will send a notification to the Blynk application.

Zapper is used to kill mosquitoes and the mosquitoes will accumulate in the net tray. The current will increase when the mosquito is electrocuted by the zapper and be able to detect the dead mosquito. This action will be notified through Blynk thus, the real-time data is collected. Although when the net tray is full of mosquitoes and detected by the infrared sensor, the zapper and ultraviolet light will turn off.

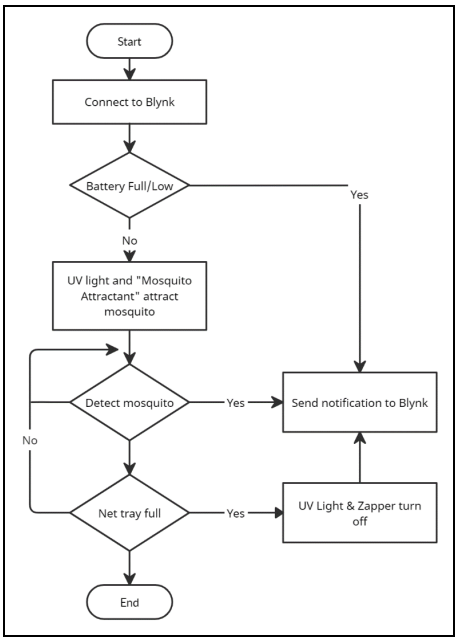


Figure 2: Flowchart Diagram.

The flowchart process system is shown in Figure 2. When the device is first turned on, it will connect to Blynk using the Wi-Fi Module NodeMCU ESP8266. The Blynk application on the phone will get the notification of the status of the battery while charging. Ultraviolet light and mosquito attractant placed in the mosquito trap will lure the mosquito. The addition of ultraviolet light with mosquito attractant will make this project more effective to lure mosquitoes into the trap. The zapper will electrocute the mosquito, causing the current to rise, and allowing the zapper to detect mosquitoes. Once a mosquito is detected it will send a notification to the Blynk application on the mobile phone. After the net tray is full of mosquitoes and detected by the infrared sensor, it will send a notification to the Blynk application and will automatically turn off the ultraviolet light and zapper.

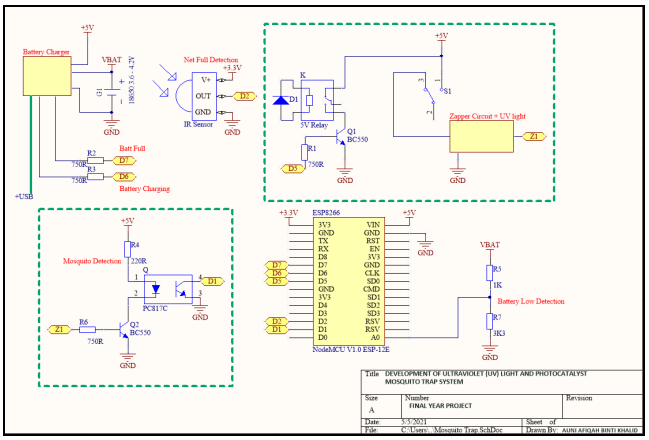


Figure 3: Schematic Diagram.

The battery charger, zapper circuit, and ultraviolet light are the original mosquito trap circuit on the printed circuit board. The other circuit is added to the original circuit and connected to Wi-Fi Module NodeMCU ESP8266 for the IoT part. The relay circuit is added to the zapper and ultraviolet light circuit to cut off the zapper and ultraviolet light when the net tray is full. In the battery charger circuit two 750-ohm resistors are added to detect whether the battery is in charging or fully charged. In order to detect low battery voltage, the resistor divider is added and connected to Analog Pin 0, A0. The zapper and ultraviolet light are connected to the optocoupler circuit for mosquito detection. The optocoupler interface is to completely isolate the input circuit from the output circuit which is 5V and 3.3V. The infrared sensor is connected to the circuit for net full detection when the object detected out pin is in a high state.

Figure 4: Project prototype with detachable cover.

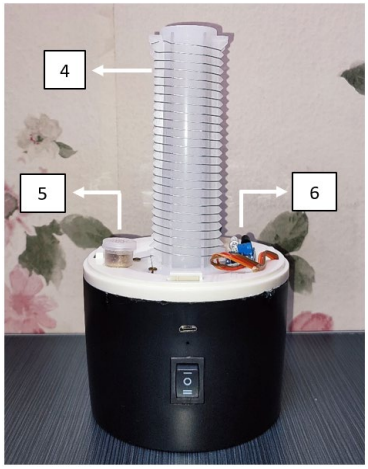


Figure 5: Project prototype without detachable cover.

Table 1: Prototype Components.

Number	Components
1	Detachable Cover
2	Android Interface
3	Switch
4	Zapper and UV Light
5	Mosquito Attractant
6	Infrared Sensor

4.0 RESULTS AND DISCUSSION

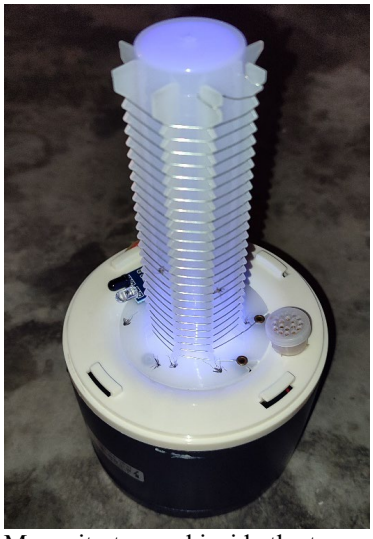


Figure 6: Mosquito trapped inside the trapper (without cover).

The experiment was carried to gather information on the number of mosquitos in the area. The experiment was carried out at three different times of day: morning, evening, and night. The highest number of mosquitoes were detected in the evening, according to this experiment. An example of a nighttime experiment is shown below. The number of mosquitoes caught was also recorded in the data report.

The experiments took place over four days in the University Kuala Lumpur British Malaysian Institute hostel area with many trees. The project has a lifespan of 15 hours and the battery has to be charged for about 4-6 hours to get a fully charged battery.

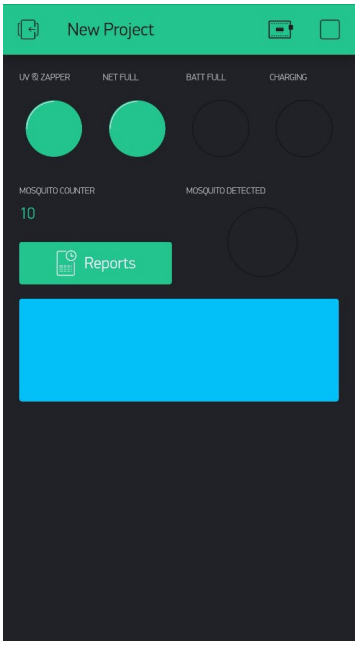
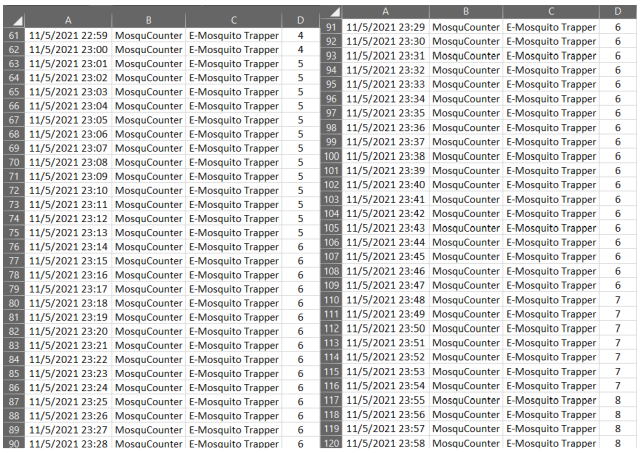


Figure 7: Total number of mosuitoes detected by the Blynk platform.

	A	B	C	D
1	11/5/2021 21:59	MosquCounter	E-Mosquito Trapper	0
2	11/5/2021 22:00	MosquCounter	E-Mosquito Trapper	0
3	11/5/2021 22:01	MosquCounter	E-Mosquito Trapper	0
4	11/5/2021 22:02	MosquCounter	E-Mosquito Trapper	0
5	11/5/2021 22:03	MosquCounter	E-Mosquito Trapper	0
6	11/5/2021 22:04	MosquCounter	E-Mosquito Trapper	0
7	11/5/2021 22:05	MosquCounter	E-Mosquito Trapper	0
8	11/5/2021 22:06	MosquCounter	E-Mosquito Trapper	0
9	11/5/2021 22:07	MosquCounter	E-Mosquito Trapper	1
10	11/5/2021 22:08	MosquCounter	E-Mosquito Trapper	1
11	11/5/2021 22:09	MosquCounter	E-Mosquito Trapper	1
12	11/5/2021 22:10	MosquCounter	E-Mosquito Trapper	1
13	11/5/2021 22:11	MosquCounter	E-Mosquito Trapper	1
14	11/5/2021 22:12	MosquCounter	E-Mosquito Trapper	1
15	11/5/2021 22:13	MosquCounter	E-Mosquito Trapper	1
16	11/5/2021 22:14	MosquCounter	E-Mosquito Trapper	1
17	11/5/2021 22:15	MosquCounter	E-Mosquito Trapper	1
18	11/5/2021 22:16	MosquCounter	E-Mosquito Trapper	1
19	11/5/2021 22:17	MosquCounter	E-Mosquito Trapper	2
20	11/5/2021 22:18	MosquCounter	E-Mosquito Trapper	2
21	11/5/2021 22:19	MosquCounter	E-Mosquito Trapper	2
22	11/5/2021 22:20	MosquCounter	E-Mosquito Trapper	2
23	11/5/2021 22:21	MosquCounter	E-Mosquito Trapper	2
24	11/5/2021 22:22	MosquCounter	E-Mosquito Trapper	2
25	11/5/2021 22:23	MosquCounter	E-Mosquito Trapper	2
26	11/5/2021 22:24	MosquCounter	E-Mosquito Trapper	2
27	11/5/2021 22:25	MosquCounter	E-Mosquito Trapper	2
28	11/5/2021 22:26	MosquCounter	E-Mosquito Trapper	2
29	11/5/2021 22:27	MosquCounter	E-Mosquito Trapper	2
30	11/5/2021 22:28	MosquCounter	E-Mosquito Trapper	2

	A	B	C	D
31	11/5/2021 22:29	MosquCounter	E-Mosquito Trapper	2
32	11/5/2021 22:30	MosquCounter	E-Mosquito Trapper	2
33	11/5/2021 22:31	MosquCounter	E-Mosquito Trapper	2
34	11/5/2021 22:32	MosquCounter	E-Mosquito Trapper	2
35	11/5/2021 22:33	MosquCounter	E-Mosquito Trapper	2
36	11/5/2021 22:34	MosquCounter	E-Mosquito Trapper	2
37	11/5/2021 22:35	MosquCounter	E-Mosquito Trapper	2
38	11/5/2021 22:36	MosquCounter	E-Mosquito Trapper	2
39	11/5/2021 22:37	MosquCounter	E-Mosquito Trapper	2
40	11/5/2021 22:38	MosquCounter	E-Mosquito Trapper	2
41	11/5/2021 22:39	MosquCounter	E-Mosquito Trapper	2
42	11/5/2021 22:40	MosquCounter	E-Mosquito Trapper	2
43	11/5/2021 22:41	MosquCounter	E-Mosquito Trapper	2
44	11/5/2021 22:42	MosquCounter	E-Mosquito Trapper	2
45	11/5/2021 22:43	MosquCounter	E-Mosquito Trapper	2
46	11/5/2021 22:44	MosquCounter	E-Mosquito Trapper	2
47	11/5/2021 22:45	MosquCounter	E-Mosquito Trapper	2
48	11/5/2021 22:46	MosquCounter	E-Mosquito Trapper	2
49	11/5/2021 22:47	MosquCounter	E-Mosquito Trapper	2
50	11/5/2021 22:48	MosquCounter	E-Mosquito Trapper	2
51	11/5/2021 22:49	MosquCounter	E-Mosquito Trapper	2
52	11/5/2021 22:50	MosquCounter	E-Mosquito Trapper	3
53	11/5/2021 22:51	MosquCounter	E-Mosquito Trapper	3
54	11/5/2021 22:52	MosquCounter	E-Mosquito Trapper	3
55	11/5/2021 22:53	MosquCounter	E-Mosquito Trapper	3
56	11/5/2021 22:54	MosquCounter	E-Mosquito Trapper	3
57	11/5/2021 22:55	MosquCounter	E-Mosquito Trapper	3
58	11/5/2021 22:56	MosquCounter	E-Mosquito Trapper	3
59	11/5/2021 22:57	MosquCounter	E-Mosquito Trapper	4
60	11/5/2021 22:58	MosquCounter	E-Mosquito Trapper	4

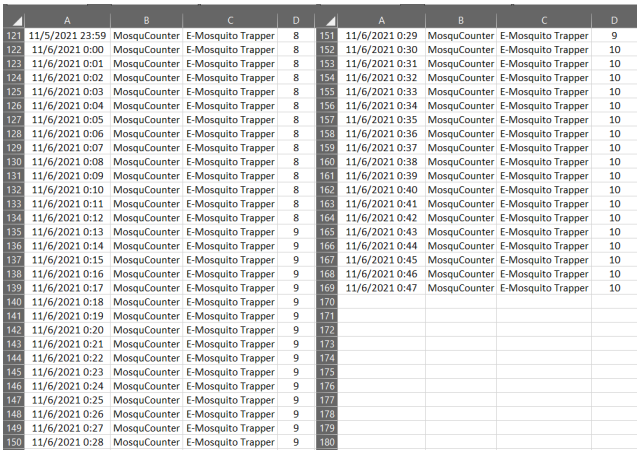
Figure 8: Data on mosquitoes were detected.



	A	B	C	D
61	11/5/2021 22:59	MosquCounter	E-Mosquito Trapper	4
62	11/5/2021 23:00	MosquCounter	E-Mosquito Trapper	4
63	11/5/2021 23:01	MosquCounter	E-Mosquito Trapper	5
64	11/5/2021 23:02	MosquCounter	E-Mosquito Trapper	5
65	11/5/2021 23:03	MosquCounter	E-Mosquito Trapper	5
66	11/5/2021 23:04	MosquCounter	E-Mosquito Trapper	5
67	11/5/2021 23:05	MosquCounter	E-Mosquito Trapper	5
68	11/5/2021 23:06	MosquCounter	E-Mosquito Trapper	5
69	11/5/2021 23:07	MosquCounter	E-Mosquito Trapper	5
70	11/5/2021 23:08	MosquCounter	E-Mosquito Trapper	5
71	11/5/2021 23:09	MosquCounter	E-Mosquito Trapper	5
72	11/5/2021 23:10	MosquCounter	E-Mosquito Trapper	5
73	11/5/2021 23:11	MosquCounter	E-Mosquito Trapper	5
74	11/5/2021 23:12	MosquCounter	E-Mosquito Trapper	5
75	11/5/2021 23:13	MosquCounter	E-Mosquito Trapper	5
76	11/5/2021 23:14	MosquCounter	E-Mosquito Trapper	6
77	11/5/2021 23:15	MosquCounter	E-Mosquito Trapper	6
78	11/5/2021 23:16	MosquCounter	E-Mosquito Trapper	6
79	11/5/2021 23:17	MosquCounter	E-Mosquito Trapper	6
80	11/5/2021 23:18	MosquCounter	E-Mosquito Trapper	6
81	11/5/2021 23:19	MosquCounter	E-Mosquito Trapper	6
82	11/5/2021 23:20	MosquCounter	E-Mosquito Trapper	6
83	11/5/2021 23:21	MosquCounter	E-Mosquito Trapper	6
84	11/5/2021 23:22	MosquCounter	E-Mosquito Trapper	6
85	11/5/2021 23:23	MosquCounter	E-Mosquito Trapper	6
86	11/5/2021 23:24	MosquCounter	E-Mosquito Trapper	6
87	11/5/2021 23:25	MosquCounter	E-Mosquito Trapper	6
88	11/5/2021 23:26	MosquCounter	E-Mosquito Trapper	6
89	11/5/2021 23:27	MosquCounter	E-Mosquito Trapper	6
90	11/5/2021 23:28	MosquCounter	E-Mosquito Trapper	6

	A	B	C	D
91	11/5/2021 23:29	MosquCounter	E-Mosquito Trapper	6
92	11/5/2021 23:30	MosquCounter	E-Mosquito Trapper	6
93	11/5/2021 23:31	MosquCounter	E-Mosquito Trapper	6
94	11/5/2021 23:32	MosquCounter	E-Mosquito Trapper	6
95	11/5/2021 23:33	MosquCounter	E-Mosquito Trapper	6
96	11/5/2021 23:34	MosquCounter	E-Mosquito Trapper	6
97	11/5/2021 23:35	MosquCounter	E-Mosquito Trapper	6
98	11/5/2021 23:36	MosquCounter	E-Mosquito Trapper	6
99	11/5/2021 23:37	MosquCounter	E-Mosquito Trapper	6
100	11/5/2021 23:38	MosquCounter	E-Mosquito Trapper	6
101	11/5/2021 23:39	MosquCounter	E-Mosquito Trapper	6
102	11/5/2021 23:40	MosquCounter	E-Mosquito Trapper	6
103	11/5/2021 23:41	MosquCounter	E-Mosquito Trapper	6
104	11/5/2021 23:42	MosquCounter	E-Mosquito Trapper	6
105	11/5/2021 23:43	MosquCounter	E-Mosquito Trapper	6
106	11/5/2021 23:44	MosquCounter	E-Mosquito Trapper	6
107	11/5/2021 23:45	MosquCounter	E-Mosquito Trapper	6
108	11/5/2021 23:46	MosquCounter	E-Mosquito Trapper	6
109	11/5/2021 23:47	MosquCounter	E-Mosquito Trapper	6
110	11/5/2021 23:48	MosquCounter	E-Mosquito Trapper	7
111	11/5/2021 23:49	MosquCounter	E-Mosquito Trapper	7
112	11/5/2021 23:50	MosquCounter	E-Mosquito Trapper	7
113	11/5/2021 23:51	MosquCounter	E-Mosquito Trapper	7
114	11/5/2021 23:52	MosquCounter	E-Mosquito Trapper	7
115	11/5/2021 23:53	MosquCounter	E-Mosquito Trapper	7
116	11/5/2021 23:54	MosquCounter	E-Mosquito Trapper	7
117	11/5/2021 23:55	MosquCounter	E-Mosquito Trapper	8
118	11/5/2021 23:56	MosquCounter	E-Mosquito Trapper	8
119	11/5/2021 23:57	MosquCounter	E-Mosquito Trapper	8
120	11/5/2021 23:58	MosquCounter	E-Mosquito Trapper	8

Figure 9: Data on mosquitoes were detected.



	A	B	C	D
121	11/5/2021 23:59	MosquCounter	E-Mosquito Trapper	8
122	11/6/2021 0:00	MosquCounter	E-Mosquito Trapper	8
123	11/6/2021 0:01	MosquCounter	E-Mosquito Trapper	8
124	11/6/2021 0:02	MosquCounter	E-Mosquito Trapper	8
125	11/6/2021 0:03	MosquCounter	E-Mosquito Trapper	8
126	11/6/2021 0:04	MosquCounter	E-Mosquito Trapper	8
127	11/6/2021 0:05	MosquCounter	E-Mosquito Trapper	8
128	11/6/2021 0:06	MosquCounter	E-Mosquito Trapper	8
129	11/6/2021 0:07	MosquCounter	E-Mosquito Trapper	8
130	11/6/2021 0:08	MosquCounter	E-Mosquito Trapper	8
131	11/6/2021 0:09	MosquCounter	E-Mosquito Trapper	8
132	11/6/2021 0:10	MosquCounter	E-Mosquito Trapper	8
133	11/6/2021 0:11	MosquCounter	E-Mosquito Trapper	8
134	11/6/2021 0:12	MosquCounter	E-Mosquito Trapper	8
135	11/6/2021 0:13	MosquCounter	E-Mosquito Trapper	9
136	11/6/2021 0:14	MosquCounter	E-Mosquito Trapper	9
137	11/6/2021 0:15	MosquCounter	E-Mosquito Trapper	9
138	11/6/2021 0:16	MosquCounter	E-Mosquito Trapper	9
139	11/6/2021 0:17	MosquCounter	E-Mosquito Trapper	9
140	11/6/2021 0:18	MosquCounter	E-Mosquito Trapper	9
141	11/6/2021 0:19	MosquCounter	E-Mosquito Trapper	9
142	11/6/2021 0:20	MosquCounter	E-Mosquito Trapper	9
143	11/6/2021 0:21	MosquCounter	E-Mosquito Trapper	9
144	11/6/2021 0:22	MosquCounter	E-Mosquito Trapper	9
145	11/6/2021 0:23	MosquCounter	E-Mosquito Trapper	9
146	11/6/2021 0:24	MosquCounter	E-Mosquito Trapper	9
147	11/6/2021 0:25	MosquCounter	E-Mosquito Trapper	9
148	11/6/2021 0:26	MosquCounter	E-Mosquito Trapper	9
149	11/6/2021 0:27	MosquCounter	E-Mosquito Trapper	9
150	11/6/2021 0:28	MosquCounter	E-Mosquito Trapper	9

	A	B	C	D
151	11/6/2021 0:29	MosquCounter	E-Mosquito Trapper	9
152	11/6/2021 0:30	MosquCounter	E-Mosquito Trapper	10
153	11/6/2021 0:31	MosquCounter	E-Mosquito Trapper	10
154	11/6/2021 0:32	MosquCounter	E-Mosquito Trapper	10
155	11/6/2021 0:33	MosquCounter	E-Mosquito Trapper	10
156	11/6/2021 0:34	MosquCounter	E-Mosquito Trapper	10
157	11/6/2021 0:35	MosquCounter	E-Mosquito Trapper	10
158	11/6/2021 0:36	MosquCounter	E-Mosquito Trapper	10
159	11/6/2021 0:37	MosquCounter	E-Mosquito Trapper	10
160	11/6/2021 0:38	MosquCounter	E-Mosquito Trapper	10
161	11/6/2021 0:39	MosquCounter	E-Mosquito Trapper	10
162	11/6/2021 0:40	MosquCounter	E-Mosquito Trapper	10
163	11/6/2021 0:41	MosquCounter	E-Mosquito Trapper	10
164	11/6/2021 0:42	MosquCounter	E-Mosquito Trapper	10
165	11/6/2021 0:43	MosquCounter	E-Mosquito Trapper	10
166	11/6/2021 0:44	MosquCounter	E-Mosquito Trapper	10
167	11/6/2021 0:45	MosquCounter	E-Mosquito Trapper	10
168	11/6/2021 0:46	MosquCounter	E-Mosquito Trapper	10
169	11/6/2021 0:47	MosquCounter	E-Mosquito Trapper	10
170				
171				
172				
173				
174				
175				
176				
177				
178				
179				
180				

Figure 10: Data on mosquitoes were detected.

As shown in Figure 7, the total number of mosquitos detected was successfully delivered to the Blynk platform. As shown in Figures 8, 9, and 10, data reports on mosquitos collected from Blynk were generated and sent to the email inbox. Technically, it was accomplished by stating the number of mosquitos collected per minute. As a result, the precise time at which a mosquito was captured was successfully recorded.

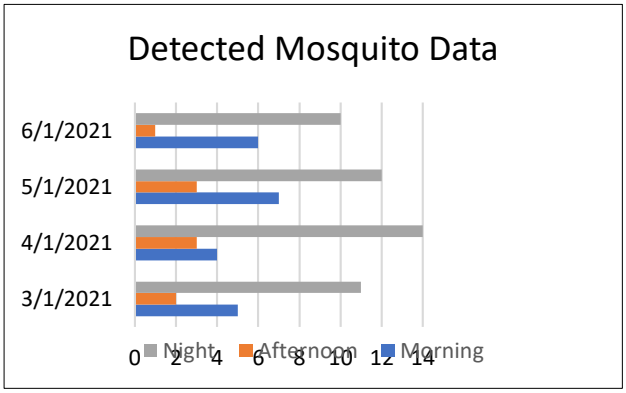


Figure 11: Detected Mosquito Data**.**

According to Figure 11, the highest number of mosquitoes trapped during the experiment, which was approximately 14 mosquitoes, was recorded on the night of November 4, 2021. Meanwhile, on the afternoon of November 6, 2021, the smallest number of mosquitoes captured during the experiment, 1 mosquito, was detected. Based on this finding, it may be concluded that mosquitoes are active at night. Furthermore, the carbon dioxide mosquito attractant has a lifespan of approximately 15-20 days and needs to be replaced.

5.0 CONCLUSION

At last, this project met its goal of developing an Ultraviolet Light and Photocatalyst Mosquito Trap System capable of providing real-time data for remote data monitoring. The Wi-Fi Module NodeMCU ESP8266 was used in this project to provide notification to the user.

During the implementation stage, the system ran smoothly. The user could access the data provided by the Blynk Platform if they had Wi-Fi coverage. The system was also equipped with a UV light and a carbon dioxide attractant to lure mosquitos into the traps. This system allows mosquito control experts to precisely track the increase or decrease in adult mosquito populations as well as monitor changes in mosquito species.

Besides that, making this project had a lot of problems and errors that needed to be overcome, and it is necessary to overcome all of them. Finding a solution to the problem that has arisen may lead to the achievement of the project's goal. Furthermore, it is critical to record all data from the experiment to demonstrate that the implementation of the research project was successful.

REFERENCES

[1] IDengue_Versi 3.0. (n.d.). Retrieved November 11, 2021, from https://idengue.mysa.gov.my/.

[2] Rosanti, T. I., Mardihusodo, S. J., & Artama, W. T. (2017). Effectiveness of environmentally friendly mosquito trap contained sugar yeast solution. Jurnal Kesehatan Masyarakat, 12(2), 270–276. https://doi.org/10.15294/kemas.v12i2.6063

[3] Tseng, W.-H., Yuan, D., Hsiao, W.-C., Chan, C.-H., Chen, Y. C., Ma, H.-Y., & Lee, H.-Y. (2018). Applying physical optics to design solar-powered outdoor UV led Mosquito trapping system. 2018 IEEE International Conference on Applied System Invention (ICASI). https://doi.org/10.1109/icasi.2018.8394456

[4] Tanawat, C., Sedthapong, L., & Chaekki, K. (2019). Effectiveness of ultraviolet (UV) insect light

traps for mosquitoes control in coastal areas of Samut Songkhram Province, Thailand. Journal of Animal Behaviour and Biometeorology, 7(1), 25–30. https://doi.org/10.31893/2318-1265jabb.v7n1p25-30

[5] Vijayakumar, P., Akshith Reddy, C., Sai Shivani Aahwanik, M. L., Varshith, S., Krishnaprasanna, R., Tamilselvi, M., Rajashree, R., & Zhi Gao, X.-. (2019). IoT Based Smart Mosquito Killing System. International Journal of Engineering and Advanced Technology (IJEAT), 8(4), 587–591.

[6] Liu, Y.-N., Liu, Y.-J., Chen, Y.-C., Ma, H.-Y., & Lee, H.-Y. (2017). Enhancement of mosquito trapping efficiency by using pulse width modulated light emitting diodes. Scientific Reports, 7(1). https://doi.org/10.1038/srep40074

[7] Poulin, B., Lefebvre, G., Muranyi-Kovacs, C., & Hilaire, S. (2017). Mosquito traps: An innovative, environmentally friendly technique to control mosquitoes. International Journal of Environmental Research and Public Health, 14(3), 313. https://doi.org/10.3390/ijerph14030313