Activity Tracker Wrist Band for Children Monitoring using IOT

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Abstract—Today in introduce universe of advanced innovation and worldwide figuring each individual is associated with each other in number of ways. In current worldwide figuring world, the youngsters and ladies provocation, chain snatchings, hijacking, lewd activities, eve prodding, and so forth are expanded step by step, winding up more perilous and powerless. At the point when these risky circumstances happen there must be an inclining innovation to be agreeable to deal with. So we are proposing a framework that takes a shot at the debate of youngsters utilizing IOT. In this venture we proposed a gadget which is incorporated with different gadgets, containing wearable "Action Tracker Wrist Band" which is modified with all the required information which incorporates the conduct of the human responses like outrage, uneasiness, anxiety and dread. At the point when these circumstances are looked by the casualty, the different sensors produce the crisis signals which are to be transmitted to the advanced cell. The framework adequately screens the kids nearness inside the normal zone. At the point when the individual crosses the checking zone, at that point in light of IOT Monitoring framework, GSM sends help ask for by sending messages to the closest police headquarters, guardians and the general population in the close sweep.

Keywords-IOT Monitoring system; GSM; smart phone ; messages;

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I. INTRODUCTION

Internet Of Things is the network containing many physical devices, vehicles, electronic parts, software, sensors, actuators, etc. It mainly enables these devices to efficiently, intelligently connect these objects to collect the data and usefully exchange it for a purpose. The term IOT was first coined by Kevin Ashton in the year 1999. Internet Of Things (IOT) associate to be sensed and connect remotely to monitor the already existing network and its infrastructure. The important vision of IOT has evolved due to a convergence of various technologies, including ubiquitous wireless communication, real-time analytics, sensors, embedded systems, etc. It is a technology that allows the objects to be sensed or controlled remotely across existing network infrastructure having numerous devices connected to it. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. In today's scenario, over 80% of the world population habituated towards the new technologies developed, including the children by the usage of mobile phones, smart devices, laptops and others smart equipment's are also increased.This proposed system will be highly effective from other existing techniques in helping the victims. The system uses Arduino for the process integrated with sensors like temperature sensor, heart beat sensor, etc.

The children with Activity Tracker that has access to IOT monitoring and GSM technology keeps monitoring the children. The system has sensors interfaced with the processor which keeps sensing the vital signals such as heart beat rate, temperature, etc. So whenever some perilous situations arise there may be an indication to parents. The parent can delimit the safety distance for each child and when it is overtaken the system will alarm for both the parent and child. When the child crosses the zone (say a school zone) unfortunately due to some harassment, then the system automatically sends the information to the parents, nearest police station informing the status of the problem occurred.

II. LITERATRURE SURVEY

KhasimShaik, SanthosiBogaraju Proposed "Implementation of novel application for woman and child protection using IOT enabled techniques"

This system focused on a wireless method which will send alert and communicate with a secure medium. The system here is based on smart phone which will be very much useful in helping victims. Women will be provided with smart band and the smart phone that has access to the GPS tracking mechanism that gets the location and these location values are displayed on the LCD. The Smart band is integrated with Smart phone and The GPS and the GSM can be used. The smart phone is connected to smart band watch through Bluetooth Low Energy (Bluetooth 4.0) module. The device communicates with phone through an application designed specially that acts an interface between the smart band and the phone.

Helen. A, FathimaFathila proposed "A smart watch for women security based on IOT concept 'watch me'"

The 'Watch me' was designed in a way to secure women when they are exposed to external challenges and harassments in the society. Women safety by smart phone can be activated

200

only by a touch or one click. It is impossible to have mobiles on our hand under all circumstances. In such situations this watch me concept can be used. It works automatically based on heart beat rate which increases due to the secretion of epinephrine hormone from hpa axis that is specifically defined for each and every situation like fear, anger, anxiety and other reactions triggering the sensors automatically.

Ms. Deepali, M. Bhavale, proposed "IOT based unified approach for women and children security using wireless and GPS"

This system explains that the main goal of this project is to preserve the security of women and school children using a wireless portable safety device and school bus tracking system. This system consists of an emergency 'PRESS' button and an electronic camera for capturing image. When the sensor kit button is pressed the camera will captures the image and will collect the information of the user. This system uses a wireless method which will alert and communicate with secure medium.

Kavita Sharma, Anand More proposed "ADVANCE WOMAN SECURITY SYSTEM BASED ON ANDROID"

This android application was designed to provide security and provide awareness on the time of critical situation for women. This proposed system is GSM & GPS Based women Security System. The main objective of security system is to track the current location of the victim having an android enabled mobile by extracting the longitude and latitude of that target person. The GPS device is placed inside the device (Android Phone). An emergency button is fixed on the device at a particular position. Generally service is made active by clicking on ACTIVE SERVICE button. On clicking this, button service gets activated and clicking on VOLUME key a new window is opened and SMS is sent to those contacts saved already at the time of registration. The SMS contain alert message and the current location.

Shree Varsha. K, Dr. UmaraniSrikanth proposed "A survey on android application for personal security"

The project explained that when the user touches the application, within few seconds the app will be executed automatically and turns on the camera in order to capture the images (victim's surrounding). The app picks up the user's GPS location (Current Location) exactly and shares it along with location to the nearest helpers (Ambulance, Police Station, etc). The main feature of this application is that the helper will get the details of user (Image, address and personal information) in order to avoid fake details. The nearby helpers can be found using cloud crawling techniques according to the affected users.

Nagaraju. J, Sadanandam. V proposed, "Self-salvation – the women's security module"

The main idea of this project was to help and guard the women to prevent themselves from kidnaps and chain snatchings. Here three methods of Safety and security for women are introduced. In each and every method there will be an alert message that is sent to the existing Phone Numbers through GSM technology. The purpose of using GPRS is that to track the location and position. Also a Smart Phone app is developed for controlling and for sending the alert message to the parents and police station. Women will be provided with equipment which is not visible to others.

Nitishree proposed "A review on IOT based smart GPS device for child and women safety applications"

The paper was based on IOT (Internet of Things). This paper proposes an Android based solution to aid parents to track their children in real time. The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the advantage of the location services provided by GSM. It allows the parents to get their child's location on real time by SMS. Here, a prototype model (device) is created which is simulation based. The work comprises ARM-7 LPC2148 as microcontroller, along with GPS and GSM module. Embedded C core compile using Keil and virtual simulation check using Proteus 8.1 is done. A server is created which will collect all the data generated by our prototype system and send the same to server using GPRS. A Dummy server will be created by using Filezilla. This device will also have the facility of Emergency help key (SOS), if anyone presses the key, automatic help message will be sent to 3 registered mobile numbers on Server.

AbhijitParadkar proposed, "All in one intelligent safety system for women security"

A model had been proposed for the women security in public places which aims to provide the 100% safe environment. The integration of various existing systems on women security has been gathered together. An advanced women security system to provide the safety measure in public places as well as travelling alone through public transports have been introduced finally. The proposed system can be implemented as an android app application or using Arduino based board. It consists of Database Module, SOS Key Press Module and Voice Recognition Module, Auto receiving call module, Global Positioning System (GPS) module, GSM System Module, Spy camera detection module, Intrusion Detection Module, Area zone module, Fake call Tool Module, Action after getting the Handler Notification, Audio and video recording module, Call on 100 or other emergency number,

Generate Electric Shock for Self Defense module, Screaming Alarm Siren module all integrated within a single module

Vijaylashmi. B, Renuka. S proposed "Self defense system for women safety with location tracking and SMS alerting through GSM network"

The proposed idea was a quick responding; cost protection system for women in distress can call for help just with the press of a button on smart band. It has the ability to help women wearing this device as a watch or band, in case of any harassment .By the press of a switch that is located on the watch or band or when the women has fallen the information about the attack along with the body posture and location information is sent as SMS alert to a few predefined emergency numbers. The system consists of embedded hardware and software co-designed for this dedicated application. It allows for exact location of the victim, as soon as the Emergency key on the belt is pressed.

III. PROPOSED SYSTEM

The proposed system is based on an advanced technology that primarily safeguards the children that offers "Activity Tracker" based on particular zones within which they must be. This proposed system will be highly effective from other existing techniques in helping the victims. The children with Activity Tracker that has access to IOT monitoring and GSM technology keeps monitoring the children. The system has sensors interfaced with the processor which keeps sensing the vital signals such as heart beat rate, temperature, etc. So whenever some perilous situations arise there will be an indication to parents. Also when the person crosses the zone (say a school zone) unfortunately due to some harassment, then the system automatically sends the information to the parents, nearest police station informing the status of the problem occurred.

The system accomplishes the above tasks using the Arduino as the processor core for the control mechanism of the whole system. It has two sections: 1) Wearable section 2) Remote monitoring section. These two sections are explained below in a detailed manner. The wearable section can be in the form of wrist band that can be worn on the hands of the children. This band consists of microcontroller processing the information by monitoring. The remote monitoring section has the IOT based monitoring section integrated with the IOT system module. This module is programmed in a way to monitor the wearable section that is installed in the wearable part. These modules are explained clearly below.

IV. DESIGN METHODOLOGY

WEARABLE SECTION:

The wearable section is given in the Figure 3.1. This section comprises of the tracker band wearable on the children's hand for the purpose of monitoring embedded with the Arduino along with a LCD display.
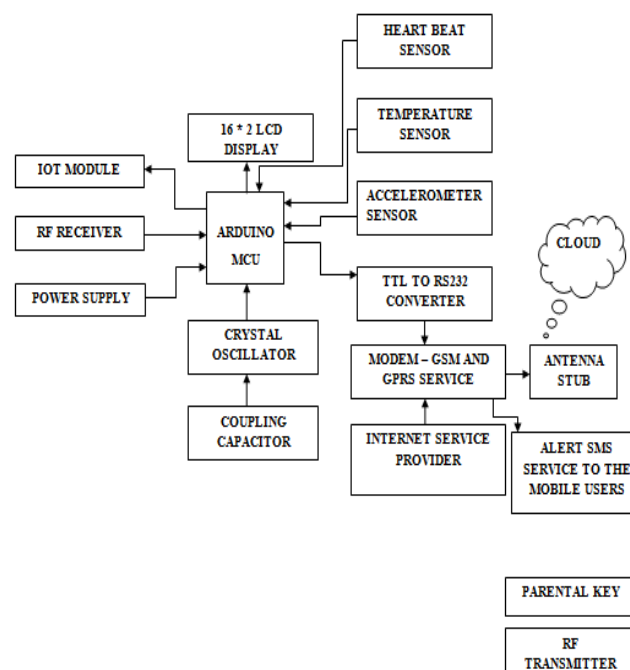

Fig.1 Wearable Section

The RF transmitter decides the zone by transmitting its RF frequencies and RF receiver is placed on the band. So that whenever the person crosses the particular monitoring zone the alert message is sent where the RF range is also crossed

REMOTE MONITORING SECTION:

The remote monitoring section shown in the figure 3.2 comes with the facility of IOT based remote monitoring.
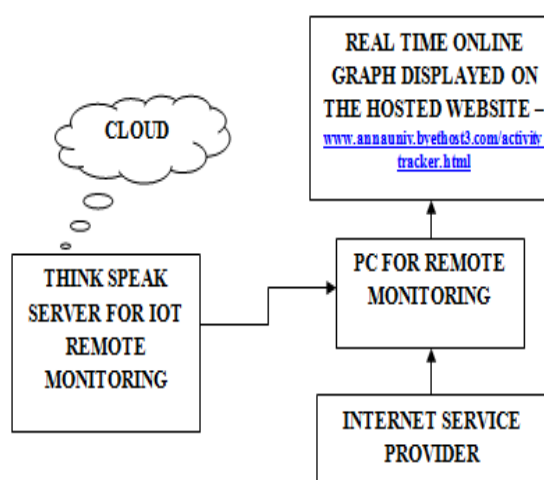

Fig 2 Remote Monitoring Section

The section consists of a PC for remote monitoring integrated with IOT module where IOT is a technology that allows the objects to be sensed or controlled remotely across existing network infrastructure having numerous devices connected to it. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. This facility has internet connection that can provide service for 365 days and 24 hours a day without any error. So monitoring can be carried out at any time without the problem of service. The monitoring process is a real time monitoring which is displayed as a graph that varies with respect to time.

FLOW CHART:

The project process flow given in Figure 3.3 explains clearly about the working mechanism that includes the Wearable section and Remote monitoring section.

This flowchart explains the steps that involved in this project, starts with the wrist band section where sensors are placed to monitor the vital signals and the location. From this section, one of them is connected to the remote monitoring section which is also connected to the internet. Other one is connected to the microprocessor where sensor values are given as the input and there it processes that information. After processing information in microprocessor, that information are send to the 16*2 LCD display, where it

displays the title messages at the initial stage and also the status information in the upcoming stage of the phase I. The status information is given by comparing the sensor values and signals values are compared to the threshold values whether they have equal values. If they have equal values an ALERT message has been transferred to the parent's/guardian's mobile or to the police station using the GSM module. If the signal value is not equal to the threshold value, the process again goes to the wrist band section where it is connected to the microprocessor and the process repeats.

As earlier referred to the remote monitoring section which is connected to the internet, it is also connected to the IOT system which monitors the location of the child based on the internet connection. If the child crosses the location which is monitored using GSM module, an ALERT message has been transferred to the parent's/guardian's mobile or to thepolice station using the GSM module. After the alert message has been transferred, the process ends.
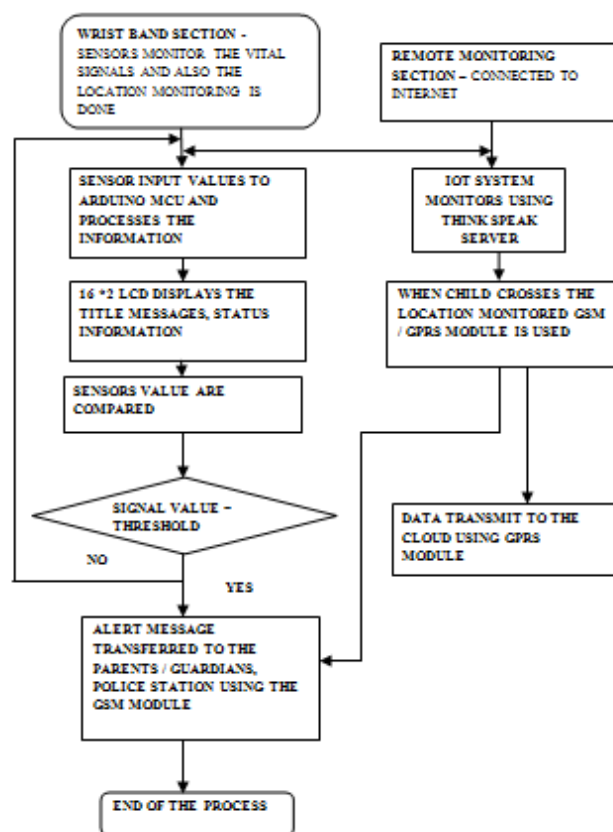

Fig 3: Flow chart for the monitoring mechanism in phase II

The hardware prototype for the wearable section is given below as depicted in the Fig 5.1. The Arduino Uno as the heart of the system takes care of the peripherals interfaced to it. The part and peripherals of the module is clearly explained below:

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins out of which 6 can also be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection to connect it to a computer with a USB cable or power it with a AC-to-DC adapter, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. It has facilities for communicating with a computer, another Arduino board, or other microcontrollers.

The boards feature serial communication interfaces, including Universal Serial Bus - USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages, C and C++.
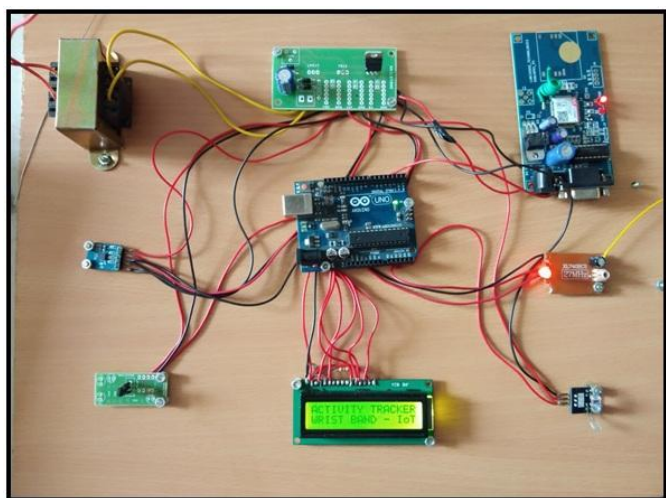
Fig4:Hardware Prototype

HEART BEAT SENSOR:

Heart beat sensor utilized as a part of this undertaking gives computerized yield of heart beat when a finger is put on it as appeared in the Fig 5.2 and Fig 5.3. This advanced yield esteem can be associated with microcontroller straightforwardly to quantify the Beats Per Minute (BPM) rate. It deals with the standard of light regulation by blood move through finger at each heartbeat. At the point when the heart beat locator is working, the beat LED flashes as one with every pulse.

Fig5:Heartbeat sensor

The basic heartbeat sensor consists of a light emitting diode like a photodiode and a detector like a light detecting resistor. The heart beat pulses causes a variation in the blood flow to different regions of the body as given in the above Fig 5.3. When a tissue is illuminated with a light source, it either reflects (a finger tissue) or transmits the light (earlobe). Some amount of the light is absorbed by the blood and the transmitted or the reflected light is then received by the light detector. The amount of light absorbed depends on the blood volume in that tissue. The detector output is in form of electrical signaland is proportional to the heart beat rate. This signal is actually a DC signal relating to the tissues and the blood volume and the AC component synchronous with the

heart beat caused by pulsatile changes in arterial blood volume is superimposed on the DC signal. The sensor consists of a super bright red which needs to be super bright as the maximum light must pass spread in finger and detected by light detector. Now, when the heart pumps a pulse of blood through the blood vessels, the finger becomes slightly more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal. The output signal is also indicated.

TEMPERATURE SENSOR:

A temperature sensor is a gadget which is composed particularly to gauge the temperature of a question. In our venture, LM35 arrangement is utilized which are exactness incorporated circuit temperature sensors, whose yield voltage is directly relative to the Celsius (Centigrade) temperature. The temperature can be estimated more precisely than with a thermistor whose yield esteem is relative to the temperature (in °C). The LM35 in this manner has favorable position over straight temperature sensors aligned in ° Kelvin.

Fig6:Pin Out of Temperature Sensor

ACCELEROMETER SENSOR

Need of Fall Detection Technology

Not everyone should use fall detection devices, as the devices may detect false alarms, which can be a hassle. These devices are best for a very specific subset of people: those who frequently fall, those with early dementia or those with diabetes. To determine if fall detection is the best system for you, check with your primary care physician.

Fall Detection

While fall detection is not for everyone, it can be the difference between life and death for those who need it. Falls can result in critical injuries, like those to the head and hips, and are the leading cause of loss of independence for the elderly. These injuries can lead to hospitalization or prompt a move to an assisted living facility. The longer someone remains unassisted, the less likely it becomes that he or she will make a full recovery. While fall detection is a great

204

system, keep in mind that it does not detect 100% percent of falls.

Independence

Sometimes, a family might want an elderly relative who is prone to falling to live with them or to live in an assisted living facility. While a family's concern is real, it is not easy for someone to give up an autonomous lifestyle. The best fall detection sensors can bridge the gap between family member's concerns and someone's desire to stay independent. These devices will alert help in the event of a life-threatening situation, helping you maintain your independence and helping your family maintain their peace of mind.

Increase Response Times

Falls can be debilitating, or even life threatening, and threaten seniors' way of life. Falls often result in injuries to the head or hips, which leads to long-term complications and loss of independence. The faster help arrives, the better the chances of recovery are. This technology can prove invaluable in times when you may be unconscious or too disoriented to seek assistance. Your wearable fall detection sensor detects if you have fallen and alerts help when you are unable to push the button yourself.

Fall Detection Working:

Fall detectors use specialized technology to measure your movements and the position of your body. These devices can tell the difference between everyday movements and emergencies. For example, the device can tell if you are just lying down or if there is a sudden change in direction as a result of a fall. Many fall detectors use accelerometers and gyroscopes to measure the changes in direction or acceleration of your movement. These monitoring tools use careful calculations that enable a sensor to tell the difference between a fall and other movements.

Fall Detection Sensors:

To evaluate each service and provide the fairest comparison, we tested each service's basic fall detection package. Each service has similar basic features, so your choice may come down to things like comfort of the pendant, reliability and customer service.

SIM 800C GSM/GPRS MODULE:

The SIM 800C is an entire Quad-band GSM/GPRS arrangement in a SMT module which can be implanted in the client applications. Including an industry-standard interface, the SIM900 conveys GSM/GPRS 850/900/1800/1900 MHz execution for voice, SMS, Data, and Fax in a little shape factor

and with low power utilization. With a minor arrangement of 24mm x 24mm x 3 mm, SIM900 can fit all the space necessities in your M2M application, particularly for thin and minimal request of outline.

SIM 800C is designed with a very powerful single-chip processor integrating, AMR926EJ-S core, Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm, SMT type suit for customer application, An embedded Powerful TCP/IP protocol stack, Based upon mature and field-proven platform, backed up by our support service, from definition to design and production.

V. RESULTS AND DISCUSSIONS

The results for the stated activity tracker has been shown below and explained with various scenarios below. The outputs has been obtained for various temperature cases and depicted as shown in the figure below.

Case 1: When the temperature level is normal then the real time graph which is graphed by IOT is as shown in the below figure. Here the heartbeat rate is also normal and so there is no perilous situation occurrence.

TEMPERATURE LEVEL GRAPH

Fig7:Activity tracker in temperature graph output

Case 2: When the temperature level is rising than the normal one the temperature graph is represented in real time as below.

205
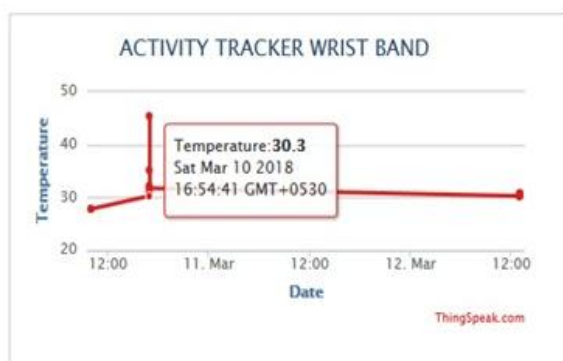
TEMPERATURE LEVEL GRAPH

Fig8:Activity tracker wrist band output on March 10 2018

Case 3: When the temperature rate is high and heart beat rate is also high the real time graph represents as shown below. It represents the data of the temperature, the day when it is measured, the time along with the year, and the date along the axis of date in X-axis and temperature along the Y-axis.

TEMPERATURE LEVEL GRAPH

Fig9:Activity tracker wrist band output on March 10 2018 at different timing

When the temperature rises and the heart rate is also high, the processer finds for the location of the child whether he/she is within the protected zone. If not found within the zone, then the message is sent to the mobile phones of his/her parents, guardians and also if required to the nearby police stations. An example of the message is displayed as below:
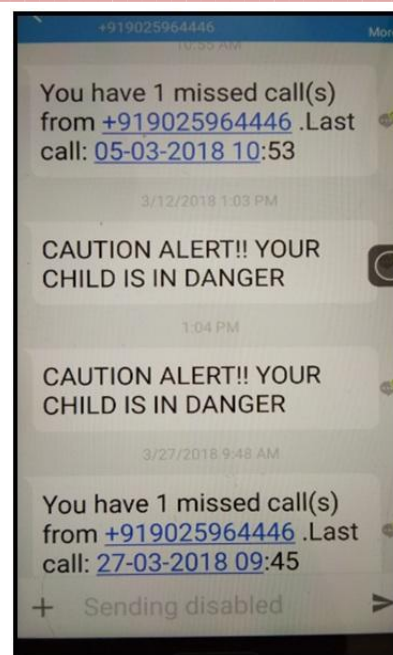

Fig10:displays the details of the alert message

Case 4: When the monitoring is carried out for the upcoming days say on March 12, the temperature and the other parameters are monitored and displayed as below.
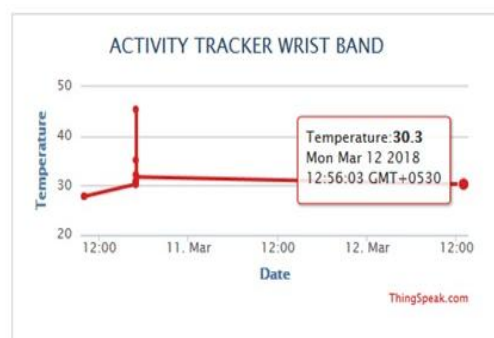
TEMPERATURE LEVEL GRAPH

Fig11: displays the details of the glucose level on March'12 2018.

Case 5: When the child is monitored for it temperature rate, heart beat rate, fall detection along the axis, the graph output is displayed for the present scenario as shown in the figure.

Thus the monitoring based on IOT is accurate for different scenarios has been explained and depicted using the real time graphical monitoring as shown in the above different cases.

VI. CONCLUSION

The Implementation of Activity tracker system using IOT safeguards the children and it can also be effectively used for women, elderly people to protect them and safeguard in the fastest way which is possible automatically. This system mainly focuses on a wireless method which will alert and communicates with secure medium and can perform the real time monitoring of particular zone and detect the safety with efficient accuracy. This idea can be implemented in different areas of security around the school zones, institutions, shopping zones where facing perilous situations happens because of attacks. This system would be highly sensitive and easy to handle. Its quick action response will provide better rescue to every individual user.

The Activity tracker can been used for the elderly ill people, physically challenged and children in a better way fixed with real time cameras for more precision based results and real time accuracy.

VII. ACKNOWLEDGMENT

VIII. REFERENCES

[1] Alexandros Pantelopoulos, Nikolaos G. Bourbakis, "A Survey on Wearable Sensor - Based Systems for Health Monitoring and Prognosis", IEEE Transactions on Systems, Man, and Cybernetics, Volume - 40, Issue - 1, January 2010.

[2] Abhijit Paradkar, Deepak Sharma, "All in one Intelligent Safety System for Women Security", International Journal of Computer Applications, Volume - 130, November 2015.

[3] Bharathi. G, Ramurthy. L, "Implementation Of Children Tracking System Using ARM Microcontroller", International Journal of Industrial Electronics and Electrical Engineering, Volume - 2, December 2014.

[4] Deepali M. Bhavale, Ms. Priyanka S. Bhawale, Ms. Tejal Sasane, Mr. Atul S. Bhawale, "IOT Based Unified Approach for Women and Children Security Using Wireless and GPS", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Volume – 5, August 2016.

[5] Gatzoulis L, Iakovidis L, "Wearable and Portable eHealth Systems", IEEE Engineering in Medicine and Biology Magazine, Volume - 26, September – October 2007.

[6] Harikiran. G. C, Karthik Menasinkai, Suhas Shirol, "Smart security solution for women based on Internet of Things", Volume – 3, IEEE 2016.

[7] Helen. A, Fathima Fathila. M, Rijwana. R, Kalaiselvi .V.K.G, "smart watch for women security based on IOT concept "watch me", International Conference on Computing and Communications Technologies – IEEE 2017.

[8] Khasim Shaik, Santoshi Bogaraju, "Implementation of Novel Application for Woman and Child Protection Using IOT Enabled Techniques", International Journal of Advanced Research in Computer Science, Volume 8, March – April 2017.

[9] Khaled Shaaban , Abdelmoula Bekkali, Elyes Ben Hamida, and Abdullah Kadri, " Smart Tracking System for School Buses Using Passive RFID Technology to Enhance Child Safety", Journal of Traffic and Logistics Engineering, Volume - 1, December 2013.

[10] Kavita Sharma, Anand More, "Advance Woman Security System based on Android", IJIRST- International Journal for Innovative Research in Science & Technology, Volume - 2, May 2016.Electronic Publication: Digital Object Identifiers (DOIs):