IBM REPORT

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1.INTRODUCTION

One of the things we parents fear most for our children is that they will be unintentionally and unnecessarily hurt. Skinned knees and incidental boo-boos aside, the environment we create for them is the one they live in, and though we can't wrap them in bubble wrap till they're 21, there are many things we can do to help protect them from preventable injuries. Some of these things are educational, others observational, and still others involve safety equipment or choices about furniture, or positions of items in the household.

1.1 Project Overview

Basically, children cannot complain about abusements which they face in their daily life to their parents. They can't even realize what actually happens to them at their age. It is also difficult for parents to identify their children are being abused. Since to prevent children before being attacked, an autonomous real-time monitoring system is necessary for every child out there. In this system, the collected values from every sensor like temperature sensor, pulse rate detection sensor, metal detection sensor, and the location value from GPS are used to detect the status of the child and alerts the respective guardians using GSM accordingly.

1.2 purpose

child safety, area concerned with limiting children's exposure to hazards and reducing children's risk of harm. No one device or solution can prevent all types of accidental childhood injuries. Instead, child safety requires a multifaceted approach, which includes educating adults and children about risks, designing safe environments, conducting research, and advocating for effective laws. Education is one of the main pathways to improving child safety and requires the involvement of parents, caregivers, children, health care practitioners, policy makers, and other target groups in order to increase knowledge and change

attitudes and behavior. Changing children's surroundings and influencing design are key issues when dealing with child safety. Child safety advocates promote the development and manufacture of safer products. This can be achieved by the issuance and enforcement of regulations as well as through the development of voluntary standards and guidelines enabling injury prevention. 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.

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. Acquisition of raw data is then followed by activity recognition which is a process of employing a specialized machine learning algorithm. Real-time monitoring of data is achieved by wirelessly sending sensor data to an open source Cloud Platform. Analysis of the data is done on MATLAB simultaneously. This device is programmed to continuously monitor the subject's parameters and take action when any dangerous situation presents itself. It does so by detecting the change in the monitored signals, following which appropriate action is taken by means of sending notifications/alerts to designated individuals.

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.

2.1 Existing problems

Real-Time Child Abuse and Reporting System

In the existing system, we use a voice recognition module in which the alert commands from the child are stored and kept for further reference. If the same child delivers the same command, it will compare with the alert command which was previously stored and sets an emergency level according to the alert command. The GSM has a SIM which is used to send an alert message or an alert call to the trusted peoples. GPS is used to track the live location and it is used when needed. The server will search the respective device ID from the database and search for respective contacts according to that device ID and helps in alerting the registered guardians.

The disadvantage of this project are,

i. The child could not produce the exact alert command during a panic condition.
ii. The command produced may not match with the previously stored command.
iii. This project requires manual intervention.

2.2 References

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[5] Dr. R. Kamalraj, " A Hybrid Model on Child Security and Activities Monitoring System using IoT", IEEE Xplore Compliant Part Number: CFP18N67-ART; ISBN:978-1-5386-2456-2.

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2.3 Problem statement definition

IoT or the internet of things is characterized as a forthcoming innovation that empowers us to create worldwide networked machines and also the devices that can be helped for exchanging of communication. As we all know that the real-time application has been increasing day by day, the smart connection also had increased. Rapid population growth, led to the increase in global life expectancy and the advance of technology, paving the pathway for the creation of age-friendly environments. This had led to the necessity in designing new products for infants protection.

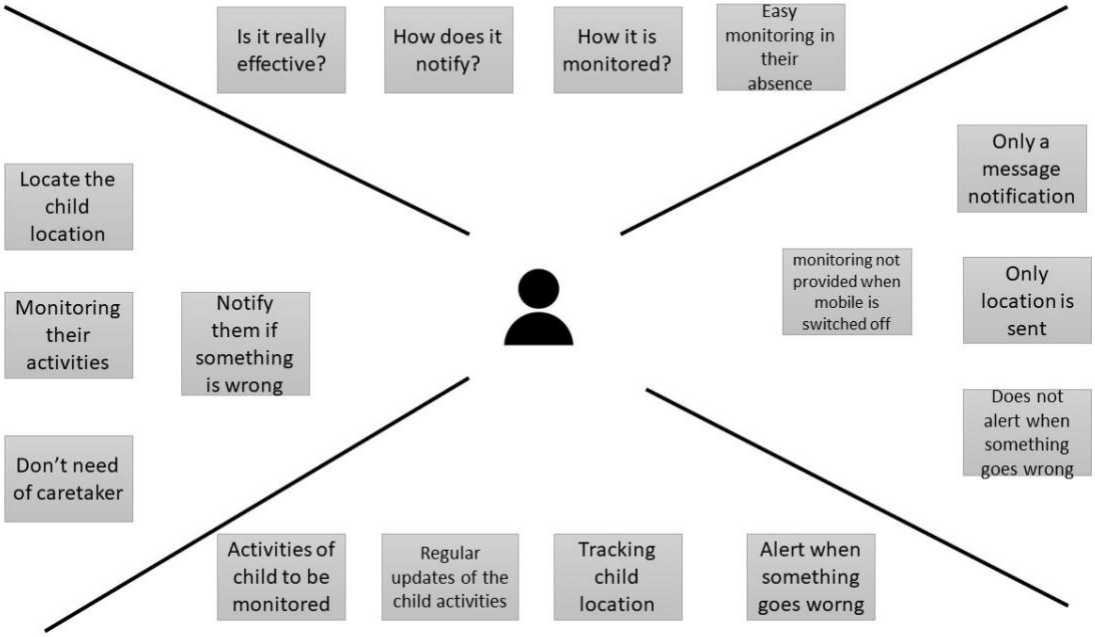
Infants or toddlers need parents' attention 24×7. In this present era, the cases regarding missing children have been increasing day by day, which was the main motivation that comes for the safety of little children. However, the parents cannot continuously monitor their babies' conditions either in normal or

abnormal situations. Still, certain incidents like infant attacks have been reported, it is necessary to protect the baby.

3.IDEATION & PROPOSED SOLUTION

Our proposed system is based on the Internet of Things-based Smart Child Safety Wearable Device System designed as an efficient and low-cost IoT-based system for monitoring infants in real-time. This system plays a key role in providing better care for the lost children until they reconvene with the parents. The system architecture of the wearable is controlled by an AT -atmega328p microcontroller with an Arduino Uno bootloader. The Arduino Uno receives 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 function as an interface to transmit 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 Uno to request data from its various modules. If an SMS text is sent to request the current location or GPS coordinates is sent to the Arduino GSM shield via the user's smartphone, then the GSM shield triggers the Arduino Uno to request the current GPS coordinates. Once the Arduino Uno has received the coordinated information, it will process this information and transfer it over to the GSM shield, which then via SMS sends.

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

In this present era, most of the wearable devices today are designed based on the location, activity, temperature, pressure, etc of the child and inform the parents via GPS. Therefore it is intended to use voice call as the way of communication between the parent mobile and child's wearable device. The system operates on the microcontroller board and the functions of sending and receiving notifications, calls, voice messages via GPS.

3.3 Proposed Solution

Wearable technology is designed explicitly to influence the fields of health and medicine, fitness, aging, disability, education, transportation, enterprise, finance, gaming, music, etc. The main aim of this technology is to smoothly enter the daily lives of individuals and become a functional part of them. Nowadays, we should be more concerned about the security of children. In our proposed system, this device helps parents to locate their children easily under missing conditions.

At the present, there exist 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

4.REQUIREMENT ANALYSIS

4.1 Functional requirements

We can use both web application as well as mobile application or either one of it as the front end user interface, cloud, and database as the back end for storing and retrieving information, and a device for monitoring.

GPS is used to track the live location of the child who is wearing that device. With the help of GPS, we can easily perform Geo-fencing concept, in which we will be able to feed a particular boundary to that device.

4.2 Non-Functional requirements

Nonfunctional Requirements (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.

Security

The major goal of this project is to use modern technology to create a gadget that provides "Smart Child Safety" to protect children, which will be far more effective than current methods in assisting victims. The device has IoT monitoring and a GSM module that allows the child to be monitored at all times. there is an additional panic button. The purpose of this button is to notify parents and the police of a child's current location whenever they are in a perilous scenario. A GPS module is utilised to access their present location, and a GSM module assists in transmitting the information via SMS to designated contacts. In this approach, the device tries to provide child safety while remaining unobtrusive.

Reliability

parents are responsible for taking care of their own children. But, due to economic condition and aims to focus on their child’s future and career, parents are forced to crave for money. Hence, it becomes difficult to cling on to their children all the time. In our system, we provide an environment where this problem can be resolved in an efficient manner. It makes parents to easily monitor their children in real time just like staying beside them as well as focusing on their own career without any manual intervention.

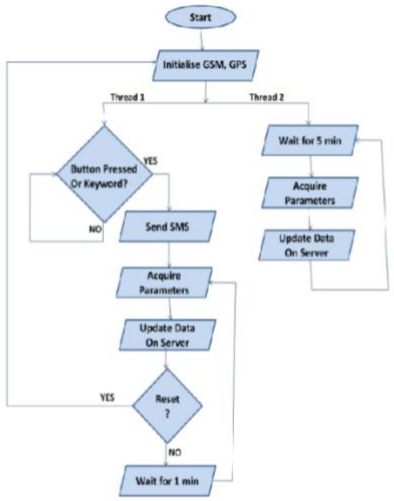
Scalability

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.

5 Project design

5.1 Data Flow Diagrams



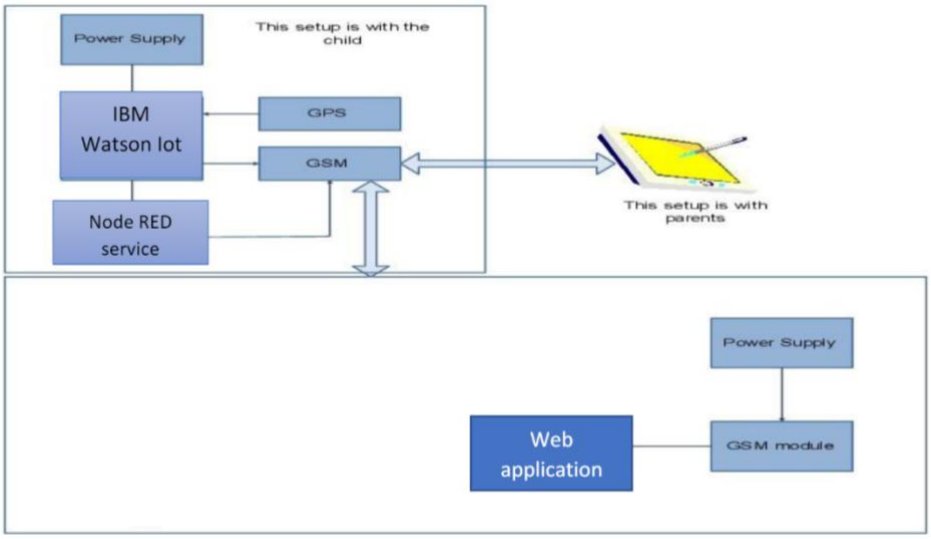
DATA FLOW DIAGRAM: IOT based safety gadget for child safety monitoring and notification

5.2 Solution & Technical Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.

• Define features, development phases, and solution requirements.
• Provide specifications according to which the solution is defined, managed, and delivered.



5.3 User Stories

Many parents don't have an easy solution to this challenge. Cell phones are essential communication tools for adults, but in the hands of children, they may prove to be an expensive distraction. Plus, some communication tools come with potential security threats that parents want to avoid. IoT technology offers a simple solution to this dilemma: child tracking systems that are designed with communication and safety in mind. By developing this technology to meet a child's unique needs, we can ensure that our children stay safe throughout the

day, without interrupting their valuable playtime. Child tracking systems and communication tools need to be completely secure from end-to-end, leaving parents with full control over who communicates with their children. Many existing smartphone apps cannot retain this level of security, in part, due to the many endpoint vulnerabilities that exist in a smartphone. While ease of communication and security are essential features in a child tracking system, these devices must also be sufficiently durable to keep up with a young child's lifestyle. Kids run, jump and climb playground equipment all day, and they don't want to become overburdened by bulky hardware. You can't use a child tracking system that's too small and delicate either, as children could lose the device or break it. Devices like Okie-talkie are designed specifically for a child's lifestyle, featuring portable, rugged modules that don't break easily. The technology used to connect to the network is also designed for daily use.

6. PROJECT PLANNING AND SCHEDULING

6.1. SPIRINT PLANNING AND ESTIMATION:

SPIRINT-1:

It indends to develop a python code to publish the location of the child.

Step-1 Install python software python version 3.7.4

Step-2 Install Watson IoT Python SDK to connect to IBM Watson IoT Platform using python code.Give the following command in command prompt: pip install wiotp-sdk pip install ibmiotf

Step-3 Develop a python script to publish the location details to the IBM IoT platform

PROGRAM:

```
import json
import wiotp.sdk.device
import time

myConfig = {
   "identity":{
      "orgId": "xemkos",
      "typeId": "abbcc",
      "deviceId": "1234"
      },
   "auth": {
      "token": "12345678"
   }
```

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

while True:
    name= "TCE"

    #in area
    latitude= 17.4225176
    longitude= 78.5458842

    #out area
    #latitude= 17.4219272
    #longitude= 78.5488783

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

client.publishEvent(eventId="status",msgFormat="json",data=myData,qo
s=0,onPublish=None)
    print("Data published to IBM IoT platform: ",myData)
    time.sleep(5)
client.disconnect()
```

SPIRINT 2:

It intends to create and configure the IBM cloud services.

Step-1

To create a IBM Cloud Services

Step-2

Create IBM Watson IoT Platform And Device

IBM Watson IoT platform acts as the mediator to connect the web applic ation to IoTdevice, so create the IBM Watson IoT platform.

In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credential

Step-3

Integrate the python code with IBM Watson IoT Platform. Create board in IBM Watson IoT Platform

SPIRINT 3:

Creating a Web Application through which the user interacts with the dev ice & Create a Database in Cloudant DB

Step-1

Create Node-RED service

Step-2

Connect the node in workflow

Step-3

Install palette node-red-dashboard node-red-contrib-scx-ibmiotapp

Step-4

Deploy the flow

Step-5

To build a Dashboard

Step-6

Launch the cloudant DB

Step-7

Create a database to store the location data

SPIRINT 4:

Develop the app and integrate with device.

Step-1

Develop the app (MIT inventor)

Step-2

In Node-RED using http node connect the Node-RED dashboard with mit app.

Step-3

With the help of app user get the location details and give the command through app

7.CODING AND SOLUTIONING:

The features of the solutioning are as follows:

- One approach for parents is to install software that restricts content on devices or a home router.
- Typically, if they're not using a general rating scheme by age, parents need to know the sites they want to block ahead of time and set up their own block lists.
- This is time consuming and chances are they are going to miss something.

- ChildRouter from Cloud-Nanny offers an automated and intelligent way to filter web content with a firewall-as-a-service (FaaS) solution.
- Parents choose which categories of sites they will allow their kids to see and Cloud-Nanny handles almost everything else.
- The solution decides whether to allow or block web requests without noticeable effect on the user's browsing experience.
- Using IBM dashDB, the processing check makes a request in Cloud-Nanny's database and returns a decision is less than 40 microseconds.
- ChildRouter uses machine learning algorithms running in IBM Analytics for Apache Spark together with AlchemyAPI to classify and categorize content in nearly real time.
- If the system is unsure about a site, it checks with the parents. Using that input the model learns and gets better at classifying that type of site in the future.

- Software Productivity Strategists (SPS) developed WatchOver using the IBM Cloud, incorporating the Watson Alchemy Data News API. The back end is a node.js app hosted on the IBM Cloud, using the IBM Cloud IoT Foundation and the Geo-Spatial Analytics service.
- Furthermore, the GPS tracker watch has both call receiving and dialing capabilities, as well as an SOS feature. In case of emergency,

when the child presses the SOS button, it launches a call and message to three primary numbers registered as emergency contacts.

8.TESTING:

8.1. TEST CASES:

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	8	0	1	7
Client Application	45	0	2	43
Security	1	0	0	1
Outsource Shipping	4	0	0	4
Exception Reporting	10	0	1	9
Final Report Output	5	0	0	5
Version Control	3	0	0	3

9.RESULTS:

The child safety wearable device can act as a smart device. It provides parents with the real-time location,surrounding temperature, 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 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.

10.1. ADVANTAGES:

1. Easy Availability& Affordability

Gone are the days when buying a GPS enabled Wearable Device for kids was considered a luxury. Today, however, the scenario is different. There are plenty of options readily available. It is easy to buy a smart watch for kids of your choice online. What’s more, these magnificent tech gadgets don’t burn a big hole in your pockets and make up for an affordable buy. Now a smart watch is just a click away! Besides ,these smart-watches lend a style statement to your fashion conscious kids.

2. Tracking Made Easy

Fueled by IOT, the GPS enabled Wearable Device act as a saviour for parents who are always clouded with worries about their kids. Tracking a child was never this easy. These Wearable Device allow parents to track their children in crowded/public places or when they are out of sight say at school, picnic or an outing. Parents can use these smart-watches to track the location of their lost kids.

3. Smart watch is Technology in Disguise

No matter how tech advanced the smart watches are, they hardly look like one. Most manufacturers have worked hard to mold their tech wonders in a time piece that looks everything but a tech piece! Their childish designs and bright colour combination is perfect to disguise them. This is precisely why most people can hardly spot the difference between a smart watch and an ordinary watch. Good for kids who use them, as their adorable designs keep these watches safe from the prying eyes.

4. Watches Over Your Kids

GPS tracker watches are a boon for parents as they help in watching over your kids when either they are away or you are away from them. These devices:

1. Tracks kids when they reach school or arrive home from school.
2. Track kids when they are untraceable in a crowded space.
3. Track kids when they are away from home and out of your sight.

5. Guarantees Peace of Mind to Parents

Parents, whether at home or office, are always worried about the safety of their kids. The fear of losing your child to avoidable circumstances is the concern area for all mommies and daddies. On the other hand, a smart watch equipped kid is always traceable and reachable in case of contingencies and emergencies. This in fact, offers great solace for parents, who are relieved at the thought of maintaining an uninterrupted connectivity with their children, anytime, anywhere. Enough to of course, guarantee the much-needed peace of mind.

10.2. DISADVANTAGES:

According to this project there is only one disadvantage that is while using this device in any place there must be efficient flow of internet connections, it must be fullest then it gives the output as soon as possible otherwise it take time for the result.

11. 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 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 LilyPadArduino 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.

12.FUTURE SCOPE:

A. Camera Module

For surveillance of the child surroundings, to get a clearer picture of the location or place, this wearable can also be incorporated a camera module in it.

The hardware that can be used would be an ad fruit TTL serial camera or anyother camera module. Since the major focus of this wearable is the GSM module which is a better alternative than Bluetooth, Wi-Fi or ZigBee due to the short range and connectivity issues.

Therefore for this project using the GSM technologies is beneficial for us as the cellular range is vast and since all the communication between the wearable and the user is taking place via SMS, therefore no internet connectivity is required.

But still the GSM module possess the added advantage of using GPRS which enables the board to use the internet if required.

Whereas for camera module which supports video streaming but due to the constraint of trying to use only SMS, therefore only four wire connections will be taking place.

The red and black wires will be connected directly to +5V and GND respectively to the Arduino Uno board. Whereas for the RX pin which will be used for sending data via Arduino Uno and gsm board and for the TX pin which will be utilized for receiving incoming data via from the modules.

The lO K resistor divider, the camera's serial data pins are 3.3v logic, and it would be a good idea to divide the 5V down so that its 2.5V.

Normally the output from the digital 0 pin is 5V high, the wa0y we connected the resistors is so the camera input (white wire) never goes above 3.3V.

To talk to the camera, the Arduino Uno will be using two digital pins and a software serial port to communicate to the camera. Since the camera or the Arduino Uno do not have enough onboard memory to save snapshots clicked and store it temporarily, therefore an external storage source microSD board will be used to save the images temporarily.

The camera works on a standard baud rate of 38400 baud. The camera will be collecting information in the same manner as the GPS module does.

It will be on standby conserving power waiting for the particular keyword "SNAPSHOT" or any other defined in the program to be sent from the user's smartphone to the GSM module will activate the camera by the Arduino Uno to start clicking a snapshot of the surrounding and save the file temporarily on the external microSD card.

After which Arduino Uno will access the saved images from the SD storage and transfer it to the GSM module which send it to the user via SMS/MMS text.

B. Android App

The idea behind the Android app has been derived from having an automated bot to respond to text message responses from the user. It will provide the user with predefined response options at just the click of a button.

The user doesn't need to memorize the specific keywords to send. Also the bot will be pre-programmed to present the user with a set of predefined keyword options such as "LOCATION," "SNAPSHOT," "SOS," etc.

Whereas for the future aspect of this wearable device based on what type sensor is added to it, additional specific keywords could be added such as, "HUMIDITY," "ALTITUDE," etc.

This android app provides mote interface to the user which help understand easily.

The main idea in this android app is to provide keyword button i.e. that for getting location we have a specific button, by pressing this button we get the location instead of typing the keyword which ease our work.

13.APPENDIX:

Source code:

```
import json

import wiotp.sdk.device

import time
```

```
myConfig = {
    "identity":{
        "orgId": "xemkos",
        "typeId": "abbcc",
        "deviceId": "1234"
        },
    "auth": {
        "token": "12345678"
    }

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

while True:
    name= "TCE"

    #in area
    latitude= 17.4225176
    longitude= 78.5458842
```

```
    #out area
    #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()
```

Github link:

https://github.com/IBM-EPBL/IBM-Project-27726-1660063702