PILGRIM TRACKING AND MONITORING USING EMBEDDED SYSTEM: A REVIEW

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Abstract — There are so many holy places in religious country like India and there is continuous rise in the number of pilgrims visiting holy places every year. Because of this it is becoming very difficult for the pilgrimage authority to control the crowd and also their safety is a big issue. So in this paper we have developed new system that will resolve problems faced by pilgrims upto a greater extent. In this every pilgrim carries a small embedded device which includes ARM7, GPS unit and various Biomedical Sensors. Real time monitoring is done by control unit which is a Web server installed near to the holy area. Control action is taken by Web server based on Real time information of particular unique ID.

Index Terms — Biomedical Sensors, GPS, Pilgrim, Tracking.

I. INTRODUCTION

The wide coverage of cellular and satellite network leads to various useful applications that increase the convenience of our daily life. One of such applications is people tracking or positioning system. The real time location of a person can be tracked by using the GPS (Global Positioning System) and GSM (Global System for Mobile communication) technology.

In every year pilgrims are increasing, the pilgrims move simultaneously from one place to another in large groups. Overcrowding at specific site often result is stampede or foot injuries. Finding a lost or panic pilgrim is big problem to their relatives and authorized people. Many problems were faced by the respective authorities of the holy areas. Some difficulties which may be mentioned are:

- Identification of pilgrims (lost, dead, or injured)
- Medical Emergencies
- Difficulty in location like hotel, prayer area, washroom etc.
- Reduce the travel time to holy place by better bus scheduling and trip planning.

II. RELATED WORK

There are many systems under development used for tracking and monitoring which are using different means, protocols and facilities according to the need and convenience of the system.


In reference [4] objective is to solve the problem of pilgrim transportation, shuttle bus control, and route planning, and parking organization. The main aim of the system is to resolve the problems related to the transportation and tracking of the pilgrims from the starting point to destination. This can be possible by fixing a RFID tag on the bus to track its location the passengers boarding or leaving the bus can be identified by the individual RFID cards provided to them.

The architecture proposes in paper [3] allows for continuous tracking and trip planning of shuttle-bus during its journey using a assisted GPS and client-server network architecture for safe pilgrimage in the holy area.

One of other application of RFID is for bus Driver and travel agency to find out the authorized passenger by providing them tags.

In references [1], [2] wireless sensor Network for pilgrim tracking, existing model of pilgrims tracking is done by wireless sensor network. A network of fixed units is installed in the holy area for receiving and forwarding data. Periodically, each mobile unit sends its user identification (UID), latitude, longitude with respect to time. The function of mapping of latitude and also tracking of longitude (GPS coordinate) is done by web server on the basis of GIS (Geographical Information System). The developed system can be used to monitor a specific or a group of pilgrims.

III. PROBLEM DEFINITION

RFID technology was not suitable because the read range of RFID tags was low. It was also affected by environmental factors. For large areas, the tracked person can move anywhere. For that purpose it requires installing huge amount of RFID tag readers. These drawbacks make the usage of RFID as not well & good as well as cost inefficient for tracking the movement of humans over large area.
IV. PROPOSED SYSTEM

For the pilgrims tracking using the existing model is not up to the mark. The problems encountered in this model are out of range problem, heavy traffic density, network hanging and interference. The existing system model tracks the pilgrim using GPS and GPRS system, but it cannot monitor the health status of the pilgrim.

The proposed system has biomedical sensors interfaced with the embedded system to monitor the health of the user. These biomedical sensors are used to measure heart rate, oxygen saturation and body temperature of the pilgrim.

We are allowing each pilgrim to carry a small matchbox sized unit that includes a GSM module to communicate with the GPS receiver and sensors. These embedded systems have hardware as well as software to send information with the mobile units carried by user to make queries and to receive real time location and other information like UID. Further, this embedded system can be capable of communicating to each other so as to route the gathered data to the tracking and monitoring station via a gateway node.

![Fig 1. Block diagram of system](image)

The proposed system has two parts, first part is embedded system connected with sensors and GPS receiver and second part is the database server. The GPS-enabled mobile phone is attached with the user and it will then sends the data with the Subscriber Identity Module (SIM) card number as its identity, together with other data such as the coordinates latitude, longitude and sensors data to the server and saved into the database.

A. Embedded Device

This embedded system consists of ARM processor with GPS and biomedical sensor. The 32 bit processor having ARM7 chip with real-time emulation Up to 512 Kb on-chip flash programming memory. Eight channel 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.

It has single 10 bit DAC, multiple serial interfaces including two UART, two 8 channel ADC, two 32 bit timer/counter, multiple serial interfaces including two UART, two fast I2C, Capture, compare and PWM module.

The tracking devices can be classified into two groups which are local and global. For local tracking system, it operates based on the local technology such as RFID, Bluetooth and Wi-Fi. While for global positioning system, satellites have to be used in order to obtain the required information.

The GPS is suitable to be used in the people tracking embedded system because the GPS can work in any environment condition, anywhere in the world and 24 hours a day with no subscription fees or setup charges.

GSM modem is similar to mobile phone. It is a specialized wireless modem which needs a SIM card and works with a GSM wireless network. GSM modem utilizes the radio wave for sending and receiving the messages. The Systems uses general packet radio service (GPRS) for sending the data. GSM/GPRS TTL UART Modem which is built with Dual Band GSM/GPRS engine- SIM900, works on frequencies 900/ 1800 MHz. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface.

In the recent years various biomedical sensors are used to monitor and analyse human health parameters. Biomedical sensors are used to recognize and monitor pilgrim health status. Examples of these biomedical sensors are heart beat sensor and body temperature sensor. Heart beat sensor is designed to give digital output of heart beat. When the heart beat detector is working, the beat LED flashes in corresponding with each heartbeat. This digital output can be proportionally converted to Beats per Minute with the help of hardware. It works on the principle of light modulation by blood flow through finger at each pulse. Temperature sensor is used to measure the body temperature of pilgrim. For demo purpose we are using LM 35 Temp Sensor.

B. Web Server

The web server is a computer program that dispenses web pages as they are requested. For rechecking as well as updating the location and health status of pilgrims it is connected to data based server. Hardware sends real time location with real time biomedical condition to the web server. The web application build for tracking and monitoring pilgrim and all information that belongs to the pilgrim will be added and stored in the data base using his Identification Device (ID) value which is the same ID of his tracking device hardware. Web server contains a web page which shows a real time location of...
particular pilgrim with particular ID on Google map. The Google map shows added pilgrims location as a point. By clicking on this point the details about the location and the pilgrim appears. This can be monitored by only the authorized person.

If in some case any pilgrim health status goes above or below its threshold level, for example if the heart beat of any pilgrim increases or decreases then, at that time the system identifies it and contacts the nearer doctor or hospital.

Web server is developed by using PHP and HTML languages. PHP is scripting language in server side. PHP is simply mixed with HTML code or it can use various templates and web framework. Web browser reads HTML files and translates them into visible or audible web page. Database is managed or controlled by using MySQL. The web server updates pilgrim information in web application.

CONCLUSION

Tracking and monitoring in crowded areas such as Kumbha Mela, Tirupati and Hajj is difficult task. This paper gives a perfect solution for this.

This paper gives a overview of tracking and monitoring of pilgrim. System consists of embedded device with GPS and biomedical sensor used to send pilgrim information continuously to web server. This system provides one alert button in embedded device. Whenever pilgrim needs help he/she can press this button. At that time web server controller or authorized person will get this signal and will give the needed help to pilgrim.

REFERENCES