CHILD SAFETY USING IOT

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Abstract : This paper discusses the concept of child safety device with the help of IOT (Internet of Things) technology. Recently, all over the world, crime against children is increasing at higher rates and it is high time to offer safety support system for the children going to schools. This paper focuses on implementing children tracking system for every child attending school. Today, technology is growing rapidly and providing all essential and effective solution for every requirement. The major advantage of this wearable over another wearable is that it can be used in any cell phone and doesn't necessarily require an expensive smartphone and not a very tech savvy individual to operate. The purpose of this device is to help parents locate their children with ease. At the moment there are many wearables in the market which help track the daily activity of children and also help find the child using Wi-Fi and Bluetooth services present on the device. But Wi-Fi and Bluetooth appear to be an unreliable medium of communication between the parent and child. Therefore, the focus of this paper is to have an SMS text enabled communication medium between the child's wearable and the parent as the environment for GSM mobile communication is almost present everywhere. The parent has to send a text with specific keywords such as "START" and "STOP". After sending "START" message the device will be activated and it sends the information about the child repeatedly after certain time of interval. Child information includes location of that child, surrounding temperature, UV radiation index, etc. Also, after sending "BUZZ" message the alarm buzzer is activated and sounds an alarm which a bystander can easily spot. After sending "STOP" message the device will be deactivated. Finally, implementation results for the proposed system are provided in this paper.

IndexTerms **- IOT, Safety, Wearable, GSM, GPS, Children.**

I. INTRODUCTION

As per the National Policy of children 1974, children have been called as the "Supreme National Asset". They are the foundation on which the future of a strong and dynamic India shall be built. The rate of crime against children has been increasing over the years especially in India.

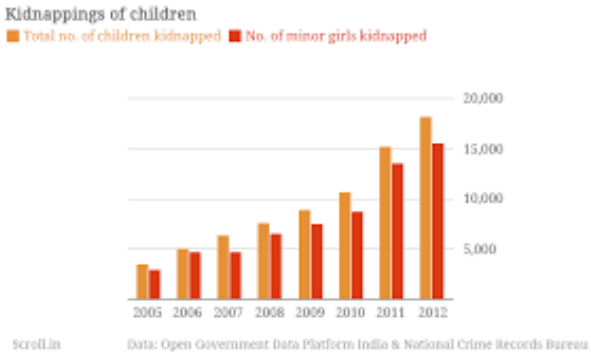

Figure.1. Graph of children kidnapping

Nowadays, both the parents are working and are unable to manage and keep a track of various activities of their children [1]. Hence, the proposed system will be very useful to the parents. The Internet of Things system (IOT) [8] 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 [5] and even human implanted devices, home automation systems [10], lighting controls, Smartphone's which are increasingly being used to measure the world around them. Similarly, wireless sensor networks [11] that measure weather, flood defences, tides and more. The motivation of this wearable 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 wearable's available today are focused on providing the location, activity, etc. of the child to the parents via Wi-Fi and Bluetooth. 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 wearable device, 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 Uno and functions of sending and receiving SMS which is provided by the GSM module using the GSM network [2]. Some of the existing works done on these similar lines are for example the low-cost, lightweight Wristband Vital which senses and reports hazardous surroundings for people who need immediate assistance such as children and seniors. The major drawback for the Vital band is that it uses Bluetooth as the mode of communication between child and the parent. 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. Hence this system combines both GPS and GSM technology to provide a hand in such situations. The GPS is used for identifying the location and GSM is used for sending them as a message [6].

II. PROBLEM STATEMENT

Children are one of the most precious assets of our country as they are the future of the nation. Unfortunately, crime against children has been increasing exponentially. The safety of school children is the most significant component encouraged to precede with the support of advanced technology. There have been several unfortunate instances reported in the media about callous approach by certain schools with respect to the safety of school children during transit to and from the school [1].

Today, technology is growing rapidly and providing all essential and effective solutions for every requirement. Nowadays, child security is an important area of concern. Our system ensures maximum security and ensures live tracking for their kids because parent worries are genuine [7].

Now-a-days children and women are facing many security related problems. In such situations, they are helpless and don't have any way to protect them or inform it to their family members, neighbours or police station and they feel as handicaps. Hence there should be a system to protect them in such times. So, this system helps them to seek help in any critical situation [4].

The absence of information system which could display condition, actual activity, and annual reporting of kindergarten students in a platform which could be accessed easily anywhere and anytime has led to be a major block between coordination of student, parent, and teacher. One of the most difficult technical implementation is how to compile and display the updates of children's position in a fast (near real-time) duration while accessed from outside communication [3].

III. SYSTEM OVERVIEW

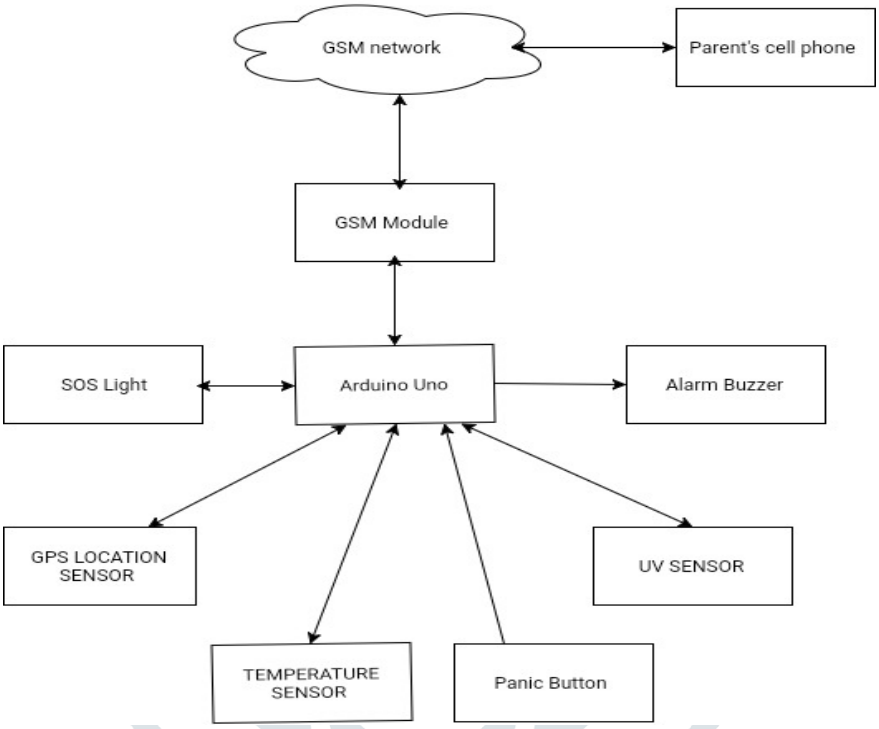

Figure.2. System Block diagram

An ATmega328p microcontroller controls the system architecture of the wearable 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.

GSM Sim 300 module is used as an interface to send the data received by the Arduino Uno via SMS to a mobile phone over GSM/GPRS. The GSM module functions as a trigger for the Arduino Uno to request data from its various modules. The GSM module uses digital pins 7 and 8 for the software serial communication with the Sim 300. Pin 7 is connected to the Sim 300 TX pin and pin 8 is to its RX pin.

By receiving the sensors information, Arduino Uno will process this information and send it over to the GSM module, which then sends the information to the user's mobile phone. It also includes the URL of GPS coordinates; the user can just tap on the URL so it will open up the default GPS application installed on phone or Web Browser in phones. This will show the user the distance between the child and the user.

IV. PROPOSED SYSTEM

This system is aimed at proposing a method for improving the child security system already available. The proposed system ensures that a child is safe while commuting from their home to school or vice versa. In this system, the parent has to send a text with specific keywords such as "START" and "STOP". After sending "START" message the device will be activated, and it send the information about the child repeatedly after certain time of interval. Child information includes location of that child, surrounding temperature, UV radiation index, etc. Also, after sending "BUZZ" message the alarm buzzer is activated and sounds an alarm which a bystander can easily spot. After sending "STOP" message the device will be deactivated.

Our System consists of following modules:

1) **GPS location sensor:** Once the SMS trigger text "LOCATION" is sent from the smartphone of the user, this text is received by the Arduino. For determining the real time location. Then the final results for latitude and longitude are inserted into the following URL format: http://maps. google.com/?q=<lat>, <lng>. Hence the user can just directly click on the received Google maps Hyperlink which will automatically redirect the user to the Google maps app on the smartphone o browser in

mobile phones and show the pinpoint location of the child. Also, message sends after some time of interval. Following is an output of GPS location sensor:

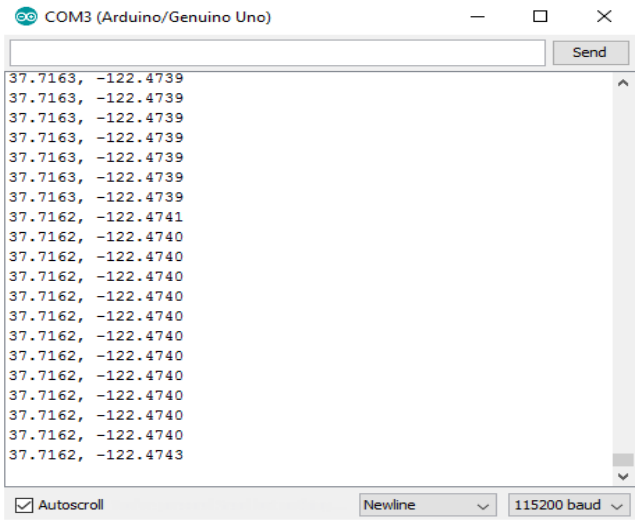

Figure.3. GPS output on serial monitor

2) **Temperature Sensor:** To measure the temperature of the surroundings of the child, a temperature sensor is used the sensor module is equipped with a thermistor for measuring the ambient temperature and the fluctuations with high accuracy.

3) **UV Sensor:** To measure the ultraviolet radiation intensity present around the surroundings of the child, a UV sensor used the sensor works by outputting electrical signal which alters with UV intensity. Following is an output of UV sensor:

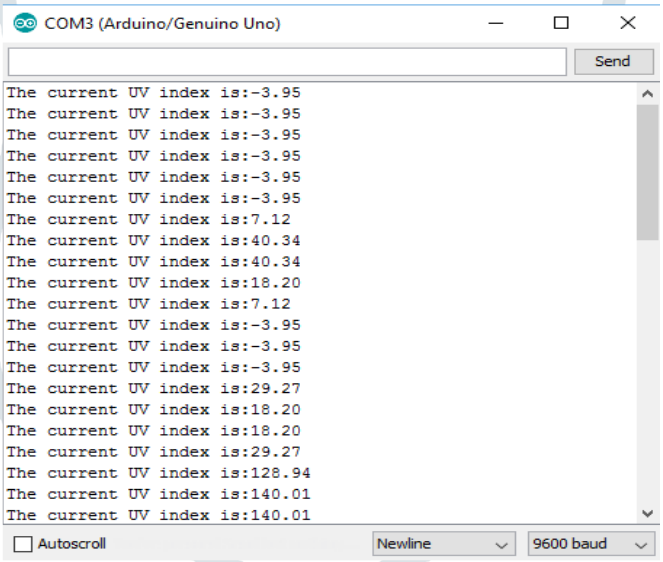

Figure.4. UV output on serial monitor

4) **Distress Alarm Buzzer:** In the scenario, if a child is separated from his/her parents, the parents can locate their child by sounding a very loud alarm on the wearable. To achieve this, buzzer is used, which has a piezoelectric module which is responsible for emitting a strong tone upon the output being set to HIGH.

5) **GSM Module:** The GSM module can be used to send SMS receive the SMS and do the basic GSM operation with the help of AT commands GSM provides us a wide scope in controlling things remotely from any place just with our fingertips. GSM also provides ease to easily communicate in a more robust way. The GSM module has been programmed to receive SMS text messages from the parent's cell phone.

6) **Panic Button:** If the child feels unsafe he\she press the panic button and immediately the GPS module is activated and location will be send to the parent's cell phone [9].

V. RESULT

In this section, the experimental tests were performed to determine the various components of the proposed wearable device.

5.1 GPS Location Sensor:

The GPS location sensor will fetch the latitude and longitude coordinates of the wearable device and reply to the user's cell phone, which then the user would click on the received Google maps URL which would open the Google maps app or web browser and display the pinpoint location.

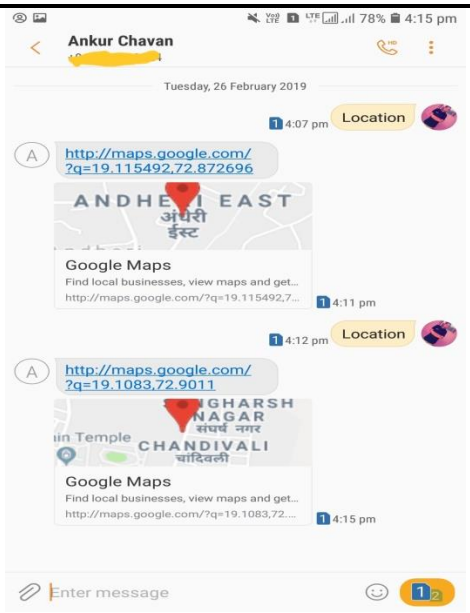

Figure.5. GPS Location URL

In all the scenarios the GPS module was tested, it would respond back to the user's cell phone within a short time. The GPS turned out is so precise with the location that it performed even better than the GPS on an expensive phone.

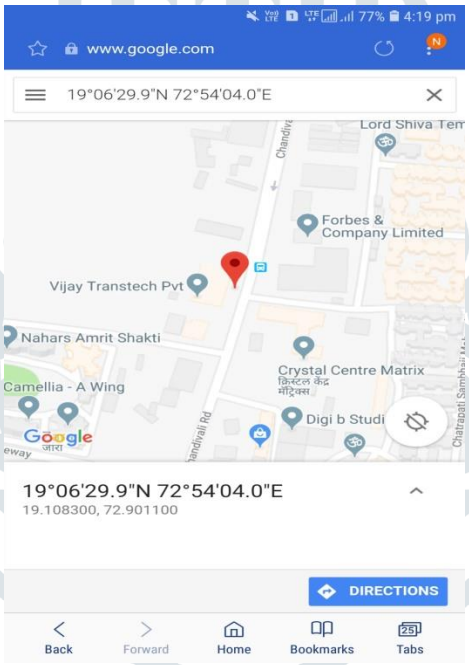

Figure.6. GPS Location in Map

5.2 Temperature and UV sensors:

The temperature and UV sensors are tested multiple times under different temperature and intensities of sunlight. The response time to receive a temperature value is quick. Also, the UV sensor is quick in responding to the changes in the intensities of sunlight.

Figure.7. Temperature and UV Index

VI. CONCLUSION

The System proposed in this paper is to ensure safety of children and increase their confidence. Many researchers are working in this area and have developed different technologies to help the children. The solution represented in this paper takes the advantage of smart phones which offers rich features like Google maps, SMS, etc. The child safety device is capable of acting as a smart IOT device. It provides parents with real-time location, surrounding temperature, UV radiation index along with alarm buzzer for their child's surroundings and the ability to locate their child. This paper describes the basic design concept and functionality along with the expected outcomes.

VII. ACKNOWLEDGMENT

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