



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

Multi-Purpose IoT-Based Women Safety System Design and Development

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ABSTRACT

Women nowadays deal with a variety of security issues in society. Despite the fact that numerous technologies have been developed specifically for women, abduction, and sexual misconduct still happen in our nation. An automated detection system that establishes an alarm message with the location of the IOT when women are in unsafe circumstances is necessary to safeguard their safety. This project proposes the implementation of a multipurpose women's safety system based on IoT. It consists of sensors like IR and GPS, a microcontroller, and a Wi-Fi module. When a woman feels threatened in the present situation, she must grasp onto the device's trigger. When the gadget is turned on, it uses the GPS (Global Positioning System) to track the present location and transmit an emergency notice to the IoT application and consensus mail ID. The Internet of Things (IoT) feature is employed to continually track the location and update the website. A cloud website called BLYNK monitors and provides updated information to the user.

Keywords: IOT, Node-Microcontroller ESP8266, IR Sensor, GPS Module, Power Supply, Blynk App.

1 Introduction

The most desired power in today's society is safety. Rape is one of the most frequent offenses among women and children in India. Since the previous couple decades, the crime rate has been continuously rising. The most recent National Crime Records Bureau (NCRB) 2013 annual report states that 33,707 rape cases have been registered in India alone. Over the past ten years, there have been a rising number of recorded rape instances [1]. From the moment of birth till the end of life, children and women perform important responsibilities in our society. Crime against women and children has significantly escalated during the past several years. They are dealing with several issues relating to securities. The mis behaviors toward women and children are growing exponentially worse every day. They run the risk of being easily abducted. Women and children nowadays experience physical harassment in public spaces,



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

schools, jobs, and when traveling [2]. In an effort to outlaw these unlawful activities, the government has put in place a number of preventative measures, but they haven't really had much of an influence on the increased frequency of these crimes. The issue of sexual harassment at work is becoming more prevalent every day. The tendency to avoid being friendly to everyone may have an impact on the psyche [3-4]. A new safety option for kids and anybody who needs help right away is called Smart Security for Child Safety. Since a wearable gadget for women's and girls' protection and safety is being developed [5-6]. One of the primary benefits of this wearable over others are that it works with all telephones, doesn't necessarily need a pricey smartphone, and doesn't require someone who is very tech-savvy to use it [7]. A key aspect of modern life is the Internet of Things (IoT). The primary difference is that because IoT devices are cognitive and capable of making decisions, embedded systems and IoT go hand in hand depending on their environment, whereas embedded systems rely on predefined manners or software written in the chip. The advancement of sensor technology, the accessibility of devices with internet connections, and data analysis algorithms enable IoT devices to respond intelligently and autonomously to emergencies. Many different industries, including farming, medical, enterprise, safeguards, and relationships, employ IoT devices in this way. [8-9]. Designing a system that supports and provides high-quality monitoring will be difficult. Consequently, the goal of this study for develop a low-cost system with high-quality features [10].

The remainder of the paper is systematized as follows: Section II discusses a deep overview of the prior works. In Section III, the proposed system is illustrated. Section IV provides the results, and finally, Section V presents the conclusion part.

2 Recent Works

Lai Yi Heng *et al* (2021) [11] have developed an IoT-based system for monitoring child security. Semi-structured interviews and online surveys are two data collecting methods. The online survey gathers feedback by asking questions electronically and requesting respondents to submit their answers online. This device will be enhanced in the future with the addition of features and software that will enable it to function like a phone, including messaging, a gallery, Google, and YouTube, as well as with the addition of further safety precautions to assure safety.

P.Poonkuzhlai *et al* (2021) [12] have discussed the development of a sensor-embedded health monitoring system for safety and emergency services that is a portable IOT-based safety and monitoring system for kids. Device that continuously monitors a child's bodily parameters and whereabouts for safety purposes. The use of technology provides an advanced method for tracking and keeping an eye on kids. In the medical and healthcare industries, even the smallest error might result in the loss of a life, hence increasing the device's trust can also improve system accuracy.

Prakriti Agarwal *et al* (2020) [13] have outlined the idea of a wearable kid safety device employing cloud computing and IoT sensors. One advantage of this wearable device's design



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

is that it is accessed from any mobile device and doesn't require a lot of technological know-how from the user to utilize. The benefits of this gadget is to make it simpler for a parent or guardian to locate their child and make sure they are safe. A technique for tracking the child must also be incorporated.

Firoz Khan *et al* (2020) [14] have implemented a wearable, intelligent, low-cost kid safety IOT gadget for India. The project demonstrates a mobile application that tracks the children's whereabouts in real time using Java and XML as its development language. This device is designed to keep tabs on the child's area and alert the parents by sending an SMS or voice information when the child violates a boundary. These features include high reliability, swift responses, and excellent accuracy. The requirements guarantee the child's security.

Roopesh P *et al* (2020) [15] have proposed integrating a kid monitoring system. Child monitoring systems can help parents who need to keep track of where their kids are and can also help with the major issue of missing children. To locate their child, the smartphone app employs GPS and communication services. This malware secretly gathers all the call records, message information, contact list, browsing histories—including YouTube search histories—and specific location from the ladies.

3 Proposed Work Explanation

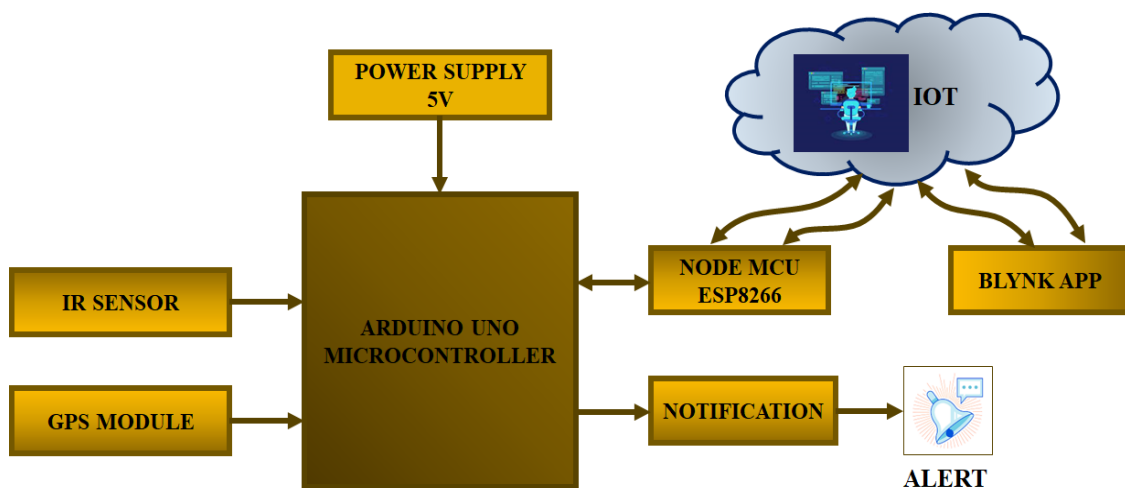


Figure 1: Block Diagram for women safety system

Figure 1 shows the multipurpose women safety system's block diagram. In this paper, uses a microcontroller, Wi-Fi module, and sensors like IR and GPS modules. In the event of danger, this gadget is designed to safeguard women. The gadget uses wireless sensor networks to connect with other devices and provide them notifications. By monitoring the IR radiation of things in their area of vision, infrared sensors (IR sensors) is detect the movement of objects and identify the presence of people. This IR sensor sensing the emergency circumstance and fetches the current location of woman and sends it to emergency contacts via GPS module. The



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

GPS is used for share the user's location directly and alerts the emergency notification send to IoT application and consensus mail id. IoT components are implemented to continually update the position and refresh the internet page. A cloud website called BLYNK app monitors and provides an updated information to the user.

3.1 Arduino UNO



Figure 2: *Arduino UNO*

The Arduino open source electronics platform is constructed using user-friendly technological infrastructure and technology. It is an ATmega328-based microcontroller board. It contains a USB port, a power connection, an ICSP header, a 16 MHz ceramic resonator, six analog inputs, fourteen digital input/output pins, and a reset button. It already has everything needed to support the microcontroller; all you need to do to utilize it is connect a USB cable, an AC-to-DC converter.

3.2 Node MCU ESP8266

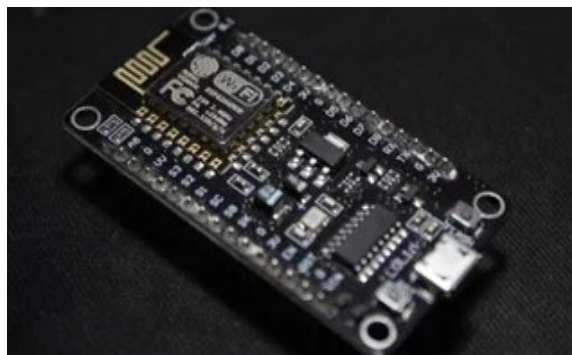


Figure 3: *Node MCU ESP8266*



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

A self-contained SOC with an inbuilt TCP/IP protocol stack called the ESP8266 WiFi Module makes it possible for any microcontroller to establish a WiFi network connection. The ESP8266 is capable of hosting an application or giving another application processor complete control over Wi-Fi networking. Simply attaching an ESP8266 module to an Arduino project will give you WiFi functionality akin to a WiFi Shield because each one is pre-programmed with an AT command set firmware. A very inexpensive board with a huge and growing community is the ESP8266 mode.

3.3 IR Sensor



Figure 4: *IR Sensor*

There is an IR sensor in Figure 4. An electronic sensor is a gadget that produces infrared light to pick up certain details about its environment. In addition to monitoring an object's heat, an IR sensor has the ability to detect movement. These kind of sensors are referred to as passive IR sensors since they just evaluate infrared light rather than creating it. Here, we're utilizing an IR sensor to find obstructions. When an obstacle is detected in the course of an IR signal being emitted by an IR transmitter, the signal is reflected back and received by the receiver.

3.4 GPS Module

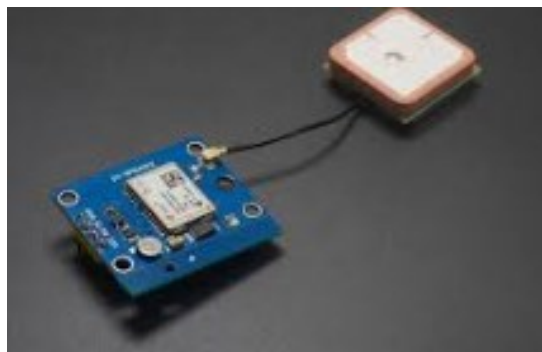


Figure 5: *GPS Module*



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

A satellite-based navigation system called GPS offers information on time and position. A GPS module is shown in Figure 5. A GPS receiver pinpoints its location by precisely timing the signals transmitted by GPS satellites. GPS is used often today and is now a feature of many cellphones. The RS232 and USB interfaces on the GTPA010 module make it simple to use. It can connect with 3.3V and 5V microcontrollers since it operates within the 3.2 to 5V supply range. NMEA0183 formatted GPS data are generated by the module.

3.5 Blynk App

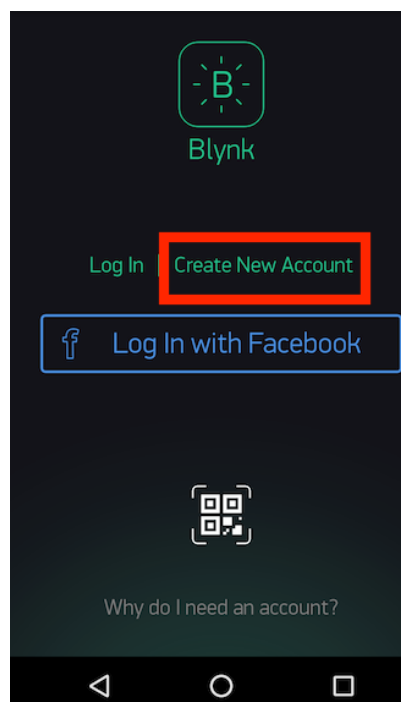


Figure 6: *Blynk app*

Android and iOS mobile devices are capable of controlling Arduino, Raspberry Pi, and NodeMCU thanks to the IoT platform Blynk. By gathering and entering the acceptable data on the easily accessible icons, this application may be employed to construct a GUI or HMI. Without creating any code, the Blynk library enables direct control of Arduino or ESP32 pins from a mobile. A project may also be shared with customers or friends, granting them access to the connected devices but restricting them from making modifications to the system. The Blynk app is displayed in Figure 6.



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

4 Results and Discussion

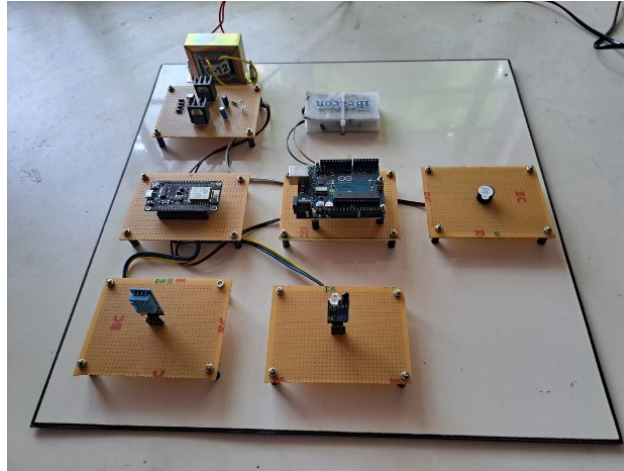


Figure 7: Hardware View

Figure 7 represents the hardware view of an IoT-based multipurpose women's safety system for safety and security. This integration includes a mechanical structure, an Arduino microcontroller, IR sensors, a GPS module, the Blynk app, and other electrical parts. It has been successful in developing a control system that uses an Arduino microcontroller to control the overall process of this work. IOT technology helps detect any type of obstruction and send the information to users.

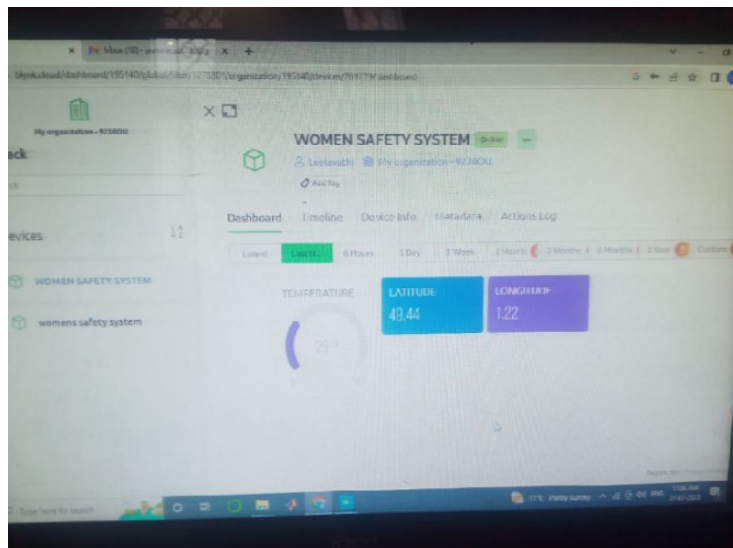


Figure 8: Output for Blynk app

Figure 8 shows the latitude and longitude that are reported in Blynk app. With the use of this software, users may now periodically and from any place recognize the status of their location.



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

5 Conclusion

This effort involves the execution and creation of a safety plan for women that may be applied to other kinds of safety, such. If the IR sensor notices any unusual values, an emergency message is sent to an IoT application and a specified mail address for alerting reasons. Additionally, GPS is used to track the present location. In this project, infrared sensors (IR sensors) are used to detect people and track the IR radiation of objects in their field of view. The device's IR sensor alerts emergency responders when a situation develops, collects the woman's present location, and then uses a GPS module to communicate that information to the recipients. The webpage is constantly updated, and the position is tracked using IoT modules. BLYNK app, a cloud-based website, keeps track of and updates the user's information. The goal of creating a safety control system is to ensure full and complete women's and child safety in the environment.

Reference

1. P. Nandhini; K. Moorthi, Year: 2018, "A Research on Child Safety Wearable devices", International Journal of Scientific Development and Research (IJS DR)", Vol: 3, no: 10.
2. M. Nandini Priyanka; S. Murugan; K. N. H. Srinivas; T. D. S. Sarveswararao; E. Kusuma Kumari, Year: 2019, "Smart IOT Device for Child Safety and Tracking", International Journal of Innovative Technology and Exploring Engineering (IJITEE), Vol: 8, no: 8, pp. 1791 – 1795.
3. Dina M. Ibrahim; Mohammed Ali A. Hammoudeh; Sadaf Ambreen; Sajid Mohammadi, Year: 2019, "Raspberry Pi-based smart infant monitoring system", International journal of engineering research and technology, Vol: 12, no: 10, pp. 1723 – 1729.
4. A. Saranya; C. Venkatesh; S. Selva Kumar, Year: 2016, "Design and Implementation of Automatic Child Monitoring (ACM) system using Wireless Network", International Journal of Computer Science and Mobile Computing, Vol: 5, no: 4, pp. 356 – 363.
5. N. Senthamilarasi; Divya Bharathi; D. Ezhilarasi; R. B.Sangavi, Year: 2019, "Child Safety Monitoring System Based on IoT", Journal of Physics: Conference Series, Vol: 1362, no: 1, pp. 012012. IOP Publishing.
6. P. Nandhini; K. Moorthi, Year: 2018, "A Study on Wearable Devices for the Safety and Security of a Girl Child and Women", International Journal of Advanced Research, Vol: 6, no: 10, pp. 231 – 237.
7. R. Kamalraj; M. Sakthivel, Year: 2018, "A hybrid model on child security and activities monitoring system using IoT", 2018 International Conference on Inventive Research in Computing Applications (ICIRCA), pp. 996 – 999 IEEE.



Article Title: Multi-Purpose IoT-Based Women Safety System Design and Development

8. B. Sathyasri; U. Jaishree Vidhya; G. V. K. Jothi Sree; T. Pratheeba; K. Ragapriya, Year: 2019, "Design and Implementation of Women Safety System Based On IoT Technology", International Journal of Recent Technology and Engineering (IJRTE), Vol: 7, no: 63, pp. 177 – 181.
9. P. Soundarya; M. Nivetha Kumari; J. Jayachitra, Year: 2018, "A Smart Security for Child Safety", Asian Journal of Applied Science and Technology (AJAST), Vol: 2, no: 2, pp. 107 – 113.
10. P. Elamathi; R. Nagaraja, Year: 2019, "Smart Children Safety Using Wearable Device – A Review", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol: 8, no: 11, pp. 2430 – 2434.
11. Lai Yi Heng; Intan Farahana Binti Kamsin, Year: 2021, "IoT-based Child Security Monitoring System", 3rd International Conference on Integrated Intelligent Computing Communication & Security.
12. P. Poonkuzhlai; R. Aarthi; V. M. Yazmin; S. Yuvashri; G. Vidhyalakshmi, Year: 2021, "Child Monitoring and Safety System Using Wsn and Iot Technology", Annals of the Romanian Society for Cell Biology, pp. 10839 – 10847.
13. Prakriti Agarwal; R. Ramya; Rachana Ravikumar; G. Sabarish; Sreenivasa Setty, Year: 2020, "Survey on Child Safety Wearable Device Using IoT Sensors and Cloud Computing", International Journal of Innovative Science and Research Technology, Vol: 5, no: 2.
14. Firoz Khan; S. Yashas; Shivangowda R Patil; G. J. Nandini; P. S. Greeshma, Year: 2020, "Low Cost Intelligent Child Safety Wearable IoT Device for India", International Journal of Recent Technology and Engineering (IJRTE), Vol: 9, no: 1.
15. P. Roopesh, C. H. Sai Prashanth, K. SivaKumar, Year: 2020, "Child Monitoring System", International Research Journal of Engineering and Technology (IRJET)", Vol: 07, no: 06.