AUTOMATIC TRACKING OF VICTIMS AT SACRED CONGREGATION FOR EARTHQUAKE SEISMIC REGIONS USING GPS, ZIGBEE AND GSM TECHNOLOGIES

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An electronic based network will be established in vicinity of earthquake seismic region/area. The system will focus on providing track information and instantaneous location of victims of earthquake especially those who are severely injured. It is expected that through the providing of information to the security or medical emergency team about the subject (earthquake victim) will be possible to pin point and identify the subject (earthquake victim) from the Earthquake region for necessary action.

The implementation of the project requires developing of electronic network which consists of two major modules

    1. Wearable module

    2. Mobile or stationary base stations.

Wearable module will be designed such that the size is as small as possible and can be worn by the subject (Earthquake victim) around the neck as collar or on wrist of the hand and operate on dual power of battery and solar cell. This module consists of a GPS receiver which gives positional coordinates like latitude, longitude and altitude of the subject (earthquake victim) and Zigbee module which transmits this information to the base station.

Base Stations may be module carried by the security personnel or may be fixed station distributed in the vicinity. Base stations job is to identify the wearable modules in its coverage area using Zigbee and pin point the specific subject's (earthquake victim) location on Google map live. Base stations also communicate with other base stations or control unit to trace the specific subject (earthquake victim) if necessary, using basic GSM or internet connectivity.

The statistics says that very dangerous natural disaster like Earthquakes are increasing every year and most of the injured victims require continuous assistance and First Aid after the immediate happening of earthquake from volunteers to overcome the hard situations. If link with their family members is broken in the earthquake region it will difficult for both earthquake victims and family members to trace them. In the other scenario people from all over the world may not be in a position to communicate with earthquake victims. The designed system can be very helpful to handle such situations to pinpoint and identify the required person (earthquake victim) in the huge damage of earthquake region. During the earthquake times most of persons will die in that situation to find the location of dead body of earthquake victim at earth quake region, this module will help.
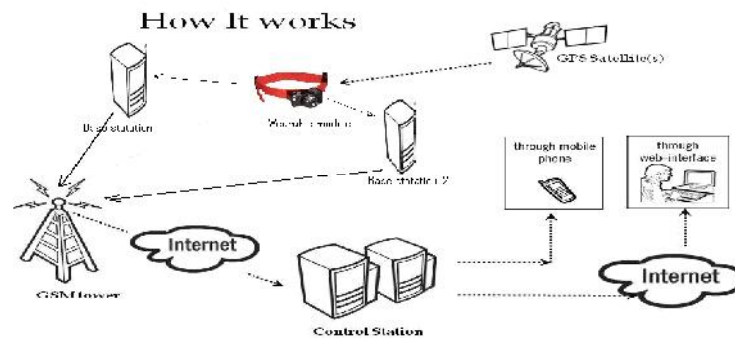
Figure 1. System Configuration

There are two major goals for the Project and specific objectives within each of the goals.

Goal #1 -To reduce the degree anxiety among all the injured earthquake victims, their family

Objective #1.1: To assist the security and medical personnel.

Objective #1.2: To increase confidence to injured earthquake victims and their family and minimize the panic and remove the fear of getting lost in the huge damage during earthquake.

Goal #2 - To effectively use the latest available technology in helping security for monitoring

Objective #2.1 – To provide the exact location of the subject (severely injured earthquake victim) of interest so that he can be traced quickly.

Objective #2.2 - To minimise the confusion and manpower requirement in tracing the subject (severely injured earthquake victim) of interest.

Objective #2.3 – To have live positional information of the subjects (seriously injured earthquake victims) if any in the crowd

The technologies required to implement the project are GPS receivers, Zigbee modules, GSM modems, Solar cell, antennas and laptops. All these modules are available in the market and these can be tailor made as per our requirement.

There are different GPS tracking modules available in the market which uses GPS and GSM technologies in the wearable module, which has serious limitations:

1. The GSM module requires service provider just like mobile phone to work and user has to bear service providers charges.
2. GSM module consumes huge electrical power to work therefore cannot be operated on solar cell.
3. It cannot be operated in GSM non coverage areas.
4. GSM modules produce lot of electromagnetic radiation because of their high power demands

The designed system uses Zigbee and GPS receiver in the wearable module which has the following advantages

1. No subscription fee or licence fee of any type. It is lifelong 100% free because GPS and zigbee work independent of any service provider
2. Zibee module consumes very less power (nearly 100 times compared to GSM Module) therefore solar cell based module can be designed.
3. If the subject (earthquake victim) is within the vicinity of any base station there is no need of GSM module. Therefore the designed system can be operated in areas where GSM coverage is not available.
4. The coverage area of zigbee can be extended to 40 miles in open areas, which helps to covers most of the natural disaster earthquake region.
5. More number of Zigbee modules can be used as the radiation levels are very low compared to GSM

REFERENCES

Angeli MG, Pasto A and Silvano S (2000) A critical review of landslide monitoring experiences, Eng. Geol., 55: 133-147

Gili JA, Corominas J and Rius J (2000) Using global positioning system techniques in landslide monitoring, Eng. Geol. 55: 167-192

Remote motoring system with wireless network to support rescue operations (2013), 13th International Conference on Control, Automation and Systems ICCAS 2013, pp.251-254

ZigBee Sensor Network for patient localization and Air Temperature Monitoring During Emergency Response to Crisis (2008) Second International Conference on Sensor Technologies and Applications, SENSORCOMM 08, pp. 233-238