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AFFILIATED TO BUTEX

PROJEECT TOPIC

Improved Fire Safety Automation Using Real-time Mobile
App Control System

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Improved Fire Safety Automation Using Real Time Mobile App Control System

Abstract:

Automation plays an important role in this modern era. We developed a new automatic method of fire detection, notification and suppression by using automation. Here we used a three-stage fire protection system for better performance and effectiveness that could be monitored and controlled by a mobile app.

In the first stage the photoelectric smoke detector will detect smoke and make the people concern as per required. If the fire continues to spread, we use a second stage detection system by IR based flame sensors and temperature sensor to measure the intensity of fire. In the second stage mass alerting and notification systems will be activated. In this stage automatic fire suppression system will be continued and other safety measures like electricity and gas supply will be turned off automatically and automated emergency exit windows will be opened. In the third stage a recorded phone call and text message with location and other detail will be delivered to the fire service and top management to get instant help. Mobile apps will deliver real time updates of the fire condition and perform automated tasks and will provide suggestions for further actions.

1. Preface:

Fire protection systems could save thousands of lives in the world. Traditional manual fire protection systems are less effective and harmful to humans. With the ease of automation, we developed a new method of fire detection, notification and suppression. that could work smartly without human assistance by intelligent program. If the fire could be detected at an early stage, then it could be solved without sacrificing lives and assets. Here we used a three-stage fire protection system for better performance and effectiveness that could be monitored by a mobile app.

2. Objectives:

- Automatically detect and prevent fire through a smart and effective process even in absence of humans.
- Easy rescue and exist by "Automated Rescue Window".
- To improve the design of the existing fire detection and protection system

3.Raw Materials and Equipment:

- Ionized Smoke Sensor (MQ2 Smoke Sensor)
- Carbon Monoxide Sensor (MQ7B Sensor)
- Flame Detector (IR Flame Sensor)
- Temperature Measurer (PT100 Sensor)
- Arduino Board
- Relay Module
- Emergency DC light
- Electric Door Lock
- Solenoid Valve
- Power Supply (Online UPS)
- Alarming System
- GSM & GPS module (SIM-808 Module)
- GSM Antenna
- GPS Antenna
- Wi-Fi Module (ESP8266 ESP01)
- Radio Commutation Module (NRF24L01 PA LAN)
- Exhaust Fan
- Firefighting Pump
- Arduino SD Card Module
- Mobile App

5.Methodology:

Here, an accurate and fast sensing is required. Then, an in-house system to solve the firing problem by suppression. In this system water and foam spray is required to extinguish fire. Then early notification to the fire service will help to the fire and reduce losses. Alarming is required to notifying the nearest persons who are in danger. A system could be used to the system at high temperature to remove toxic gas and draw fresh

Besides these automated features we have a manual Step forward and an emergency button to control these steps. Again, the whole system works with a dedicated power

supply and UPS for emergency conditions. And the wiring of this system will be short circuit protective, and the wire will be fire resistant.

6. Process Design and Set-up:

Our system works mainly in three steps to detect fire, to make the authorities and to prevent fire automatically.

Though we explain this from industrial perspective, this technology can be used in industries as well as residential or any other building.

6.1 First Step:

In the early stage of a fire, there will produce smoke and we indicate this as the first step. In this project, there will be a photoelectric "Smoke Detector" that will detect smoke in the earlier stage of fire. In this step, if we buzz an alarm to the whole building the mass general people may panic. So, in this situation, we have an alarm only for the adjacent room in which smoke is detected. For example, if smoke is detected in room no 2 there will alarm in rooms no 1, 3 & 6. Again, if the smoke is detected in room no 7, There will alarm in rooms no 3, 6, 8, 10, 11 & 12.

6.101. Schematic:



If Smoke are detected there will Alarm only to "Adjacent Room" rather than Whole Building

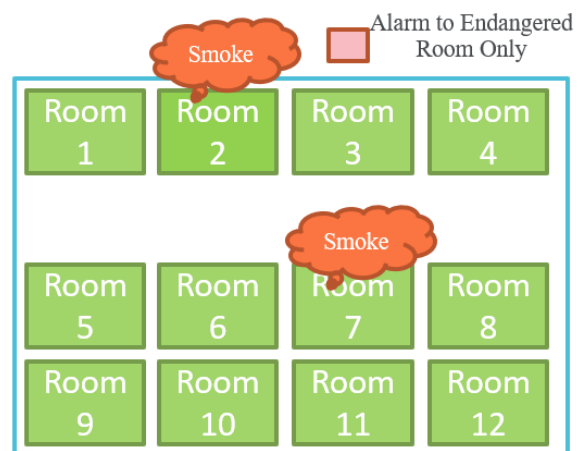


Fig: Schematic of 1st Step

6.2. Second Step:

If the first attempt fails, and the fire spreads a little more, the second attempt will start after the specified volume of fire has been spread. At this stage, there include some automated functions.

First of all, there will be an alarm for neighbors to make them conscious of fire. Secondly, there will be an alarm throughout the factory, that will allow all the trained people to help extinguish the fire, and help ordinary people to leave the building safely. Thirdly, the gas

and electricity connections of the entire factory will be turned off automatically, so that the gas explosion or electrical short circuit does not cause a terrible fire. And this operation will be by Wireless Radio frequency. Again, in this step fire*ng pump will be started automatically by Wireless Radio Frequency and by opening a solenoid valve, automatically water will spray to the room which is affected by the fire. In case of fire by Chemicals, sprayer device will start to spray fire extinguishing foam automatically. Generally, the grill of the Fire Rescue Window remains locked due to security purposes. In this step, the grill of our Automated Rescue Window will be opened automatically by an electric lock so that, in emergency cases they can be accessed easily and anyone can be go out of the room with an emergency roped stair. Furthermore, there will be an exhaust fan to ventilate toxic air where there is less air passage. This will reduce the harm of life and wealth.

6.2.1. Flowchart:

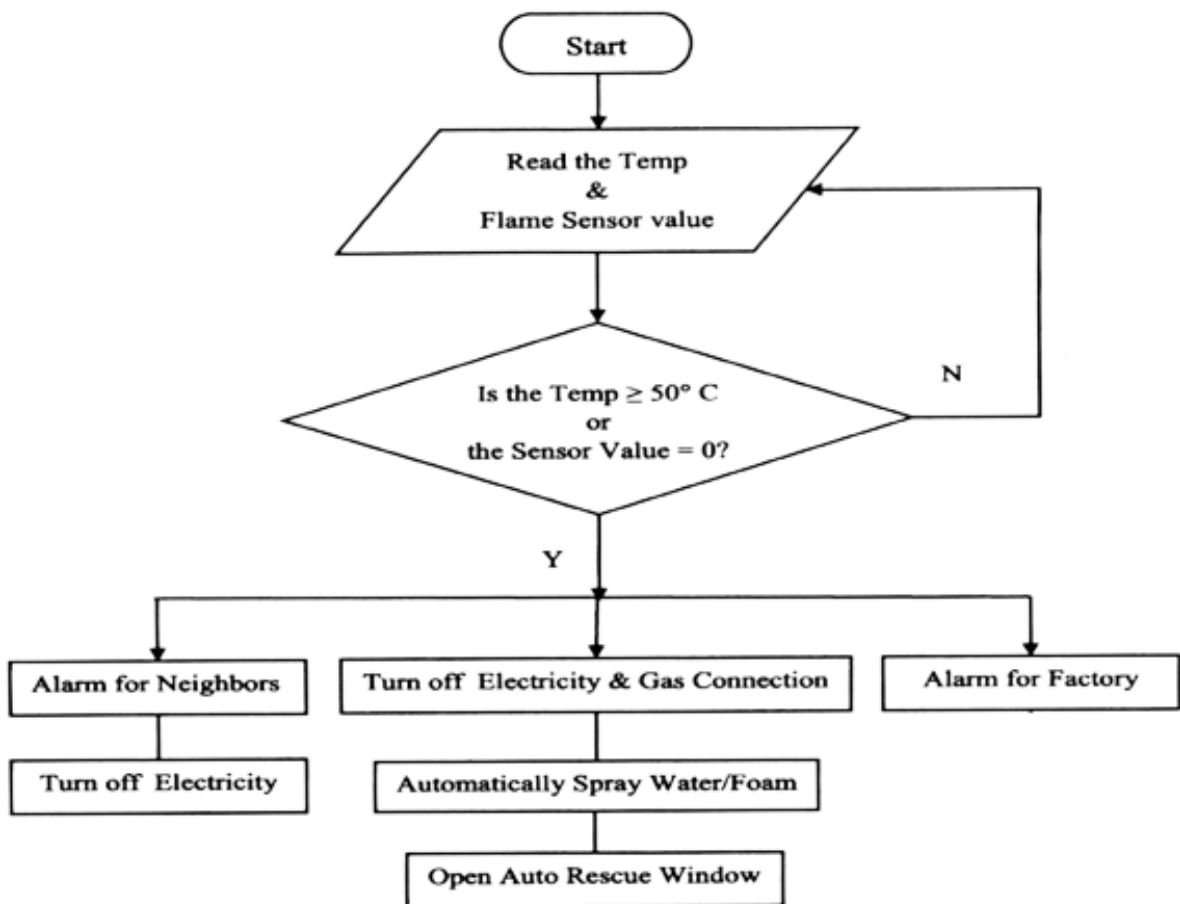


Fig: Flowchart of Second Step

6.2.2. Schematic:

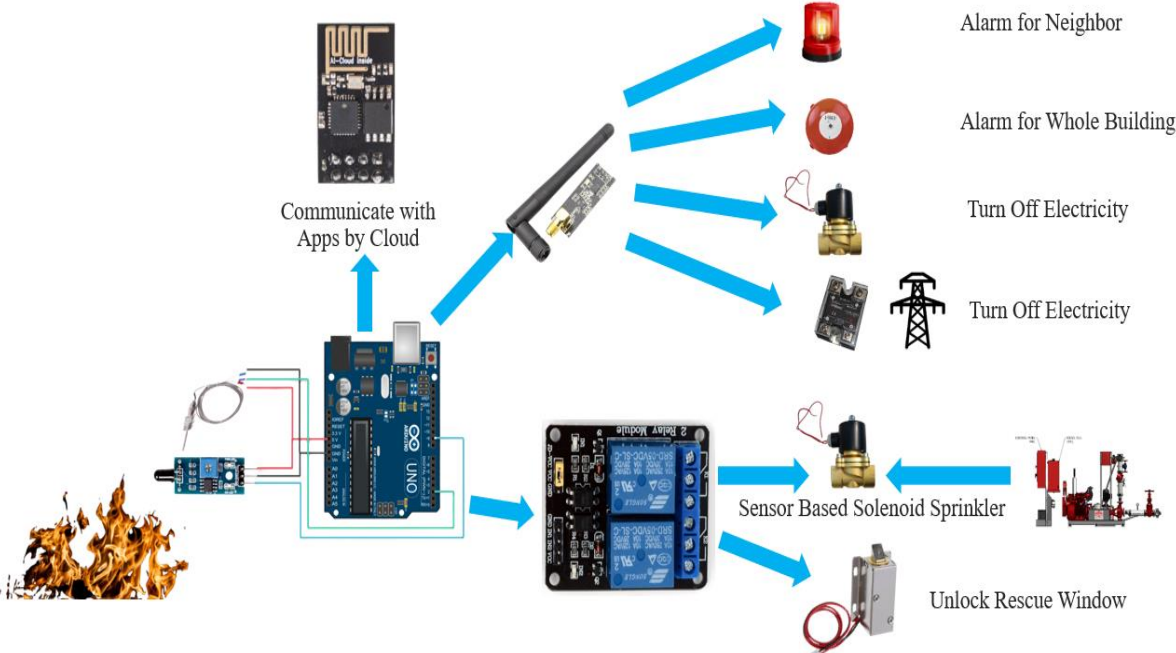


Fig: Schematic of 2nd Step

6.3. Third attempt:

If the second attempt fails, and the fire spreads furthermore, we mark this as 3rd step. The fire service must be assisted now. But in such a situation, it is a great hassle to inform them. Therefore, in this step, our project will have the facility to call the fire service automatically and send the factory location and the link of Google map through SMS to the fire service. Here also includes various exciting features for Calling and SMS. AND thereby our three stepped fire detection and suppression system works.

6.3.1. Flowchart:

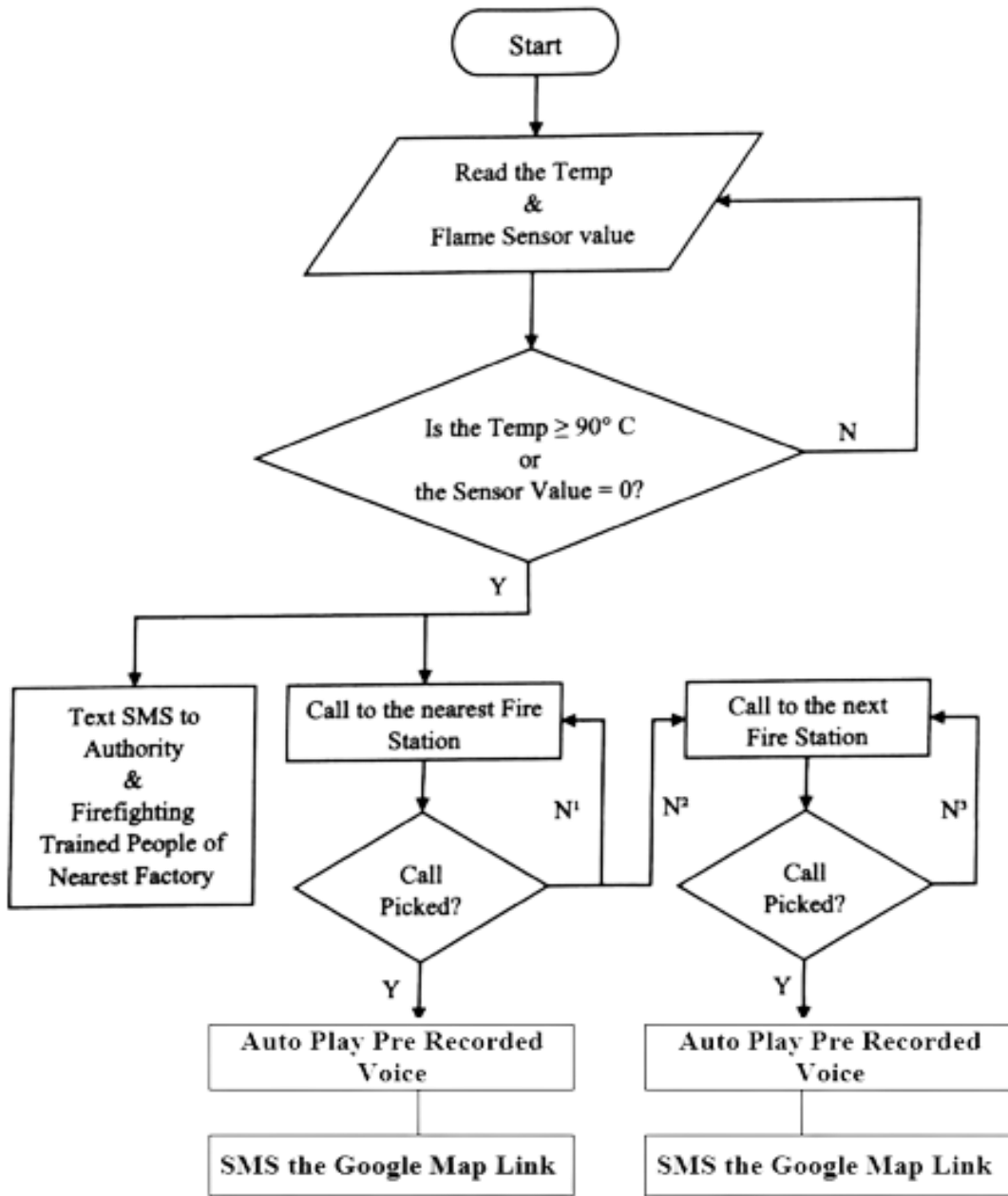


Fig: Flowchart of 3rd Step

6.3.2. Schematic:

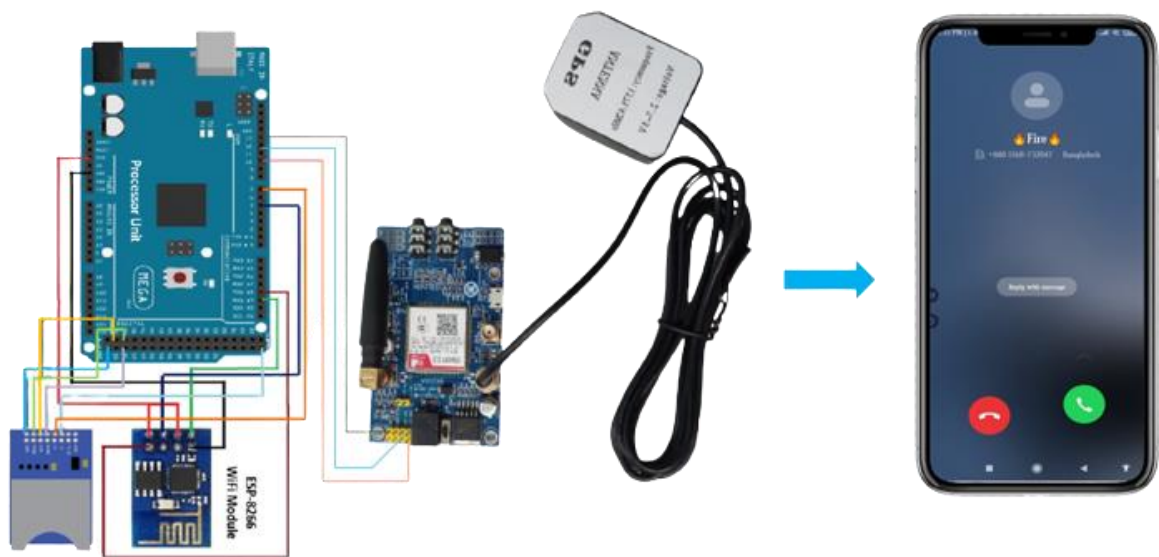


Fig: Schematic of Calling features of 3rd Step

7. Estimated cost:

Name of Materials	Unit Price	Quantity	Total Price
1. Photo-electric Smoke Sensor	2000	1	2000
2. Grove IR Flame Sensor	900	2	1800
3. M -2 Sensor	180	3	540
4. Tem rature Sensor M35	500	2	1000
5. Arduino Board	2300	5	11500
6. ESP8266 Wi-Fi Module	550	1	550
7. NRF24L01 RadioF uenc Module	500	2	1000
8. Ei t Channel Rela Module	900	1	900
9. Hi h Load Rela Module	1000	1	1000
10. Electric Door Lock	1100	1	1100
11. Solenoid Valve	2000	2	4000
12. Demo Alarmin S tem	500	1	500
13. Miniature Firefi tin Pum	1200	1	1200
14. Miniature Exhaust Fan	200	1	200
15. GSM & GPS Module	4000	2	8000
16. GSM & GPS Antenna	1000	2	2000
17. DC to AC Inerter	3000	1	3000
18. DCPowerS 1 12VBatt	2000	1	2000
19. Five Volt and Two Ada ter	200	3	600
20. Arduino SD Card Module	250	1	250
21. APR33A3 Voice Record Module	500	1	500
20. Miscellaneous			4000

Total Cost = 47640 TK

3. Conclusion:

At last we like to say confidently that Those three steps of automated prevention and alarming systems will help to reduce the percentage of damage to life and property during a fire accident.