

Smart Wrist Band for Children Tracking using Regression Technique

Avantika Bhate¹

¹Department of Computer Science and Engineering, Chhattisgarh, India

Abstract - Today, all over the world, crime against the children is increasing rapidly. Human trafficking is one of the major crimes taking place and safety of children has become a major concern, in present years many cases have been reported against missing children and it is high time to provide a safety support system for children going at public places. In such situation it is necessary to design a system which will provide security to children. This paper serves a purpose of providing a safety to children, it consists of IOT based smart wrist band which is implemented using machine learning techniques. A GPS module and sensors are integrated with Arduino UNO board for getting information about the children and sending notification to the family member.

Key Words: Children safety, Sensors, GPS, Mobile Application, machine learning.

1. INTRODUCTION

In current situation misbehavior against children has increased rapidly and their safety has become a common issue, parents are worried about their ward's safety and security. Children tracking system is widely used all over the world to assure parents that kids are safe from suspicious cautions. Smart application is implemented for providing security which consists of all the latest technologies. IoT based smart band are designed which are connected to the mobile devices for providing information about the children. The device help parents in getting the location of their children. The main purpose of implementing this project is to switch to an independent hardware which ensures the safety of children. The system is designed with IOT devices consists of different sensors i.e. pulse, temperature, motion, ultrasonic which are integrated with the GPS module on Arduino UNO board which provides information and results according to the situation of children and sends the current location so that the family member can track them. As a result, sensors get activated and sends the data to the training dataset. If the analysis is observed as abnormal it will send notification on an application.

The system aims to provide safety and security to children dealing with different issues. Children safety has become

biggest concern for parents. It has become necessary to provide some solution for the safe guard of children. Many applications have been designed which provides various essential features but they come up with a drawback of initial interaction of children and that is not possible.

2. LITERATURE SURVEY

"A Mobile Safety Monitoring System for Children" [1]. The objective of this paper is to provide security using a mobile based monitoring system. They have implemented the software which keeps the track of children with two major scenarios, i.e., going outside with guardians and without guardians using GPS sensor, Acceleration sensor and Mobile GIS.

"Smart Girl child security system using IOT" [2]. This paper tells about the device which is designed for the security of girl child. It gives description about GSM shield, Arduino Board, GPS tracking system, Screaming alarm and sensors.

"Children Security and Tracking System Using Bluetooth and GPS Technology" [3]. The main objective of this paper is to develop a child tracking system to help parents monitor their children in public areas. The system uses alarm technique which will trigger when the Bluetooth connection will disconnect. Along with this GPS tracker is installed to provide the location of the children.

"Design of Child Security System" [4]. The main focus of this paper is to develop a tracking system to provide a security to school going children. The system is designed using 8051 microcontrollers, GPS, GSM, along with a panic button and RFID tag and reader. An android application is developed for providing the information to the parents.

"Security system for children on school route" [5]. The model is developed with new security system for children going school. The system is designed with mobile ad hoc network on smart mobile using Bluetooth.

3. GAPS IDENTIFIED IN EXISTING SYSTEM

We can see many devices have been designed for tracking children and providing security. But it is seen that the existing system have come up with drawback which creates problem for children.

- "SMS based children tracking system using GPS", it is difficult for child to send its location by itself.

- “Mobile Tracking system for children”, smart phone is required on both the sides and application software must be installed to get the location.
- “Tracking System using internet” it is necessary to have WIFI module integrated in a device to get the location of children.

To overcome all the difficulties, we have designed a system with GPS module which will help parents in getting current location of children through mobile application installed in smart phone. In these the sensors will get activated and send data to the system for predicting the current situation of children.

4. SMART WRIST BAND SYSTEM

This system is aimed at designing a method for improving the security of children. The wrist band consists of GPS module for tracking the location, sensors integrated with the Arduino UNO for getting information and regression technique is implemented using the sensor data for predicting the condition of children.

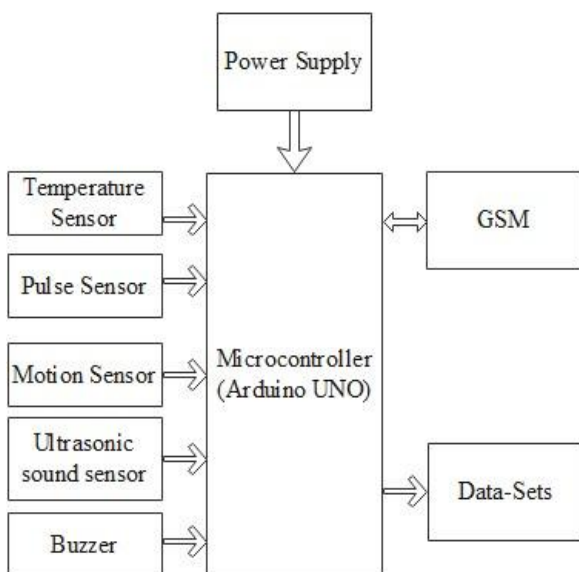


Fig -1: Architecture of Smart Wristband

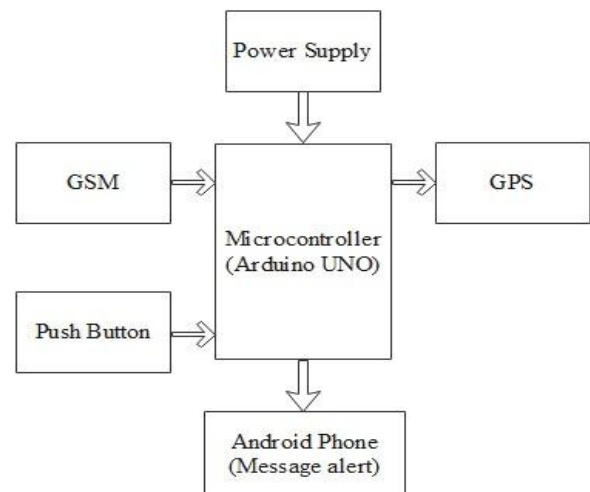


Fig -2: Architecture of Tracker Module

Temperature sensor:

A temperature sensor is used to detect the temperature of an object or its environment and further converts the reading into an electrical signal. Different temperature sensors are available for monitoring which include thermocouples, resistance temperature detectors, thermistors.

Motion Sensor:

A passive infrared motion sensor is an electronic sensor which is used for measuring the infrared light. It is used for detecting the motion around the objects in its field of view. It is commonly used in security systems.

Ultra-Sonic Sensor:

It is an instrument that is used for measuring the distance to an object. A sensor is mainly classified into three categories i.e., transmitters, receivers and transceivers. It uses a transducer to send and receive ultrasonic pulses that relay back information about object’s proximity.

Pulse Sensor:

Pulse sensor is used to incorporate live heart rate of a person. It is a plug-and- play heart rate sensor for Arduino. It is noninvasive in measuring the cardiovascular pulse wave by detecting the blood volume changing in blood vessels. It adds up amplification and noise cancellation circuitry to the hardware.

GPS Module:

Global positioning system (GPS) is able to locate the current location and the latitude and longitude of a receiver and also calculate the time distance of the user.

As seen in figure, the sensors are connected to the microcontroller (Arduino UNO) which continuously produces the datasets and the device is connected to the smart phone using WIFI module which monitors the activity of the system and perform the operation.

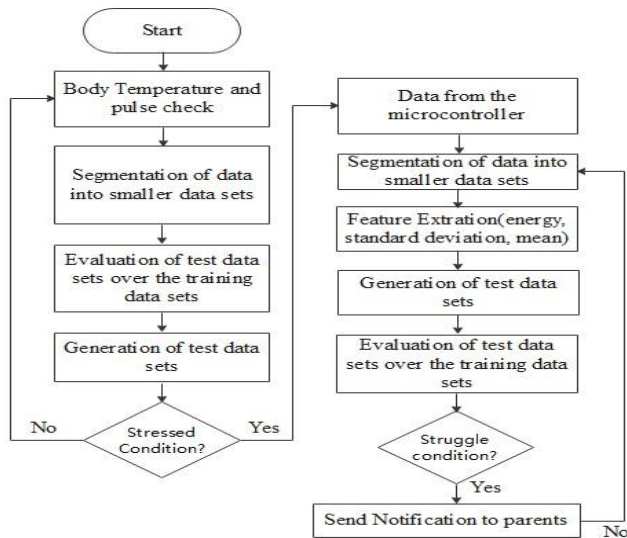


Fig -3: Methodology of Smart Wristband

In critical condition the application performs various function and alerts the networking device to perform various operations:

- Sends notification and alert the family member by sending message and nearby police station.

The system is designed with GPS monitoring location tracker which sends the exact location of the victim. System is all in one device. We don't have to carry multiple devices. When the power condition is less, it autogenerate the signal and sends the location to the pre-stored contacts. We don't need internet connection for tracking. GPS track the exact location of the person wearing it.

5. SMART WRIST BAND DESIGN WITH REGRESSION TECHNIQUE

The system is designed to identify the behavior of children in stressed and unusual condition. The analysis is carried out with data obtained from the sensor and further prediction is done using logistic regression technique. The device works on the pre-programmed situation and makes the decision which is handled by the smart mobile application.

- Get the data using the GPS module.
- Get the Data from the different sensors and perform prediction.

- Send the message to the contact which are available in the device.

Machine learning approach for prediction and classification: The system is designed with the sensors integrated on the microcontroller device which continuously observes the data from the sensor. The sensor data received is uploaded to Thingspeak using Arduino UNO IDE. The data is stored in cloud and further analyzed by the MATLAB to perform operation. The device analyses the pulse and body temperature of children with sensors and perform prediction using machine learning technique. Large amount of data is collected from the sensors which is further classified as dataset. The dataset is divided into "training" and "test" dataset which perform the prediction and as a result it generates the graph. During analysis all the sensors generate the data and are continuously being monitored for the analysis. Prediction is done on the training data considering the test data.

6. RESULTS AND DISCUSSION

The figure 6.1 shows the system designed using the sensors which are integrated with the Arduino UNO.

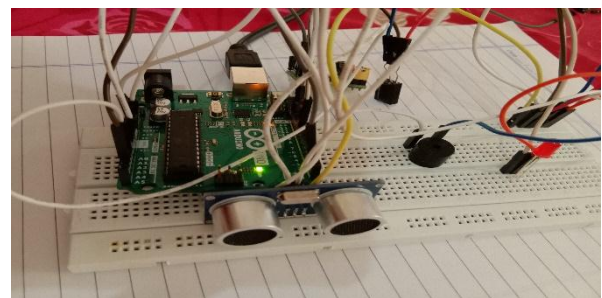


Fig -4: Smart Wristband System

The data collected from the sensors are further stored in cloud platform namely Thingspeak which is analyzed using MATLAB and results in generating graph using different parameter values.

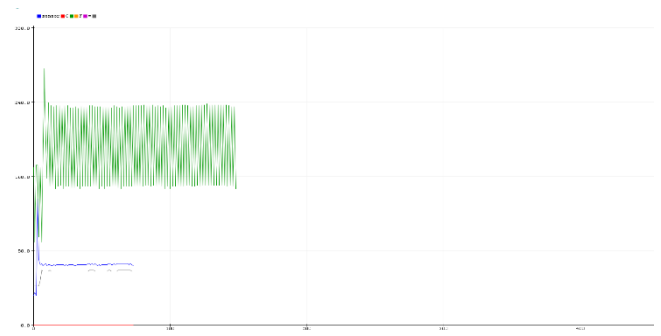


Chart -1: Graph generated from the device data

The device further performs the logistic regression technique to analyze the datasets which are classified into

training and test data. Further the datasets are used for performing the prediction.

Table -1: Training Data

S.no	Temp	Ultrasonic	Motion	Pulse
1	65.0	0	11.0	49.0
2	56.0	23.0	15.0	85.0
3	52.0	45.0	16.0	55.0
4	45.0	54.0	25.0	66.0
5	65.0	29.0	14.0	76.0
6	59.0	26.0	12.0	78.0

Table -2: Test Data

S.no	Temp	Ultrasonic	Motion	Pulse
1	56.0	26.0	14.0	74.0
2	54.0	28.0	12.0	79.0
3	54.0	21.0	13.0	78.0
4	52.0	25.0	15.0	69.0
5	43.0	36.0	15.0	48.0
6	35.0	29.0	29.0	75.0

After applying the prediction logic, a graph is generated as a result showing the stressed or relaxed condition of children and the impact of parameters on each other.

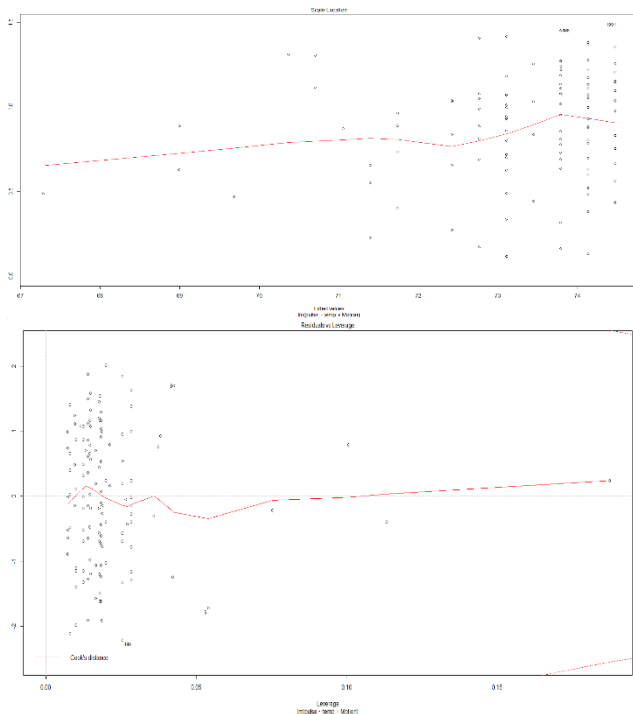


Chart -2: Graphs generated from the Regression Technique

7. CONCLUSION

Nowadays it is difficult for children to walk on the street in broad daylight, it is not safe for them to move out freely. With the increase of children harassments, kidnappings, children are afraid of moving out alone. To ensure the safety of children and provide a security in a fastest way possible a system has been which will help children in all the critical situation and increase their confidence. Many research works have been carried out in this area considering different technologies to help children. Using the inspiration from these technologies a system is designed with new features by making it more secure and reliable for children.

REFERENCES

- [1] J. Saranya, J. Selvakumar, "Implementation of Children Tracking System on Android Mobile Terminals" International conference on Communication and Signal Processing, April 3-5, 2013.
- [2] Aditi Gupta, Vibhor Harit, "Child Safety & Tracking Management System By using GPS, Geo-Fencing & Android Application: An Analysis", 2016 Second International Conference on Computational Intelligence & Communication Technology.
- [3] Anwaar Al-Lawati, Shaikha AlJahdhami, Asma Al-Belushi, Dalal AlAdawi, MedhatAwadalla and Dawood Al-Abri, "RFID-based System for School Children Transportation Safety Enhancement", 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February, 2015.
- [4] B.Chougula, "Smart girls security system," International Journal of Application or Innovation in Engineering & Management, Volume 3, Issue 4, April 2014.
- [5] Vinoth Rengaraj, Vinoth Rengaraj, "A study and implementation of Smart ID card with M-Learning and Child Security".
- [6] Atsushi Ito, Tomoyuki Ohtat, Shinji Inoue, "Security system for children on school route".
- [7] Cassandra Dsouza, Dhanashree Rane, Anjanette Raj, Supriya Murkar, Namita Agarwal, "Design of Child Security System", 3rd International Conference for Convergence in Technology (I2CT), Apr 06-08, 2018.
- [8] M.Navya, S. Mohammed Rafi, K. Niranjan Reddy, "Android Based Children Tracking System Using Voice Recognition", International Journal of Computer Science and Mobile Computing, Vol.4 Issue.1, January-2015, pg. 229-235.
- [9] Abid khan, Ravi Mishra, "GPS-GSM Based tracking system", International Journal of Engineering Trends and Technology, vol: 3 Issue: 2-2012.
- [10] J. Saranya and J. Selvakumar, "Implementation of children tracking system on android mobile terminals," In Proceedings of the 2013 International

Conference on Communications and Signal Processing (ICCSP), pp. 961-965, 2013.

BIOGRAPHIES



Avantika Bhate completed BE in Computer science and engineering from Dr. C. V. Raman University Bilaspur. Completed M. Tech in Computer science and engineering from Vellore Institute of Technology, Vellore.