

TRACKING THE PILGRIMS USING WIRELESS MOBILE NETWORK

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ABSTRACT

Every season about 30 lakh people gather at Makkah and In Maha Kumbh Mela 90 lakh people come for pilgrimage. Tracking the pilgrims in such a large number becomes difficult for the authorities and ourselves. For this scenario we are using our model – Wireless mobile networks. In this model we have wireless mobile network and fixed network. Each pilgrim is given a WMN for tracking them and fixed network is used for monitoring the pilgrims. Our model consists of the following components such as: Tmote Sky module for tracking when GPS not in range, GPS module for efficient tracking, PIC Nano microcontroller for processing the signals, ISM band radio for communication to nearest help centers, Lithium ion batteries for WMN to work, UHF high gain antennas, RF transceiver and Personal computer.

Keywords: WMN, GPS, TMote sky, RF Transceiver.

1. OBJECTIVES

The main objective of this paper is to track the pilgrims in such a large crowd. Especially to get the efficient networking around in such heavy traffic.

1.1. Presentation

With the coming of low-force installed frameworks and remote systems administration, new potential outcomes developed for disseminated sensing provisions. These advances accelerated the usage of remote sensor systems, permitting effectively designed, adjustable sensors to be set essentially anyplace, and their perceptions comparatively transported over substantial separations by means of remote systems.

1.2. What are Wireless Sensor Networks?

Wireless sensor organizes comprise of conveyed, remotely empowered installed gadgets skilled of utilizing an assortment of electronic sensors. Each hub in a remote sensor system is outfitted with one or more sensors notwithstanding a microcontroller, remote transceiver, and vigour source. The microcontroller capacities with the electronic sensors and the transceiver to structure a proficient framework for handing-off little measures of vital information with negligible force utilization. The most magnetic characteristic of remote sensor system is their independence. When conveyed in the field, the chip immediately instates correspondence with each other hub in extent, making a specially appointed work arrange for transferring data to and from the entryway hub. This invalidates the need for expensive and ungraceful wiring between hubs, rather depending on the adaptability of cross section systems administration calculations to transport data from hub to hub. This permits hubs to be sent in very nearly any area. Coupled with the practically boundless supply of accessible sensor modules, the adaptability offered by remote sensor systems offers much potential for provision particular results.

1.3. Why Sensor Networks?

Wireless sensor systems have numerous preferences over universal sensing innovation, because of their inserted development and disseminated nature. The in the first place, and for numerous the most remarkable, characteristic is their expense. Using low-force and generally economical microcontrollers and transceivers, the sensor hubs utilized within remote sensor systems are regularly less than one hundred dollars in expense. This opens the entryways for numerous business or military requisitions, as the generally little cost of hubs takes into account not just vast amounts of sensors to be conveyed, additionally for huge amounts of sensors to be lost. For illustration, sensor hubs could be dropped from a plane, permitting far reaching scope of a zone with insignificant exertion included in positioning the distinctive hubs. The moderately ease of the sensors permits for a few hubs to be harmed or lost without trading off the framework, unlike bigger, more incorporated sensors. Another playing point remote sensor arranges hold over customary remote sensing innovation lies in the cross section systems administration conspire they utilize. Due to the way of RF correspondence, transmitting information starting with one focus then onto the next utilizing a cross section arrange takes less vigor than transmitting straightforwardly between the two focuses. While implanted frameworks must regard their energy envelope, the generally vigor used in RF correspondence is lower in a cross section systems administration

situation than utilizing accepted focus to focus correspondence. Sensor systems can additionally offer preferable scope over additional unified sensing engineering. Using hub cost advantage and cross section systems administration, associations can send more sensors utilizing a remote sensor organize than they could utilize more accepted innovation. This abatements the generally speaking indicator to-commotion proportion of the framework, expanding the measure of usable information. For all these explanations and more, remote sensor systems offer numerous conceivable outcomes at one time inaccessible with customary sensor innovation.

1.4. Application example

Wireless sensor systems are seeing use all as far and wide as possible. Just off of the expense of Maine, The University of California Berkeley is utilizing a remote sensor system to screen the settling conduct of sea winged animals. Previously, this research might be performed by researchers physically watching the feathered creatures, frequently meddling with their settling by physically touching their homes. Now, minor sensor hubs are put close to the homes, permitting researchers to gather information without influencing the feathered creatures. Another Berkeley group advanced a remote sensor system that could be dropped from an Unmanned Aerial Vehicle (UAV), self-ruling record activity designs, and report the outcomes once more to the UAV. This framework saw testing in the Mohave Desert, demonstrating guaranteeing comes about for military and regular person requisitions. For this anticipate, we will be utilizing the Tmote Sky stage for remote sensor systems. Systems executed utilizing the Tmote Sky stage have been utilized for numerous differing requisitions running from atmosphere control for ranchers to extension structural dependability observing. Among the most fascinating of the samples is a Tmote-based firefighter checking framework. Utilizing sensors to screen smoke, light, and fire, and consolidating electronic maps, the sensor hubs screen the status of firefighters, showing pertinent data inside a firefighter's veil.

2. LITERATURE REVIEW

This paper and its main points are taken from IEEE embedded system letters volume 4 of December 2012. The paper is wireless sensor Network for pilgrim tracking done by Mohamed Mohandas, Mohamed Haleem, Mohamed Deriche, and Kaviarasu Balakrishnan. Here in the existing model pilgrims tracking is done by wireless sensor network, we want to modify it since, if it is not in range the pilgrim cannot be tracked. For the efficient tracking we are using additional hardware to efficient tracking.

3. DETAILED PROBLEM DEFINITION

For the pilgrims tracking using the existing model is not up to the mark. The problem encountered in this model are out of range problem, heavy traffic density, network hanging and interference. To overcome this problem we have come up with some changes.

4. SOLUTION METHODOLOGY

The solution methodology is very simple. For the efficient we have made minor changes in the model. For the out of range and heavy traffic density problems we are adding a simple Tmote sky module with GPS instead of existing only GPS module. To overcome Network hanging and interference we are using GSM module (or) CDMA module depending upon the country.

5. DETAILS, ANALYSIS AND MODELING

5.1. DETAILS

The component using in the circuit are

5.1.1. Tmote Sky Module Specification:

- 250kbps, 2.4 GHZ.
- IEEE 802.15.4 chipcon.
- Wireless transceiver.
- Interoperability with other IEEE devices.
- 8Mhz Texas Instrument MSP 430 micro controller.
- Integrated ADC, DAC and DMA controller.
- Ultra-low current consumptions.
- USB support.
- Tiny os support.

Product Description

Tmote Sky is an ultra-low force remote module for utilization in sensor systems, observing provisions, and fast requisition prototyping. Tmote Sky influences industry guidelines like USB and IEEE 802.15.4 to interoperate flawlessly with different gadgets. By utilizing industry models, mixing dampness, temperature, and light sensors, and giving adaptable interconnection peripherals, Tmote Sky empowers an extensive variety of cross section arrange provisions. Tmote Sky is a drop-in reinstatement for Moteiv's solid Telos outline. Tmote Sky incorporates expanded execution, usefulness, and development. With Tiny os uphold out-of-the-case, Tmote powers rising remote conventions and the open source programming development. Tmote Sky is part of a line of modules emphasizing ready for to build strength while diminishing cost and bundle measure.

5.1.2. ZIGBEE SPECIFICATIONS

Mesh networking. Low power usage. Zigbee chip has microcontroller with 60Kb to 256Kb flash memory. Zigbee operates in ISM Band. Zigbee is a IEEE 802.15.4 standard protocol suite of high level communication used to create personal are networks, built for small low power digital radio's. Zigbee transmits data over longer distances by passing through intermediate devices creating a mesh network. Zigbee has a define rate of 250 kbps. IT has many applications. It is extended to other WPAN's such as Bluetooth (or)

Wi-Fi.

Zigbee network are secured by 128 bit symmetric encryption keys. In automation applications , transmitter range from 10 to 100m.

5.1.3. GPS Module

GPS Module is used for Geo tagging (i.e.) for location tracking the exact latitude and longitude of the pilgrim.

5.1.4. ISM BAND RADIO

It is used for generation of SOS message to nearest help center in emergency conditions.

5.1.5. LITHIUM BATTERIES

Since it is a device which uses ultra-low power.

We can use Li Batteries for efficient battery usage.

5.1.6. UHF antenna for tracking the pilgrims.

5.1.7. RF Transceivers for transmitting and receiving signal.

5.1.8. PC for user interfacing the model.

5.1.9. PIC micro controller for interfacing and processing.

5.2 MODELING

Here in the modelling we are having mobile unit and fixed unit. The mobile unit which should be carried by pilgrims has the major importance. For the efficient tracking in it we have used many modules. Similarly, the fixed units are kept at regular intervals for tracking.

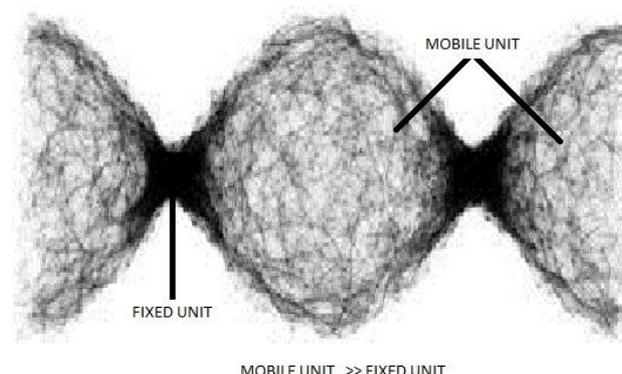
OUR MODEL

We query the mobile unit from fixed unit. If it responds, there is no need of future tracking; if it's not responds we give the signal for SOS message from the mobile unit. We track the mobile unit from the SOS, which uses the GSM module, when WSN not n range. (i.e.) we are using mobile network here for tracking.

EXACT OPERATION

EXISTING MODEL

We have two units: Mobile units and fixed units. Mobile unit is match box sized and easy to carry. It is the device with actual circuit. The other is fixed unit used to monitor the mobile unit with antennas and monitoring devices. To monitor we are giving the query to mobile unit. The signal is transmitted to it, if it received we get the response. If it doesn't it tracks till it get the response. For some time it sends and if response doesn't comes, it routes the most recent route.



6. OPERATION METHODOLOGY

PROCEDURE

- ✓ First we should select the pilgrims, whom we should track. Since already the pilgrims register with the ID, we send the query message from zebranet.
- ✓ The zebranet tracks the pilgrim within the fixed unit range and now monitors the pilgrim,
- ✓ Here in this process, the ID of pilgrim is processed in Zebranet from fixed unit in the mobile unit the process goes as follows
 - The query message is received by mobile unit.
 - Now according to the query message received by Tmote Module, it process the message and send its geo tag from GPS server to fixed unit.
 - Behind this, if the GPS signal not in range, the GSM module using Tmote processor sends the SOS message. This is the new features we have included in it.
 - The ISM band radio communicates with the nearest fixed unit for any important messages.
 - The whole process repeats with every mobile unit who is in need for tracking.

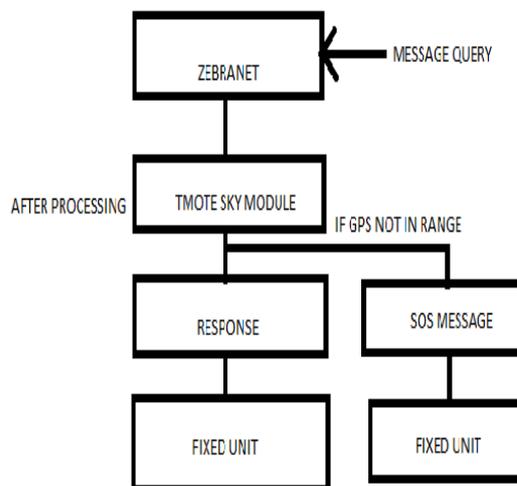


Fig. Operational diagram

7. RESULTS AND DISCUSSION

By using this model we can get greater efficiency of tracking the pilgrims and the additional features. We are having the SOS message.

8. CONCLUSION

Hence we are getting the efficient output we can implement in the real time. We will execute a remote sensor system utilizing the Tmote sky stage, incorporating all supporting base, for a checking requisition. In completing in this way, we will demonstrate that remote sensors systems are in reality a suitable rising innovation accessible to architects for an extensive variety of provisions. We will record our methodology from beginning to end, specifying the prerequisites for building a useful remote sensor system and all supporting building design. By making this sample we will uncover the profits and burdens of moving sensing requisitions onto an implanted stage and make proposals for what's to come for both business sensing requisitions and provision particular stages.

REFERENCE

- [1.] Wireless Sensor Networks for Pilgrims Tracking by Mohamed Mohandes, Mohamed Haleem, Mohamed Deriche, and Kaviarasu Balakrishnan from IEEE embedded system letters volume 4 of December 2012.
- [2.] Tmote sky data sheet.
- [3.] Wireless Sensor Network for Monitoring Applications –project report.
- [4.] Mobile location estimation and tracking for gsm systems by Ding-Bhg Lin, Rong-Terng Juang, and Hsin-Piao Lin.
- [5.] A pilgrims tracking and identification using near field communication.
- [6.] “Ticketless parking structure” by USC EE579 group 10- Beibei Zhang, Ming-Tsan yueh, Sa yang.

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