International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 11
November 2017

# Quick Rescue and Notification Engine for Fire Accidents in Smart Cities

**M.Swetha Priyadarshini**, -M.tech(CSE), JNTUH CEJ jagityal.
*Under the guidance of*
**Dr S.Viswanadha Raju**, Professor of CSE, JNTUH CEJ Jagityal

**Abstract**

*The trend of urbanization is growing word wide. More than 6.3B people, 60% of the population will be living in cities by 2050. These cities must provide better and more efficient infrastructures and services, often for less cost. This trend has contributed to the growing popularity and use of the term 'Smart City'. The paper gives a solution for reducing loss of life using smart technology (IoT) accompanied by software technology (Bigdata Analytics); it mainly focuses on providing helping hand to the victims stuck in fire accidents with less delay. Real time data from sensors is a huge collection of heterogeneous data. The data is processed and classified through big data analytics. The challenging task of this project is to find the nearest possible resources to help the victims by informing nearest possible resource and pass on the information. The two perspectives from which the project can be viewed are user prospective, technical prospective; the key requirements identified in user prospective are low cost, Ease of use, appealing design, flexibility, privacy. The technical prospective key requirements to be satisfied are Scalability, Performance, Power consumption, Integration, Security.*

## Introduction

Faster rescue in fire accidents is primary concern for victims. Now a day's fire accident is most often occurring in public places and go downs. When these accidents are occurring in remote areas or during night times the loss or damage being caused is at higher rates. The damage is heavier due to improper reach of service at right time due to improper communication. This time delay is causing heavier damage. Thus, eliminating the time between when an accident occurs and when first responders are dispatched to the scene decreases the damage. One approach to eliminate the delay is by identifying the fire accident and notifying the concerned authorities, NGO teams with in no time. Concerned authorities and NGOs will be notified by showing the message in the LCD display. In the same time the concerned nearest fire authorities and emergency services are notified by sending SMS through GSM service.

## Objective:

Effective utilization of technology and devices for the wellbeing of the society. The phone which every person use can become and aid to a person stuck in fire accident and seeking help. Though government provides rescue operation, but the delay may cost many lives for a single accident if the response is not quick and faster. The objective is to reduce the time lag between victim and the first responder. This featured solution helps in notifying the fire authorities and emergency services in a fraction of seconds through handy devices.

## Literature survey

The dream of transforming cities into smarter cities can be done through collaborating IOT and Big Data Technologies.

**IoTs** can be described as connecting everyday objects like smart phones, internet televisions, sensors and actuators to the internet where the devices are intelligently linked together to enable new forms of communication amongst people and themselves[1]. The significant advancement of IoTs over the last couple of years has created a new dimension to the world of information and communication technologies. The advancement is leading to anyone, anytime, anywhere (AAA) connectivity for things with the expectation being that this extend and create an entirely advanced dynamic network of IoTs. The IoTs technology can be used for creating new concepts and wide development space for smart homes in order to provide intelligence, comfort and improved quality of life. The vision of the internet of things is to manage objects around us with their own unique IP

International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 11
November 2017

address. IoT will comprise of billions of devices that can sense, communicate, compute and potentially actuate. Billions of Data streams coming from these large scale sensor networks will challenge the traditional approaches to data management and related context capturing techniques. Even after enabling cloud integration for storing, archiving and processing of IoT data, it would be difficult convert it into user community centric useful intelligence. Cloud based Big Data techniques offer some promise.

**Big Data** in information technology is a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications. Within the no period of time, sensor data will hit the crossover point with unstructured data generated by social media. From there, the sensor data will dominate by factors 10 to 20 times that of social media. However, using this data will be difficult for the time being, as there are no standards to ensure the data's readability beyond those possessing the right software or algorithm.

**Big Data Application to unstructured data**

Big data is a term applied to data sets whose size is beyond the ability of commonly used software tools to capture, manage, and process the data within a tolerable elapsed time. Big data sizes are a constantly moving target currently ranging from a few dozen terabytes to many petabytes of data in a single dataset. Unstructured data streams rapidly and constantly. This data is heterogeneous and variable in nature and comes in many formats, including text, document, image, video, and sensed data. These are untapped sources of insight, and big data analytics can reveal important interrelationships that were previously difficult or impossible to determine. 'Big data' refers to a collection of tools, techniques and technologies which make it easy to work with data at any scale. However, the one getting the most attention is Hadoop as it based on popular

distributed processing friendly MapReduce technology. However, there is no single perfect data management solution for the cloud to manage big data.

**The user software features requirements from the service providers:**

1.Data storage with redundant reliability for preserving long-term sensor data streams
2. Time series visualization & graphing tool with exceptionally fast response, allows viewers to navigate through massive amounts of data, and quickly zero in on points of interest
3. Quickly develop and deploy data processing and analysis apps in the cloud
4. Flexible SMS and email alert scripting features
5. useful for Structural health monitoring and condition based monitoring of high value assets
6. data sharing and analysis for team members spanning multiple locations
7. Tools to Visualize, Analyse, Collaborate and scale

**Existing systems that laid a path to the proposed system**

- *Intelligent Accident-Detection and Ambulance- Rescue System:*

Road accidents and traffic congestion are the major problems in urban areas. Currently there is no technology for accident detection. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital.

**Existing System**

Security in public places in smarter cities is primary concern for everyone. When these accidents are occurring in remote areas or during night times the loss or damage being caused is at higher rates. The damage is heavier due to improper reach of service at right time due to improper communication. This time delay is causing heavier damage.

**Disadvantages of Existing System**

- The death loss occurred.|
- Improper services at right time.|
- Time delay causing heavy damage occurred.|

**Proposed System**

Our proposed system demonstrates, the eliminating the time between when an accident occurs and when first responders are dispatched to the scene decreases the damage. This projects help in notifying the passengers and emergency services. The project consists of a microcontroller which is

International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 11
November 2017

interfaced with the GPS module, GSM modem and fire sensors. Once the

sensors attached in the compartments of train senses the smoke detection, it assumes a fire accident. The controller assumes it as an emergency and starts the LCD display and GSM modem sending the latitude and longitude information to the specified mobile number and emergency services, by fetching the information from the GPS.

**Advantages of Proposed System**

- Eliminate the delay is by identifying the fire accident and notifying the concerned authorities, loco pilot and passenger with in no time.
- Passengers will be notified by ringing the buzzer and loco pilot will be notified showing the message in the LCD display fitted in the engine along with alarm.|

**System Architecture**

AT89C52 microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem continuously gives the data i.e. Latitude and Longitude indicating the position of the vehicle. The GPS modem gives many parameters as output, but only NMEA data coming out is read and displayed on the LCD. The same data is sent to the mobile at the other end from where the position of accident has occurred. levels.

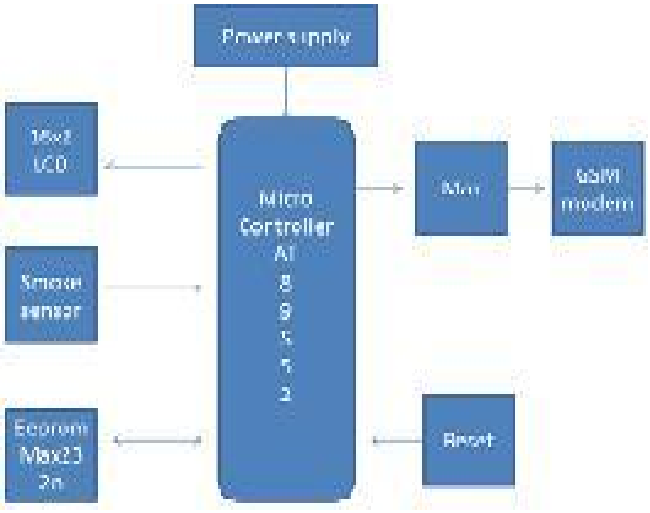
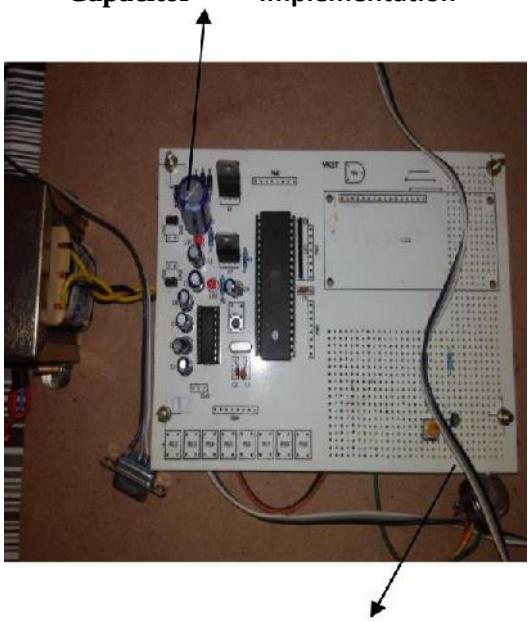



Figure 1: Block diagram of system architecture

An EEPROM is used to store the mobile number. The hardware interfaces to microcontroller are LCD display GSM modem and GPS receiver. The design uses RS 232 protocol for serial communication between modems and microcontroller. A serial driver IC is used for converting TTL voltage levels into RS 232 voltage

**Capacitor Implementation**



**Smoke detector**

Figure 2: Circuit diagram

**Capacitor:** Capacitor is an electronic component that stores electric charge. The capacitor is made of 2 close conductors (usually plates) that are separated by a dielectric material. The plates accumulate electric charge when connected to power source.

**Smoke detector**: A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control as part of a fire alarm system.

**Modules**

1. Administrator Module
2. Sensor Module
3. The Information Detection Module
4. GPS Location Module

International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 11
November 2017

**Administrator**

The Administrator can add the fire station details and he can also add place details where the sensors are deployed to protect from the loss when fire accidents are occurred. Keeping security and privacy issues admin is given the user id and password so that only admin can make any modifications to the data. The information maintained by the admin is very confidential.

**Sensors**

Once there is a fire accident, immediately the fire sensor will immediately sense the change in temperature and the composition of smoke. If the fire is detected, the fire sensors placed in places sends a signal and the GPS, GSM, LCD modem which are kept ON all the time will respond. The smoke sensor gets initiated only when there is occurrence of fire in other cases it is in off mode. This feature of the sensor helps in reducing the power consumption. Once if the fire sensor starts all other modules in the project gets activated.

**The Information Detection Module**

Information detection module consists of fire sensors installed in every public place. Whenever fire accident occurs any of the fire sensors placed in public places senses and immediately it sends signals to the microcontroller. The information from the micro controller is passed on to the administrator data base to map to the nearest possible resource to the place of accident. The nearest possible resource to the place is identified using shortest path algorithm.

The shortest path algorithm takes the latitude and longitude of the fire occurred place and then trims it, the trimmed value is mapped on to the data base and the distance for all the latitude and longitude values in database is calculated. The place with smallest distance is sent the information of fire accident by sending SMS to the resource.

**GPS Location Module**

GPS location module GS-87 is the third generation of GPS receiver chip designed by the United States SiRF star III Company, which consists of a radio frequency integrated circuit, a digital signal processing circuit and standard embedded GPS software composition.

**Message Transmission Module GSM**

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz frequency. Cellular is one of the fastest growing and most demanding telecommunications applications. GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band. The GSM network is structured into a number of discrete sections they are the Base Station Subsystem (the base stations and their controllers), the Network and Switching Subsystem (the part of the network most similar to a fixed network). This is sometimes also just called the core network. The GPRS Core Network (the optional part which allows packet based Internet connections). The Operations support system *(OSS)* for maintenance of the network.

**TESTING**

The Modules in the scope of testing for the implemented project's System Testing are mentioned below:

1.Administrator Module

2.Add fire station Module

3.Add place Module

4.Sensor deployment Module

5. UDA-IoT Module 6.Sms Sender Module

Test Cases:

i. Administrator validation the possible validations under this module are as follows

J To validate that Login name, password on login page.|

International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 11
November 2017

ii. Adding fire station details

J To Verify the fire station name, contact no, no should not be empty, the latitude and latitude.|

iii Adding place details

J To Verify the place name, sensor id, sensor|

id latitude and longitude should not be empty.

**Results**

Innovative and reliable systems and technologies are needed to transform a city into smart city for better living. The quick fire rescue engine is one among the systems that would be use full in smart cities. The proposed system show cases various results regarding scalability, reliability, security. The system shows

the feature of scalability by getting deployed with various sensor ids to the same sensor, this can be extended by using other sensors with different sensor ids, as we have used single sensor in the project it can be deployed with various sensor ids. The performance of the system is accurate it gives the alert message (sms) to the fire authorities contact number without any delay with accurate place of fire accident. The data the flows in the system is reliable as it is maintained only the administrator and is well secured as the administrator is given the user name and password. It highlights the use of IoT and big data analytics when further extended.

**Conclusion and Future scope:**

The fire rescue engine that is proposed help in providing the greater help to the victims stuck in fire accidents and in informing the nearest fire departments without human intervention and minimum delay. There are various problems to be faced in helping the victims; the proposed system solves one of the problem of minimizing the delay and reducing loss of property and life's. Smoke sense technology is implemented successfully to detect the fire. The information regarding the fire accident is transferred to LCD display screen. This information about accident is being sent to the concerned fire authorities and emergency services like police, ambulance etc.

The system can further be enhanced by deploying sensors at various other places, which results in heavy flow of data. The regular flow of data can be handled by using big data analytics technology. The data can be collected in cloud and can be processed, with the assistance of tools such as the Apache Hadoop. Big Data Platform could be helpful for launching such applications. Such data high volume, high-velocity, and/or high-variety information assets require new forms of processing to enable enhanced decision making, insight discovery and process optimization.

**BIBLIOGRAPHY**

[1] Muhammad Ali Mazidi, Janice G. Mazidi, Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2nd ed.

[2] The IEEE website. [Online]. Available:http://www.ieee.org/

[3] GSM. [Online]. Available: http://www.gsma.com/home/

[4] ZigBee Alliance Official Site, [online]. Available: www.zigbee.org.

[5] Rajesh, N.N.Ramesh and S.M.Prakhya 2010. Wireless vehicular accident detection and notification system. International conference on mechanical and electrical technology.

[6] M.Rajendra Prasad, P.Aswani Kumari,"An Automated Traffic Accident Detection and Alarm Device", published in IJTEL.

[7] GSM. [Online]. Available: http://en.wikipedia.org/wiki/GSM

[8] Wireless sensor networks to detect forest fires. [Online]. Available: http://www.libelium.com/wireless_sensor_networks_to_detec_forest_fires/