IOT Based Smart Fire Detection and Reponse System

Group Leader Name: Syed Rehan Mehdi
Group Leader Roll Number 2014-CE-022
Student-1 Name: Syed Zaid Imam
Student-1 Roll Number: 2014-CE-052
Student-2 Name: Muhammad Ahmed Aslam
Student-2 Roll Number: 2014-CE-028
Student-3 Name: Muhammad Saad Yousuf
Student-3 Roll Number: 2014-CE-023
Date: 14/April/2017

1 Motivation

This project is being made to overcome the need of fire extinguisher systems. As in our society there no such good and smart fire response systems which can overcome the need of the city. As in the recent past many unfortunate events have occurred in which many lives have been lost. So this motivated us to make a smart system which can act quickly and can save lives.

2 Overview

The core Idea behind the project are as follows

2.1 Significance of project

This project has its own importance as it is meant to save lives and the property. It is very much practical in real life as we live in 21st century where these are the needs and these things are doing well in other countries. Smart fire response system is very useful in our city after considering the recent tragic events which caused hundreds of lives. This project depicts our four academic years at the university. It will have a big impact in our society as it is something which is necessary. We have pick this project as a challenge so difficulty level didnt matter to us. It will have a huge impact in our society if it becomes successful as it is very much helpful in public places to save lives.

2.2 Description of Project

This project is IOT based smart fire response system in which we will make fire brigade system smarter. Our aim is to blow up the fire as soon as possible by placing multiple sensors through which data will be transferred and it will automatically update the fire department where it will allocate the available fire car and rescue workers. They will reach the destination A.S.A.P. the problem we are trying to solve is to reduce the time taken by fire brigade to arrive at the destination.

2.3 Background of project

While doing research for the project we went through some articles which motivated us to make this as our FYP. Some of the links are as follows.
http://www.jbrehm.com/blog/2015/6/11/smart-fire-fighting-merging-iot-and-big-data-for-fire-safety

3 Methodology

The methodologies are as follows

3.1 Design Phase

In this project we will make an android application and web application through which staff will get to know the location where fire is set. The main component of this project is sensors which will play a vital role in completing the project. The alternative solution of this problem available in this city is smart fire detection and we are taking one step forward and we will try to make smart fire response system which will make the whole system smarter.

3.2 Implementation Phase

We will implement this project by using multiple sensors which will come under hardware components and we will use a raspberry pi to connect everything. The software component of the project is to make an android and web application and to program the raspberry pi.

3.3 Testing Phase

We plan to test our project by giving a demonstration on a lower scale just to make sure that it is giving us 100 percent result. The components which are to be tested are sensors because it is sensors which will play a vital role. Sensors are to be tested when it is placed. Raspberry pi will be tested. Source code is to be tested. Android application is to be tested.

3.4 Evaluation Phase

We will evaluate our project by checking that our goal is achieved or not. We will provide hardware and software demonstration. Hard and software components are specific aspects that we are going to evaluate. These both aspects will show the working of our project.

4 Features

The distinguished features which would make it significant for the evaluators will be the fire detection by fire detection sensors. This project is not very common however some of its features are in common for ex the fire detection system which is very common. The features which makes our project different from others is the response system through which available workers, fire car will reach destination which will work automatically.

There are many benefits of our project as it is meant to save time which is main benefit secondly it will allocate the available resources to reach at the destination. Which will cut the cost for the fire brigades. The most significant features are as follows.

- **Fast Response Emergency System:**
  The most significant feature will be the response system of the project through which every information will be sent to the fire station.
- **Fire Detection:**
  The second most significant feature is the fire detection in which the system will detect fire through fire detection sensors.
- **Monitor Water Level:**
  The second most significant feature is the fire detection in which the system will detect fire through fire detection sensors.

5 Project Planning

We are planning to complete this project by the end of this year and each one of us will work with equal co ordination and dedication and each one of us will use his expertise in this project.

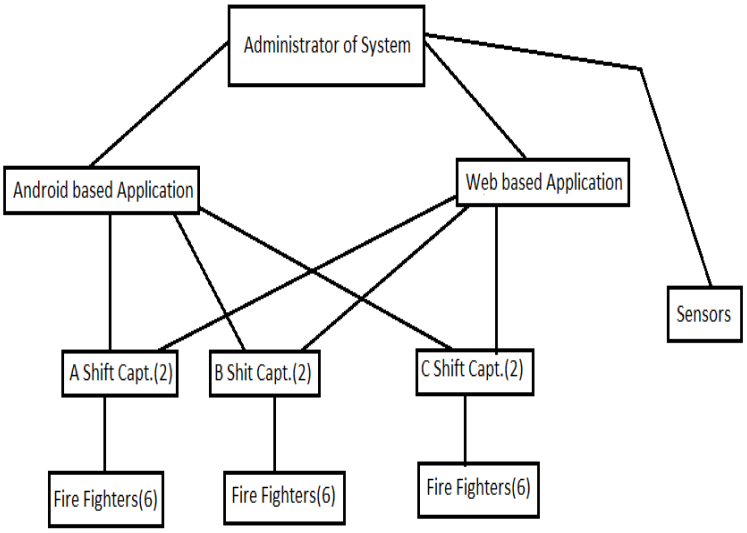

Figure 1

6 Required Hardware And Software

Required software are as follows

- **Python:**
  Python is an interpreter, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding; make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together.

- **Java:**
  Java is a programming language and computing platform first released by Sun Microsystems in 1995. There are lots of applications and websites that will not work unless you have Java installed, and more are created every day. Java is fast, secure, and reliable. From laptops to datacenters, game consoles to scientific supercomputers, cell phones to the Internet, Java is everywhere!

- **SQL Database:**
  SQL stands for Structured Query Language. SQL is used to communicate with a database. According to ANSI (American National Standards Institute), it is the standard language for relational database management systems. SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database. Some common relational database management systems that use SQL are: Oracle, Sybase, Microsoft SQL Server, Access, Ingres, etc.

- **Android Studio:**
  Android Studio provides the fastest tools for building apps on every type of Android device. World-class code editing, debugging, performance tooling, a flexible build system, and an instant build/deploy system all allow you to focus on building unique and high quality apps.

- **Android Operating System:**
  Android Operating is an operating system developed by google. It is designed for smartphones, phablet, tablet, wearable and TV devices. It is the commonly used OS in smartphones.

Required hardware are as follows

- **Raspberry Pi:**
  A Raspberry Pi is a credit card-sized computer originally designed for education, inspired by the 1981 BBC Micro. Creator Eben Upton's goal was to create a low-cost device that would improve programming skills and hardware understanding at the pre-university level. But thanks to its small size and accessible price, it was quickly adopted by tinkerers, makers, and electronics enthusiasts for projects that require more than a basic microcontroller (such as Arduino devices).The Raspberry Pi is slower than a modern laptop or desktop but is still a complete Linux computer and can provide all the expected abilities that implies, at a low-power consumption level.

- **Fire Detection Sensor:**
  A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is properly lit; in these cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame

- **Water Level Sensor:**
  A level sensing device is designed to measure the level of flow substances including liquids, slurries and granular materials. There are also continuous level sensors; however, these sensing modules can only detect the level of flow of a substance with a specific range. A water sensor is a device used in the detection of the water level for various applications. Water sensors are of several types that include ultrasonic sensors, pressure transducers, bubblers, and float sensors.

7 Diagrammatic Representation of the Overall System

At the place of blast, the sensor senses the heat level which is connected to internet through IOT which sends data to cloud. The function of cloud is to inform main administration and the nearest fire brigade station and it also generates alert that infers the location of infected area, the boot will generated the automatic call. It verifies the request and generates responsive system. The functionalities of responsive system is to check fuel level and water level of emergency vehicle. This automatic system orders the emergency vehicle with full resources.
Diagramatic Represtation can be seen in figure 2 on page 6.

8 References

1. http://www.jbrehm.com/blog/2015/6/11/smart-fire-fighting-merging-iot-and-big-data-for-fire-safety
2. https://www.python.org/doc/essays/blurb/
3. http://www.azosensors.com/article.aspx?ArticleID=225

9 Appendix

9.1 A.Expected Internal Advisor

- Sir Noman Ali Khan
- Sir Najam ul Islam
- Sir Hasan Zaki

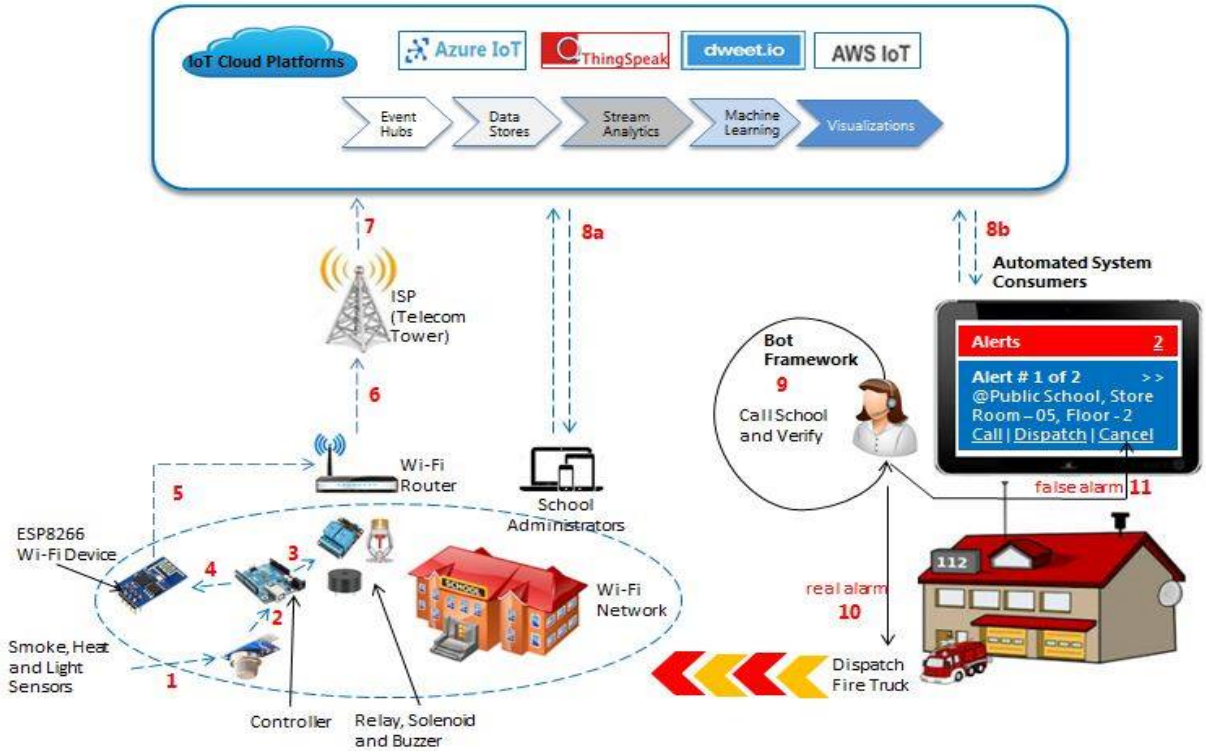
IoT Cloud Platforms
Azure IoT
ThingSpeak
dweet.io
AWS IoT
Event Hubs
Data Stores
Stream Analytics
Machine Learning
Visualizations
7
8a
8b
Automated System Consumers
ISP (Telecom Tower)
6
Bot Framework
9
Call School and Verify
Alerts 2
Alert # 1 of 2 >>
@Public School, Store Room – 05, Floor - 2
Call | Dispatch | Cancel
Wi-Fi Router
5
School Administrators
false alarm 11
ESP8266 Wi-Fi Device
4
3
Wi-Fi Network
112
real alarm
10
2
Smoke, Heat and Light Sensors
1
Dispatch Fire Truck
Controller
Relay, Solenoid and Buzzer

Figure 2