

IoT based Intellieght Fire Escape System

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Abstract—This implementation paper is regarding an intelligent system which helps user to get out of the building very safely, thereby reducing human casualties. It helps user by sending appropriate maps which contain navigation that helps user to escape safely. The introduction contains the modules required to implement this intelligent fire escape system. Proposed system contains the system that we have put forth. Results contain the screenshots and actual images of implementation. This provides flow control by assigning different routes to different users.

Keywords-component; IoT, flow control, maps, navigaition.

I. INTRODUCTION

We require following components:

- 1) Sensors
 - a) Flame
- 2) Arduino Uno R3
- 3) GSM Module 900a
- 4) Power Supply
- 5) Buzzers
- 6) LED Display
- 7) Jumper Wires

Flame Sensor



Figure 1: Flame sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. 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; 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 [15].

GSM Module

This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications allowing you to benefit from small dimensions and cost-effective solutions. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900A can fit almost all the space requirements in your applications, especially for slim and compact demand of design [16].



Figure 2: GSM Module 900A

Piezo buzzer

Piezo buzzer is an electronic device commonly used to produce sound. Light weight, simple construction and low price make it usable in various applications like car/truck reversing indicator, computers, call bells etc. Piezo buzzer is

based on the inverse principle of piezo electricity discovered in 1880 by Jacques and Pierre Curie. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials and the vice versa is also true [17].

II. LITERATURE SURVEY

LBS refer to mobile services. GPS technology is used for most different fields which is one the most obvious technology for LBS. Generally, LBS are based on wireless LDTs which are either terrestrial (a limited operational area) or spatial (Global navigation system). Mobile networks (GSM, GPRS, UTMS) are available everywhere but the positioning accuracy is rather low (100m and more). Terrestrial LDTs are represented by different methods to determine the position of the mobile device in the wireless communication operator's networks. It is based on computations done in the handheld device or by the network's LMC (Location Measurement Center). It is possible to determine the location with different methods for LBS. However, these methods have different accuracy level. Network Based-Hybrid, one of the two fields in LDTs. This technology uses the network of the operator to determine the location of the mobile device. All mobile telephone networks that are used and are built the same way: The network is organized in cells around the antennas of the BTS, which connect the user terminal to the global telephone network.[1][2][14].

ZigBee, a wireless sensor network which combines driver's display unit and signal transmitter, is considered to be one of the reliable applications. This network is composed of micro sensor nodes which have the ability to calculate. These nodes can monitor sense and collect information of different locations in the coach. Compared with other wireless technologies, ZigBeetechniques has provide important of unique advantages are safe and reliable in data transmission, an easy and more flexible network configuration, low cost for equipments and Long- lasting batteries. The ZigBee Alliance is not pushing a technology; rather it is providing a standardized base set of solutions for sensor and control systems and The ZigBee Network Node is designed for battery powered or high energy savings. Thus, it has great development potential and a promising market application in the field of industrial control. By applying a wireless sensor network based on ZigBee to a train fire monitoring system, information such as temperature and relative humidity at any part of the train covered by the network could easily be collected, dealt with and analysed at any time.[3]. The thermocouple temperature sensor is to monitor for fire conditions external and internal alarms, together with automatic operation of the alarm system in organization. When the temperature senses it triggers the alarm make the people alert and wake up who are present in the building. The carriage Controllers have associated with the LED batteries such that fire protection is maintained by indicating the color lights in the security manager. As a backup, the alarm also installed in the building[4][14]. A self-controlled smart system is proposed with microcontroller unit to control and integrate the information received from different sensors(the location, the severity and the breakout). It informs the fire services and the other users about the fire via messages and phone calls. It also put out the fire by releasing the extinguishing gas at the exact location of the

fire[5]. No navigation for the users. An IPS system being used in the critical environment must have the following important features:

- The system must be on an ad hoc basis without any requirement for pre-setup platform such as cabling, electricity power supply and permanent devices installed in a fixed located
- The system must be portable and flexible without any requirement on location for installation. □ The system must be integrated with position tracking and communication capability in real time
- . □ The system must be controlled remotely.[8][14] Wi-Fi and Cloud Technologies is used for detecting fire, gas leakage, or smoke and informs the owner about the hazards in the house by integrating the information received from the various servers[7].

Pedometry and indoor mobile augmented reality can be used for evacuating the building in the emergency situations by recommending the best way out of the building in terms of time for evacuation. GPS and Wi-Fi based positioning system used for better understanding and communication within the network[9]. A prototype consisting of vehicle mounted units is proposed for vehicle platforms and portable units for dismounted personnel, where the vehicle mounted unit has 100-200 meters diameter of cover range and the portable unit with 50-100 meters diameter of cover range[6].

One Hop Two Hop Network cover range 200m x 200m 400m x 400m Data Transmission capacity 24kbps 24kbps Positioning accuracy 10 cm 25 cm Target tracking accuracy 20 cm 50 cm UWB cover ranges and accuracy of positioning and target tracking[6]

III. PROPOSED SYSTEM

We have proposed the design of our system[14].

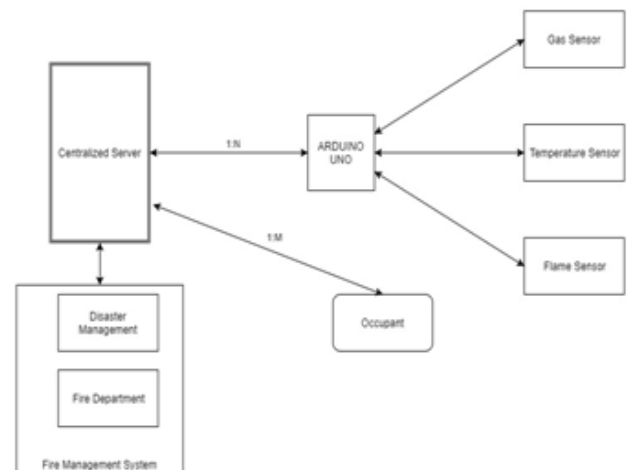


Figure 3: Block diagram

Different sensors are connected with Arduino Uno. The total no of Arduino Uno depends on area, efficiency and need. Thus, different Arduino Uno Boards are connected with centralized server. Centralized server is used to receive data from sensors, and then calculate the intensities and give the

result to the Fire Management System. Different occupants are then updated and given the escape plan to the exit the building. It also shows the various places on fire, and overview of fire estimation and occupants can also derive their own way based on data provided. Also the message sent to the Fire Management contains the route towards the fire. If same route is provided to each and every user, it could result in a stampede and could be detrimental to life of humans. Hence, different routes are provided to different users. Thus, this provides flow control[14].

IV. RESULTS

The flame sensor is interfaced with arduinouno. It also contains a buzzer and an LED. The connection is shown below:

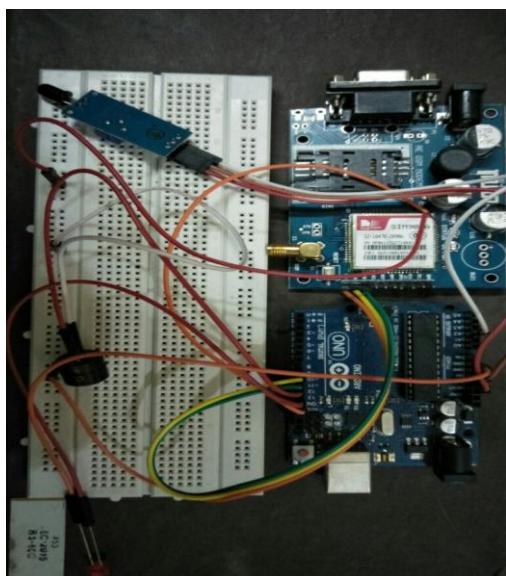


Figure 4: Status before fire is detected

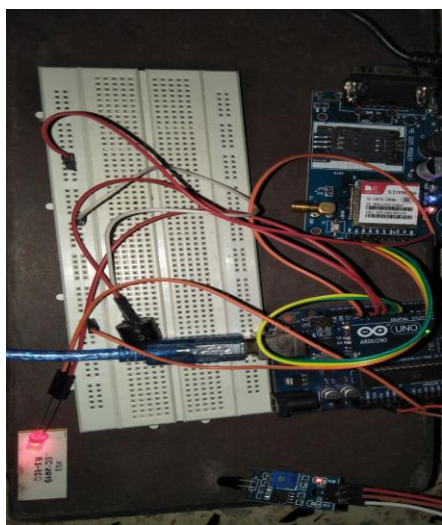


Figure 5: Status when fire is detected

The maps which provide navigation shows fire detected at different places, and accordingly it shows navigation.

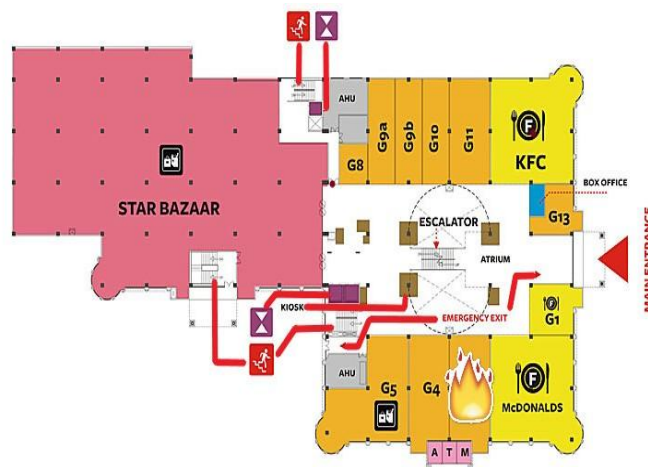


Figure 6: Fire detection at G3
 Here, we provide navigation according to the fire.



Figure 7: Fire detected at star bazaar.

We provide different route for navigation based on the location of fire.

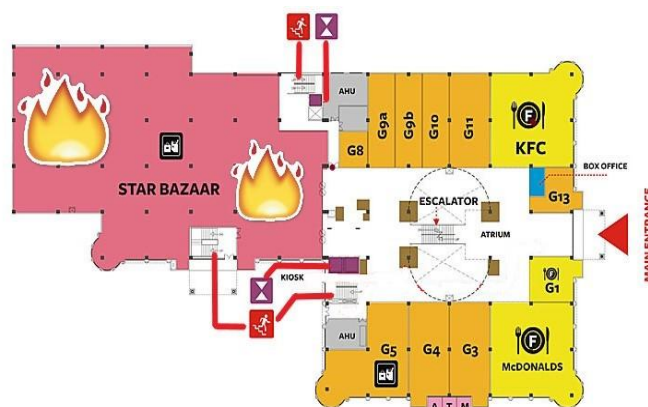


Figure 8: Navigation route 1 to some users

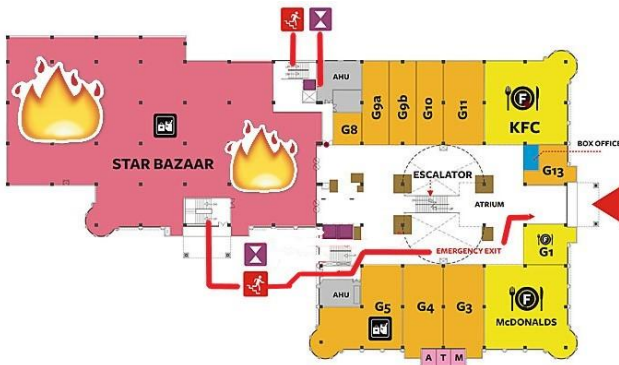


Figure 9: Navigation route 2 for other users

These maps have to be uploaded to a website and the link has to be sent to the users.

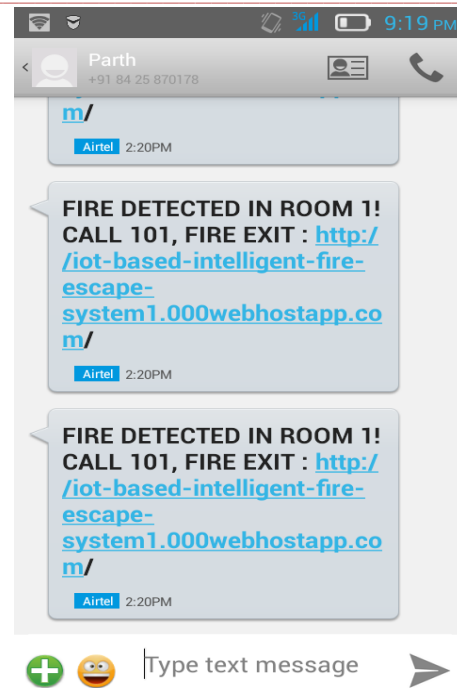


Figure 12: Messages containing link of the maps.

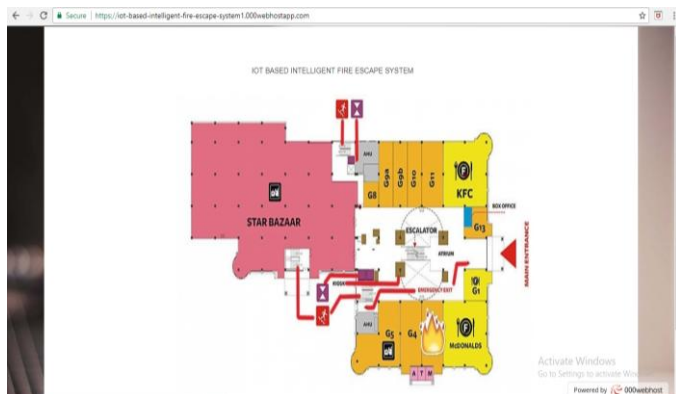


Figure 10: Link 1 showing map with fire at G3

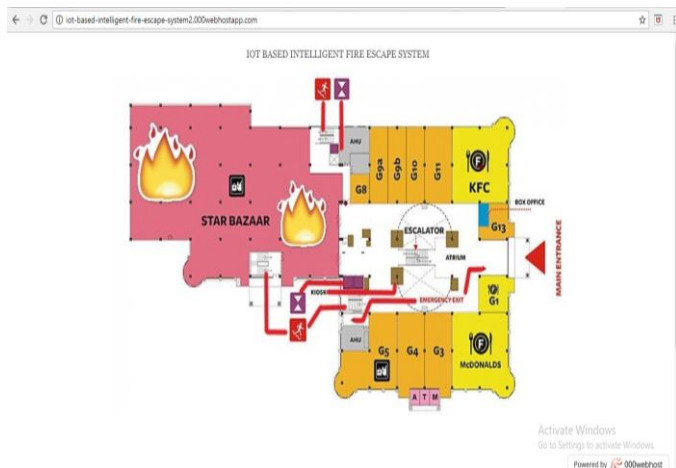


Figure 11: Link 2 showing map with fire at Star bazaar

The user will receive the message and it will contain the link to direct the user to the map.

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