

SMART DEVICE TO ALERT BYSTANDERS OF THE ABDUCTED CHILD

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ABSTARCT : Our paper dissert the concept of device for children. Using this device the parents can easily track the child using GSM technology. The advantage of this device is that, it does not require any expensive smart phone and the user does not need technical knowledge. In market many devices are available, but it is only using WIFI and Bluetooth with the specific range. Therefore the focus of this project is to have the SMS text alert communication between parents and the device. Thus the GSM mobile communication is almost present everywhere. The parents can send the text to the device with keywords about the "LOCATION"," TEMPERATURE"," PIR sensor" and "BUZZ " the device will reply back to the parent mobile about the real time accurate location of the child which will provide the directions of the child location in Google map app and the surrounding location temperature and the PIR sensor radiation so that the parents can keep track of child with ease. This prestige of this project is that people in the surrounding of the child could instantly react if the child is in danger. This device provides the more security for the children.

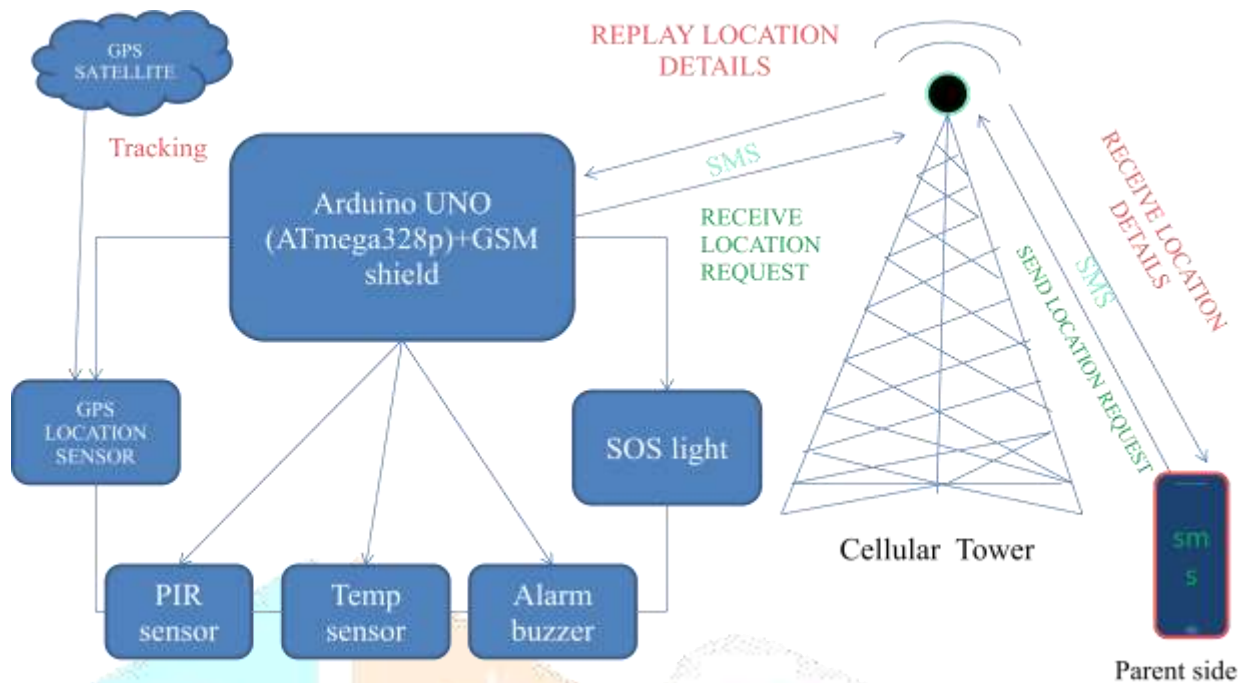
KEYWORDS: GPS,GSM,PIR Sensor, Arduino UNO.

I.INTRODUCTION

The Internet of Things System (IoT) [1] refers to the set of devices and systems that stay interconnected with real-world sensors and actuators to the Internet. IoT includes many different systems like smart cars, wearable devices [2] and even human implanted devices, home automation systems [3] and lighting controls; smartphones which are increasingly being used to measure the world around them. Similarly, wireless sensor networks [4] that measure weather, flood defenses, tides and more. There are two key aspects to the IoT: the devices themselves and the server-side architecture that supports them[5]. The motivation for this device comes from the increasing need for safety for little children in current times as there could be scenarios of the child getting lost in the major crowded areas. This paper focuses on the key aspect that lost child can be helped by the people around the child and can play a significant role in the child's safety until reunited with the parents. Most of the devices available today are focused on providing the location, activity, etc. of the child to the parents via Wi-Fi [8] and Bluetooth [9]. But Wi- Fi and Bluetooth seem a very unreliable source to transfer information. Therefore it is intended to use SMS as the mode of communication between the parent and child's, as this has fewer chances of failing compared to Wi-Fi and Bluetooth. The platform on which this project will be running on is the Arduino [10] Uno microcontroller board based on the ATmega328P, and the functions of sending and receiving SMS, calls and connecting to the internet which is provided by the Arduino GSM shield using the GSM network [11]. Also, additional modules employed which will provide the current location of the child to the parents via SMS. Therefore alerting the people around the child that the child is in some distress and is universally known as the signal for help needed. Additionally, the device comes equipped with a distress alarm buzzer which sets to active by sending the SMS keyword "BUZZ" to the device. Hence the buzzer is loud and can be heard by the parent from very considerable distance. Also the parents via SMS can receive accurate coordinates of the child, which can help them locate the child with pinpoint accuracy. Some of the existing work done on these similar lines are for example the low-cost, lightweight Wristband Vital [2] which senses and reports hazardous surroundings for people who need immediate assistance such as children and seniors. It is based on a multi-sensor Arduino micro-system and a low power Bluetooth 4.1 module. Since the distance between the two in some cases could be substantial and the Bluetooth just won't be able to establish a close link between the two. Therefore, the device proposed will be communicating with the parent via SMS which would ensure that there is a secure communication link. It comprises of Arduino Uno based on the ATmega328P microcontroller. It receives the data from its various physically connected modules, anatomizes this data and refines the data in a more user understandable format to the different available user interfaces . The user, therefore, can conveniently view the information on their cellphone.

II. SYSTEM DESIGN AND ARCHITECTURE

This section consist the architecture and the design tracking methodologies chosen for the development of the SMART DEVICE TO ALERT BYSTANDERS OF THE ABDUCTED CHILD .



2.1 System Overview

An ATmega328p microcontroller controls the system architecture of tracking with an Arduino Uno boot-loader. A 5 pin header allows for power (+3 V) and ground connections as well as providing access to TX, RX, and reset pins of the ATmega328p. The diagram illustrates the architecture of the child safety device, which depicts the various technologies and technological standards used. The system architecture of the device is based and controlled by an AT - mega328p microcontroller with an Arduino Uno boot loader. The Arduino Uno collects various types of data from the different modules interfaced to it, such as the GPS module upon being triggered by the Arduino GSM shield. The GSM shield is used as an interface to send the data received by the Arduino Uno via SMS or MMS to a Smartphone over GSM/GPRS. If an SMS text with distinct characters is sent to request the current location or GPS coordinates is sent to the Arduino GSM shield via the user's smartphone, then the GSM shield triggers the Arduino Uno to request the current GPS coordinates. The GSM shield uses digital pins 2 and 3 for the software serial communication with the MIO. Pin2 is connected to the MIO's TX pin and pin 3 to its RX pin. The MI 0 is a Quadband GSM/GPRS modem that works at GSM850Mhz, GSM900Mhz, DCS1800Mhz, and PCS1900Mhz. It also supports TCPIUDP and HTTP protocols through a GPRS connection. Once the Arduino Uno has received at the coordinate information, it will process this information and transfer it over to the GSM shield, which then via SMS sends 439 the coordinates to the user's smartphone. The user can just tap on the coordinates which will open up the default GPS application installed on the phone and will show the user the distance between the child and the user.

2.2 GPS Location Sensor

GPS is a space based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the earth. The signals are transmitted at the speed of light by these GPS satellites, GPS tracking system is a great technology and it is used to track the objects around the world. For determining the real time location of the child Parallax PMB-648 GPS module has been used which communicates with the Arduino Uno through a 4800 bps TTL-level interface. The connections between the Arduino Uno and the GPS module established with three wired connections which enable the Arduino to read the GPS data. The GPS module receives location information from the various satellites present in the NAVSTAR (American Satellites Timing and Ranging Global Positioning System) GPS system [1]. It has a low power consumption and size of the only 32x32mm, which is very compact. The output received from the GPS module is a standard string information which is governed by the National Marine Electronics Association (NMEA) protocol. To interface the PMB-648 GPS module with the Arduino to provide precise latitude and longitude GPS coordinates, the TinyGPS library was added into the Arduino IDE. The Yin (red wire) on the PMB-648 GPS module is connected to the 5V pin on the Arduino Uno via jumper cables. Similarly, the GND (black wire) pin on the GPS module is connected to the GND pin on the Arduino Uno via jumper cables. The TXD (yellow wire) is connected to pin 6 of the Arduino Uno via jumper cables on the breadboard. The pin six on the Arduino Uno is a digital pin which

can also be used for PWM (Pulse Width Modulation) applications. The SMS trigger text "LOCATION" is sent from the smartphone of the user, this text is received by the Arduino GSM Shield which in turn triggers the Arduino Uno to execute the GPS code to fetch the current, accurate location of the GPS module. The location output string received from the GPS module is in the following format:

- 1) 220516-Time Stamp
- 2) A-validity- A-ok, V-invalid
- 3) 5133.82-current Latitude
- 4) N-North/South
- 5) 00042.24-current Longitude
- 6) W-East/West 7) 173.8-Speed in knots
- 8) 231.8-True course 9) 130694-Date Stamp
- 10) 004.2-Variation 11) W-East/West
- 12) *70-checksum

Then the final results for latitude and longitude are inserted into the following URL format: <http://maps.google.com/?q=>, For example: Reading received: 37.7163, -122.4739 SMS sent to the user's <http://maps.google.com/?q=37.7163,-122.4739> smartphone: Hence the user can just directly click on this received Google maps hyperlink which will automatically redirect the user to the Google Maps app on the smartphone and show the pinpoint location of the child. This SMS can be received directly on the default SMS app or via Android app on the user's smartphone.

2.3 GSM sensor

GSM MODULE With the help of GSM module interfaced, we can send short text messages to the required authorities as per the application. GSM module is provided by SIM uses the mobile service provider and send SMS to the respective authorities as per programmed. Specifications: Control via AT commands (GSM07.07, 07.05 and SIMCOM enhanced AT Commands. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communication over the mobile network. while these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS & MMS message. The term GSM usually means the GSM standard and protocol in the frequency spectrum around 900MHz.

- ❖ Supply voltage range 3.4 - 4.5 V
- ❖ Low power consumption
- ❖ Operation temperature: -30 °C to +80 °C

2.4 Temperature Sensor

In order to measure the temperature of the surroundings of the child, the thermistor temperature sensor is used, which is inexpensive, adaptable and easy to use. This thermistor offers higher sensitivity than the resistor detectors. Most of the thermistor have negative temperature coefficient. Which means that the temperature increases resistance decreases. There are three pins in the temperature sensor, which are pin1, pin2, pin3 and there is a flat face on the head of the three pins. The temperature sensor offers high linearity and high accuracy over the operating range of about 55°C to +150°C.

2.5 PIR Sensor

The term "Passive Infrared", or "**PIR**", is commonly assigned to the technology of motion detectors used to detect people by **sensing** the thermal infrared radiation emitted by the human body. Such as a human, passed in front of the background, such as a wall, The temperature at that point in the sensor's field of view will rise from room temperature, and then back again. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over thirty meters (one hundred feet) away from

the PIR. The PIR sensor is consistory all objects, living or not, whose temperature is anything above absolute zero emit infrared radiation. Every object that has a temperature above perfect zero emits thermal energy (heat) in form of radiation. We, Homo sapiens, radiate at wavelength of 9-10micrometers all time of the day. The **PIR sensors** are tuned to detect this IR wavelength which only emanates when a human being arrives in their proximity. The term “pyroelectricity” means: heat that generates electricity (here, an electric signal of small amplitude). Since these sensors do not have an infrared source of their own, they are also termed as passive.

2.6 Distress Alarm Buzzer

In the scenario, if a child is separated from his/her parents. The parent can locate their child by sounding a very loud alarm on the device. To achieve this, grove seed studio buzzer was used, which has a piezoelectric module which is responsible for emitting a strong tone upon the output being set to HIGH. The grove buzzer module is activated upon sending an SMS text with the keyword "BUZZ" from a cell phone. Also, this buzzer works by alerting the people nearby with the distressed tone that the child might be lost and is in need of assistance. The buzzer is connected to the D4 digital port of the base shield.

III. PROPOSED METHOD

The platform on which this project will be running on is the Arduino Uno microcontroller board based on the ATmega328P, and the functions of sending and receiving SMS, calls and connecting to the internet which is provided by the Arduino GSM shield using the GSM network .SMS text enabled communication medium between the child's device and the parent as the environment for GSM mobile communication is almost present everywhere. The device comes equipped with a distress alarm buzzer which sets to active by sending the SMS keyword "BUZZ" to the device. The term "Passive Infrared", or "**PIR**", is commonly assigned to the technology of motion detectors used to detect people by **sensing** the thermal infrared radiation emitted by the human body. Such as a human, passes in front of the back ground ,such as a wall.The temperature at that point in the sensor's field of view will rise from room temperature, and then back again. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over thirty meters (one hundred feet) away from the PIR. Every object that has a temperature above perfect zero emits thermal energy (heat) in form of radiation. We, Homo sapiens, radiate at wavelength of 9-10micrometers all time of the day.

Advantages for Proposed System

- Safety Device which can be carried by everyone – These devices will be used for safety purpose which will be easier for carrying from place to place.
- Easy and fast to install-These system will be easy to handle.
- Low cost with high performance-The device will be in a low cost which will work with a good performance.
- Environmental friendly system- The system will not harmful for the surrounding.

IV.FUTURE SCOPE

4.1 Camera Module:

For surveillance of the child's surroundings, to get a clearer picture of the location, this device can also contain a camera module incorporated in it. The hardware that could be used would be a adafruit TTL serial camera. Since the major focus of this project is the GSM module which is a better alternative than Bluetooth, Wi-Fi due to the short range and connectivity issues of these technologies. Therefore, for this project using the GSM technologies is beneficial as the cellular range is vast and since all the communication between the device and the user is taking place via SMS, therefore no internet connectivity is required at all. But, still, the Arduino GSM shield possess the added advantage of using GPRS which enables the board to use the internet if required. Whereas for the camera module which supports video streaming but due to the constraint of trying to use only sms, therefore only four wire connections will be taking place. The red and black wires will be connected directly to +5V and GND respectively to the Arduino uno board. Whereas for the RX pin which will be used for sending data via arduino uno and arduino gsm board and for the TX pin which will be utilized for receiving incoming data via from the modules.To talk to the camera, the Arduino uno will be using two digital pins and a software serial port to talk to the camera. Since the camera or the Arduino Uno do not have enough onboard memory to save snapshots clicked and store it temporarily, therefore an external storage source microSD breakout board will be used to save the images temporarily. The camera works on a standard baud rate of 38400 baud. The camera will be collecting information in the same manner as the GPS module. It will be on standby conserving power waiting for the particular keyword "SNAPSHOT" to be sent from the user's smartphone to the GSM shield will activate the camera to start clicking a snapshot of the surrounding and save

the file temporarily on the external microSD card. After which Arduino Uno will access the saved image from the microSD storage and transfer it to the GSM module which send it to the user via SMS/MMS text.

4.2 Android App:

The idea behind the Android app has been derived from having an automated bot to respond to text message responses from the user. It will provide the user with predefined response options at just the click of a button. The user doesn't need to memorize the specific keywords to send. Also, the bot will be preprogrammed to present the user with a set of predefined keyword options such as "LOCATION," "SNAPSHOT," "SOS," etc. Whereas for the future aspect of this device based on what type sensor is added to it, additional specific keywords could be added such as, "HUMIDITY," "ALTITUDE,".

V.CONCLUSIONS

The child safety device is capable of acting as a smart IoT device. It provides parents with the real-time location, surrounding temperature, PIR radiation index and SOS light along with Distress alarm buzzer for their child's surroundings and the ability to locate their child or alert bystanders in acting to rescue or comfort the child. The smart child safety device can be enhanced much more in the future by using highly compact Arduino modules such as the LilyPad Arduino which can be sewed into fabrics. Also a more power efficient model will have to be created which will be capable of holding the battery for a longer time.

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