Child Safety Wearable Device

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***Abstract*—** Recently in all over the world in every 40 seconds child becomes missing or kidnapped. The increasing prevalence of children wandering has many parents very concerned. We have to see and read many stories about children's or students who are kidnapped or not reaching homes. Most of the stories have had tragic endings. This paper focuses on implementing children tracking location system for every child attending school. Additionally, we can implement fall detection unit, body temperature unit as well as voice messaging unit from parent to the children.

***Keywords*—** *IOT, Arduino, GPS, Safety*

I. INTRODUCTION

Designing a child tracking system to assure parents that their child is safe from suspicious actions and happy in school environment. The information of child real time location is sent to respective parents mobile, if they move beyond the coverage area, they can observe it. Also, when child wants to convey that they are in danger than they will press a panic button given on their wearable. It will be a real time device which will be monitoring the temperature of the child if there is a variation in their body temperature parent will be notified instantly.

Children's security has always been a priority problem whose solution must constantly be improved. The Smart Cities paradigm clearly takes into account the need of providing a more favorable environment for children's living and learning, but focusing on this aspect it has also to deal with challenges due to cities complex environments, e.g. many construction sites, a large number of running vehicles, crowded meeting places and complex personnel structures. Such an environment indeed is generally lacking of safety conditions for children, which are inherently curious, active, and unaware (or incautious) of surrounding dangers.

According to the incomplete statistics of news reports, the school-age children security accidents in recent years can be classified into four types: 34.7% of accidents happening outside the schools, 11.7% of children's misconnections, 29.8% of school bus drivers carelessness and 23.8% of children's losses. Safety oriented projects are addressed to use ICT services to build secure ways of reducing accidents probability. For parents the safety of their children is vital and a low-cost technology may give a big contribution to improve it. One line of experimentation is related to the monitoring of child's movements through a system involving both GPS (Global Positioning System) and RFID (Radio Frequency IDentification) technologies. The first solution is exploited for school buses localization, while the second to gather information's. Categories of security system for children children's entering and exiting the school bus. This paper is especially focused on children's movements from home to school entrance, trying to solve a little part of the school-age children's security problem. A possible categorization of security system for children is displayed in. During the past few years, in the area of wireless communications and networking, a novel paradigm named the Internet of Things (IoT) has gained increasing attention both in the academia and industry. In recent times, researchers have used the term" Internet of Things" to refer to the general idea of things,

II. ARCHITECTURE

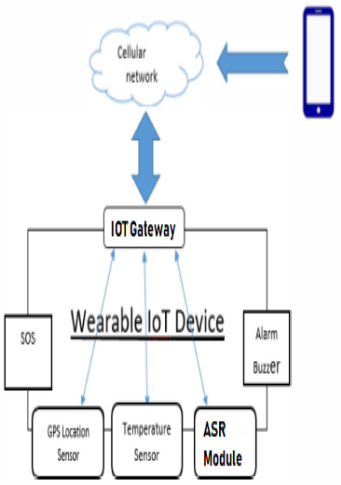

Fig 1. System overview of the wearable device.

III. SYSTEM OVERVIEW

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 Fig illustrates the architecture of the child safety wearable device, which depicts the various technologies and technological standards used. The system architecture of the wearable 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 IOT. The IOT module

functions as a trigger for the Arduino Uno to request data from its various sensors.

IV. WEARABLE IOT DEVICE

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 IoT 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 their cell phone . The physical characteristics of the wearable device a r e 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 wearable 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 GPS

1) GPS Location Sensor

GPS stands for Global Positioning System and can be used to determine position, time, and speed if you're travelling. It comes with an external antenna, and doesn't come with header pins.

- This module has an external antenna and built-in EEPROM.
- Interface: RS232 TTL
- Power supply: 3V to 5V
- Default baud rate: 9600 bps
- Works with standard NMEA sentences

The NEO-6M GPS module is also compatible with other microcontroller boards. To learn how to use the NEO-6M GPS module with the Raspberry Pi,
The NEO-6M GPS module has four pins: VCC, RX, TX, and GND. The module communicates with the Arduino via serial communication using the TX and RX pins.

NEO-6M GPS Module	Wiring to Arduino UNO
VCC	5V
RX	TX pin defined in the software serial
TX	RX pin defined in the software serial
GND	GND

To get raw GPS data you just need to start a serial communication with the GPS module using Software Serial

2) Temperature Sensor:

The Temperature Sensor LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature.
The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°Cover a full −55°C to 150°C temperature range.
Unlike a thermistor, the TMP36 does not have a temperature sensitive resistor. Instead this sensor uses the property of diodes; as a diode changes temperature the voltage changes with it at a known rate. The sensor measures the small change and outputs an analog voltage between 0 and 1.75VDC based on it. To get the temperature we just need to measure the output voltage and a little bit of math!

3) ESP 8266 (Wi-Fi Module)

The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

4) APR 9600

When this circuit gets data from Microcontroller then voice command is board is sounded which we recorded.
The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs.
Integrated output amplifier, microphone amplifier, and AGC circuits greatly simplify system design. the device is ideal for

use in portable voice recorders, toys, and many other consumer and industrial applications.

APLUS integrated achieves these high levels of storage capability by using its proprietary analog/multilevel storage technology implemented in an advanced Flash non-volatile memory process, where each memory cell can store 256 voltage levels.

This technology enables the APR9600 device to reproduce voice signals in their natural form. It eliminates the need for encoding and compression, which often introduce distortion.

Components required: -

Hardware:-

- Arduino Uno
- GPS
- Switch
- Buzzer
- Wi-Fi module
- Temperature Sensor
- ASR

Software:

- Arduino IDE
- HTML
- Blynk
- Embedded C

V. CONCLUSION

The child safety wearable device is capable of acting as a smart IoT device. It provides parents with the real-time location, surrounding temperature, UV radiation index and SOS button 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 Lily Pad 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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