Wireless Technology Based Wearable Device Designed for Kiddiewinks and Also an Android Application Designed for Parents

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Abstract- *The main purpose of the project is to provide safety to the kiddiewinks. Consequently to achieve this, we have implemented a prototype of wearable device in our project. Also an android application is developed which helps the parents to get notification regarding the kiddiewinks. The wearable device can be used to find different parameters which are the parameter useful in finding kiddiewinks health conditions and fear. It is implemented using a Raspberry Pi3, ADC and the sensors. The kiddiewinks health condition can be tracked using temperature, heartbeat, IR, ultrasonic and accelerometer sensor. By using these sensors the data will be collected and then stored in the server which can be sent to parents through android application and also through SMS. The wearable device contains buzzer. If the notified details about kiddiewinks are unusual, parent can activate a buzzer by using an android application or through SMS. This alerts the people around kiddiewinks that they are in need of help.*

Keywords- Kiddiewinks, Raspberry Pi3, Sensors, Android application, IoT

I. INTRODUCTION

The internet of things (loT) [1] refers to the set of devices and systems that stay interconnected with real-world sensors and actuators to the Internet. In the simple words, IoT means connecting thing to the internet. The idea for doing wearable device for age groups from three to five years kindergarten going kiddiewinks to school going ones comes from the increasing need for safety, security and health monitoring for little kiddiewinks in current times. As there could be scenarios of the kiddiewinks getting lost in the major crowded areas as well as there is need for any health problem taking place when they are away from their parents may be at kindergarten, malls, play areas or being left with maid at home. This paper focuses on the key aspect that lost kiddiewinks can be helped by the surrounding people and can play a significant Role in the kiddiewinks safety.

Most of the wearable's available today are focused on providing the location, activity, etc. of the kiddiewinks to the parents Bluetooth [2]. But Bluetooth a very unreliable source to transfer information. Therefore, it is intended to use SMS and Wi-Fi as the mode of communication between the parent and wearable device, as this has fewer chances of failing compared to Bluetooth. Nowadays we have very good Wi-Fi range in almost all the places. Hence Wi-Fi is the correct mode of wireless communication being chosen. But we also use SMS mode by using mobile signals.

The platform on which this project will be running on is the Raspberry pie3. The function of sending and receiving SMS is done using the GSM network, sending required request through android application is also done with the help of server and cloud storage. Also, additional effort employed to provide the current location of kiddiewinks to the parents via SMS and through android application. There is also a buzzer provide, which get buzzed in the kiddiewinks wearable device when parent sets condition for buzzing the buzzer.

There are a number of sensors used in the project to check the kiddiewinks heartbeat rate, temperature, positions. There are sensors used to find whether if any obstacles present before the kiddiewinks and also find whether any pits or holes present before the kiddiewinks.

II. LITERATURE SURVEY

Akash Moodbidri, Hamit Shahnasser published the paper on the title "Child Safety Wearable Device" which describes 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 wearable's 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. 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. A bright SOS Light and distress alarm buzzer present on the wearable device which when activated by the parents via SMS text should display the SOS signal brightly and sound an alarm which a bystander can easily spot as a sign of distress. Hence this paper aims at providing parents with a sense of security for their child in today's time.

B. Dorsemaine, 1. P. Gaulier, 1. P. Wary, N. Kheir and P. Urien published the paper on the title "Next Generation Mobile Applications, Services and Technologies" which is based on a multi-sensor Arduino micro-system and a low-power 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. It has an estimated battery life of 100 hours. 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.

H. Moustafa, H. Kenn, K. Sayrafian, W. Scanlon and Y. Zhang published the paper on the title "Mobile wearable communications". The prime motivation behind this paper is that we know how important technology is in our lives but it can't be trusted sometimes, and we always need to have a secondary measure at hand. The secondary measure used in this project is the people present in the surrounding of the child who could instantly react for the child's safety till the parents arrive or they could contact the parents and help locate them. The secondary measure implemented was using a bright SOS Light and distress alarm buzzer present on the wearable device which when activated by the parents via SMS text should display the SOS signal brightly and sound an alarm which a bystander can easily spot as a sign of distress. Hence this paper aims at providing parents with a sense of security for their child in today's time.

III. PROPOSED SYSTEM

The main intention is to protect the lost kiddiewinks with the help of bystanders, who play a major role in the kiddiewinks safety until the parents arrive. The wearable device provides the location and activity of the kiddiewinks to the parents through Wi-Fi. SMS is used as the mode of communication between the parent's smartphone and kiddiewinks wearable device because it can transmit the message even when there is no network. To achieve all these we use power supply, capacitor, raspberry pi3 and particular sensors. The temperature sensor and heartbeat sensor can be used to detect the temperature and heart beat rate of the kiddiewinks if varied above the normal range. IR sensor is used to find the distance of kiddiewinks from the obstacles. SOS Light and distress alarm buzzer when activated should display the SOS light instantly and make sound. Protocol is used to transfer data between ADC microcontroller and raspberry pi3. Inbuilt application in smartphone GPS tracker tracks the location of the kiddiewinks. Android application is used to send the value of the particular when button is pressed from the parent's smartphone.

A) SOFTWARE TECHNOLOGIES AND TOOLS USED

1)Hardware Interfaces

- Pic16F877A Microcontroller
- Raspberry pi3
- IR Sensor
- Ultrasonic Sensor
- MEMS Sensor
- Analog to Digital Converter Circuit
- Heartbeat sensor
- Temperature
- Mobile

2) Software Interfaces

- Xamp
- Embedded-c program
- Python program

III. DESIGN AND IMPLEMENTATION

The systems architectural design of wearable device for kiddiewinks is shown below. The wearable device can sense the data and send the feedback or report of sensed data to parents/guardians through the android application. A microcontroller controls the system architecture of the wearable with Raspberry Pi3. A certain pin header allows for power (+5V) and ground connections as well as providing access to TX, RX and reset pins. The Fig illustrates the architecture of the kiddiewinks safety wearable device which depicts the various technologies and technological standards used. The system architecture of the wearable is based and controlled by Raspberry Pi3 microcontroller with a Raspberry Pi3. The Raspberry Pi3 collects various types of data from the

different modules interfaced to it, such as the GPS module. The GSM shield is used as an interface to send the data received by the Raspberry Pi3 via SMS to a smart phone. If an SMS text with distinct characters is sent to request the current location or GPS coordinates is sent to the GSM shield via the user's smart phone, then the GSM shield triggers the Raspberry Pi3 to request the current GPS coordinates. Once the controller has received the coordinate information, it will process this information and transfer it over to the GSM shield, which then via SMS sends the coordinates to the user's smart phone. The user can just tap on the coordinates which will open up the default GPS application installed on the phone and will show the users the distance between the kiddiewinks and the user.

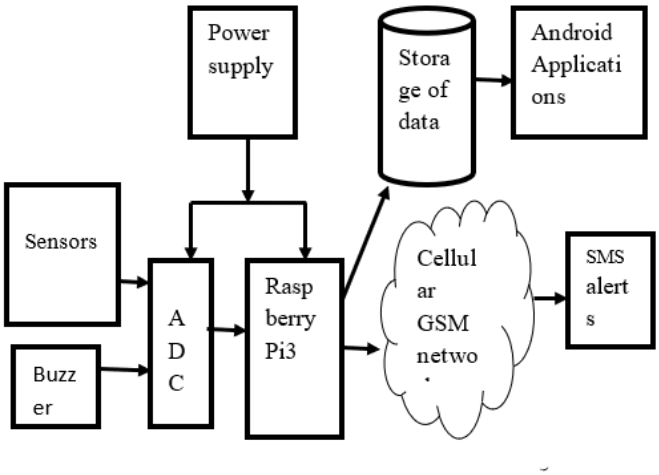

Figure 1.1: system's architectural diagram

Sensors

There are different sensors being used in the project. Heartbeat, temperature sensors are used to find heartbeat rate and temperature respectively. Accelerometer sensor is used to measure the stable and unstable position of the kiddiewinks. It is also known as Mems sensor. IR sensor and ultrasonic sensor are used to detect obstacles and pit, holes respectively. A buzzer is used, which makes a high buzzing sound in the wearable device.

ADC

ADC means analog to digital converter. It is used in the project,
as not all sensors outputs are digital. The sensor outputs obtained are analog, digital and timer/counter based. Hence we need to convert them into digital signals. So we make use of analog to digital converter.

Power supply

The power supply connection is needed for the ADC and raspberry. Sensors work with the supply of power to them.

Raspberry pi3

It is a mini computer on a chip. This is the main unit. The language used is python.

Server

The serve are used to store the sensed data information. And also a server used to send SMS alerts.

Android application

It is designed for monitoring the safety of kiddiewinks. Android application serves best job in providing required details regarding the kiddiewinks in an easy way.

IV. CONCLUSION

In the project we have made an embedded design of a wearable device and also an android application. The kiddiewinks wearable device designed is a smart IoT device. It is designed for the safety and security of the kiddiewinks. The wearable device is worn by the kiddiewinks. To get notification and information regarding the kiddiewinks to parents/guardians an android application is designed. Parents are provided with the real-time location, surrounding temperature, buzzer of their kiddiewinks wearable or alert bystanders to rescue and safeguard the kiddiewinks. It provides tracking the location of kiddiewinks with android application and also using SMS alert. It is a cost effective hardware design of wearable device done by using raspberry pie3 and sensors.

FUTURE ENHANCEMENT

The smart kiddiewinks safety wearable can be enhanced much more in the future by using highly compact modules. 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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