# "Child Safety Wearable Device"

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## ABSTRACT

*Its the concept of a smart wearable device for little children ,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 can send a text with specific keywords such as "LOCATION" "TEMPERA TURE" "UV" "SOS" "BUZZ", etc., the wearable device will reply back with a text containing the real time accurate location of the child which upon tapping will provide directions to the child's location on google maps app and will also provide the surrounding temperature, UV radiation index so that the parents can keep track if the temperature or UV radiation is not suitable for the child. The prime motivation behind this concept is that we know how important technology is in our lives but it can sometimes can't be trusted.*

**Keyword :** - *child safety, SMS based, LOCATION,GPS tracking .*

## 1. INTRODUCTION

The Internet of Things System (loT) refers to the set of devices and systems that stay interconnected with real-world sensors and actuators to the Internet. loT includes many different systems like smart cars, wearable devices and even human implanted devices, home automation systems and lighting controls; smartphones which are increasingly being used to measure the world around them. Similarly, wireless sensor networks that measure weather, flood defenses, tides and more. There are two key aspects to the loT: the devices themselves and the server-side architecture that supports them. The motivation for this wearable comes from the increased 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 project focusses 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 wearables 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 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.
Also, additional modules employedwhich 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 using Morse code. The different modules stay enclosed in a custom designed 3D printed case [12]. In the scenario, a lost child can be located by the parent could send an SMS to the wearable device which would activate the SOS light feature on the wearable. Therefore alerting the people around the child that the child is in some distress and needs assistance as the SOS signal is universally known as the signal for help needed. Additionally, the wearable comes equipped with a distress alarm buzzer which sets to active by sending the SMS keyword "BUZZ" to

the wearable. 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 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 Vital band samples data from multiple sensors and reports to a base station, such as the guardian's phone or the emergency services. 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. Some more of the similar wearable devices are the Mimo, Sproutling, and iSwingband having their several drawbacks. Therefore, the wearable device proposed will be communicating with the parent via SMS which would ensure that there is a secure communication link. Also, customization of the wearable is possible as per our needs by reprogramming the Arduino system.

## 2.RELATED WORK

The wearable device, for now, is not built on a SoC model, rather has been proposed using larger components and can later build on the SoC platform once put into manufacture. The wearable loT device tasked with acquiring various data from the all the different modules connected. 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 the cellphone. The physical characteristics of the wearable device are proposed to be as a wrist watch which remains placed around the wrist of the child during times when the child is not being accompanied by an adult/parent. For the moment the design is not made compact, since the main focus now has been to show that this concept of smart wearables would be highly impactful for the safety of children. The wearable system runs on a battery with an output voltage of 5V. In order to maximize power consumption, the wearable device has been programmed to provide G P S and image information only upon request by SMS text via GSM shield.

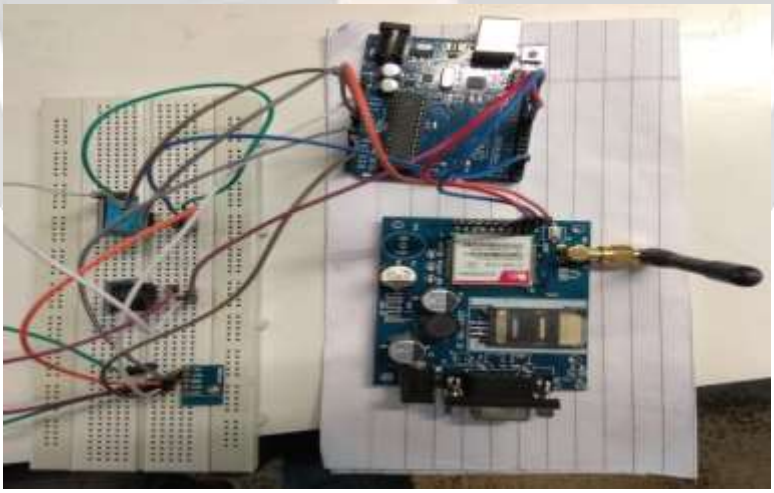

**Fig -1** System Implementation

## 3. PROBLEM STATEMENT

Design Embedded System (smart wearable device) for children. This embedded device responds to commands sent by guardian to ensure safety of children. It provides temperature and uv radiation surrounding the children and also provides the facility of SOS and buzzer in emergency case.

## 4.GOALS and OBJECTIVE

Goals:
Wearables can help minimize unplanned downtime in the workforce, but the type of wearable to be most readily adopted into the enterprise remains dependent upon the specific industry or the use case to which it caters, according to ABI Research.

Objectives:
1) To introduce software verification and validation and to discuss the distinction between them.
2) To describe the program inspection process and its role in V and V.
3) To explain static analysis as a verification technique.
4) To describe the Cleanroom software development Process.

## 5. SYSTEM ARCHITECTURE

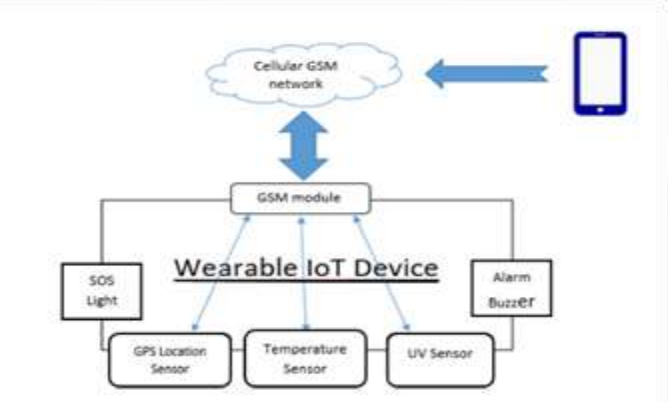


**Fig -2**: System Architecture

New system will be based on "IOT" It will consist of web based monitoring system. 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. The GSM shield functions as a trigger for the Arduino U An A Tmega328p microcontroller controls the system architecture of the wearable 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 system architecture of the wearable is based and controlled by an AT - mega328p microcontroller with an Arduino Uno boot loader.no to request data from its various modules.

## 6. MATHEMATICAL MODEL

S=U, I, O, P
Where,
U = Set of users
Ui = {u1,u2,u3,... ... ...,un}
Where n>0
= ex. Primary user.

I = Set of Inputs
Ii = {i1, i2, i3,... ... ..., in}
Where n>0
= ex.RFID tag .

Output= {successfully child safty}
P = Set of Processes
Pi = {p1,p2,p3,... ... ...,pn}
Where n>0

## 7. CONCLUSION

The child safety wearable device is capable of acting as a smart loT device. It provides parents with the real-time location, surrounding temperature, UV 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 wearable 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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