



DESIGN AND IMPLEMENTATION OF CHILD SAFETY USING ARDUINO

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Abstract: - Parents in most households today don't have enough free time to keep an eye on their kids all the time because of office employment. To protect their children, parents can easily use the technology provided in this paper. In an effort to improve children's safety, this study makes use of a safety monitoring system built on our Android smartphones. The parents will worry in especially when the child is left alone. Children are frequently abducted, especially young girls. By constantly monitoring the kids' surroundings, this method makes sure they are safe. This system would broadcast the child's location, together with pictures and videos, to the parent's mobile device by integrating a Global Positioning System (GPS) with a GSM module (Global System for Mobile communication).

Index Terms – Child safety, Arduino, GPS, GSM, RFID Module.

1. INTRODUCTION

The safety of children has long been a major issue that requires ongoing improvement. Children safety is vital to their parents even if they have most perfect safeguards, youngsters, due to their lack of ability to protect themselves. Most students travel to and from school every day all around the world, and school buses play a vital role in this. There are a number of issues with school-age children's travel that could trouble parents. This system focuses specifically on kids' movements from their homes to the school entrance in an effort to address a small portion of the security issue for kids at school.

The protection of children in today's fast-paced environment presents considerable concerns for parents, particularly when they are not present. Due to the increase in dual-earner households, parents must spend more time at work, leaving their kids home alone or in the care of others. Child safety is a concern in this circumstance, especially in light of the rising number of kidnapping cases and other risks. Therefore, there is an increasing demand for creative solutions that may assist parents in keeping an eye on their kids' safety in real-time, even when they are not around.

Innovative solutions that can assist parents in keeping an eye on their children's safety in real-time, even when they are not present, are increasingly needed to address this issue. This study suggests a safety monitoring system that makes use of Android smartphones in this situation to increase children's safety.

The suggested system uses GPS and GSM modules to continuously track the child's surroundings and send parents real-time updates to their mobile devices. These components

can be combined to allow the system to track the child's whereabouts precisely, deliver photographs and videos, and notify parents of any unusual action or potential danger. The system also enables parents to define "safe zones" for their kids, which will result in an alarm being sent out if the kid exits the region.

Additionally, the study intends to offer parents a practical and affordable answer. It takes advantage of the widespread use of cellphones and the low cost of GPS and GSM modules to create a system that is usable by the majority of parents. The proposed system has undergone rigorous testing, and the outcomes show that it is capable of efficiently tracking a child's whereabouts and surroundings in real-time.

This study fills a critical need for parents and other carers by offering a workable method for keeping track on kids' safety. The suggested solution can readily be adopted by parents utilizing their smartphones and is simple to use and affordable. The study makes a significant contribution to the expanding body of knowledge in this field and emphasizes how technology can improve kid safety. The following are a few instances of kid safety systems that may be created and used with Arduino: GPS tracking system: This system tracks the child's whereabouts using GPS sensors and notifies the parent's phone when the child departs a predetermined area. Access control system: This system restricts entry to particular regions of the house using RFID tags. The child may, for instance, have an RFID tag that grants entry to the playroom but not the kitchen. Motion detection system: This system sends a notification to the parent's phone when it detects a youngster in a certain location using motion sensors.

2. LITERATURE SURVEY

"Smart Child Safety System using Arduino and Internet of Things" by F. Anjum et al [1], In order to identify and avert probable mishaps, the study describes a smart child safety system that makes use of an Arduino Uno board, sensors, and the internet of things (IoT). The system is made to keep track of the kid's whereabouts, temperature, and humidity. The system notifies the parents or guardians via a mobile app if there is any anomaly.

In another study [2], the author Dhinesh Kumar have proposed a study that implements child safety adopting a safety monitoring system employing our android mobile phones in an effort to increase children's security. Particularly when the youngster is alone, the parents will experience a sense of insecurity. In truth, kidnapping of children is a typical occurrence today, especially of young girls. This method keeps an eye on the kids' daily environments and aids in keeping them safe. This technology uses a GPS (Global Positioning System) and GSM module to broadcast the child's position along with photographs and videos to the parent's mobile device (Global Space for Mobile communication).

In yet another paper [3], IoT Based Child Localization System W. Anto Win Shalini, have presented the idea of a smart wearable gadget for young children is covered in this essay. The main benefit of this wearable over other wearables is that it can be used with any mobile phone, doesn't necessarily need a pricey smart phone, and is easy to use even for those who aren't extremely tech aware. This gadget is designed to make it simple for parents to find their kids. There are numerous safety wearables on the market right now that track children's daily activities and also assist in locating lost children utilizing the Wi-Fi and Bluetooth capabilities of the gadget. Bluetooth and Wi-Fi, however, seem to be unreliable forms of contact for parents and kids. Since the environment for GSM mobile communication is virtually ubiquitous, the focus of this study is on having an SMS text-enabled communication channel between the child's wearable and the parent.

In alternative study [4], Design and Implementation of Child Safety Wearable Device to Prevent Child Trafficking using Arduino Elakiya M. The safety of children is a major area of worry right now. This essay was written to address the concerns parents have about the safety of their children. According to a 2014 report, it is estimated that 135,000 children are trafficked in India each year. Children who have been trafficked are sold out into the sex trade, domestic slavery, and enslavement abroad. This study presents a design for wearable devices that are practical for our children. also, to halt the trafficking of children. The fact that this device gives us our children's tracking information is one of its main advantages. And neither a smart phone nor a specialist is necessary to understand and operate it. This tool is intended to help parents easily locate their children. There are various tracking devices available right now that make it simple for us to keep track of our kids' whereabouts and to spot them via Wi-Fi and Bluetooth.

In another study [5] "Arduino based smart safety helmet for children" by R. Prasad, the paper describes a smart safety helmet for kids that tracks the child's position, speed, and direction of movement using an Arduino board, sensors, and GPS. Moreover, the helmet has a panic button that may be pressed in an emergency. In the event of any odd activity, the system notifies the parents through text message.

Another research [6], "Smart infant monitoring system utilizing Arduino," was conducted in 2019 by S. L. Lee and N. H. Ismail. The system described in this paper for tracking a baby's movements and activities makes use of an Arduino board, sensors, and a camera. A smartphone app is

used to notify the parents or guardians when the system detects any unusual activity, such as unexpected movements, strange sounds, or temperature changes.

3. EXISTING SYSTEM

In the existing systems, the application was used to handle the children's alarm system. The SOS number is included in the applications for security reasons so that the victim's relatives can be informed. GPS and GSM are used in the proposed system. If the child presses the switch, GSM will send a message to the parent's phone and communicate the child's location. Parents can precisely determine whether their children have attended school and whether they get there safely by deploying RFID readers.

4. PROPOSED SYSTEM

We are utilizing GSM and GPS in this proposed system. If the child presses the switch, GSM will send a message to the parent's phone and the location will be provided. Parents can precisely determine whether their children have attended school and whether they get there safely by deploying RFID readers.

A. Block Diagram

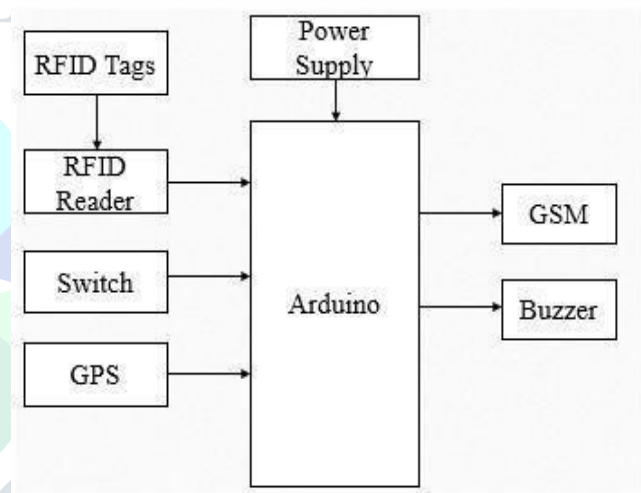


Fig.1: Block Diagram

B. Working

The suggested project would provide real-time location and activity tracking in order to protect youngsters. To implement this capability, the project uses RFID reader modules, GSM, and GPS reader modules. The steps that follow describe how the project functions as a whole:

GPS Module: A GPS module that tracks the child's whereabouts is fastened to their clothing or backpack.

GSM Module: The child's backpack or other items of clothing are attached with a GSM module, which transmits the child's location to the parent's phone.

Switch: When pressed, a switch attached to the child's clothing or backpack transmits the child's location to the parent's phone.

RFID Reader: A RFID reader is set up at the school entrance to keep track of when students arrive and depart the building.

Data Processing Unit: The data processing unit processes the data gathered from the GPS, GSM, and RFID reader modules. To ascertain the child's location and activity, this processing involves analyzing the location data and the RFID data.

Notification Unit: Using the data that has been processed, the notification unit sends notifications to the parent's phone. The location of the child, whether they've made it to school, and whether they've been to class are all included in these messages.

C. Hardware Requirements

1. Arduino:

Arduino Uno shown in figure is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button. It also supports serial communication using Tx and Rx pins. shown in fig.2.



Fig.2: Arduino Uno

2.Switch:

A Push Button switch is a type of switch which consists of a simple electric mechanism or air switch mechanism to turn something on or off.



Fig 3: Switch

When connecting in between of supply and the circuit we should only connect the wires with both the legs of the Push-Button as shown in the circuit below:

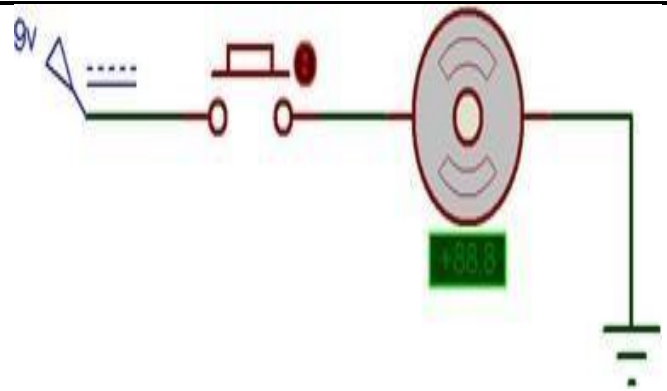


Fig 4: Simple circuit

A Push-Button can also be used for the triggering purpose like of SCR. An SCR is a gate-controlled Switch which needs a triggering pulse. So, for this we can add a Push button in the circuit to give a triggering pulse, as shown in the circuit below:

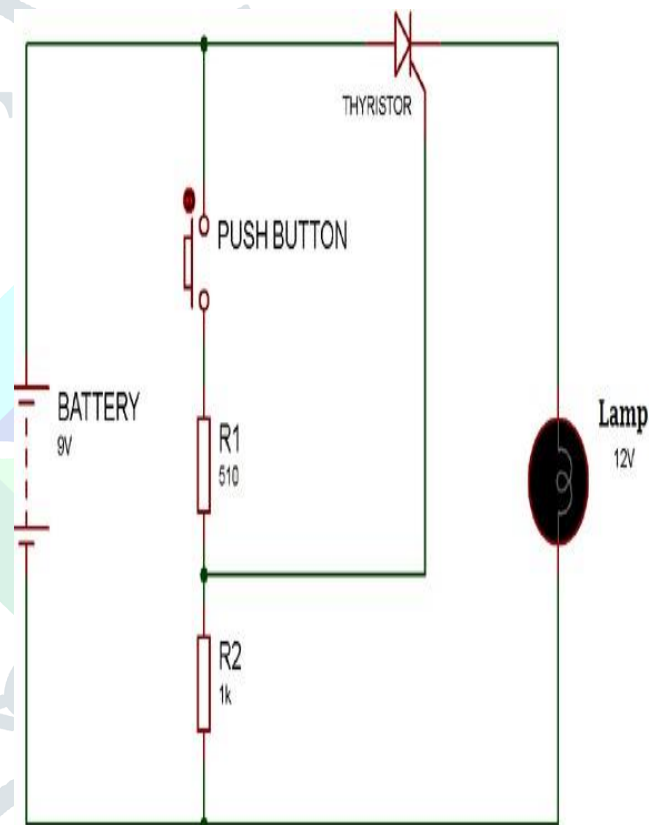


Fig 5: complex circuit

3. RC522 RFID Module:

Based on NXP semiconductors' MFRC522 controller, the 13.56MHz RFID module known as the RC522 uses this chip. The module typically comes with an RFID card and key fob and can support I2C, SPI, and UART. It is frequently used in applications for person/object identification, such as attendance systems.



Fig 6: RFID Module

4. GPS:

The Global Positioning System (GPS) is a satellite-based system that calculates and measures its position on Earth using ground stations and satellites. Navigation System with Time and Ranging (NAVSTAR) GPS is another name for GPS.

For accuracy, a GPS receiver must receive information from at least four satellites. The satellites receive no data from the GPS receiver. Several applications, including fleet management, taxis, and cellphones, utilize this GPS receiver.



Fig 7: GPS

5. GSM Modem:

A computer or any other processor can communicate across a network via a GSM modem, which can be either a mobile phone or a modem device. A SIM card is necessary to run a GSM modem, which utilizes a network range to which the network operator has subscribed. It has three different connections options for computers: serial, USB, and Bluetooth.

With the proper cable and software driver, a regular GSM mobile phone can function as a GSM modem when connected to a computer's serial port or USB port. Often, a GSM modem is preferred over a GSM mobile phone. Applications for the GSM modem include transaction

terminals, supply chain management, security software, and weather stations.



Fig 8: GSM MODEM

6. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.



Fig 9: Buzzer

D. Software Used:

1. ARDUINO IDE

Arduino IDE Arduino IDE is open-source software that makes to write the code in easy manner and helps to upload it into the Arduino board and the uploaded code contains the program that describes the working of the process. The main advantage is the software can be used in any Arduino board. The Arduino can control and interact with a wide variety of sensors like temperature, accelerometer and heart beat sensor.

5. EXPERIMENTAL RESULTS

The experimental outcomes for the Arduino-based child safety system were encouraging and showed how well the system worked to provide real-time information about the child's whereabouts, activities, and communication. The system's GPS module precisely recorded the child's location and sent the coordinates—latitude and longitude—to the parent's mobile phone through the GSM module. The system's ability to pinpoint the child's position was quite accurate. Also, the system was successful in taking images and videos at predetermined intervals or on demand, and sending them via

the GSM module to the parent's mobile device. The high-quality photos and videos offered a clear glimpse of the kid's activities. With the Arduino board and GSM module, the two-way communication module enabled efficient communication between the parent and child. The system enabled real-time communication between the parent and child. The system's comparatively low power consumption made it an effective and workable solution for child safety.

The kid safety system using Arduino was successful in giving real-time information about the child's whereabouts, activities, and communication, according to the testing results. The location of the child could be determined with high degrees of accuracy, and the photographs and videos that were sent to the parent's mobile device were of good quality. The two-way communication module made it possible for parents and children to communicate effectively, which made it an excellent child safety option.

6. CONCLUSION

To protect children's security throughout their everyday travel, an RFID system has been suggested. The technology would immediately update their record of attendance in the school's database and notify their parents through email or text message that their child had safely arrived at school. The use of GPS monitoring would add another layer of protection against any risks or mishaps by enabling the school and parents to track the child's whereabouts in real-time. Overall, putting this system in place would offer a thorough answer for guaranteeing the safety and security of schoolchildren on their regular outing.

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