JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DESIGN AND DEVELOPMENT OF A WEARABLE IOT-BASED DEVICE FOR CHILDREN'S SECURITY

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Abstract: Technology that links the physical and virtual worlds is constantly developing.
One of them, wireless technology, enables the connection of many devices over a larger area without the use of cables or wires. Large data may be simply stored and processed using a cloud computing platform. The device is A child safety gadget combined with cloud and wireless technology, giving it access to both technologies' benefits. The created system is a prototype that uses temperature and heart rate sensors to keep track of the health of the kids. Using an accelerometer and an ultrasonic sensor, it determines if the child's position has changed excessively and feels any obstacles

IndexTerms **- Child, Health, Temperature, Heartbeat, Accelerometer, Ultrasonic, Buzzer, GSM, Camera**.

I. INTRODUCTION

The Internet of Things (IoT) is a technology that enables a group of systems and devices to connect to various sensors over the internet. It encompasses technologies like smart cities, smart automation, and smartphones. The impetus for this method comes from the escalating urgency of protecting children. The main goal of the method is to aid in the reunion of a lost kid with their parents with the aid of those closest to the youngster. The prototype system that was created can issue an alarm in case of abnormal circumstances. For the kids, the device is provided in the form of a glove. The glove functions as a wearable gadget with all the components integrated inside. The ultrasonic sensor aids in obstacle detection within a specific range. The accelerometer is used to determine whether the child's position has changed. Heartbeat and temperature sensors aid in keeping track of the child's health. When the parameters are detected as abnormal, the alert messages are delivered to saved emergency contacts.

II. RELATED WORK

Existing System

Some of the current systems employ Bluetooth as their communication technology. There is a system that can be worn and was designed like a band. A few additional systems employ various sensors in accordance with their needs, such as barometers for height measurement. The Mimo, Sproutling, and iSwingband are comparable wearable gadgets.

III. LITERATURE SURVEY

3.1 Vehicle Tracking System for Children's Safety Using RFID, GPS, and GSM

Using RFID and GSM technology, this system aids in vehicle monitoring by providing information on the entry and exit of the student from the bus. The suggested solution offers the possibility to efficiently track the exact location of the bus. So, this can be used in smaller schools. These systems aid in lowering the number of kidnappings that occur. Some of the challenges include the fact that the entire system is built onto a tiny chip and that the school buses can't be traced if it's too late to drop the kids off at their destinations. Given that it is tied to the child's body and that neither the child nor the parent may own an Android phone, it could be harmful to the child. Also, using a phone in class is definitely forbidden, so the child does not know when to activate the panic button. Using RFID and GSM technology, this system assists in keeping tabs on the kids as they board and exit the bus. Information will be sent to the school if the child is missed on the bus.

3.2 Design and Development of an IOT-based wearable device for the Safety and Security of women and girl children

Wearable technology was created with the intention of protecting and securing women and girls. One method of reaching the goal is the study of physiological signals in conjunction with body posture. The indications that Galvanic skin resistance and physiological measures of body temperature are examined. By gathering raw accelerometer data, a triple-axis accelerometer is utilized to estimate the body position. After gathering the raw data, a machine learning algorithm specifically designed for activity recognition is used. Real-time data monitoring is accomplished by transmitting sensor data wirelessly to an open-source cloud platform. This equipment is set up to continuously track the subject's parameters and react to any potentially hazardous circumstances. This monitoring process starts with the detection of changes in the monitored signals, and then the proper action is taken by sending notifications or alerts to the right people. The association between stress and skin resistance as well as stress and body temperature has been researched in this work. There are four techniques to distinguish between distinct body positions when using activity recognition: sitting, standing, sleeping, and struggling. While the device analyses and response to the existence of a harmful circumstance using both skin resistance and body temperature.

3.3 Smart Wearable Device Using Arduino GSM Shield

The majority of wearable gadgets on the market now include Bluetooth and Wi-Fi to track users' movements and their moments. Nevertheless, Bluetooth and Wi-Fi are unstable for long-distance communications; as a result, we adopted GPS-enabled communication as a trustworthy medium for in-person interactions. The Arduino Uno microcontroller based on ATmega328p will power the entire project, and an Arduino GSM shield will be used to transmit and receive text messages as well as connect to the internet. We can find the other person's location, including their precise coordinates, by sending a text with the subject "LOCATION." Several projects now in existence use this similar concept but Bluetooth [5] or Wi-Fi technology, therefore the working range will be limited to a fixed length of 100 meters at most. Children, seniors, and young individuals can all benefit from this smart wearable GPS device.

3.4 SMS-Based Kids Tracking and Safety System by Using RFID and GSM

The father and child use Short Message Service to converse (SMS). The SMS module will make it possible for the system to function without an internet connection. When a parent wants to check on their child, the system sends the child's location to their smartphone. The advantage of this method is that it operates automatically, requiring the child to do nothing other than keep it in his bag.

System Details:

- RF Receiver and transmitter module: It guides the RFID
- Sensing Unit: The sensing element will connect to the speedometer of the school bus for security against the threshold limit of the bus.
- RFID: used to turn on and off the module via HT12E
- GPS Unit: contains a cohesively made GPS module for receiving the longitude and latitude of the kid’s location.
- GSM\GPRS Unit: Contains module for transferring data.

IV. SYSTEM DESIGN

4.1 Problem Statement

To create and put into use a smart Internet of Things (IoT) wearable child safety device. It gives parents data on the child's temperature and heartbeat in addition to an alarm siren to warn onlookers. The gadget senses whether there are any obstructions and whether the child's position has changed too much.

4.2 Proposed System

The goal of the suggested method is to create a tool for the child's protection and security. The wearable technology is a hand glove that may be put on. Using a temperature and heartbeat sensor, the gadget keeps an eye on the child's health. The device uses an ultrasonic sensor to find the obstruction. Using an accelerometer, it can detect if the child's position has changed excessively. The camera begins recording video as soon as an obstacle is spotted and the accelerometer detects a change in position. The video is forwarded to a stored mail account as an email.

4.3 Block Diagram

The Raspberry Pi 3B microcontroller board that is being used here provides pins for both digital and analog input. The input pins are connected to the temperature sensor and the pulse sensor. These two senses, therefore, re-serve as the microcontroller board's inputs. The board is powered by a battery or terminal linked to a computer, a USB cable, or an adaptor connected to a plug point. The electricity to the sensors and monitor is supplied by \Raspberry Pi. Users can see the output on the monitor. If the child's location changes too much, the accelerometer detects it. If barriers are identified, ultrasonic technology is employed to find them. If one of these two sensors is turned on, then The footage is first being recorded by the camera module. The board is connected to the internet by the WIFI module, which then sends the sensor data to cloud storage. The cloud platform used to store and manage a sizable collection of data is called Thing Speak. After authentication, Thing Speak can be accessed with a user ID and password.

In the form of graphs and charts, Thing Speak maintains all the details and data from the sensors. The information is then instantly accessible to the parents via the cloud.

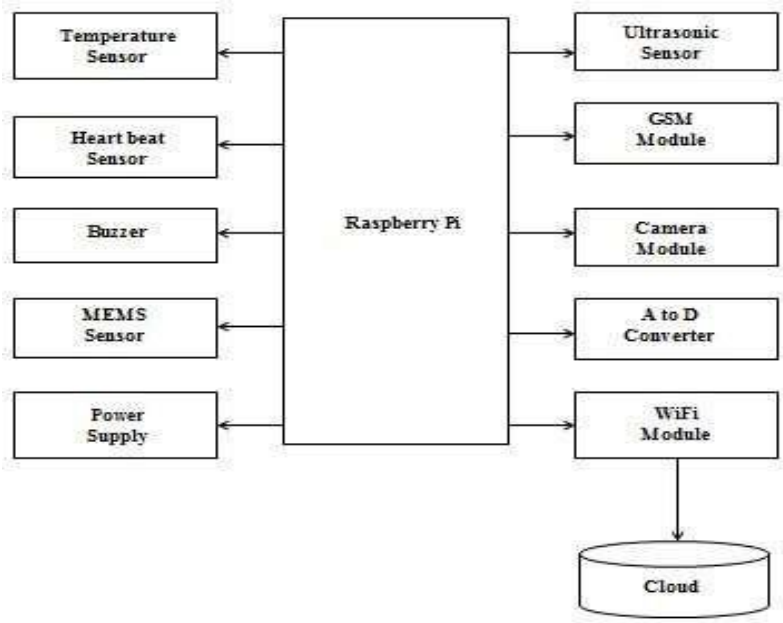

fig.1 block diagram

When the sensed values are outside of the range of the threshold values, the GSM module, which is connected to the Arduino Raspberry Pi, sends alert messages to the preset contact number.

V. METHODOLOGY

This system examines the idea of a wearable gadget for kids or any kids with disabilities. The system focuses on delivering an SMS text message so that the parent's phone and the child's gadget may communicate. We utilize a heartbeat and temperature sensor to keep an eye on the infant. Lm35 sensors are used to assess the child's body temperature, while heartbeat sensors are used to monitor the child's heartbeat. To determine whether the child's body position has changed by 90 to 180 degrees, a MEMS sensor or accelerometer is employed. If there are any obstructions, they are discovered using an ultrasonic sensor. If an obstruction is discovered or the camera's accelerometer detects a change in position, video recording will begin. The captured video will be forwarded as a mail message to a stored mail account. All of the sensors are wired to the Raspberry Pi 3B and run on a 5-volt power supply. The Raspberry Pi boot-loader is used by this IC microcontroller to control the system. The device's buzzer will turn on in an emergency. The sensors built inside the device capture the child's parameters, which are then uploaded to the cloud. Some users who have been granted access via username and password can access this sensitive data from the cloud. In accordance with needs, it also offers cloud-based child data analysis.

5.1 Flowchart for sensor analysis

The Raspberry Pi board, which manages the system's operation, is connected to the sensors. The gadget is given access to the wireless network, and once linked, it will begin to function. If the connection is successful, data from the sensors is read. Over a wireless network, the read data is stored in Think Speak. The output screen, which is a monitor, also shows the sensed data. To read the information in Think Speak, only authenticated users who have created a channel may log in. An alarm message is sent to a stored contact number if the data sensed exceeds the threshold values. If not, it just checks for the next iteration

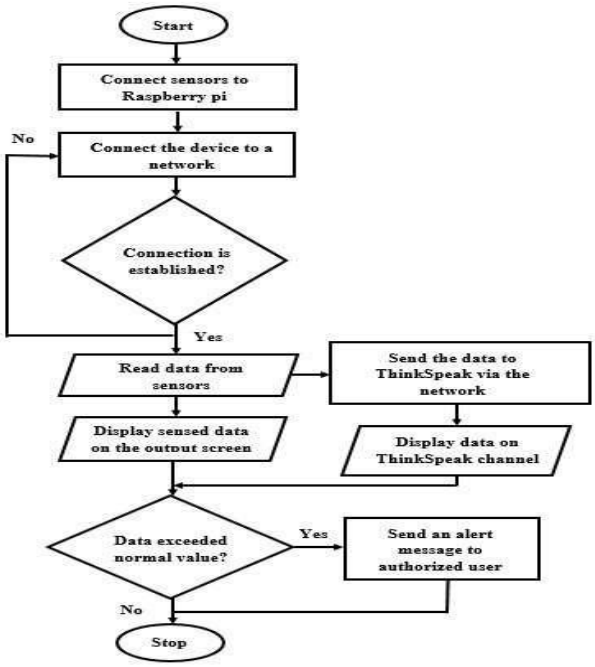

fig.2 flowchart for sensor data analysis

VI. EXPERIMENTAL RESULT

The implemented child safety wearable is evaluated to ensure that it satisfies the system's goals. After integration, all module interactions are evaluated. The outcomes are examined and validated. Hence, both the user interface and the system are finished.

fig.3 system setup

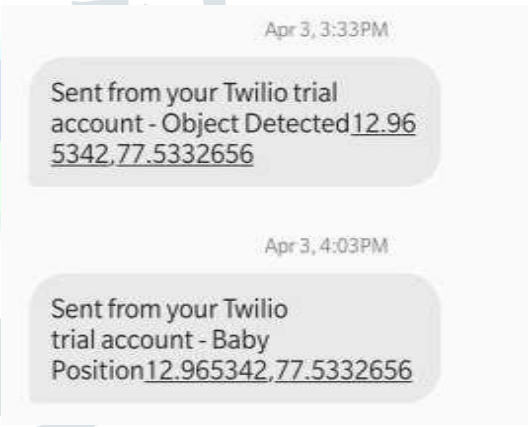

fig.4 sms alert

VII. CONCLUSION

The Camera Module can be used to keep an eye on the surrounding nature. This provides a clearer picture of the area or setting and can also be used as a camera module. Any camera module, including an adafruit TTL serial camera, can be used as the hardware. Since the GSM module is the main focus of this wearable, it is a superior choice than Bluetooth, Wi-Fi, or ZigBee because of their limited range and communication concerns. Streaming video is supported by some camera modules. Only four wire connections are utilised due to the restriction of attempting to use SMS alone. The red and black wires will be directly linked to the Arduino Uno board's +5V and GND ports, respectively. When using an Arduino Uno or GSM board, data is sent using the RX pin. Data coming in from the modules is received using the TX pin. It uses the 10 K resistor divider. It would be a good idea to split the 5V down till it hits 2.5V because the serial data ports on the camera need 3.3V logic. The output of the digital 0 pin is typically 5V high. Resistors are wired together so that the camera input never rises above 3.3V. The Arduino Uno will use two digital pins and a software serial port to connect to the camera.

While the camera or the Arduino Uno do not have enough onboard storage space to save snapshots, an external storage micro board can be utilised to save the photographs temporarily. The standard transmission rate for cameras is 38400 baud. Similar to how the GPS module gathers data, the camera also does so. It will be waiting for the keyword "snapshot" or any other word that is clearly stated in the application when in standby power saving mode. The GSM kit receives this keyword from the user's mobile device. The Arduino Uno then uses this to turn on the camera. A picture of the environment can then be taken, and a temporary copy of the file can be

stored on the external SD (Secure Digital) memory card. After this procedure, the Arduino Uno will migrate the saved photos from the SD storage to the GSM module. This is then transmitted to the user through SMS text.

Android App: To respond to user text message responses, an automated bot is needed. The primary concept behind using an Android app is this. With just one button click, the user can access predefined response alternatives. The user must learn the precise keywords that are to be conveyed. Also, the automated bot can be pre-programmed to display a list of predefined and specified keywords to the user, such as "Location," "Snapshot," "SOS," etc. In the future, further precise keywords might be included.You may add things like "Humidity," "Altitude," etc. The user of an Android app has an added advantage for simple understanding. The primary idea behind Android apps is the provision of a predetermined keyword button for getting location. This makes the job easier.

VIII. REFERENCES

1] A. NasneenFathima, P. S. Nivedha, T. Sangavi, S. Selvalakshmi, R. Chitra, "Vehicle Tracking System for Children Safety Using RFID, GPS, and GSM", International Journal for Trends in Engineering & Technology, Volume 13, Issue 1, May 2016

[**2**] AnandJatti, MadhviKannan, Alisha RM, Vijayalakshmi P, Shrestha Sinha, "Design and Development of an IOT based wearable device for the Safety and Security of women and girl children", IEEE International Conference On Recent Trends In Electronics Information Communication Technology, May 2016

[**3**] Kota Srinivasa Rao, Karri Yatheshvamsi Naidu, Mudadla Asha, Gullipalli Sailaja, "Smart Wearable Device Using Arduino GSM Shield", IJIRCCE, Volume 6, Issue 2, February 2018

[**4**] Nitin Shyam, Narendra Kumar, Maya Shashi, Devesh Kumar, "SMS Based Kids Tracking and Safety System by Using RFID and GSM", IJISET, Volume 2, Issue 5, May 2015

[**5**] Pravin Bhagwat, "Bluetooth: Technology for Short-Range Wireless Apps", IEEE Internet Computing, June 2001

[**6**] P. Santharaj, V. Anuradha in"Design and Implementation of Children Tracking System using ARM7 on Android Mobile Terminals "International Journal of Scientific Engineering and Technology Research ISSN 2319-8885, Vol.03, Issue.21, September-2014

[**7**] PoojaMankar, HitaliNasare, PrachiPatle, MeenalMahadole, PranaliBorkar, Swati Gupta in" Implementation of children tracking system using mobile terminals"International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 1, January 2015.

[**8**] Maryam Said Al-Ismaili, Ali Al-Mahruqi, JayavrindaVrindavanamin" Bus Safety System for School Children Using RFID and SIM 900 Modem" International Journal of Latest Trends in Engineering and Technology (IJLTET) Vol. 5 Issue 1 January 2015 ISSN: 2278-621X

[**9**] Azian Azamimi Abdullah, and Umida Hafsah Hassan, "Design and Development of an Emotional Stress Indicator (ESI) Kit", IEEE conference on Sustainable utilization and development in emerging and technology, University Tunku Abdul Rahman, Kuala Lumpur, Malaysia, 6-9 October 2012

[**10**] R.V. Datar, "Wi-Fi and WiMAX – a breakthrough in wireless access technologies," Wireless, Mobile and Multimedia Networks, 2008. lET, International Conference on, Beijing, 2008, pp. 141- 145