### **IoT Based Safety Gadget for Child Safety Monitoring and Notification**

**1.Introduction:**

Internet of Things (IoT) is a set of systems and devices interconnected with real-world sensors and actuators to the Internet, according to. It is able to make decisions via detecting the surrounding environment without human interaction. In this research, IoT is applied to propose a wearable smart band which helps parents to monitor and get known of their child’s condition at anywhere and anytime even if they are not by their children side. Via the IoT smart band, children safety is guaranteed, and crime rate is reduced as immediate actions can be taken in case the child is in danger. Besides, unlike existing smart band, which is less focusing on child security aspect, the proposed system emphasizes in getting as much data as possible so that actual situation can be identified. The use of IoT in this device is motivated by the need of child security system in Malaysia due to child safety issues resulting from increasing cases on child related crime.

**1.1 Project overview:**

To cope with the issue, the system is proposed with these objectives:

* Enable tracking of the child’s location and capturing of data remotely such as temperature, pulse, respiratory rate, quality of sleep and many more.
* To show the child's actual data with reference values.
* Enable sending of notification if the child is out of location or when the device realizes abnormal conditions/situations.
* To trigger the alarm and enable automatic video recording whenever the emergency button is pressed. Then, emergency notification along with real-time video will be sent to and display in the parents' mobile apps.
* Develop a prototype of IoT wearable smart band connected to parents’ mobile apps so that they can monitor the actual condition of children at anytime and anyplace.

**2. Literature survey:**

**A. RFID-based System for School Children Transportation Safety Enhancement** This paper presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during daily transportation from and to school. The system consists of two main units, a bus unit, and a school unit. The bus unit the system is used to detect when a child boards or leaves the bus. This information is communicated to the school unit that identifies which of the children did not board or leave the bus and issues an alert message accordingly. The system has a developed web-based database-driven application that facilities its management and provides useful information about the children to authorized personnel. A complete prototype of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for daily transportation safety.

**B. Design and Development of an IOT based wearable device for the Safety and Security of women and girl children**

The aim of this work is to develop a wearable device for the safety and protection of women and girls. This objective is achieved by the analysis of physiological signals in conjunction with body position. The physiological signals that are analyzed are galvanic skin resistance and body temperature. Body position is determined by acquiring raw accelerometer data from a triple axis accelerometer.

**C. Child Safety Wearable Device Parents need not have a smart mobile.**

Set of keywords are used to gain information from the kit. LOCATION keyword is used to obtain the location of the child. UV keyword is used to obtain the temperature of the surroundings. BUZZ keyword is used to turn on the buzzer which is fixed in that device. SOS is used to send a signal to the device.

**D. Smart Intelligent System for Women and Child Security**

A portable device which will have a pressure switch. As soon as an assailant is about to attack the person or when the person senses any insecurity from a stranger, he/she can then put pressure on the device by squeezing or compressing it. Instantly the pressure sensor senses this pressure and a conventional SMS, with the victim’s location will be sent to their parents/guardian cell phone numbers stored in the device while purchasing it, followed by a call. If the call is unanswered for a prolonged time, a call will be redirected to the police and the same message will be sent. Additionally, if the person crosses some area which is usually not accessed by the person then a message with the real-time location is sent to the parent/guardian's phone via conventional SMS.

**Problem statement:**

More families are now spending time on work and social duties, hence away from their children. This causes increased concerns towards their safety and whereabouts, and has made keeping a track of their activities quite challenging. Crimes against children are increasing Year on Year. According to a study, roughly 60,000 children go missing in India every year [1]. There is an assumption that every 10 minutes, a child goes missing. Mumbai and Delhi have the highest rate when compared to other metro cities. With the lack of availability of affordable child monitoring systems it is hard to monitor the whereabouts of Children [2]. Safety of children is very critical since children cannot protect themselves. A momentary lack in parental supervision should be combated with an appropriate IT solution in context. Therefore, it is necessary for the proposed system to alert the parents when the child walks too far away and/or outside the “circle of safety” when they are away. In case of an emergency, or in a situation of panic, the child must be able to communicate with their parents. This can be done via live transmission of audio from the device with the child, to the parent’s device.

**3.Ideation and Proposed solution:**

The counter should be started for counting time. The sensors output data should be read from the child safety device. The counter time should be checked for time interval of 30minutes. For every 30minutes except serial camera, the data from GPS, temperature, touch, pulse rate data is pushed into the cloud. The monitoring parameters are displayed on webpage. The counter is reset to restart the timer. So as to post the data into the cloud for every 30minutes. The sensors data is continuously read by the controller. When the value of temperature read from the sensor crosses the threshold1, notification messages are sent. The threshold value of the temperature is considered here is 38°C. Similarly, when the touch sensor value is crocess threshold2, notification messages are sent. Threshold of the touch sensor is considered here is 100. The Pulse rate intervel is analog value from the sensor, it is converted into the beats per minute (BPM) by formulae.

**4.Requirement Analysis:**

Hardware Requirements:

• GPS Neo 6m. • 20X4 LCD.

• I2C LCD Driver

• 7805 Voltage Regulator.

• DS18B20 Temperature Sensor.

• 1x4 Switch.

• Push Button

• LED

• OLED

• Jumper Cables

Software Requirements:

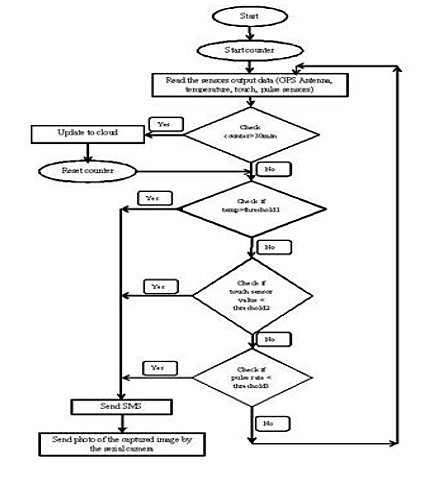
• Node Js

• Watson cloud iot platform

Languages Used:

• Python

**5.Project Design:**



This paper mainly focuses on child safety solutions which contain two major devices namely Smart gadget and BLE Listener device. The system also includes an Android app namely Parental App which will be developed and installed on parental phone. This paper consists of 6 modules as follows:

1) Live Location Tracking: Safety gadget contains a GPS module which will fetch the current location and sends it to the microcontroller for required processing, the safety gadget is also installed with the GSM module to respond for location request sent via SMS from parental phone. The system is connected to cloud via Wi-Fi technology and hence the GPS location is updated to the cloud at regular intervals or on request, whenever parent want to monitor the location of safety device then parental app can be used which fetches all the data from the updated cloud and also display the current/live location of the safety gadget.

2) Panic Alert System: The gadget is equipped with panic alert system feature which mainly consist of a button that is triggered only during certain abnormal/panic situations, this button is programmed in such a way that, once it is triggered then multiple alerts in various forms occurs within few seconds of time, SMS and also phone call is triggered to the parental phone from the safety gadget GSM module to the parental phone, which consists of current location of gadget fetched from its GPS and a pre-installed panic message seeking for help. An alert notification on parental app is triggered via WiFi on safety gadget communicating to cloud where parental app receives the information.

3) Stay Connected Feature: This feature is to communicate between safety gadget (GSM module) and parental phone always connected irrespective of the situation, safety gadget can make a phone call anytime to parental phone and vice-versa. Safety gadget which will be displayed on its screen.

4) Health Monitoring System: The gadget consists of heart beat and temperature sensor which is used to monitor the general health condition of child. Any abnormalities being detected in the health monitoring parameters by the safety gadget then an immediate alert is sent on the parental app via Wi-Fi. Also, displays on parental app.

5) Gadget Plug and Unplug Monitoring: This feature is to keep monitoring if the safety gadget is plugged or not by monitoring the contact switch, necessary alerts are provided on parental app whenever the device is unplugged. 6) Boundary Monitoring System: Binding gadget is the device which is used to satisfy this feature along with safety gadget and parental phone. This gadget is used to monitor safety gadget within a bounded area using wireless technology. Once the safety gadget is moving out of the threshold distance from the BLE listener device then an alert is provided on device itself, which will be used by parent/guardian. This feature of binding gadget is designed to work independently without phone network signal/internet so that safety gadget can even be under monitoring when it reaches remote areas where communication signals are not reachable like forest.

**6.Coding:**

Python script:

import json

import wiotp.sdk.device

import time

myConfig={

"identity": {

"orgId": "sa1ixf",

"typeId": "NodeMCU",

"deviceId":"1905151"

},

"auth": {

"token": "12345678"

}

}

client = wiotp.sdk.device.DeviceClient (config=myConfig,logHandlers=None)

client.connect()

while True:

name= "Smartbridge"

#in area location

latitude= 17.4225176

longitude= 78.5458842

#out area location

#latitude= 17.4219272

#longitude= 78.5488783

myData= {'name': name, 'lat' : latitude, 'lon' :longitude}

client.publishEvent (eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)

print("Data published to IBM IoT platform: ",myData)

time.sleep (5)

client.disconnect()

**7.Results:**

Through this device, the parent can track and monitor their child with just a simple app and one hardware device which will be with the child. It is not possible to always stay beside children as most of the parents need to go for work. With this project, parents can track the location of their children and get alerts whenever the child is in danger. It becomes easy for parents to look after their child while working. This device is efficient to use. Thus by keeping in mind the advantages and applications we are developing a child monitoring device. In order to avoid kidnapping cases, the child monitoring system is needed