Safety Device for Person with GPS Tracking Location using Dijkstra's Algorithm

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Abstract:- The goal of this research is to create a "safety device for a person with GPS tracking location" that will allow police to track offenders using the safety device with GPS tracking by sending real-time SMS alerts and GPS tracking to the nearest police station. Depending on the user's response, the device can prevent crimes before they happen. The study is most suited for people who stroll or commute to unpleasant locations. The study requires users to have an active mobile service load to optimize the device's capability. It involves a host server that receives and processes user-initiated complaints. The "Safety Device for Persons with GPS Tracking Location" was made with the Arduino Nano and includes the following functionalities: SMS alert, real-time position direct to the authorities, and GPS tracking location. It has two options. The first is the "push button," where when you press the button it will send a message to the nearby police station, and the second is the keyword "FIND." The police will send a text message to the device if the holder of the device has a serious problem and can no longer press the button. The device will automatically send the exact location of the victim and it will be notified to the police.

I. INTRODUCTION

In today's modern world, men and women share equal roles and compete in all fields. In the Philippines, workplace and safety problems have become a major concern. Sexual harassment and violence are becoming more prominent. In such a critical situation, to help everyone, we proposed the idea of using a modern safety device for a person with GPS tracking. It was designed using the Arduino Nano. This project demonstrates a "safety device for a person," and it includes a GSM module, GPS, and Google Maps. The device can be linked to the police department. It consists of a GSM modem for SMS alerts. A GPS that can detect your current location. Information from satellites can be used to determine its actual location. This data is processed by the Arduino Nano, and the data collected is sent to the user via a GSM modem. A GSM modem sends an SMS to a programmed mobile number. It is a wearable device that is easy to carry, wear, and access. They just press the button, and it will automatically connect to a nearby police station. They will also be notified if someone is in danger or hurt.

II. REVIEW OF RELATED LITERATURE

This chapter documents the studies about safety devices with GPS tracking and the technologies and hardware that are used by developers to create safety devices with GPS tracking.

A. Study about Safety Device

Raghavendrachar, S., Sunaina, N., Vishnupriya, D., Ruba, A. R., &Krithika, K. N. (2022, April). Wearable Safety Device for Children. Attacks on children have been on the rise at an unprecedented rate in recent years, with victims finding themselves in perilous situations with little chance of contacting their families. The main goal of this project is to create a smart wearable device for children that uses advanced technology to ensure their safety. As a result, this strategy is perceived as sending an SMS from the children's wearable to their parents or guardians. This project employs cutting-edge technology to protect the youngster through the use of a GSM module, ensuring that the child does not feel abandoned while dealing with such social issues. An Arduino Nano, GSM, GPS, temperature sensor, heartbeat sensor, and a panic button will be included in the wearable. The heartbeat sensor detects the child's heart rate and delivers it to the guardian regularly. If the child falls suddenly, the accelerometer detects it and alerts the parents. As a result, the parent has a sense of security. Keywords: Wearable, IOT, Arduino Nano, GSM, GPS.

B. Study about GSM

Ajayi-Smart, Emmanuel & Bello, Oluwaseyi. (2018). GSM Based Wireless Electronic Notice Board using PIC18F2550 Microcontroller. Notice board is the primary thing in any institution or organization or public utility places like bus stops, railway stations, or parks. But sending various notices day today is a tedious process. This paper deals with an advanced notice board. It presents an SMS-based notice board incorporating microcontroller PIC18F2550. A GSM module SIM 800L is interfaced to the ports of the microcontroller PIC18F2550. When the user sends an SMS via a registered number from his mobile phone, it is received by a SIM-loaded GSM modem at the receiver unit. The GSM modem is an interface to the control unit to receive messages from the user.

C. Study about GPS

According to new research by Sharma, N., Sharma, D., Singh, P., Jain, P., &Kumawat, S. (2017, October 4). The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. GPS uses these "man-made stars" as reference points to calculate positions accurate to a matter of meters. In fact, with advanced forms of GPS, you can make measurements to better than a centimeter! In a sense, it's like giving every square meter on the planet a unique address. GPS receivers have been miniaturized to just a few integrated circuits and so are becoming very economical. And that makes the technology accessible to virtually everyone. These days GPS is finding its way into cars, boats, planes, construction equipment, moviemaking gear, farm machinery, and even laptop computers.

D. Study about Google Map

Mehta, Heeket&Kanani, Pratik &Lande, Priya. (2019). Google Maps. International Journal of Computer Applications. 178. 41-46. 10.5120/ijca2019918791. This paper gives a perspective on how Google Maps, one ofthe world's mostinfluential applications works. Google Maps was initially coded in C++ programming language by its founders - Lars and Jens Eilstrup Rasmussen. Formerly it was named 'Where 2 Technologies, which was later acquired by Google Inc. in 2004, which renamed this webapplication to Google Maps. Earlier it had limited features restricted to navigation, but today it provides overwhelming features like street-view, ETA, and other intriguing features.

E. Study about Algorithm

According to Javaid, Adeel. (2013).Dijkstra's algorithm (named after their discovery, E.W. Dijkstra) solves the problem of finding the shortest path from a point in a graph (the source) to a destination. It turns out that one can find the shortest paths from a given source to all points in a graph at the same time, hence this problem is sometimes called the single-source shortest paths problem. This paper will help you understand the underlying concepts of the Dijkstra Algorithm with the help of simple and easy-to-understand examples and illustrations.

III. METHODOLOGY

The methodology used by developers to conduct the research was determined in this chapter. This chapter describes the research design, the target client, and the system's operation and completion.
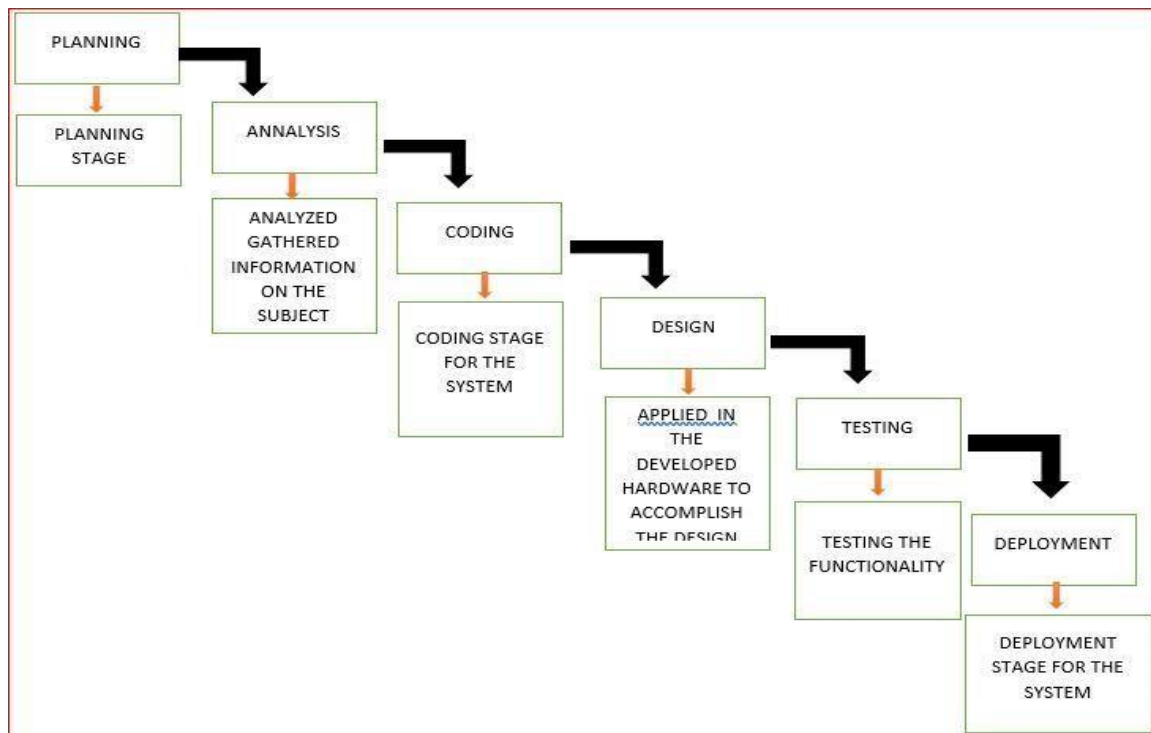

Fig. 1: Implementation Stage For System

SAFETY DEVICE FOR PERSON WITH GPS TRACKING LOCATION USING DIJKSTRA'S ALGORITHM is software that finds the fastest route to your target destination.

- *Research*. It is a type of research that aims to improve and advance a specific topic rather than just finding a solution to a specific problem.
- *Software*used in development. Developers used C++ for front-end development.
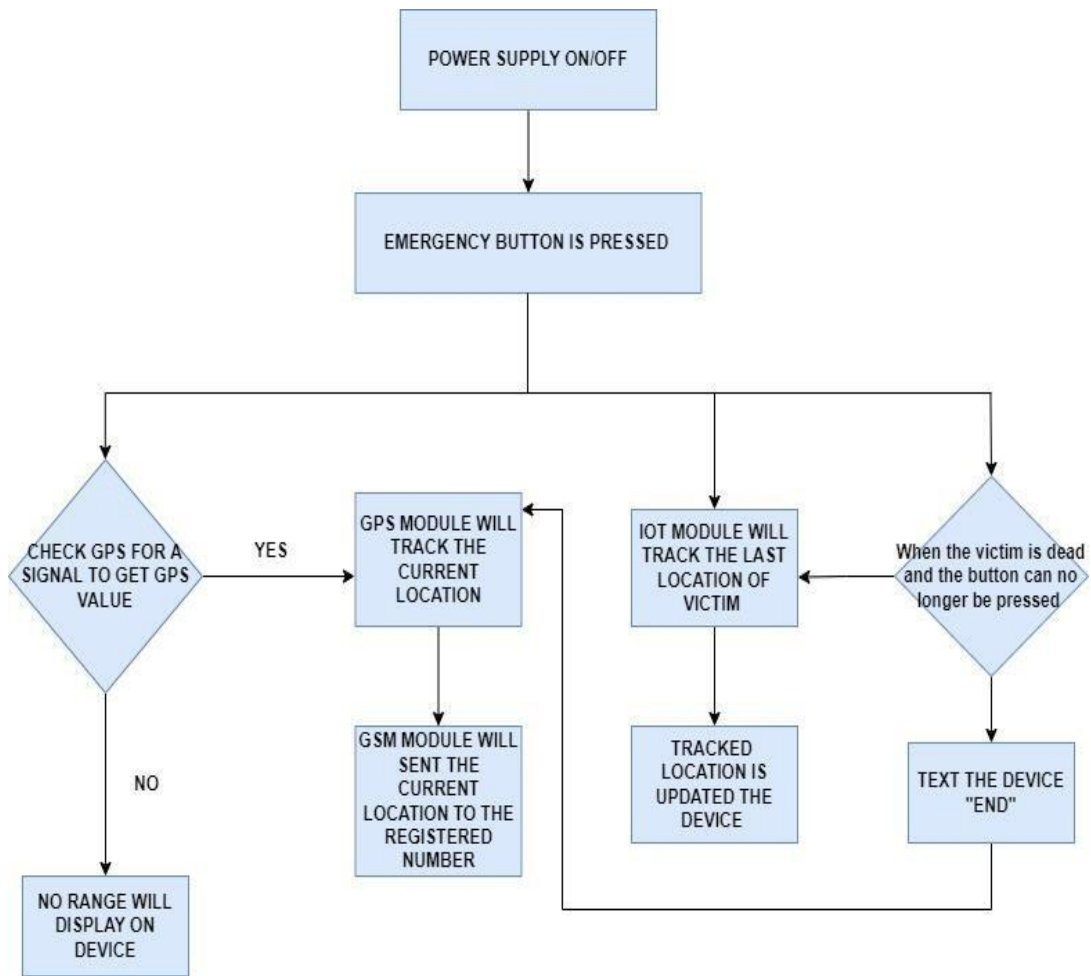- *System Flowchart*
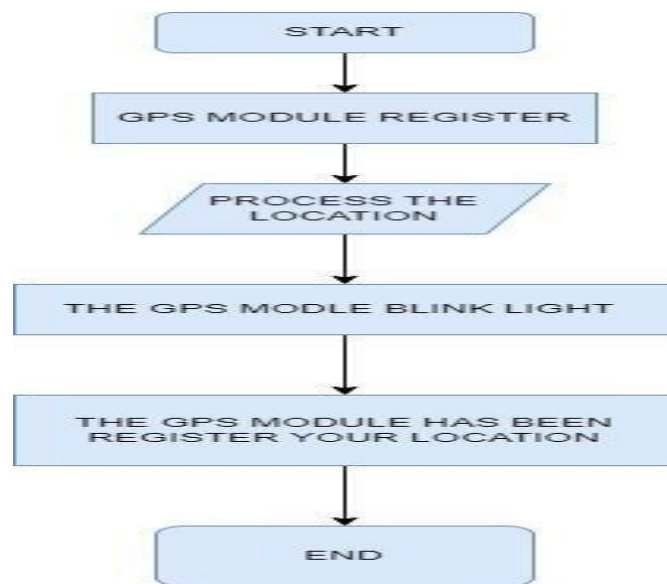

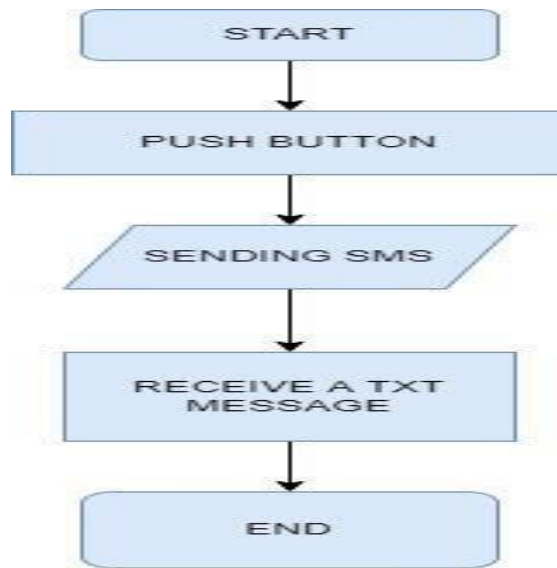Fig. 2: Safety Device For Person Flow Chart

Fig. 3: GPS Module Flowchart

Fig. 4: PUSH-BUTTON FLOWCHART

The diagram above shows how the system runs. The steps for using the system are shown below:

- **Step 1**.Open the safety device and let the sim card and GPS module register. It takes one minute before the sim card registers. You need to be able to send and receive a message at your exact location.
- **Step 2.** Press the push button of the device, and it will send a message with your location to the cell phone.

System list features: Key "FIND" serves as a second way to track the person.

This chapter shows some of the functionality, maintainability, speed, and accuracy of the system and its results.

A. *The results of a phase of a study*
  a) Tracking Device with sending SMS circuit diagram
     This is a circuit diagram. It is shown here how to connect the wires. Going to the Arduino nano transfer to the SIM 800L v2 module to register the number for the sim card and to get the signal of the sim module and NEOGPS 6M to get a signal for the exact location.

IV. RESULTS AND DISCUSSION

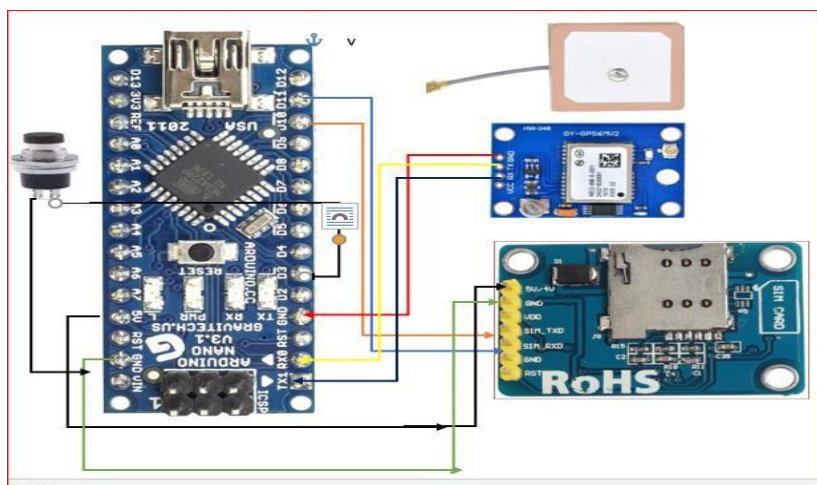- **Interfacing Arduino Nano with Mini USB cable**

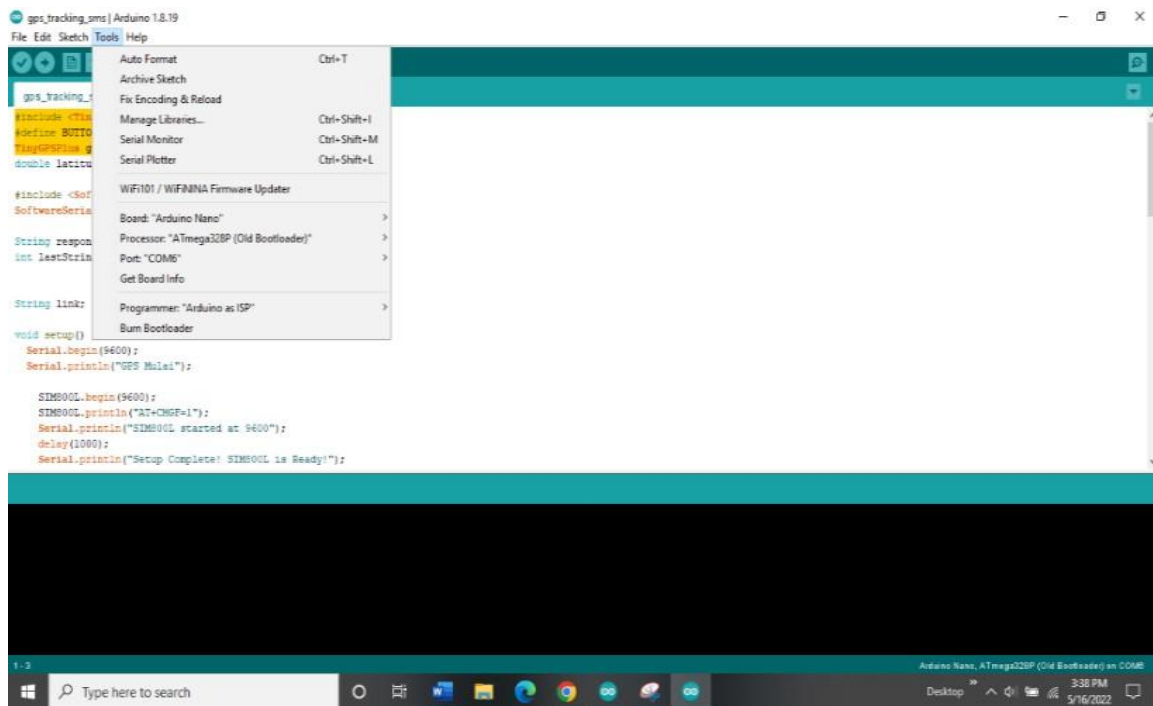Fig. 5: CONNECTION DIAGRAM

- **Arduino IDE Tools Set up**

Fig. 6: SET UP TOOLS

Select your Arduino board from the Tools Board menu. The Tools Serial Port option allows you to select the board's serial device.
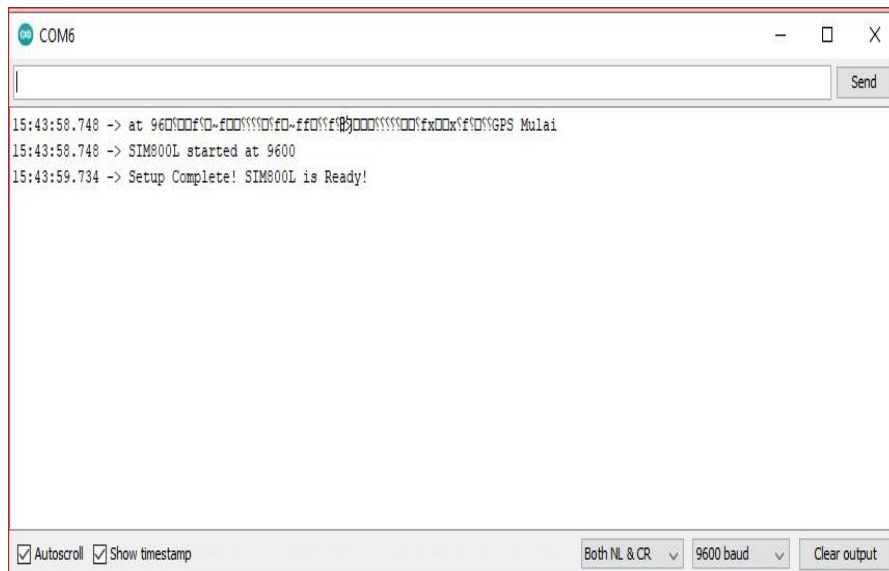
- **Processing Data**

Fig. 7: SET UP COMPLETE SIM800L

The codes from the Arduino board are then uploaded. display the process on the serial monitor
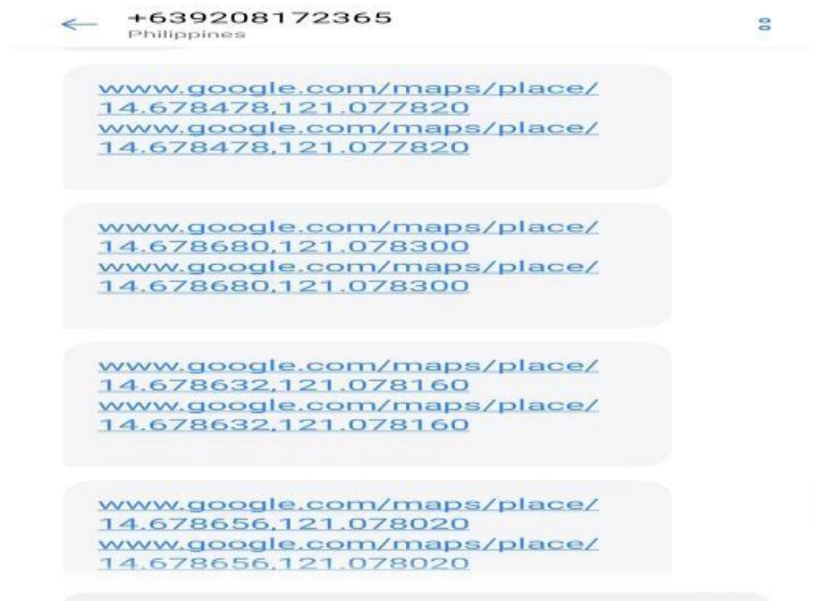
- **Receive SMS notification**

Fig. 8: RECEIVE NOTIFICATION

Here you will see the notification that the device has already messaged to your used cellphone.

- **Show the Location Map from Google map**

Fig. 9: SHOW REAL-TIME LOCATION

It shows the true location of the device holder. You can also see here the very image of the place where the person is.

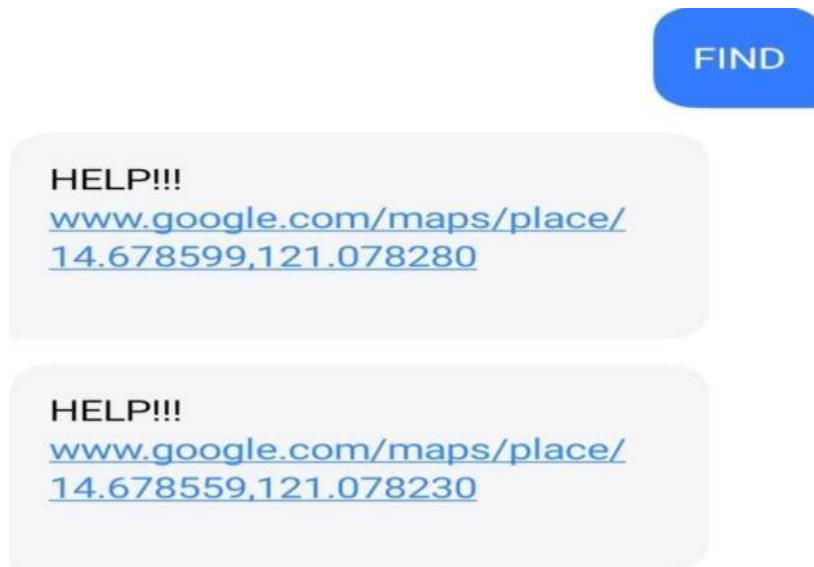*B. Testing and Evaluation of the System*

- **Maintainability**

Fig. 10: TEXT AND PUSH-BUTTON OPTION

It maintains the received message with two options. It is a push button from the device and a text message to your cellphone. The keyword is "FIND."

- **Functionality**

Fig. 11: DIGITAL READ AND SIM 800L AVAILABLE

You can see here the two codes. These are codes for the push button and for the text message that goes from the cellphone to the holder of the device.
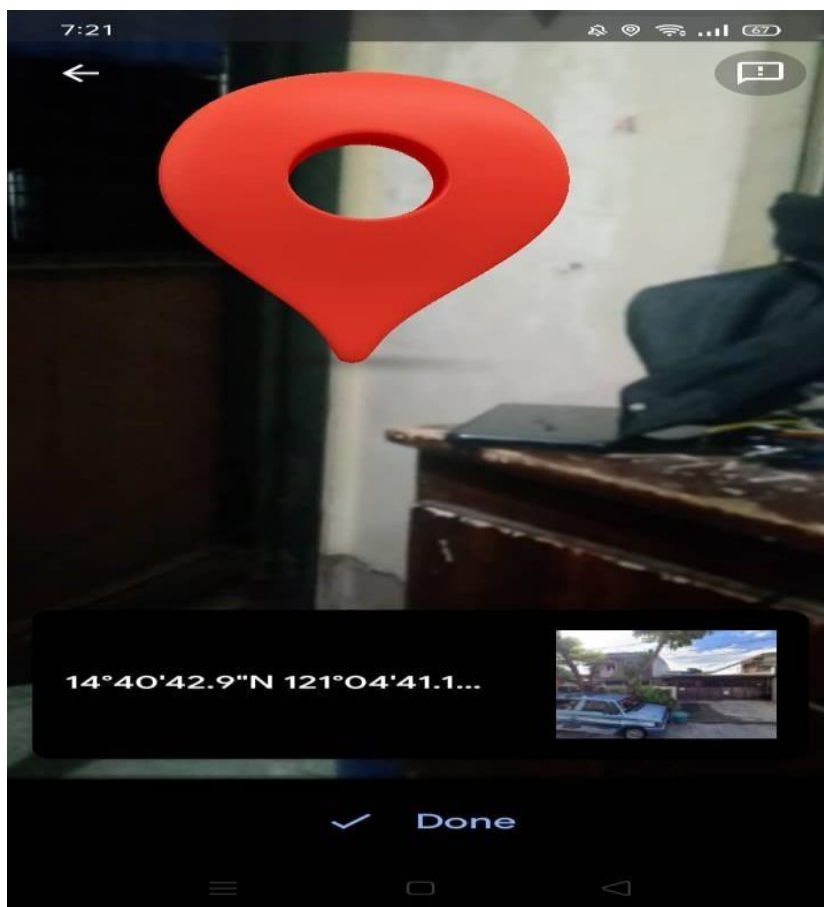
- Accuracy

Fig. 12: SAMPLE DATA ACCURACY

The accuracy of showing location is sure in real-time. You can see the live view of the location on Google Map Settings.
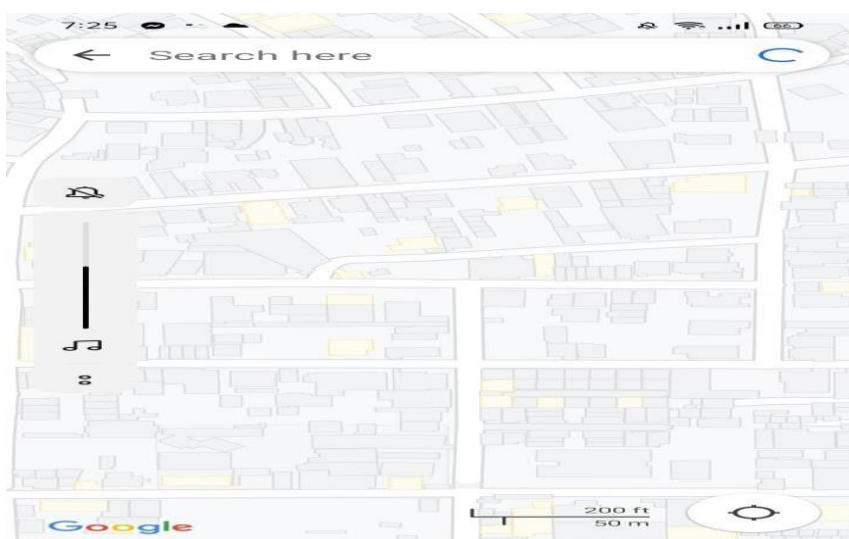
- **Speed**

Fig. 13: SAMPLE DATA.SPEED

Here you can see the Google Maps loading speed and actual position, which is only a few seconds'delay dependent on the Internet connection provided by your cellphone.

C. Testing and Evaluation of the Algorithm

- Functionality

Fig. 14: Sample of DIJKSTRA'S Algorithm

Dijkstra's algorithm displays the nearest path. The route you are following will change and you will find a shorter route when you are closer to your destination
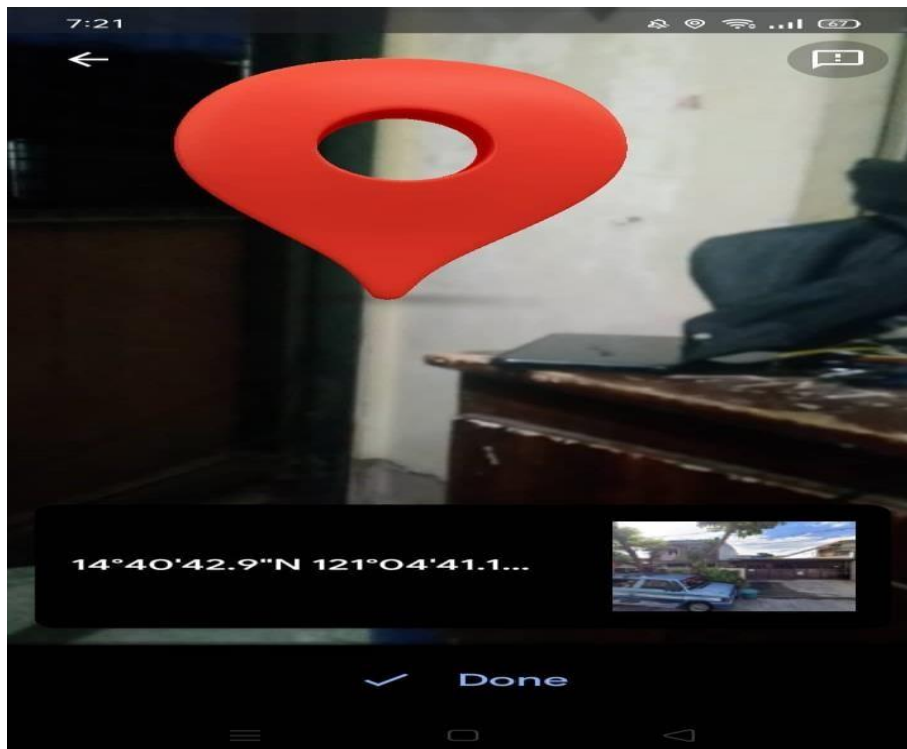
- **Accuracy**

Fig. 15: DIJKSTRA'S ALGORITHM ACCURACY

The accuracy of Dijkstra's algorithm shows how much you are accurate at the exact location of the device owner.

- **Speed**

Fig. 16: DIJKSTRA'S ALGORITHM SPEED

Here you can see the loading speed of Google maps and the exact location is only about a second delayed. depending on your internet strength to come from the cellphone.

V. CONCLUSION AND RECOMMENDATION

From our study, we conclude that this safety device for people with GPS TRACKING serves as one strategy to help reduce the number of crimes committed and promote increased safety for everyone.

A. Conclusion

From our study, we conclude that this safety device for people with GPS TRACKING serves as one strategy to help reduce the number of crimes committed and promote increased safety for everyone.

B. Recommendation

The following recommendations are offered after careful examination and assessment of the prior findings and study conclusion.

- For programmers and developers, it is best to add new features to your device to adopt the latest technology and make it easier to understand.
- For new users, it is advisable to read and understand the manual guide for you to know how to assemble and use it properly.

ACKNOWLEDGMENT

First and most importantly, we give thanks and praise to our Almighty God, who is always there for us when we need him. For guiding us and giving us strength in our everyday lives. We shall continue to put our faith in You for our future.

And we'd want to show our thanks to our panelists for taking the time to listen to us and present the system we've constructed. Lord, lead everyone, especially our team so that we can successfully defend ourselves. Now, thanks to my team for their assistance in making our system work, and hopefully nothing will stand in the way of everyone's success.

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