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A Review on Real Time Pilgrim Tracking and Health Monitoring System using GSM, GPS and Biomedical Sensors

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ABSTRACT: Every year thousands of pilgrims gather for pilgrimage in holy area. Finding the location and movement of such large number of pilgrims is important for the authorities who are managing the whole event.Authorities are facing so many problems like crowd control , security issues, identification of pilgrims. There are so many technologies used during Hajj in Saudi Arabia to reduce these problems.The goal of this paper is to review the past work of pilgrim tracking, identification and health monitoring systems, to categorize various methodologies and identify new trends.

KEYWORDS: Pilgrim tracking, GSM, GPS, Heart beat sensor, temperature sensor.

I.INTRODUCTION

The wide coverage of cellular and satellite networkleads to various useful applications that add convenience to our daily life .We can use satellite network for tracking pilgrims. GPS (Global Positioning System) is used to track pilgrims and GSM (Global System for Mobile communication) is used for sending message. Every year number of pilgrims taking part in pilgrimage is increasing, these pilgrims move simultaneously from one place to another. Relatives and authorities face problem in finding a lost or dead pilgrim. For such situations there is a need of a system to track pilgrim. Initially tracking was carried out with the help of active and passive RFID systems. Further tracking was carried out with the help of image processing system

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II.LITERATURE SURVEY

Previously some engineers have proposed solutions for problems faced by pilgrims and authorities during the holy events. Mohamed Mohandas [1]has developed a mobile device that helps the authorities to identify pilgrim using RFID
He has given a solution which is based on RFID technology. It helps the managing authority not only for identification of pilgrims but also for crowd control. He developed a prototype pilgrim identification system that provides a wristband RFID tag, RFID tag and GUI. Pilgrim wears the wristband RFID tag that stores pilgrim data. This data is useful for identification and also for medical emergency purpose.

Most managing authorities provide training to pilgrims before starting pilgrimage. However they encounter problems which occurred during the pilgrimage.This helps pilgrims to take immediate decisions while performing rituals. In such situations pilgrims may take help of guide books or follow other pilgrims. But all the time, experts may not be around to help. So Shahida Sulaimanand Hasimah[2] Mohamed have proposed knowledge based approach that can cover possible problems and solutions from experts and this system is called Hajj-QAES. This system helps the pilgrims in learning process and what to do next without asking to anyone.

Willy Wahyn Mulyana [3] proposed a simulation of crowd's behaviour based on the development of intelligent agent. Intelligent agent is applied to each pilgrim to build the crowd behaviour. The results showed that Hajj crowd simulation

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is able to demonstrate more realistic pilgrim's behaviour .Such system can be used to train the pilgrim before they perform actual activities.

Abul-Hussain, Balakrishnan K. et.al. [4] 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.

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.

Aladdein Amro, Qasem Abdel-Muti Nijem [6] proposed a distributed communication and information system that assist the guide of pilgrims group in their duties. They added new capabilities and solutions for finding lost pilgrims, predict and avoid possible lost pilgrims. System provides an interactive screen with live maps about pilgrim's locations and their movement among for each guide. System also provides several alerts in case of emergency. Proposed system is designed in such a way, it can deal with GPS receiver and mobile phones with embedded GPS receiver. This provides more flexibility to system .The guide can monitor the pilgrims through a web based application using devices like smart phone or computer. The location information of pilgrim is sent instantly to the web server via GSM.

The problems encounter during pilgrim tracking is out of range problem, heavy traffic density, network hanging and interference. To overcome this problem KarthikeyanManikavasagam and Vinod Kumar Kochera [7] proposed system for tracking pilgrims using wireless sensor network also added some additional hardware for efficient tracking. For the out of rangeand heavy traffic density problems added a simpleTmote sky module with GPS instead of existing only GPS module. To overcome Network hanging and interference usedGSM module (or) CDMA module.

S. K. Shah, Sharley Kulkarni[8] proposed a systemwhich uses camera. Camera monitors pilgrims continuously to find high density with the help of image processing.As pre-stamped starts, camera detects the picture and compares the density .If very high density found then message is send to police.This system divided into mainly two parts Stamped detection and pilgrim monitoring. Stamped detection unit continuously monitor the stamped scenario using image processing .For image processing MATLAB software is used .MATLAB software takes snapshot at every 10 sec and compare the image. If pilgrim gathered in a particular area are more than predefined threshold the stamped warning message is sent to microcontroller as well as to pilgrim unit via GSM.

Malak Osman,Adnan Shaout [9] proposed a fuzzy based solution for a personal location system. Fuzzy logic used to design an efficient personal location system. They proposed to divide the location area into small grids. Proposed system may provide some of the information

- Is the pilgrim in a specific location?
- Is the person carrying abadgethat does not belong to him/her?
- Is the person moving?
- Is the person alone?
- Is the person in the wright location at the wrighttime?
- How much fare should be taken for a certain service (ritual site, medical location, food location, etc.)?
- Has the person exceeded his/her stay in a certain hajj ritual area?
- Has the person of interest violated his/her visa stay?

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Practically it is very difficult to know exact position of any pilgrim .It may take several days. The best way to locate a person is by using a tracking system. This project and its main ideas are taken from "Wireless Sensor Network for Pilgrim Tracking" by Mohamed Mohandas, Mohamed Haleem, and Mohamed Deriche [10].

III.SYSTEM OVERVIEW

For the pilgrim tracking using the existing models does not overcome the issues faced by pilgrims. Problems occurred in this model are range problem, health monitoring system. Theexisting systems tracks the pilgrim using various technologies like GPS, RF,Zigbee, Bluetooth and GPRS, but it cannot monitor health status of pilgrim. The proposed system consists of sensorsinterfaced with the embedded system to monitor thehealth status of the pilgrim. Sensors are usedto measure heart rate, and body temperature of the pilgrim. Each pilgrim is provided with small size mobile unit which includes hardware as well as software. Hardware consists of GSM, GPS, sensors, LCD, microcontroller, and keypad. Software consists of KeilC, EAGLE, and DIPTRACE, Terminal.Software is used to send information with mobile units carried by pilgrim to give response to server. Response includes locationinformation (Latitude and longitude), UID, health status ofpilgrim like heartbeat, temperature. The proposed system consists of two units. First unit is Pilgrim unit connected with sensors, GPS receiver and second unit is Server unit.

A. PilgrimUnit

This system consists of ARM processor, GSM, GPS and sensor. LPC2138 microcontroller is used. It is 32 bit processor, 512 Kb on chip flash programming memory. It has eight channels General Purpose DMA controller (GPDMA), two fast I2C-bus and SSP with buffering and variable data length capabilities. Two 8 channels ADC and single 10 bit DAC converter peripherals, Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.

In market many tracking technologies are available. These technologies are classified into local and global. For local tracking RFID, Bluetooth, and Wi-Fi technologies are used. For global tracking satellites are used.GPS is used in tracking pilgrims because GPS can work in any environmental condition and anywhere in the world for 24 hours a day without any charges.

GSM modem is similar to mobile phone. GSM is wireless modem which needs a SIM(Subscriber Identity Module)card that works on 900/1800 MHz frequencies.

In market various biomedical sensors are available .These sensors are used to monitor human health parameters. Heart beat sensor and body temperature sensors will be used for our design. Output of heart beat sensor is in digital form, for each hear beat LED will blink .Temperature sensor (LM 35) is used to measure the body temperature of pilgrim.

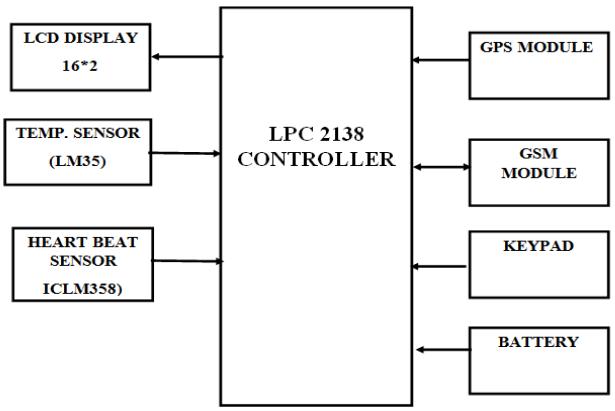

Fig. 1Block Diagram of Pilgrim unit

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B. Server Unit

Server unit consists of computer, GSMunit, LCD .For updating the location and health status of pilgrim's server is connected to the computer .In computer, Terminal software will be installed, this software is used to store received data from mobile unit .To get pilgrim information, we will enter name of that pilgrim in Terminal software.All information related to pilgrim will be stored in the data base which includes UID, Name of pilgrim, age, gender, address, emergency contact number.

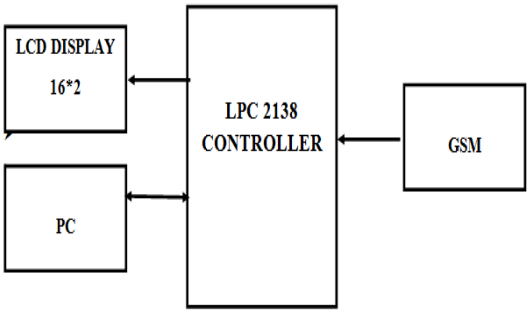
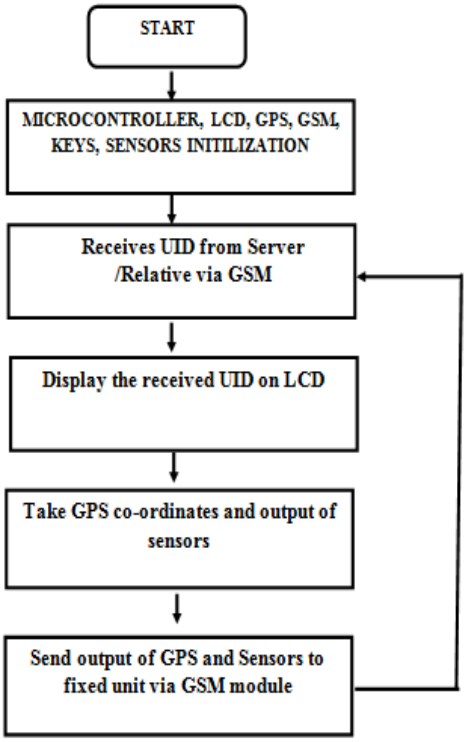


Fig. 2 Block Diagram of Server unit

Algorithm of Mobile Unit



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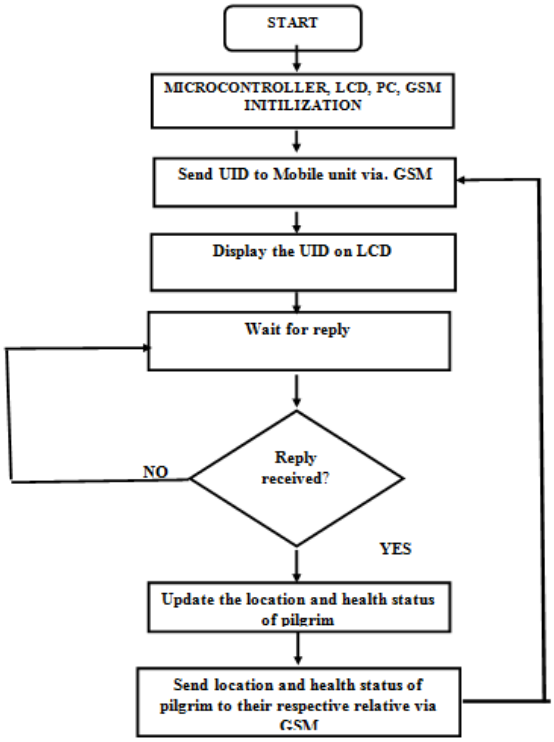

III.CONCLUSION

The paper gives a literature review on exiting tracking and identification system for pilgrim. The paper provides current technologies used to solve problems faced by pilgrims and managing authorities.
The paper also gives solutions to Pilgrim identification problems, tracking and health monitoring. It explores the solution using available technology to enhance the accuracy and tracking time.

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