IOT BASED SMART EMERGENCY ALERTING SYSTEM

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Abstract—Internet of Things (IoT) connects several devices in the world and they can exchange information in between them. To support Smart city vision, Urban IoT design plans exploit added value services for citizens as well as administration of the city with the most advanced communication technologies. To make emergency response real time, IoT enhances the way first responders and provides emergency managers with the necessary up-to-date information and communication to make use those assets. IoT mitigates many of the challenges to emergency response including present problems like flood, fire, emergency medical treatments etc. In this paper we propose an IoT based emergency alerting system which handle the emergency situations like disasters, medical emergencies or fire using mobile application or by using an IoT device placed in the buildings. If any of the above situation occurs, then the people can easily inform to the emergency monitoring center by single button click and that will update the database of monitoring centers with their map location. Authority can take action based on this data as well as they can give location wise alert to people where the chance to occur problems in the near future.

Index Terms—Disaster, Emergency Alert, GSM/GPRS, Internet of Things

I. INTRODUCTION

The Internet of Things pertains to connecting currently unconnected things and people. It is the new era in transforming the existed systems to amend the cost effective quality of services for the society. To support Smart city vision, Urban IoT design plans exploit added value services for citizens as well as administration of the city with the most advanced communication technologies. To make emergency response real time, IoT enhances the way first responders and provides emergency managers with the necessary up-to-date information and communication to make use those assets. IoT mitigates many of the challenges to emergency response including present problems like flood, fire, emergency medical treatments, etc.

Emergency alert system designed by using IoT standardized structure. To implement this proposed scheme, the GSM/GPRS is used to transmit the request of the affected area to a database of control room to take the appropriate actions immediately. It is also possible to give the emergency alert to the appropriate location/house from the control room. This system is implemented by using location sharing system and an alarm for informing the alerts. This system working with the help of an android application. Through registering this application, we can connect with the IoT device and perform sharing location when emergency situations and also get alerts from control room to registered IoT devices.

II. EXISTING METHODOLOGIES

IoT-based smart rehabilitation systems [1] are becoming a better way to mitigate problems associated with aging populations and shortage of health professionals. Although it has come into reality, critical problems still exist in automating design and reconfiguration of such a system enabling it to respond to the patient 's requirements rapidly. This paper presents an ontology-based automating design methodology(ADM) for smart rehabilitation

systems in IoT. Ontology aids computers in further understanding the symptoms and medical resources, which helps to create a rehabilitation strategy and reconfigure medical resources according to patient's specific requirements quickly and automatically. A rehabilitation system is established by Wi-Fi and radio frequency identification(RFID)-based short distance radio communication technologies global positioning system (GPS)-based location technology, unique identifier(UID)-based identification technology, and service-oriented architecture (SOA)-based architecture technology.

Vehicle Tracking System [2] is designed and implemented for tracking the movement of any equipped vehicle from any location at any time. The proposed system made good use of a popular technology that combines a Smartphone application with a microcontroller. This will be easy to make and inexpensive compared to others. The designed in-vehicle device works using Global Positioning System (GPS) and Global System for Mobile communication/ General Packet Radio Service (GSM/GPRS) technology that is one of the most common ways for vehicle tracking. The device is embedded inside a vehicle whose position is to be determined and tracked in real-time. A microcontroller is used to control the GPS and GSM/GPRS modules. The vehicle tracking system uses the GPS module to get geographic coordinates at regular time intervals. The GSM/GPRS module is used to transmit and update the vehicle location to a database. A Smartphone application is also developed for continuously monitoring the vehicle location. The Google Maps API is used to display the vehicle on the map in the Smartphone application. Thus, users will be able to continuously monitor a moving vehicle on demand using the Smartphone application and determine the estimated distance and time for the vehicle to arrive at a given destination.

Emergency Response System for Fire Hazards [3] Internet of Things pertains to connecting currently unconnected things and people. It is the new era in transforming the existed systems to amend the cost effective quality of services for the society. To support Smart city vision, Urban IoT design plans exploit added value services for citizens as well as administration of the city with the most advanced communication technologies. To make emergency response real time, IoT enhances the way first responders and provides emergency managers with the necessary up-to-date information and communication to make use those assets. IoT mitigates many of the challenges to emergency response including present problems like a weak communication network and information lag. In this paper it is proposed that an emergency response system for fire hazards is designed by using IoT standardized structure. To implement this proposed scheme a low-cost Espress if Wi-Fi module ESP-32, Flame detection sensor, Smoke detection sensor (MQ-5), Flammable gas detection sensor and one GPS module are used. The sensors detect the hazard and alerts the local emergency rescue organizations like fire departments and police by sending the hazard location to the cloud-service through which all are connected. The overall network utilizes a light weighted data oriented publish-subscribe message protocol MQTT services for fast and reliable communication. Thus, an intelligent integrated system is designed with the help of IOT.

Emergency alerting system for remotely located site [4] used for providing emergency alerting capability to persons at or near a remote banking terminal (ATM) or night-depository, in Such a manner as to minimize risk to the possible victim and maximize the emergency response authorities' ability to monitor and respond to the situation. The device consists of a covert control and two-way communication unit attached to an Automatic Teller Machine or a night-depository. The unit is activated by a button or Switch on the ATM, or by a remote radio receiver link from a keyed Small radio transmitter. Upon activation, the unit dials a 911 emergency response office, establishing two-way Voice communication from covert microphones at the ATM, and to a speaker hidden at the ATM. During communication, the unit is controlled by the emergency response operator. In an improved embodiment, the System would cover multiple automatic teller machines at an automatic teller machine Site, so

that when one of the automatic teller machines was activated by the user, there would be communication between that one automatic teller machine and a radio dispatcher at a 911 location, and the other automatic teller machines at the Site would be deactivated.

In Smart flood disaster prediction system using IoT Neural Networks [5], an IoT based flood monitoring and artificial neural network (ANN) based flood prediction is designed with the aim of enhancing the scalability and reliability of flood management system. The main aim of this system is to monitor humidity, temperature, pressure, rainfall, river water level and to find their temporal correlative information for flood prediction analysis. The IoT approach is deployed for data collection from the sensors and communication over Wi-Fi and an ANN approach is used for analysis of data in flood prediction. It has all become possible due to ubiquitous connectivity, new sensor technologies, and real-time data processing and analysis. In predictive analytics, artificial neural networks (ANNs) provide better results than other methods. In flood disaster management system, it is of utmost importance that data analysis be done for prediction of floods. Many artificial neural network algorithms are being studied and deployed for prediction purposes. The system consists of sensors that sense the surrounding environment, a single board computer which processes the sensed data; a Wi-Fi based communication infrastructure, a cloud server, and data analytics algorithm that would finally help to predict the flood disaster situations.

Disaster Management System using IoT Based Interconnected Network with Smart City Monitoring [6] In this paper a system of interconnected smart modules is developed as a way to enable centralized data acquisition as well as provide an interlinked network for transmission of data in absence of any existing infrastructure. Emphasis is given on how sensing and communication technologies of IoT can effectively be used in smart city monitoring as well as in case of disaster management. The hardware of the module used for this purpose is studied and elaborated in a detailed manner. an emergency is any occasion or instance such as a hurricane, tornado, storm, flood, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, fire, explosion, nuclear accident, or any other natural or man-made catastrophe that warrants action to save lives and to protect property, public health, and safety. In order to properly manage the catastrophic events, information needs to be collaborated, for example by sharing resources and/or data and coordinating actions, decisions, and activities. Furthermore, during an emergency, such resources and data have to be merged in order to accomplish complex tasks, such as evacuate a geographical area and perform operations by means of actuators.

III. PROPOSED METHODOLOGY

The entire system mainly uses two methods to work. That means emergency situations are handle by using registered IoT module placed in the buildings as well as mobile application. User can send request through single button click. Admin have a dashboard for live monitoring and they can send alerts to user through alarm embedded in IoT module. Each request is send over mobile application with the help of internet connection. Live monitoring system fetch the location details of requested user from database and they can see the accurate location as a map view.

A. Steps of Proposed Methodology

Submit your manuscript electronically for review. Basically the method deals with registering the IoT module with mobile application, inform the emergency situations to control room, sending alerts from control room.

1) Registration: Every user need to register the mobile application before login. User should complete registration with the help of their home location. Mobile application automatically fetches the latitude and longitude of the home location. User should specify the SIM card number that inserted in the IoT module at the time of registration.

2) Button click: Registered user can inform their current facing critical conditions to monitoring centers/control room by a simple button click. This is possible in two ways. Using mobile Application and by using Hardware device (IoT module). Button click action will

update the dashboard (Admin side).

They can view the latest requests/updates with the location of user. Decisions taken on the requests by manually.

3) Alarming: Location wise alert is possible from the Admin side. Admin can choose district and local areas in the district that may going to face critical condition in the near future.
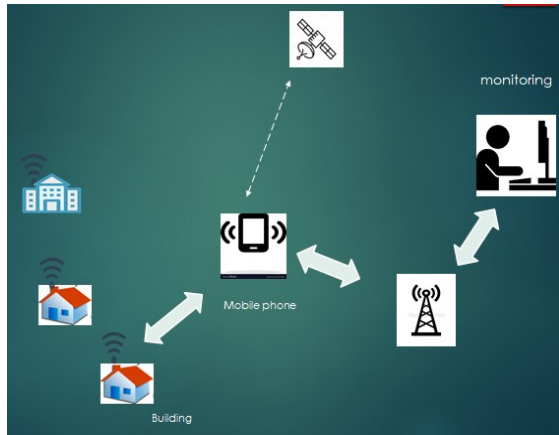

Fig. 1 Architecture diagram

IV. IMPLEMENTATION

The complete implementation of this system consists of hardware part and a software part. Software part is mainly implemented using Java, php and Json in between these two. Java on Android provides object oriented functionality and user friendly environment.
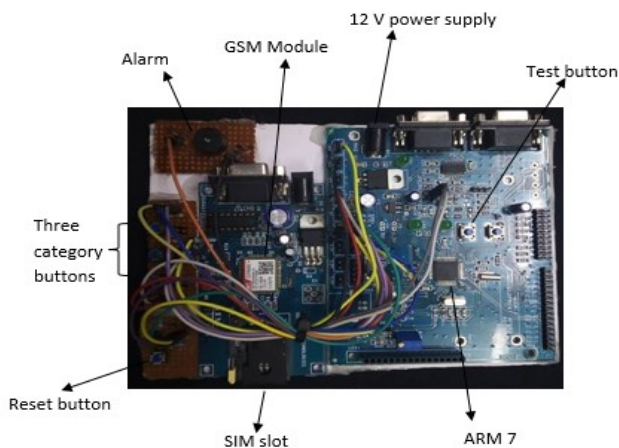

Fig. 2 IoT device

A. Hardware

IoT device is a combination of GSM/GPRS, ARM7, alarm and buttons that are integrated together with a circuit act as a single system.

Main components of hardware are:

• 12 V input
• Contain a small alarm and five buttons

• Three buttons for three category of situations and other two are for reset and test
• Activated, registered sim card

B. Software

Mobile application also used to handle the emergency situations. Home page contain three buttons representing three categories for users logged in.

Fig. 3 Home Layout

V. RESULTS AND DISCUSSIONS

This emergency alerting system provide a cost effective quality of services for the society. If any emergency situations occur, then the people can easily inform to the emergency monitoring center by single button click and that will update the database of monitoring centers with their map location. Authority can take action based on this data as well as they can give location wise alert to people where the chance to occur problems in near times. It is also possible to give the emergency alert to the appropriate location/house from the control room. Here we use simple mobile application and IOT device, so common people can handle these type of situations very easily. Helps the people for Taking precautions based on received alert. Sharing accurate location to monitoring centers with the help of mobile application. Through registering this application, we can connect with the IoT device and perform sharing location when emergency situations. Also get alerts from control room to registered phone number. Registered user can inform their current facing

critical conditions to monitoring centers/control room by a simple button click. This possible through mobile application or device. When people inform emergency situations, it will get updated in the database of control room. It can be viewed in the dashboard, so authority can easily take appropriate action based on that.

VI. CONCLUSION AND FUTURE SCOPE

IoT based emergency alerting system is giving alert in emergency situations. We developed an efficient mechanism to handle and provide coordination of smart devices to perform an emergency alerting. The device which used in the system is reduce energy consumption, improve transmission speed and accuracy. It provides an energy-efficient data collection for the IoT applications. One major challenge for the IoT emergency alerting systems is to handle vast amount of location data generated from the smart devices. So, there should be an efficient mechanism to handle data from different IoT device with reduced energy consumption and improved data quality. These are resource-limited and subject to missing data due to link or node failures. Moreover, this proposed emergency alerting system is best one in emergency conditions.

In future, more categories of emergency conditions can be added to the system to make it useful all situations. If we use sensors predictions can be made more accurate and advanced.

REFERENCES

[1] Yuan Jie Fan, Yue Hong Yin, Yan Zeng and Fan Wu, "IoT-Based Smart Rehabilitation System". IEEE transaction on industrial information, VOL. 10, NO.2, MAY 2014.

[2] Yuan Jie Fan, Yue Hong Yin, Yan Zeng and Fan Wu, "IoT-Based Smart Rehabilitation System". IEEE transaction on industrial information, VOL. 10, NO.2, MAY 2014.

[3] Ravi Kishore Kodali and Subbachary Yerroju, "IoT Based Smart Emergency Response System for Fire Hazards". 2017 IEEE.

[4] [4] Paul N. Gergen, Pass Christian, Miss, "Emergency alerting system for remotely located site". Aug 19,1996.

[5] [5] Swapnil Bande, Prof. Dr. Virendra V. Shete, "Smart flood disaster prediction system using IoT and Neural Networks ". 2017 IEEE.

[6] K Prabodh Sakhardande, Sumeet Hanagal, Savita Kulkarni, "Design of Disaster Management System using IoT Based Interconnected Network with Smart City Monitoring". International Conference on Internet of Things and Applications (IOTA) Maharashtra Institute of Technology, Pune, India 22 Jan - 24 Jan, 2016.