EVOLUTION IN ELECTRICAL AND ELECTRONIC ENGINEERING
e-ISSN: 2756-8458

EEEE

Vol. 5 No. 1 (2024) 376-380
https://publisher.uthm.edu.my/periodicals/index.php/eeee

IoT-Based Child Tracking System Using Blynk

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DOI: https://doi.org/10.30880/eeee.2024.05.01.047

Article Info

Received: 13 July 2023
Accepted: 17 March 2024
Available online: 30 April 2024

Keywords

Tracking Systems, Blynk, IoT

Abstract

Children are on the rise and victims of crime in today's world. Due to the number of schoolchildren in crime cases, parents are now more worried about their children while they are away from home. This initiative was developed to assist parents in keeping an eye on their kids at all times, especially when they're in public. Once the child presses the button when they are in danger, the device can track their location and an alarm will sound via the buzzer. In Blynk applications, it can also send notifications to the parent's smartphone. Blynk functions very well when the notifications are sent to the parent's smartphone in just 1.33 seconds on average. In the meantime, when the button was pressed, the buzzer made a sound. The buzzer's sound is strong enough to alarm other people nearby. The coordinates that the child sends to the Blynk when the button is pressed also display the child's precise location.

1. Introduction

The number of children who become victims of crimes increased by 10.5 per cent in 2020 compared to the previous year. In Malaysia, the number of cases affecting children in 2020 will be 5342 cases, increasing from 4833 cases the previous year [1]. School children also become victims in crime cases, which makes parents more anxious about their children while they are at school. Missing children, bullying, rape, and kidnapping are all examples of criminal cases involving school children.

As a consequence, this system will use Internet of Things (IoT) technology that can help parents monitor their children while they are at school. IoT is a technology that connects systems and devices through sensors. IoT is the network of physical items, or "things", that have been embedded with sensors, software, and other technologies that will allow them to connect and share data with other devices and systems over the Internet [2].

Parents will be able to track their child's whereabouts in real-time using the Global Positioning System (GPS) by sending it through Blynk on the parent's mobile to communicate between parents and child. This allows parents to track their child's location in real time. Furthermore, when a child is in danger, this device can collect data on the child's location. This data will allow parents to track their children's whereabouts. In addition, the system will also inform parents when their children are in danger.

2. Methodology

Fig. 1 displays a block diagram of the system for monitoring and tracking the child on the child's device. The push button and GPS Module are the inputs used in the child's device. Both are connecting with Durian UNO to program the coding for the device to function accordingly. Durian UNO which acts as a microcontroller will program the

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component such as a buzzer in the child's device to emit sound when the children press the push button when they are in danger. After all, the parent's device will receive the output from the child's device.

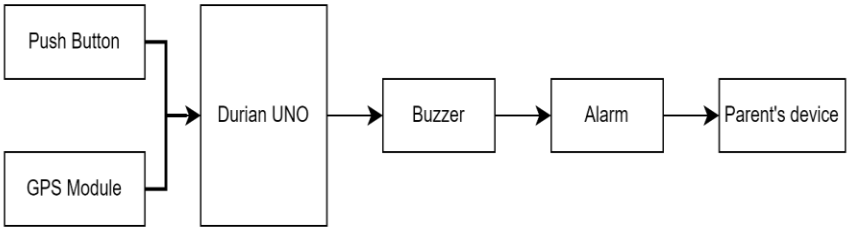

Fig. 1 *Block diagram for the child's device*

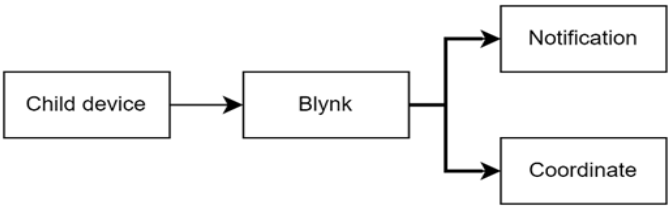

Fig. 2 *Block diagram for the parent's device*

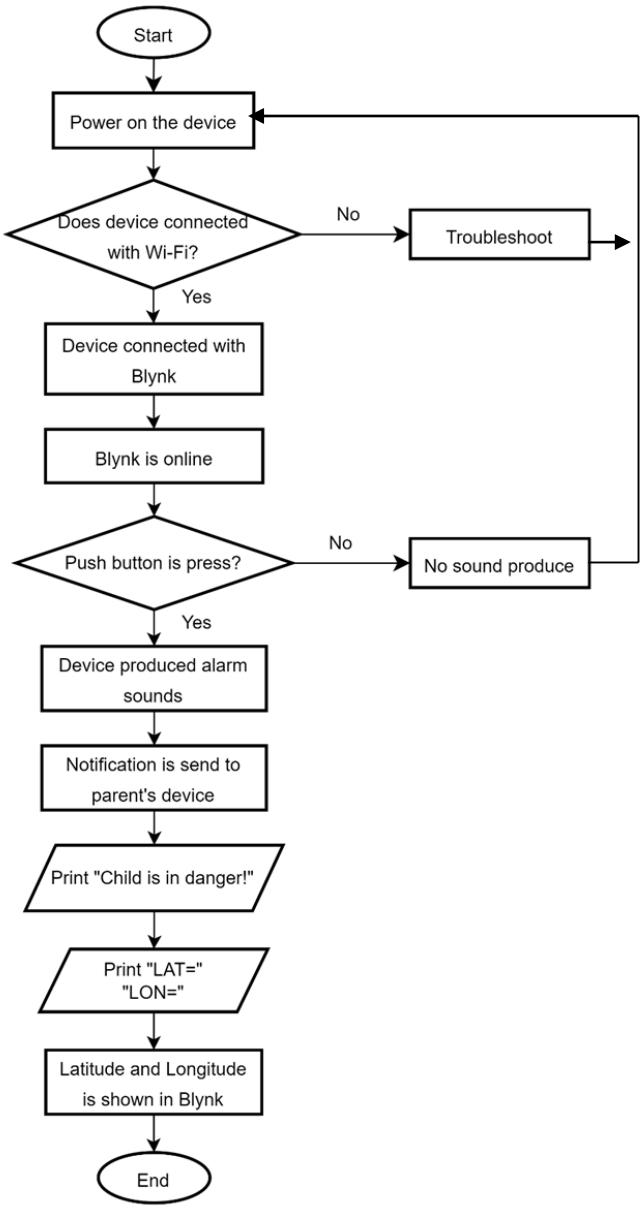

Fig. 3 *Flowchart of the system*

In order to accomplish this work, the system should consist of the child and parent's device. As in Fig. 2, the block diagram shows the flow for the parent's device to receive commands from the child's device through the Blynk application. Blynk has been programmed with the code in Arduino IDE for it to show the output such as notifications and coordinate with the parent's device. The notification pops up on the parent's device as soon as the children press the push button on the child's device. In the meantime, the coordinates of the children are shown in the Blynk application when the notification appears.

Fig. 3 shows the flowchart for the process of developing the system. First and foremost, the device must be connected to a power supply to turn it on. The device will be connected to Wi-Fi after it has completely turned on. To ensure that the device has successfully connected with Wi-Fi, check the status of the device in Blynk. If it shows that the device is online, that means the device has successfully connected. Troubleshoot is needed if Wi-Fi is not connected to the device. In addition, if the button from the child's device is pressed, it will produce an alarm sound. However, there is no sound will be produced if no one presses the button. The alarm is to ensure that people will notice that the children are in danger. In the meantime, as the button had been pressed by the children, notifications will be sent right away to their parent's device. The notifications are sent through Blynk in real-time with the message 'Child is in danger!'. The latitude and longitude of their children are shown in Blynk to give information on the children's location. All in all, this flowchart explains the entire process of how the device is functioning. It can be seen that this device will be beneficial for both parents and children to use.

3. Results and Discussions

The push button and buzzer are designed to act as a panic button or SOS button, alerting others when the user presses the push button when they are in danger as shown in Fig. 4. This is due to the buzzer emitting a sound when the button is pressed. The push button and buzzer are both functioning properly. To determine to what extent these two components are functioning, the coding for this component is uploaded to the board and the push button is pushed to determine whether the buzzer produces any sound.

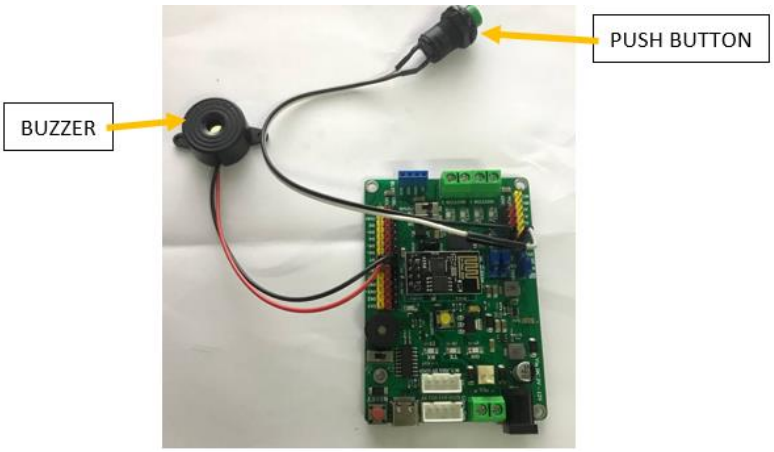

Fig. 4 *Connection of push button and buzzer with Durian UNO*

A certain amount of data has been recorded to test the functionality of the push button and buzzer connection. The data is collected five times with time intervals of 10-minute gap between each collection. The data is collected repeatedly to maintain the accuracy of the data. Table 1 displays the time taken for notifications to be sent to Blynk when the button has been pushed.

Table 1 *Time taken for notifications to be sent to Blynk*

Time	Time taken (seconds)
6:35 p.m.	1.25
6:45 p.m.	1.28
6:55 p.m.	1.15
7:00 p.m.	1.36
7:05 p.m.	1.63

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Average	**1.33**

The average time for the device to send the notifications to Blynk can be determined using Table 1. The average time for collecting data is 1.33 seconds. This demonstrates that the device takes only 1.33 seconds to send notifications to Blynk, allowing parents to be updated about their children's status whenever they are in danger. The average time indicates that the device is functioning well because it can send notifications to the parent's smartphones in the shortest possible time. This could help notify parents in real time when their children are in danger. The GPS module Neo 6M is used to track location. Fig. 5 displays the GPS connection with the Durian UNO.

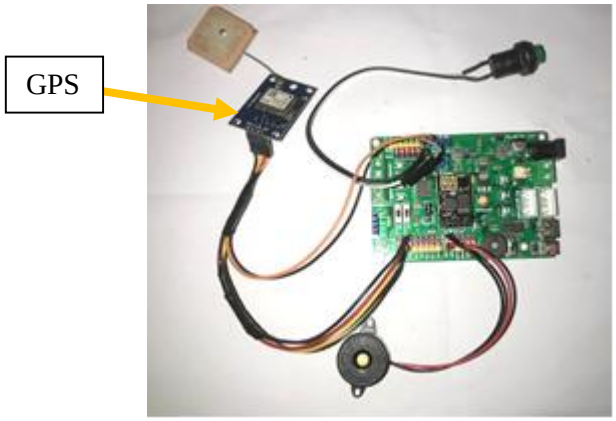

Fig. 5 ***GPS Module connection with Durian UNO***

The GPS module will detect satellites and transmit the user's latitude and longitude to the Blynk app. Fig. 6 shows the output obtained from the Blynk app.

Fig. 6 *Output latitude and longitude*

This data will be manually reviewed on the maps website to ensure that the latitude and longitude are valid. This information was gathered primarily in *Taman Universiti, Parit Raja, Johor*. The maps in Fig. 7 indicate that the device's latitude and longitude match the location at *Jalan Universiti 18*.

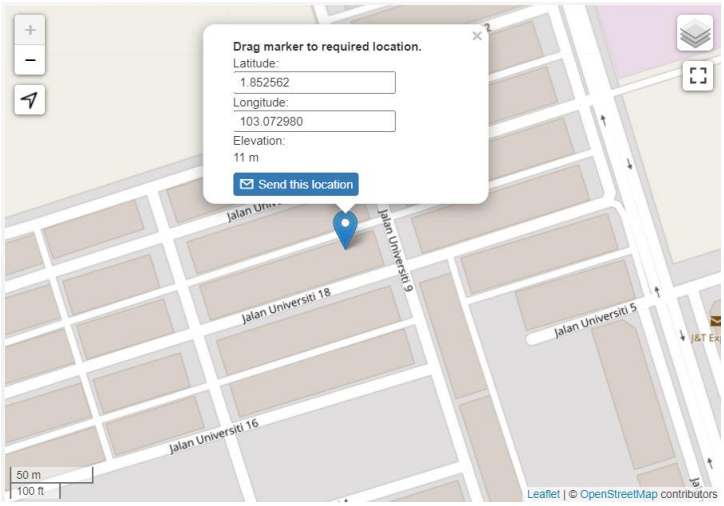

Fig. 7 *Maps that have been checked manually from latitude and longitude*

A prototype was created to make it easier for users to carry it everywhere because it is lighter and handier. Fig. 8 displays the prototype's design. This device is around the size of our hand. Thus it makes it easy for children to bring it wherever they want, allowing parents to simply monitor them if something bad is experienced by them.

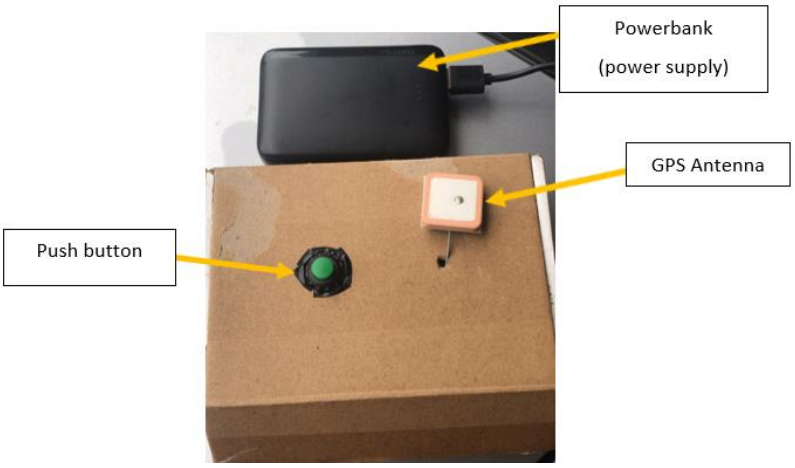

Fig. 8 *Prototype of system*

4. Conclusion

As a conclusion, a prototype of an IoT-based child tracking system was designed and developed. This project includes a GPS module, as well as a push button and buzzer. The GPS module is going to track the child's coordinates. When a child presses the SOS button, the buzzer generates a sound and sends a notification to the parent device. The GPS module will send the child's longitude as well as latitude to the parent via the Blynk application. In a nutshell, this project was completed successfully and it delivered the desired results.

Acknowledgement

The authors would like to thank the Faculty of Electrical and Electronic Engineering, Universiti Tun Hussein Onn Malaysia for its great deal of support.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Hani Farhanah;* ***data collection:*** *Hani Farhanah;* ***analysis and interpretation of results:*** *Hani Farhanah;* ***draft manuscript preparation:*** *Hani Farhanah and Shamsul. All authors reviewed the results and approved the final version of the manuscript.*

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