IoT-based Fire Analyzer and Fire Fighting System

Shaik Fayaz Begum, K. Yaswanthi, R. Yogitha, V. Sreenath Reddy, and S. Mohammad Maaz

Abstract Assuring minimum safety of the workers at the work places as fire accidents are occurring in factories and other workplaces which had been one of the major issue that the workers are facing in current days. In this paper, an Internet of things (IoT)-based fire detection system is intended to keep individuals from fire by giving an alarm message in the crisis, and analysis of a brilliant IoT framework will be done. Fire identifiers are used to perceive the fire or smoke, and automatic fire extinguisher can help in saving lives. At the present time, IoT-based caution has been arranged using temperature and smoke sensor. It wouldn't simply signal the closeness of fire in a particular explanation yet will in like manner send-related information to convenient through IoT. By using the fire sensor, smoke sensor and there is an easy to cutting edge convertor. This project can encourage various new experts to do research in the impending space of IoT.

Keywords Internet of things (IoT) · Arduino etc.

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1 Introduction

A fire is a state of consuming that conveys the bursts and warmth. The fire might perhaps make hurt its occupants and serious mischief to the property. Mechanical security overview magazine communicates that there are 25,000 individuals passed on due to fire setbacks in India in the hour of 2001–2014. The damage of designs and loss of human existence can be happened due to fire disasters in the endeavors. This current assessment tries for to find the staff qualities of business factors and work factors that incorporate which prompts fire accident in the business. Balance of fire accident and fire risk level control inconvenience is extended bit by bit. Extinguishing fires and noticing conditions are extraordinary today. They focus on work on the science and development in contradicting fire calamities. They are stressed over the utilization of new development, for instance, IoT and far off sensor orchestrate in extinguishing fires and noticing field. IoT is really proper for extinguishing fires with wide degree close by far off sensor network. A critical piece of fire protection in the business is to develop the prosperity structure by using caution sign to the relationship by strategies for IoT development to the enveloping domain in the business. The possible profound damages and troublesome costs on both condition and organization require extra improvement of prosperity procedure and choice of legitimate methods in dealing with risks in industry and quick action on standard working methodology in the event that there ought to be an event of appearance of dangers detected.

The fire disaster from Hong Kong shipyard is a critical episode which gave to search for respect for the impossible capacity of hazards like fire shoot in term of ruin of human existence, their prosperity and assets, and getting through impacts. The woods fire can be constrained by utilizing IoT-based alert system which is used in every one of the organizations to keep from the fire mishaps. A fire incident has wounds offers to the workers eliminated eliminate a sad setback's very own fulfillment to a basic degree. Second and seriously roasted regions routinely leave dreadful scars, and if these scars are instantly clear, then the settlement will generally be higher as a result of excited hurts. Consume wounds can leave a harmed person with endless distress or loss of conveyability as well, the two of which will require advancing activity-based recovery. It is gigantic to realize the issue state of fire risk in the business present to the earnestness of accident and effect the authority measures to control. The effects will be capable assuming fire will make change state to smother themselves due any human or mechanical disillusionment causes and clearly impact the human existence nearby and working condition. The place of this assessment about risk presents in condition which can be lead to fire setback in the affiliation. The fire accidents occurred in adventures should be recognized by using this way of thinking, and sensible exercises in expected to control the fire disaster in the ventures are ought to be made. The backwoods fire risk must be distinguished and give the answer for firemen utilizing the IoT innovation, the untamed life sanctuary and the creature lives in the timberland are to be saved. The greatest part of the significant that fire detection system is new widely used in various safety and security applications. The major amount of fire accidents occurs due to electric short circuits. It leads to

damage the property. To avoid this damage, we are using this IoT-based fire detector and extinguisher system. This can be implemented in many places like colleges, apartments, companies, factories, etc. Normal traditional fire detection systems will only detect fire and blow alarm. In IoT-based, it sends message to the head of the property and its automatically fire extinguishers.

2 Literature Review

2.1 Automatic Fire Detection System Using Arduino

Automatic fire detection using Arduino's paper was published by R. Angiline, Asst Prof CSE Aditya' s, B.TECH Abhishek B.TECH in year 2009.

A. Outcomes
   Rings alarm if fire or smoke is detected.
B. Limitation.
   Rings alarm only, it will not send any message to head. There is no extinguisher system.

2.2 Fire Detector and Extinguisher System Using Arduino

Fire detector and extinguisher system using Arduino's paper was published by AV Duraivel, S. Naveen in year 2017.

A. Outcome
   It will detect fire and automatically it gets extinguisher using fan or sprinklers.
B. Limitations
   Using external interface like Wi-Fi module or GSM to send message to head.

3 Methodology

3.1 Existing System

- In existing system, we had used normal fire detection alarms which are there from the early 2000s.
- But there is a disadvantage with this detection alarm which is that it only rings the alarm, but no extinguishing measures have been taken.

There are many fire security systems which only make the alarm or buzzer sound and LED to glow when the fire is detected and smoked (Fig. 1).

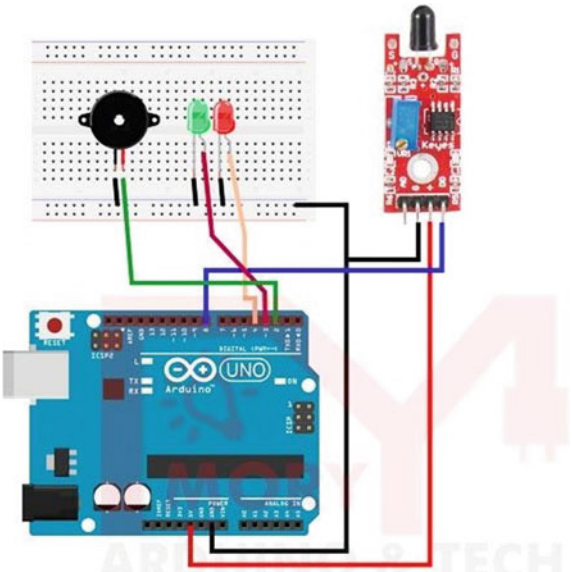


Fig. 1 Fire detection alarm circuit

- Its waste of alarm when there is no one at the site when the fire is detected. The alarm will be beeping, but no one will be at the site.
- So, then, we updated to fire detection and automatic extinguishing system. In this, it will detect the time using sensors and sends the signal to microcontroller board, and it sends some signals to DC load fan to extinguish.
- But the problem is, there is no communication with head of property and who is staying in that property.
- So we have updated to send message and automatically time extinguish.

3.2 Proposed Methods

As seen in existing system, the projects and fire detectors only detect fire which is of no use when we are not in the spot or sight. In our project, we are going to detect fire and also extinguish it by using12V DC fan so that we can make fire get blowed off. And we are going to add a new feature where you get a notification to your mobile phone or any electronic gadget you are using by the use of the application called Blynk application. Blynk application is IoT-based application where you can monitor or get warnings, alerts based on your programming during app settings. Here, we are using NodeMCU instead of Arduino uno. Arduino uno is a microcontroller which does not have a Wi-Fi connectivity. As NodeMCU consists of in built Wi-Fi module where we can connect to the Internet and trigger its pins which they are connected to the sensors externally. We will be connecting flame sensor where we will be connected to the NodeMCU. Whenever the flame is detected, it triggers the DC fan which is

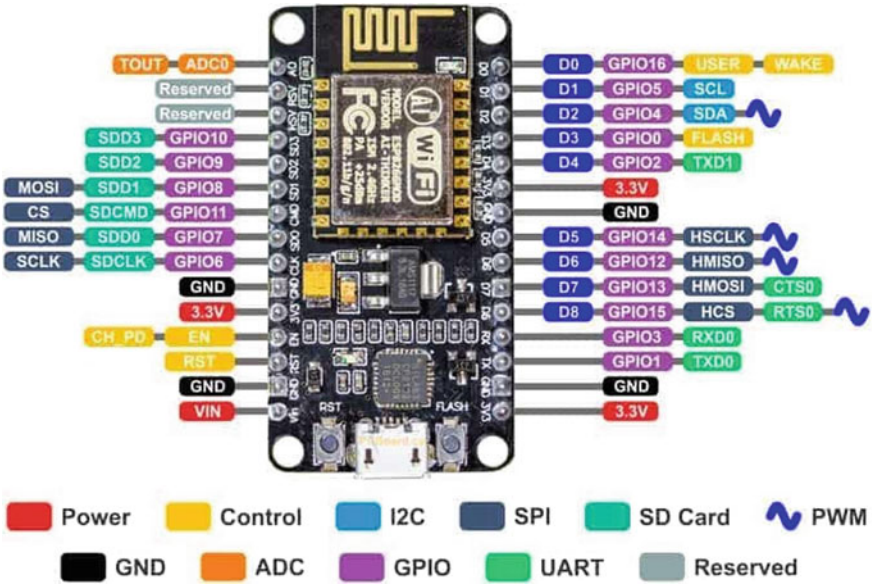


Fig. 2 NodeMCU feature

connected to the other pins and make relay module as open switch. So that DC fan gets started, and flame gets blowed off. And also it sends the notification to the Blynk application that all need to be done during programming. Because of this, we can alert the site or area which is going to be made bad because of this fire accidents (Fig. 2).

3.3 Block Diagram

We are using IR sensor or flame sensor for detecting the fire and ESP8266 (NodeMCU), it is a Wi-Fi module actually, and relay acts as switch and 12 V DC fan for extinguishing the fire (Fig. 3).

4 Results and Discussion

5 Result

Fire detection and controlling system using NodeMCU ESP8266 are made.

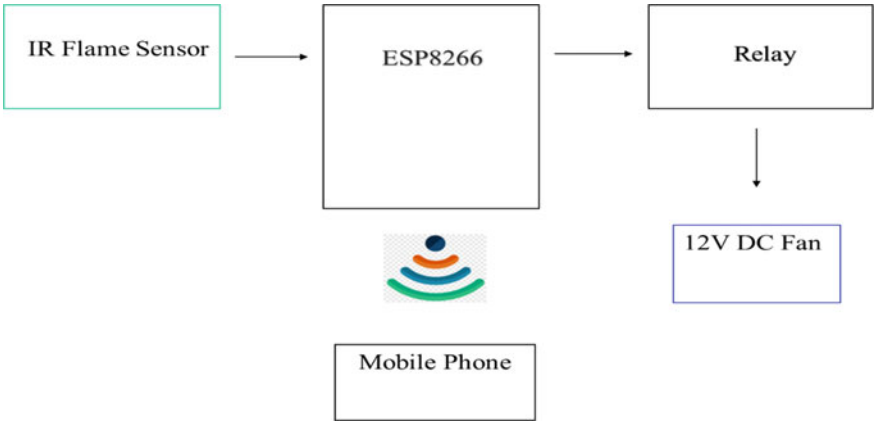
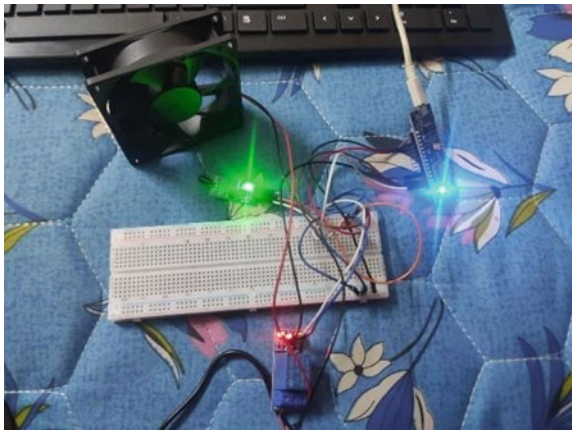


Fig. 3 Block diagram

This IoT-based project detects the nearby flame using an infrared flame sensor, and then, NodeMCU triggers the relay to extinguish the fire automatically.

It also informs the authority using IoT Blynk application (Fig. 4).

Fig. 4 Result



6 Future Scope and Conclusion

6.1 Future Scope

Mainly, the identifiers were for the recognition of intensity. As time and innovation progressed, identifiers additionally utilized for the fixed temperature, pace of rise, rate expectation, and direct. Till today, these finders are being used for various applications stay a suitable method for location, however, not with the end goal of life well-being. Using the thermistors and product/firmware of the finder and the framework, we really observe that the response time index (RTI) of an intensity locator will be decreased so the recognition of the warm occasion would be all the more immediately recognized. Alarm frameworks, not withstanding, were planned and introduced in the most of the uses for life well-being. A main finder is utilized for this application which is the smoke alarm. Smoke alarms and smoke cautions are the absolute strategy for the early recognition of the fire and would have saved incalculable lives. This gadgets anyway have a guideline issue that is a hotspot for undesirable cautions. Starting from the original of smoke alarms were delivered, there have been various headways to both diminishing the hour of discovery while simultaneously decline the actuation of the indicator when these results of ignition are absent. Smoke alarms and cautions are relocating from only the discovery of smoke, to mix finders and multiple indicators. In future, the finder would be even more a effective sensor, with the location something else for the results of ignition, for example, carbon monoxide (CO), carbon dioxide (CO_2), sulfur dioxide (SO_2), nitrogen oxides (NO) not withstanding intensity and particulate matter. Sensors will likewise can detect or follow when a room is involved or not and can be coordinated with inhabitant warning and departure. The improvement of further developed calculations and computerized reasoning, both inside the actual sensor and in the frontend control unit would diminish the time from the outset of a occasion to the warning of the occasion.

It is not unlikely that the recognition innovation will be actually want to identify a beginning stage of the fire instead of the blazing stage. This simultaneously could lessen the probability of an undesirable initiation from happening. Inside the following 10 years, video picture recognition (VID) will turn out to be more standard in which, through examination, the picture of one or the other smoke or fire will actually want to be segregated and distinguished from inside a room or space. The VID framework would likewise have the option to identify on the off chance that an individual is inside the space and through the mix with the notice machines, give a way of exit.

As per the notice of the inhabitants, inside the (US) United States, we are still fundamentally giving an alert all through the inhabitance and believing that the tenants will regard the admonition and go to the closest exit.

Consider this to be for future with notice inside a reason, in which the identification of fire framework will, through the sensors, know where the tenants are corresponding to where the caution is being produced from and have the option to direct them from

the occasion to an exit. This might be through informing by means of warning machines yet could likewise be through the point of interaction of the discovery and notice framework to the shrewd gadget that the structure inhabitants would have on them.

Inhabitant area is likewise indispensable data for specialists on call. Right now, in the event that there is a functioning fire inside a construction, the principal obligation is to play out an essential hunt, and afterward an optional pursuit of the structure to verify that nobody is still inside.

7 Conclusion

In this project, we designed and implemented a fire detection and controlling system using NodeMCU ESP8266 which is very much necessary and helpful for fire detection and security purpose.

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