

# Design and implementation of child safety monitoring system

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**Abstract:** This project discusses the concept of a smart wearable device for little children. The major pros of this wearable over other wearable is that it can be used in any cellphone 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 the parents to locate their child 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(Wireless Fidelity) and Bluetooth appear to be an unreliable medium of communication between the parent and child. Therefore, the focus of this project is to have an SMS text enabled communication medium between the child's wearable and the parent as the environment for GSM mobile communication. The parent can send atext as SMS with specific keywords such as "LOCATION", "TEMPERATURE", "SOS", "BUZZ", etc., to the wearable device. The device will reply back with a text containing the real time accurate location of the child and will also provide the surrounding temperature, so that the parents can keep track if the temperature not suitable for the child. The secondary measure implemented was using a bright SOS Light and distress alarm buzzer present on the wearable device which can be activated by the parents via SMS text to display the SOS signal brightly and sound an alarm which a bystander can instantly react for the child's safety till the parents arrive or they could contact the parents and help locate them. Hence this project aims at providing parents with a sense of security for their child in today's time.

**Keywords:** Children, Arduino, Safety, Wearble.

## I. INTRODUCTION

The motivation for this wearable comes from the increasing need for safety for

children in present times as there can be scenarios of the child getting lost in the major crowded areas. This paper focusses on

the key aspect that lost children 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. Therefore it is intended to use the SMS as the communication type between the parent and child's wearable device, as this has fewer chances of failing when compared to Wi-Fi and Bluetooth. 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, which is provided by the Arduino GSM Module using the GSM network. Also, additional modules employed which will provide the current location of the child to the parents via SMS. The second measure added is SOS Light indicator that will be programmed with Arduino UNO board to display the SOS signal whenever the parent want. In the scenario, a lost child can be located by the parent could send a predefined keyword as an SMS to the wearable device which would reply back by sending location to the parent mobile. Additionally, the wearable equipped with adistress alarm buzzer which sets to active by sending an SMS keyword "BUZZ" to the wearable. Hence the buzzer is louder and can be heard by the parent from very considerable distance. Also the parents via

SMS can receive coordinates of the child, which can help them locate the child with maximum accuracy. Some of the existing work 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. It is based on a multi-sensor Arduino micro-system and a lowpower Bluetooth 4.1 module. The major drawback for the Vital band is that it uses Bluetooth as the mode of communication between child and the parent. Therefore, the wearable device proposed will be communicating with the parent via SMS through GSM which would ensure that there is a secure communication link. Also, customization of the wearable can be possible as per our needs by reprogramming the Arduino system.

## II Existing method:

The existing methods involves smart watches which are almost equal to a smart watch with this we can get the child's location. And another devices which are based on Bluetooth and gets the child location

## Limitations:

Only GPS location can be tracked. GPS may or may not be tracked at the depth of bore

wells. Alerting guardian was not implemented this may lead to loss of lives.

### III. SYSTEM DESIGN AND ARCHITECTURE:

This section discusses the architecture and the design methodologies chosen for the development of the Child Safety wearable device.

#### A. System Overview

An ATmega328p microcontroller controls the system architecture of the wearable device with an Arduino Uno boot-loader.

#### VI Proposed method:

The proposed idea consists of a GPS module which continuously monitors the child's location. It also contains DHT11 sensor and a LDR sensor which monitors surrounding temperature and light intensity. When temperature and light intensity crosses the optimum values the device gets activated and alerts the guardian with a message and a guardian can get the location in an app .

#### Advantages:

Preventive measures are implemented with a minimum amount of time.

Human loss and property loss will be reduced.

Information will reach at right time by using GPS module.

#### Explanation:

It consists of Power supply, WIFI hotspot, GPS module, DHT11 sensor, LDR sensor, buzzer, Node MCU. Node MCU comes to active state when power supply is given to it. And it is supplied by using a USB cable. GPS module, DHT11 sensor and LDR sensor is connected to the node MCU and node MCU contains a inbuilt WIFI module and by using hotspot wifi is connected. And the data is collected from the sensor and by using gps module the location will be shared and buzzer gets activated and a message is sent to cloud.

We had implemented a design to prevent little children. The design consists of node MCU, DHT11 to detect surrounding temperature and humidity, LDR sensor for detecting surrounding light intensity, GPS module to send the location and buzzer to produce a sound.

The main component of our design is node MCU and is connected to the bread board and the power to node MCU is given by USB cable by using a system. Mainly to detect surrounding temperature and humidity there must be a sensor and we had used DHT11 sensor .The working of DHT11 is to continuously detect the surrounding temperature and humidity values.

And for detecting surrounding light intensity we are using an LDR sensor which has a

resistor. When the light intensity is high resistor value becomes zero and vice versa GPS (Global positioning system), it does not need any user to transmit the data it automatically tracks the location by triangulation principle. And another component is buzzer is activated.

The whole design is implemented by writing a certain code in Arduino software, and the code is dumped in to node MCU by using USB cable, and the power is also given by that cable. Connections are made as shown in the circuit diagram.

And to check our device we increase a temperature near DHT11 sensor using a heated soldering rod and closing the LDR sensor completely to acquire 0% light intensity. The values are sent to node MCU and node MCU activates the buzzer and send a warning message to guardian along with values and gps location.

#### V Conclusion:

The child safety wearable device is capable of acting as smart IOT device. It provides parents with real time location, surrounding temperature, humidity, light intensity .The smart child safety wearable 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.

Future scope:

#### CAMERA MODULE:

For surveillance of the child's surroundings, to get clearer picture of the location, the wearable device can also contain a camera module incorporated in it. Mobile is provided with a snapshot option on clicking on that the surroundings snapshot is obtained to the mobile.

#### GEO FENCING:

As children has less knowledge they go to fewer places daily. By adding geo fencing parent get an alert to mobile if child went to any unknown place .

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