DESIGN AND IMPLEMENTATION OF CHILD SAFETY DEVICE IN REAL TIME MONITORING SYSTEM

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ABSTRACT

Children safety is a very important issue due to rising crimes against children these days especially when children step out of their houses to meet their daily needs, is one of the major challenges faced in today's society. With this motivation we a propose the design of an Internet of Things - based safety device using the STM32 Microcontroller , along with an Android application that would assist the primary user to notify in any sort of emergency condition, the device will alert parents through the cell phone in the form SMS so that they can take immediate action. The device can detect the child's approximate location, the temperature sensor detects the body temperature of the child so that the parent may keep a track and act accordingly and the pulse sensor is used to detect the heartbeat of the child. For an emergency situation the device would have some measures like an alarm buzzer which will notify the bystanders to help the child and provide safety to them until the parents arrive. This system is all about safety and security of the children to help them to recover from any type of social challenges.

Keywords: Child security, Health monitoring parameters, GPS Module, GSM Module

I. INTRODUCTION

In present scenario there is a kidnapping cases drastically increasing in the real world. We designed an embedded concept in the project. By the survey of kidnapping kids in 2004, an aggregate of 5996 Childs are missing, Out of these exclusive 4092 kids found by police. However 1904 youngsters are missed.GPS comprises of a system of 24 satellites in 6 distinctive 12-hour orbital ways dispersed so that no less than five are in perspective from each point on the globe. Short Messaging Service (SMS) is a component accessible on all cellular telephones which permits a little content to be sent message. In view of this if kid is captured or he/she is moved outside of characterize zone then ready message will be sent to separate guardian's enrolled number. The Child Guard system is structured into three parts and provides two main functions using the region safety feature, a guardian can be alerted if a child moves beyond a certain region. The Child Guard system is structured and provides two main functions. With the rapid development of urbanization and industrialization in China, the resident population in the countryside has gradually decreased, and a significant number of children are now living in or near cities. parents and guardians thus need ways to better monitor their children but typical security measures focus on preventing theft or other illegal action and aren't well suited for monitoring children for example, two typical measures include hiring manned guards or using video surveillance, but guards aren't practical or affordable when it comes to monitoring children and video surveillance systems usually blind zone. Furthermore, parents and guardians don't have permission to access surveillance videos to monitor their children. Child guard is a security method for monitoring children that uses ubiquitous computing devices such as wearable device or smart phone. Which are growing in both popularity and performance. We exploit such devices to monitor the location and activities of the children and to proactively notify children and guardians of potential safety risk. So, IoT devices are applied in different fields such as agriculture, medical, industrial, security and communication applications [1].

II. BACKGROUND

The review of literature for child safety and location tracking devices are discussed below. In [2], the parent can send a message to the GSM module, according to the message information the GSM module reply back with particular details of the children. The location can be seen on the Google map. The life of the child can be saved within no time. In [3], for the children point of view GPS, GPRS and GSM are used to monitor the speed and location tracking purpose. Parents track their children in real time of the location tracker by GSM and [4] the microcontroller used is ARM-7 LPC2148. In [5], to solve child caring problem global position system (GPS) based solution with two nodes was proposed. Children below six years can not explain in words directly to their parents about the problems, hence a wearable device is developed in [6]. This device procures information such as heart rate, physical body movements and send it to the parents in real time. In [7], a wearable sensor badge is constructed from (hard) electronic components, which can sense perambulatory activities for context awareness. A wearable sensor jacket is used with latest techniques to form (soft) fabric. Stretch sensors are placed to measure upper limb and body movement. Worn as clothing, the sensors give the required information.[7]. In paper[8], wearable IoT device for the security and shielding of women and girl children was designed.. The device [9] an analysis of skin resistance and body temperature was made. Body position is determined by a triple axis accelerometer. After acquiring raw data activity recognition is done and a specialized machine learning algorithm is employed in this process. Real-time data is achieved by sending sensor data to a Cloud Platform. Then the data is analysed using MATLAB. In paper [10], there are two modules namely Wi-Fi and audio play back module. The details of the baby can be sent to parents through Wi-Fi module.

III. BLOCK DIAGRAM AND DESCRIPTION OF PROPOSED SYSTEM

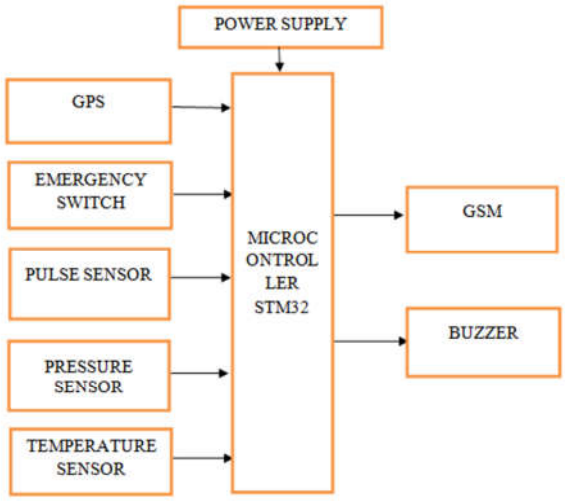

Figure 1: Block Diagram of Children Safety Device

The above block diagram consists of STM32 microcontroller, GPS module, GSM module, force sensor, temperature sensor, and pulse sensor. Considering all these parameters we have built an android app which consist of each parameter separately and the parent can easily monitor it and react based on a particular parameter. The device consist of emergency switch which can be turned ON when the child thinks that he is in danger or being harassed and it also consist force sensor with an applied force. When the force exceeds the limit, with this action an alert message will be sent to the parent who consists of location of the child. If these two cases are failed to be applied then the device will be having a pulse sensor which will keep on reading the pulse rate of the child, then the parent

gets an alarm message showing that the child's pulse is being raised by which the parent will able to access the android app and check the location of the child and act accordingly.

A. GPS Module

The complete GPS module that is based on the Ublox NEO-6M. This unit uses the latest technology from Ublox to give the best possible positioning information and includes a larger built-in 25 x 25mm active GPS antenna with a UART TTL socket. A battery is also included so that you can obtain a GPS lock faster. This is an updated GPS module that can be used with ardupilot mega v2. This GPS module gives the best possible position information, allowing for better performance with your Ardupilot or other Multirotor control platform. The NEO-6M GPS module is shown in the figure 2. It comes with an external antenna, and doesn't come with header pins.

Figure 2: Ublox NEO-6M GPS Module

B. GSM Module

The heart of the module is a SIM800L GSM cellular chip from SimCom. The operating voltage of the chip is from 3.4V to 4.4V, which makes it an ideal candidate for direct LiPo battery supply. This makes it a good choice for embedding into projects without a lot of space.

Figure 3: GSM SIM800L

The data pins of SIM800L GSM chip are broken out to a0.1″pitch headers. This includes pins required for communication with a microcontroller over UART. The module supports baud rate from

1200bps to 115200bps with Auto-Baud detection. The module needs an external antenna to connect to a network. The module usually comes with a Helical Antenna and solders directly to NET pin on PCB. The board also has a U.FL connector facility in case you want to keep the antenna away from the board.

IV. RESULTS AND DISCUSSION

Step 1: When the power supply is given to the device, all the modules get activated as shown in figure 4.

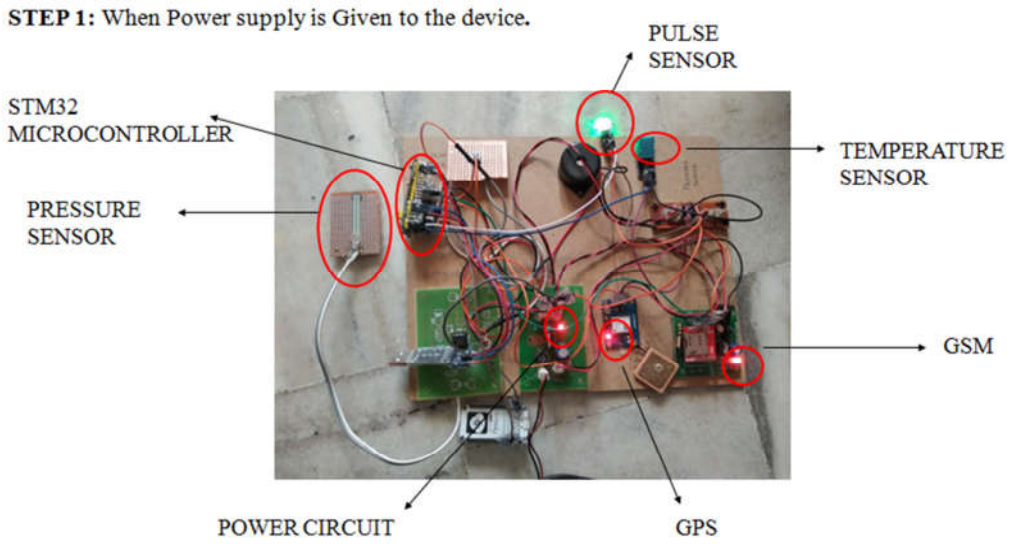

Figure 4: Activation of the modules

Step 2: When the emergency switch is turned on, the buzzer gets activated and the GPS device starts tracking the child and takes the latitude and longitude from the satellite which resembles the position of the child as shown in the figure 5.

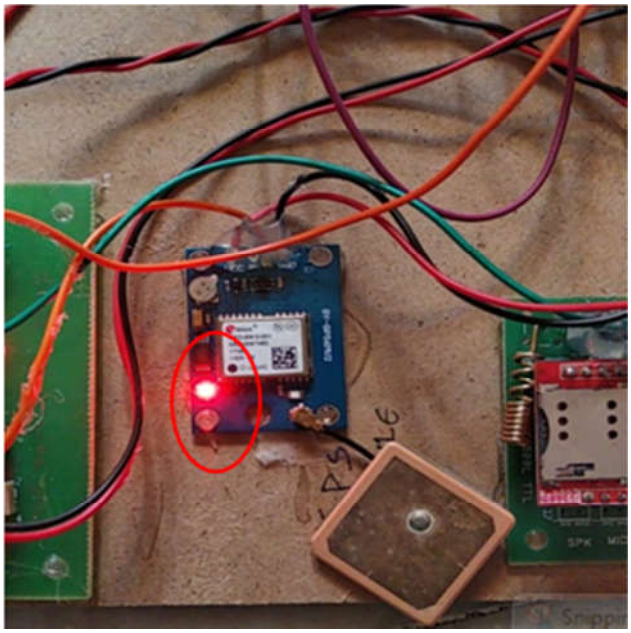

Figure 5: Input1- Emergency switch is turned ON.

Step 3: In case the emergency switch cannot be turned on, there is pressure sensor in the device which has a limit of certain pressure. If the applied pressure is beyond that limit the sensor gets activated and gives as input to STM32 microcontroller and the buzzer gets turned on to alert the surroundings, then the GPS device starts tracking the child and takes the latitude and longitude from the satellite which resembles the position of the child as shown in the figure 6.

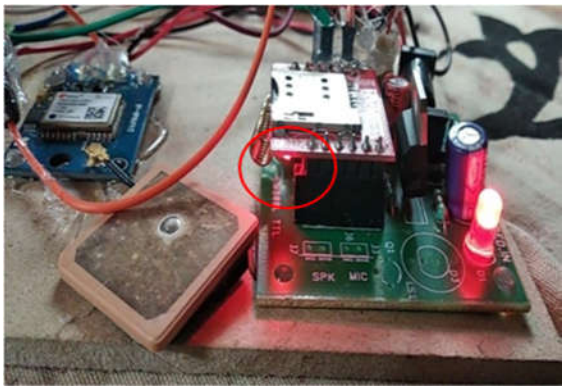

Figure 6: Input 2- Pressure Sensor is turned ON

Step 4: The GPS device starts tracking the child and takes the latitude and longitude from the satellite which resembles the position of the child and converts it into a link and this link will be sent as an SMS as " ALERT:CHILD IS IN DANGER" with the help of GSM module to the authorized personal number which is the output as shown in the figure 7.

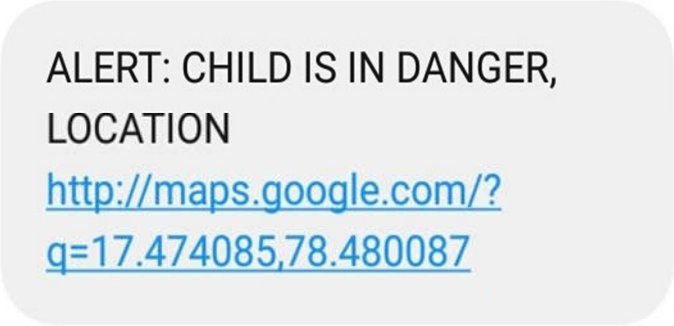

Figure 7: Output- SMS Message

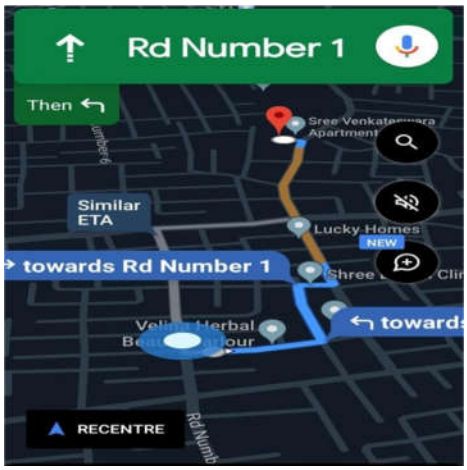

Figure 8: The child Location Identification

Step 5: Other parameters like temperature and pulse rate can be monitored by the parents by an android app. This android app contains Google maps link so that the parents can check the location of the child whenever they want. This is how the home page of the android app which which contains all the parameters like latitude, longitude, heartbeat, temperature and the Google map link as shown in figure 9.

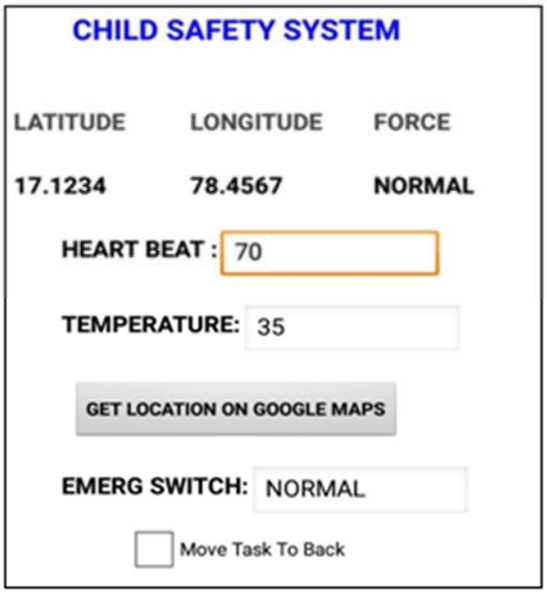

Figure 9: Android app

V. CONCLUSION

Based on the results, it can be concluded that our proposed system provides safety applications for the children and we have come up with an idea of making a safety environment for the children in the society and allows them to go anywhere fear free and it helps reducing the crime rate against the children.

VI. FUTURESCOPE

As per now we have mentioned the monitoring of heartbeat, temperature and the location of child by using android app. Future scope is to provide the real time implementation of the proposed system in tiny size with many more additional components which also includes to capture images of the surroundings or the culprits who tries to abuse or harm a child so that it would be useful as a real time evidence against the child.

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