

Fire Detection and Sending alert Using Gsm Module And firebase

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Abstract—This project describes the development of a cost effective, convenient, and reliable GSM based automated fire alarm system which provides the shortest safest escape route during fire emergencies. It also acts as a SOS system sending out messages to concerned authorities using GSM and giving warnings using an alarm system in case of such emergencies. It also supports full panel programming using embedded c and network diagnostics..

Keywords— Fire detector, Smoke detector, GSM, Mobile, Route guiding mechanism.

I. INTRODUCTION

A characteristic fire alarm control system shall be capable of detecting fire and transmitting it to the central monitoring station. Fire points (detectors or sensors) communicate with the fire alarm control unit. As part of obedience in case of any fire related event information needs to be communicated to the monitoring station for just in time response.

Current fire panels are making use of a Digital alarm communicator transmitter (DACT) which is responsible for transmitting the information to the central station. Only some panels come along with the DACT, the remaining panels need to have an external DACT unit for transmitting the information to the central station. There is obsolescence in using this DACT since it requires more hardware components and interfacing. So, to overcome the obsolescence of the DACT, the transmitting unit is designed to make the system cost effective and eliminate the uselessness.

The current life safety systems do not have any wireless connectivity to communicate with the external world. Detectors or sensors are reported only to the Fire alarm control Panel (FACP). A person cannot know the situation inside a building in case of fire, by simply standing outside. The FireFighters do not know the situation in the fireplace till they reach the spot. They cannot get the dynamic view of spreading fire outside the building. Building owner sitting somewhere in the world can't see the status of firespreading in his building. Hence the fire panel needs a system that transmits the fire events to the central station and the floor map image to the remote server.

A simple automatic fire alarm system for buildings based on wireless sensor networks is designed and implemented in this paper. We focus on the design of network architecture and communication protocol here. Thankfully by the usage of more smart fire detection systems the number of fire accidents have been reducing steadily. One of the most destructive properties of fire is that it spreads exponentially and with the right medium can spread uncontrollably. This is why timely detection of fire is necessary for avoiding a fire hazard. The Internet of Things is a collection of sensors, actuators, software, electronics embedded with home appliances, physical devices and vehicles which connect with each other to connect and exchange data which helps in increasing the efficiency of everyday appliances using computer based systems. Not only does it help in improving the efficiency of a device but also has economic benefits. IoT is just another way to make everyday life easier for humans by developing smart devices. IoT devices have increased 31% per year and were at 8.4 billion in the year 2017. The total count is set to reach 30 billion devices by the year 2020.

The market value for IoT devices is also set to increase to \$7.1 billion by the year 2020. IoT involves connecting objects beyond the range of standard devices which are used for everyday purposes. In this paper we have developed an IoT based fire alarm with additional safety and verification methods. The device uses a wide variety of sensors- PIR sensor, to detect the exact location of the origin of fire. Gas sensor, it detects the presence of any flammable gas like CO₂.

II. LITERATURE REVIEW

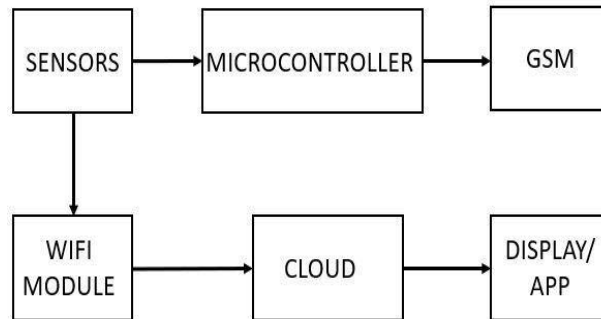
[1] , the writers deliberate on a security robot which is developed using an aluminum frame.. The hardware devices consist of a touch screen, charge-coupled device (CCD) camera, sensors and sensory circuits, driver system, etc. The sensory system consists of seven subsystems. There are the fire-detection subsystem, intruder-detection subsystem, power-detection subsystem, environment- detection subsystem, motor-control subsystem.

[2] In this paper a net work environment integrating wire and wireless communication is built, and the fire control database with a five-layer structure is established, which is critical to resolve the cooperative control problem in the quick-response fire control system.

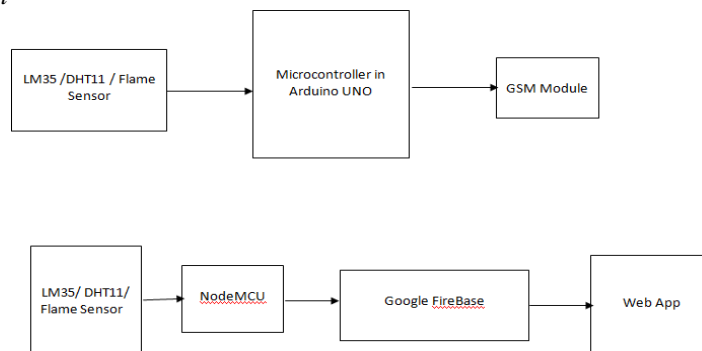
[3] (Multi Sensor based Fire Detection) algorithm using two fire parameters (temperature and optical smoke density). These two sensors were chosen since ionization systems may become increasingly difficult to apply because of the environmental regulations being imposed on them. The evaluation and processing of the sensor signals is carried out by the use of Fuzzy Logic.

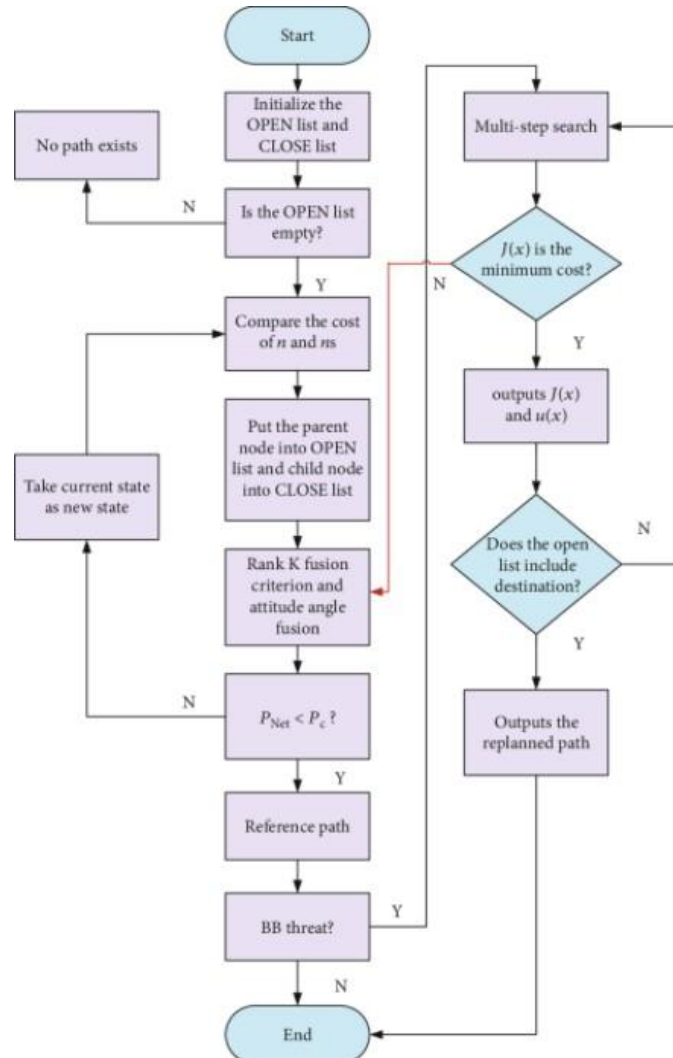
III. METHODOLOGY

A. Block Diagram



B. Flow Chart





A. MICROCONTROLLER:

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open so use Software. . The board has 14 digital I/O pins and 6 analog input pins. There is a USB connector for talking to the host computers and a DC power jack for connecting an external 6- 20 power source.

B. GSM MODULE:

GSM (global system for mobile communication) is a cellular network. GSM networks operate in four different frequency ranges. Most GSM networks operate on 900 MHz or 1800MHz bands. The transmission power was limited to a maximum of 2 watts GSM 850/900/300 and 1 watt in 1800 /1900. The longest the GSM specification supports in practical use is 35km(2mi). In this project we have use a SIM 900a based GSM modem to receive and send short message to user and system

C. FIRESENSOR:

The Flame sensor module has a photodiode to detect the light and op-amp to control the sensitivity. It is used to detect fire and provide HIGH signal upon the detection. Arduino reads the signal and provides alert by turning on buzzer and LED. Flame sensor used here is an IR based flamesensor

D. FIREBASE:

The Firebase Real time Database lets you build rich, collaborative applications by allowing secure access to the database directly from client-side code. Data is persisted locally, and even while offline, realtime events continue to fire, giving the end user a responsive experience. When the device regains connection, the Realtime Database synchronizes the local data changes with the remote updates that occurred while the client was offline, merging any conflicts automatically

E. NODEMCU

The NodeMCU board is based on an ESP8266-12 but features a built-in serial over USB interface and other amenities like 2 buttons and 2 LEDs. The board is compact and fits on a breadboard. The board can be programmed using the Wiring / Arduino framework as the other ESP8266 boards. more

C. Algorithm

A-STAR Algorithm

1) Consider a square grid having many obstacles and we are given a starting cell and a target cell. We want to reach the target cell (if possible) from the starting cell as quickly as possible. Here A* Search Algorithm comes to the rescue

2) What A* Search Algorithm does is that at each step it picks the node according to a value- f which is a parameter equal to the sum of two other parameters – g and h . At each step it picks the node/cell having the lowest f , and processes that node/cell

3) We define g and h as simply as possible below.

4) g = the movement cost to move from the starting point to a given square on the grid, following the path generated to get

there.

h = the estimated movement cost to move from that given square on the grid to the final destination. This is often referred to as the heuristic, which is nothing but a kind of smart guess. We really don't know the actual distance until we find the path, because all sorts of things can be in the way (walls, water, etc.).

Route guiding mechanism is used in the following project it takes the input from the fire sensors and detects where the fire is present schematic looks as:

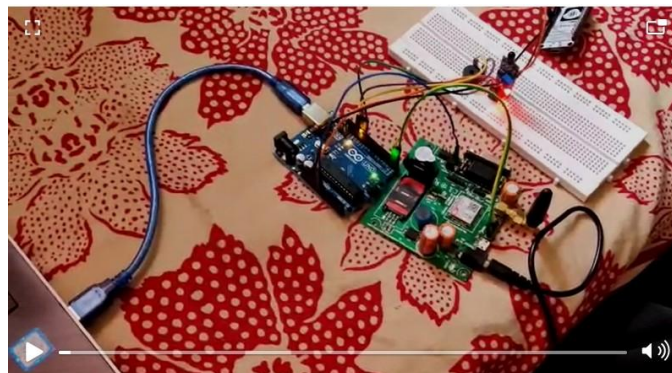
IV. RESULTS AND DISCUSSIONS

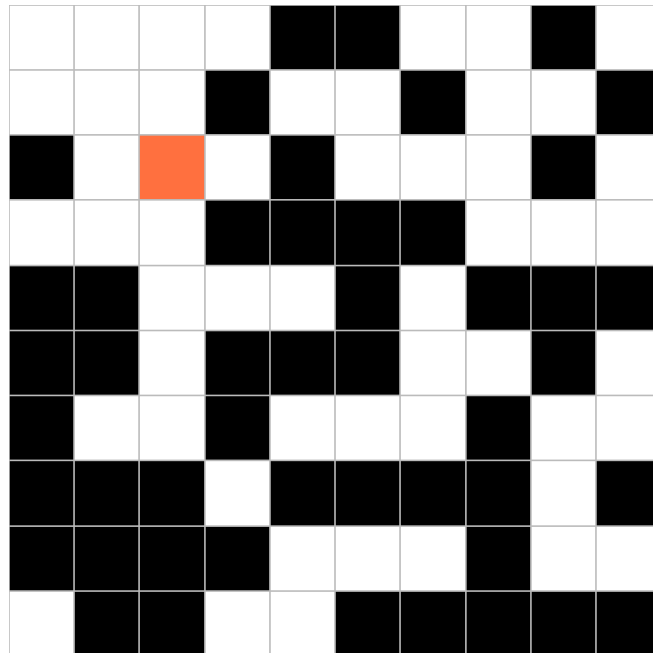
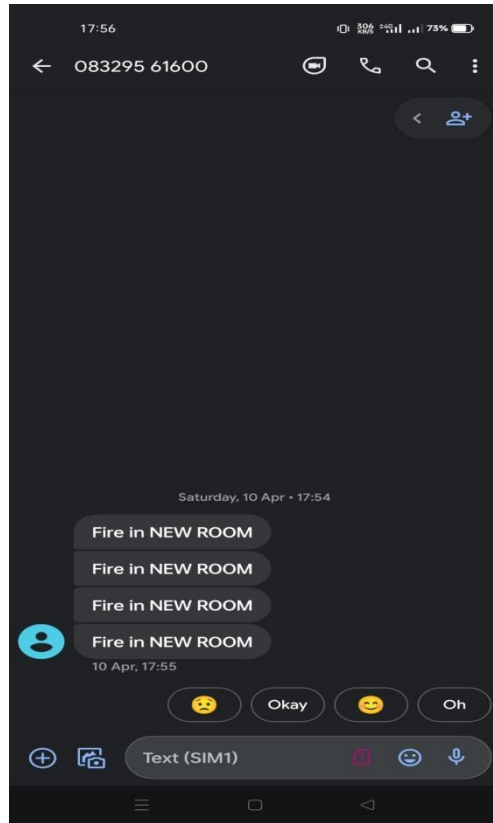
1. We can replace the microcontroller with an Arduino board. Also we can replace GSM module by Bluetooth transmitter. So that this project will be transformed into Arduino & Android based fire detection system using smoke & temperature sensor.

2. We can provide a voice feedback system. We can replace the microcontroller with an Arduino board. Also we can replace GSM module by Bluetooth transmitter. So that this project will be transformed into Arduino & Android based fire detection system using smoke & temperature sensor.

2. We can provide voice feedback system

Even further the addition of the map of the building would even guide you to the shortest escape route of the building and even tell you the nearest fire extinguishers located in the building .





LIMITATION

There are limitations as the time of fire many people tend not to look at the cell phones therefore the mechanism needs time to work and should be trusted as the time of fire the person in danger should be knowing that at the time of fire the route guiding mechanism will guide me safely

FUTURE SCOPE

This is much helpful as due to the loss of life might be reduced and if the proposed network works then it can be applied on large scale industries and might avoid fire based hazards eventually leading a safe life for workers working I the industry

V. CONCLUSION

The designed fire alarm system is simple but it has a wide area of application in household and industrial safety, especially in developing countries like India where the internet is a major issue. Using this system, quick and reliable alert response is possible to initiate preventive measures to avert danger of fire

small scale industries where cost is the major issue for them to buy internet. This is a cost effective fire alarm system which performs reliably to ensure safety from fire, and can be installed in houses, industries, offices, ware-houses etc. very easily. Large industrial or residential areas can be monitored through the proposed system installing multiple modules, each for one floor or unit. The system can be further developed with added features like web server interconnect, fire area tracking and fire extinguisher interfacing etc

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