

Tracking and Health Monitoring of Pilgrims

**Ms. Jidigam Swetha****Pursuing M.Tech,****Dept of ECE,****CMRCET, Hyderabad, TS, India.****Mr. P. Raveendra Babu****Associate Professor,****Dept of ECE,****CMRCET, Hyderabad, TS, India.****Mr. G. Karthik Reddy****Assistant Professor,****Dept of ECE,****CMRCET, Hyderabad, TS, India.**

Abstract:

This letter reports about a system that designed and implemented to track and health monitoring of pilgrims. The developed system is used to track pilgrim location using GPS, health monitoring parameters like heart beat, temperature using heartbeat sensor and temperature sensor respectively. This system provide fall detection of a pilgrim with the help of MEMS sensor and also supports pilgrims in emergency condition by using emergency button available with the pilgrim.

Keywords:

ARM-7 Micro controller, Buzzer, Heart beat sensor, MEMS , Temperature sensor, Zigbee, GPS

1. Introduction:

Every year about thousands of pilgrims go to different religious places and participate in pilgrimage to offer prayers. As the count of pilgrims taking part in pilgrimage is random and high, it is very difficult for managing authorities to track the movement and location of pilgrims as they reach to any one destination point. In order to avoid the mishaps/accidents due to medical emergencies and to discover the exact location of person in need of any help to managing authorities. This system is used for tracking the location of pilgrims and also health monitoring of pilgrims. The modules in the project are: heartbeat sensor which continuously gives the heartbeat, MEMS sensor which gives the sudden fall of the pilgrim, temperature sensor which measures the body temperature, help button input in case of emergencies,

GPS based location information, and Zigbee for data transmission along with latitude and longitude values.

2. LITERATURE SURVEY:

Technologies and Resources:

[1]. Abul-Hussain, Balakrishnan K. et.al. developed the system that can be used to track specific pilgrims. In emergency any pilgrim can request for help using same system. Pilgrim who needs help will be identified on the map so that it becomes easy to reach at pilgrim in most efficient way. The developed system works in coordination with an RFID identification system that was proposed earlier. The developed system was tested successfully during the recent pilgrim season. [2]. Priyanka Anant Khilare et.al. [5] proposed hybrid architecture. This architecture is based on sensor networks using BSN. Each pilgrim carries a small size mobile unit. Mobile unit consists of GPS which is used for location tracking, body sensor and Zigbee radio. .

Zigbee radio is used to carry out communication with fixed units. Fixed unit consists of hardware and software which is used for doing communication with mobile units. As per the query mobile unit sends location and UID information to fixed unit. Further, these fixed units communicate with each other to route the collected data to the tracking and monitoring station via gateway nodes. Gateway node is located in high data rate network such as 3.5G. The server can receive large volume of data via this high data rate network.

3. IMPLEMENTATION:

TRANSMITTER:

The block diagram of transmitter is designed with ARM7, Heartbeat sensor, MEMS sensor, Temperature sensor, Zigbee, GPS receiver & Emergency button.

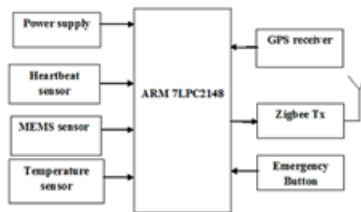


Fig – 1: Block diagram of the transmitter section

RECEIVER:

The block diagram of receiver is designed with PIC16F72, Zigbee, PC & Buzzer.

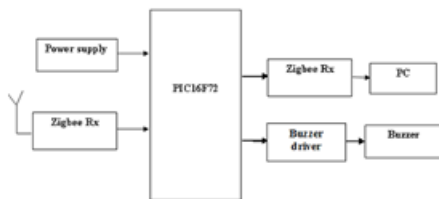
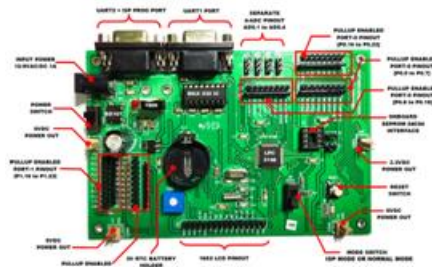


Fig - 2: Block diagram of the receiver section

In this proposed system GPS is used for tracking the pilgrim location, heartbeat sensor is used to for measuring the heartbeat of pilgrim continuously, MEMS sensor is used for detecting the sudden fall of pilgrim, temperature sensor is used for measuring the body temperature of pilgrim continuously. In case of any emergency condition pilgrim can request emergency help using emergency button. Zigbee is used for sending data along with latitude and longitude values to PC.

ARM-7 Micro controller:

ARM architecture is based on Enhanced RISC architecture (deviates from classic RISC architecture).



Embedded applications need to have high code density, Low power consumption rate and Small silicon foot print . it has a large uniform register file (bank). Load-Store architecture, where data processing operations involve only registers but not memory locations ,Uniform and Fixed length instructions. Good speed/power consumption ratio and High code density.

Heart beat sensor:

The heart beat sensor is designed to give digital output of heat beat when a finger is placed inside it. When the heart detector is working, the top-most LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

MEMS sensor:

The ADXL345 is a small, thin, ultralow power, 3-axis accelerometer with high resolution (13-bit) measurement at up to ± 16 g. Digital output data is formatted as 16-bit twos complement and is accessible through either a SPI (3- or 4-wire) or I²C digital interface. Several special sensing functions are provided. Activity and inactivity sensing detect the presence or lack of motion by comparing the acceleration on any axis with user-set thresholds.

Temperature Sensor (LM 35):

The LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. Rated to operate over a -55°C to 150°C temperature range

Zigbee:

Zigbee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs). The technology defined by the Zigbee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth.

GPS:

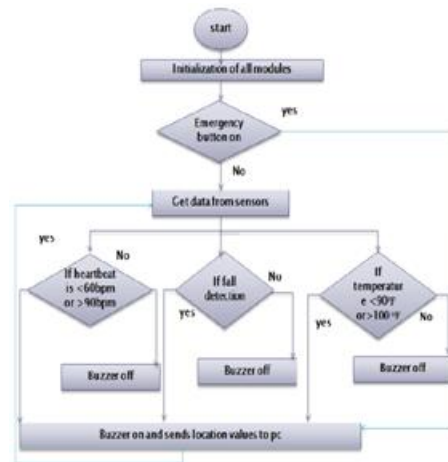
The GPS provides continuous three-dimensional positioning 24 hrs a day throughout the world. The technology seems to be beneficiary to the GPS user community in terms of obtaining accurate data.

Buzzer:

Basically, the sound source of a piezoelectric sound component is a piezoelectric diaphragm. A piezoelectric diaphragm consists of a piezoelectric ceramic plate which has electrodes on both sides and a metal plate (brass or stainless steel, etc.). A piezoelectric ceramic plate is attached to a metal plate with adhesives. Applying D.C. voltage between electrodes of a piezoelectric diaphragm causes mechanical distortion due to the piezoelectric effect.

4. Flowchart:

This system is used to track and monitor health condition of pilgrim using heartbeat sensor, MEMS sensor, temperature sensor .GPS based location information and Zigbee for data transmission along with latitude and longitude values. The flow chart describes the working of the project.



5.RESULT:

This system successfully monitor the pilgrims tracking and health monitoring using sensors. Pilgrims location and health condition is send to PC using Zigbee communication.

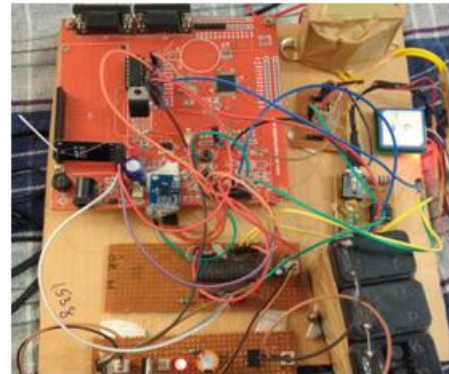


Fig 1 Transmitter

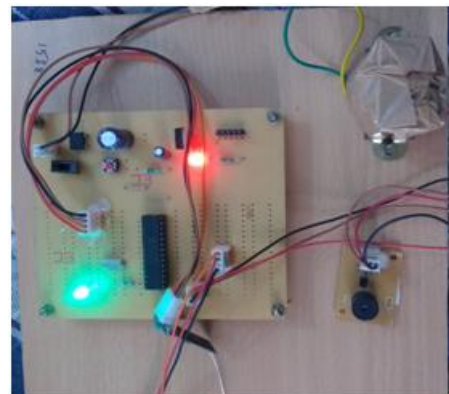


Fig 2 Receiver

CASE 1)Heartbeat monitoring:

1a) Low heart rate:

If heartbeat of pilgrim reaches 60bpm or less ,low heart rate alert is received in PC &buzzer is ON.

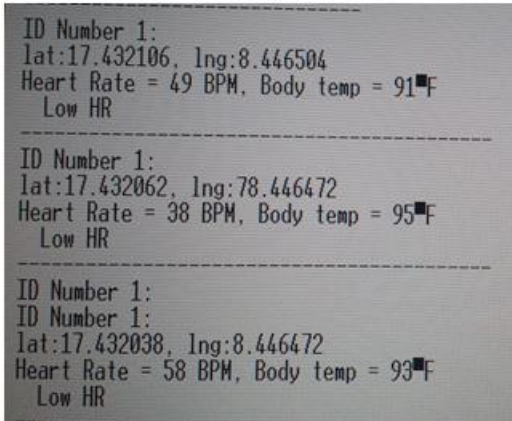


Fig 3 Low heart rate

1b) High heart rate:

If heartbeat of pilgrim reaches 90bpm or more, high heart rate alert is received in PC& buzzer is ON.

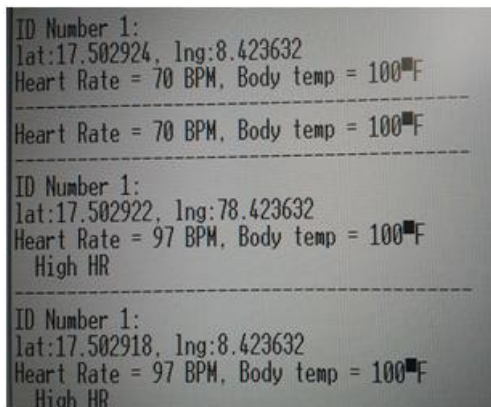


Fig 4 High heart rate

CASE 2) Fall detection:

If pilgrim fall down this tilt is detected by MEMS, fall detection alert is received in PC & buzzer ON.



Fig 5 Fall detection

CASE 3)Temperature monitoring:

If temperature of pilgrim reaches 100°F or more, high temperature alert is received in PC &buzzer is ON.



Fig 6 High temperature

In case of any emergency pilgrim press emergency button, emergency alert is received in PC& buzzer is ON.

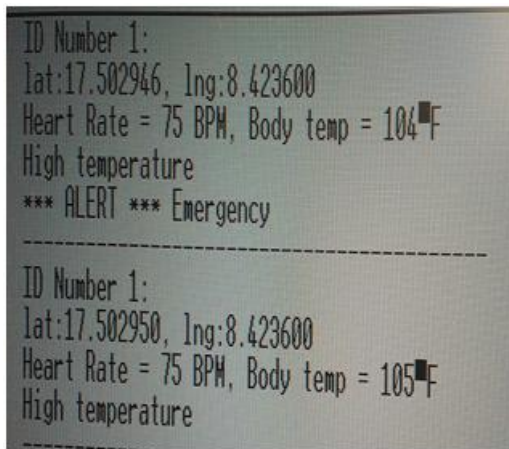


Fig 7 Emergency alert

6. CONCLUSION:

This whole paper mainly focuses on tracking and health monitoring of pilgrim using heartbeat sensor, MEMS sensor, temperature sensor & GPS based location values, monitoring the pilgrims data in PC. Using this system we can avoid mishaps/accidents due to medical emergencies.

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Author's Profile:

Jidigam Swetha Completed B.Tech in ECE from TRML. She is currently pursuing M.Tech in Embedded systems, CMR College Of Engg. & Tech, Hyderabad (T.S).

P.Raveendra Babu received his post graduation degree in the stream of Electronics and communication Engineering from JNTUA and currently working as an Associate Professor in the department of Electronics and Communication Engineering in CMR College Of Engg. & Tech, TS, India with an experience of 14 years in teaching. His Research interests include Micro Electronics & VLSI, Antennas

G. Karthik Reddy Currently working as an Assistant Professor in the department of Electronics and Communication Engineering in CMR College Of Engg. & Tech, TS, India with an experience of 9 years in teaching.