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IOT Based Fire Detection System with Camera Monitoring

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Abstract: ***Fire Detectors play a awfully necessary role in Industries, Shops, Malls, Residential complexes, parking areas, etc. fireplace detection and its corresponding safety systems area unit are crucial elements of any building or house. Facilitate {they assist} in detective work fireplace or smoke at Associate in Nursing early stage and might help in saving lives. industrial fireplace detective work systems typically have Associate in Nursing alarm signalling, with the assistance of a buzzer or Siren. we've got designed Associate in Nursing IOT primarily based fireplace Alerting System exploitation fireplace sensing element, temperature and humidness sensing element which might not solely signal the presence of fireside in an exceedingly explicit location however also will send connected data through IOT. Internet of Things (IoT) is essentially the network of 'things' by that physical things will exchange information with the assistance of sensors, physics, software, and property. These systems don't need any human interaction. net of Things (IoT) primarily based systems have revolutionized the manner world systems area unit inter-connected through net. nowadays the appliance of IoT primarily based systems is be real time detection and warning system. However, value has been a significant issue for development and implementation of IoT systems. Considering the price, simple implementation, this project proposes a coffee value however economical IoT system for warning and alerting the fireplace incidents with location details similarly as image footage. this is often a cloud-based system that uses sensors (hardware) to find fireplace and alert the user through SMS and therefore the same information is uploaded to cloud memory within the blynk app. The demo model is intended with 3 fireplace sensors to find fireplace at 3 totally different locations, DH eleven sensing element to browse temperature and humidness information, GSM to send SMS, GPS to browse location details, psychic phenomena thirty-two local area network module with camera to send image pictures and alarm to alert the environment. during this Arduino primarily based fireplace device exploitation temperature and humidness sensing element exploitation the IOT project, we will send LIVE data like fireplace, temperature, humidness price detected by a specific device to the fireplace Department in conjunction with its location details.***

Keywords: ***Internet of Things (IOT), DRT11 Sensor, H-Bridge, GSM Module, GPS Module.***

I. INTRODUCTION

Generally, most of the fire disasters occur at an industry places, housing complexes and public entertainment places like theatres and parks etc in these disasters fires were most destructive elements which not only caused the infrastructure but also took lives of many people which is very heart breaking, these types of disasters are improving year by year with increasing in development of urban construction. So, in order to protect the property and lives of many people we need to provide early detection and warning so that the people get alerted way before the happening of the disaster which gives them a way to avoid the cause up-to some extent. Therefore, there is a need to provide some intelligent system within the industries and some buildings if needed to save the lives of many innocent people. The main concern of this project is supposing a fire disaster took place in a particular zone of many zones at any industry or some housing complex, the owners as well as the fire savers may not know the fire existence and the extent at which the disaster took place. In this project we made use of the Arduino as our microcontroller And we made use of many components like the GSM which is responsible for the sending fire alert SMS for which we need a sim card to be inserted , the phone number is given in the code with the alert message to which the SMS will be sent, GPS for sending the live location of the disaster place ,esp-32 wi-fi module with web cam which is used to take the snap of the disaster place and update it to the third party server using blynk app, dc motor for pumping the water on the fire , dht-11 for sending the temperature and humidity at the live location and buzzer to alert the surrounding people which are controlled by the Arduino. Finally, we have divided the industry into three sensitive zones at which there are high chances of getting a fire accident occurred and these zones are made to monitored by a web-cam in esp-32 Wi-Fi module so as soon as some fire is detected in a particular zone this cam will take a snap at send to our blynk app which we had to configured to our project along with this all the above-mentioned features are used and finally the project was tested successfully.

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II. LITERATURE SURVEY

We have referred variety of existing models and located them helpful to our work. Ondrej Krejcar projected a model for location sweetening and personnel chase mistreatment Wi-Fi networks. In this, he has diagrammatical the system idea that's employed in handling info of location and management unit operations. the placement of the user gift within the building, is obtained through Wi-Fi access points. we've got studied this to know the usability of the Wi-Fi networks in live chase so have used this practicality to trace hearth and provides info regarding location of fireside to varied devices intimating individuals regarding the mishap.

Ahmed Imteaj et.al. Studied the issues faced by manufacturing plant staff in times once hearth breaks out. They projected a system mistreatment Raspberry Pi three that is capable of police investigation hearth and providing info regarding space of fireside. The Raspberry Pi controls multiple Arduino boards that are connected with many motors and cameras to capture the hearth incident. In this, they mentioned regarding the trendy technology which will be wont to scale back extraordinarily unfortunate accidents caused by hearth. we have a tendency to designed the full system and calculated its effectiveness. Authors in have studied the security options in home and industrial areas. they need designed new model mistreatment WSN. Not solely have they incorporated temperature and humidness sensors however additionally enclosed hearth and smoke sensors whereas developing the model. They gift a preceding study of WSN is in a position to observe hearth alarm. it's for fitting a wireless detector network with 3 sensors. associate application was developed for obtaining home info.

Azka Ihsan Nurrahman, Kusprasapta Mutijarsa have projected a model for a centralized management system for homes or offices that helps higher in managing the security options. In this, home management system is needed. this technique controls the area lights by turning on and off mechanically, it keeps the record of use of device standing, turning on and off the ac regulator mechanically, it displays the area temperature in home. If hearth is detected in the house, it activates mechanical device reception, it supervises reception via police investigation cameras, take photos and store them as well as recordings of police investigation reception, it detects the movements of individuals reception, and supply notification once somebody enters the house

III. METHODOLOGY

Here first we start the setup buy giving power supply ,then the Arduino seeks analogue input from the three fire sensors present at three zones then the analogue is converted to digital 1's and 0's where 1 indicate presence of fire and zero indicate no fire , so initially the cam is at zone 1 position so if the Arduino reads a high from fire sensor 1 then no rotation takes place but just the cam clicks the snap and buzzer is made high ,message is sent using gsm, sprinkler is switched on similarly if a high is read at zone 2 the cam is rotated buy 90degree but motor and the respective modules will be switched on as like in case 1 and similarly for zone3 where the cam is rotated 180degree from the initial position and the rest of the modules will do their work. If no fire is sensed the Arduino keeps on reading until a sense happens.

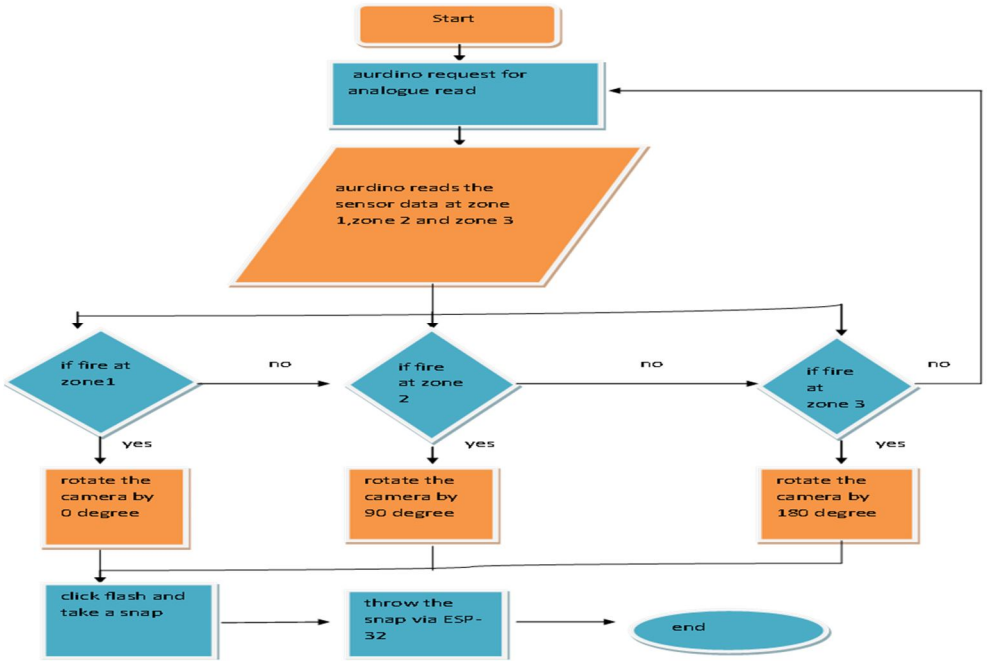

Fig: 1- Flowchart of Protocol

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IV. IMPLEMENTATION OF PROTOCOL

Arduino is the central hub which acts as the microcontroller to control the activities of the other modules, we make use of three limit switches to tell the Arduino about the position of our web cam (like in which zone it is) ,gsm module will acts as input/output pin, GPS to the input of Arduino and also we make use of h-bridge(automotive switch)for controlling of the motor rotation to rotate the web cam and relay which acts as a switch to control dc pumping motor to sprinkle the water on fire we 12-0-1 centre tapped step down transformer for the power supply where 230v is step downed to 12v where we use 7805 to supply 5v and 7812 to supply 12v, we use 12v for operation of motors and 5v for rest other components , we also provide the dht11 sensor as an input to Arduino finally we write code In the Arduino IDE and use the code burner kit called FTDI , it's like a programmer to program the ESP-32.

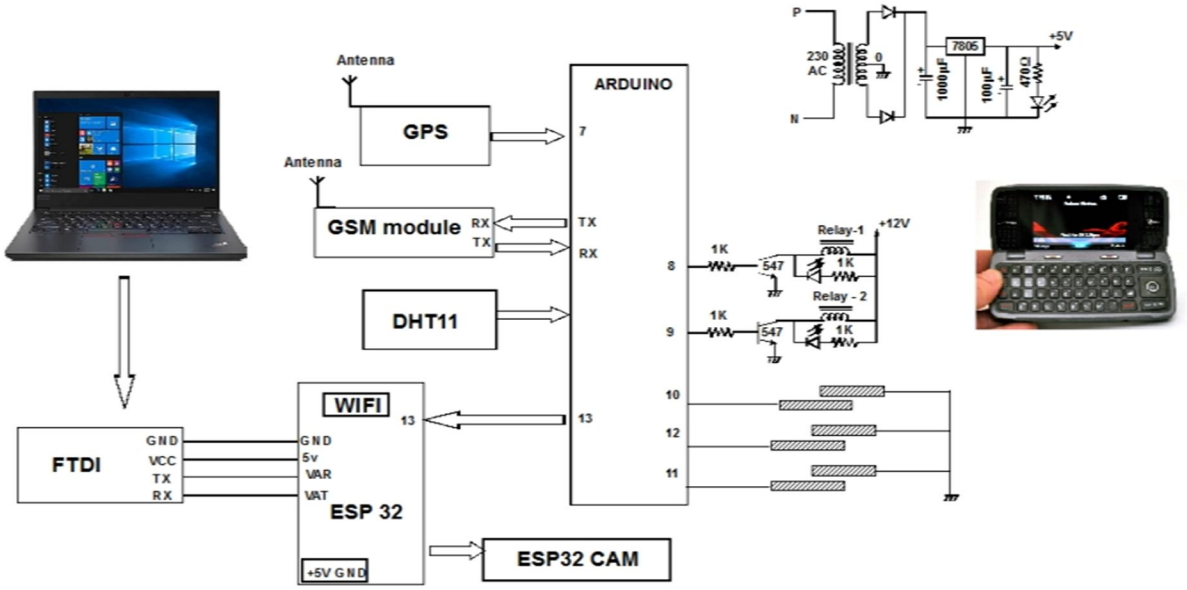

Fig:2- Implementation Overview.

V. RESULTS AND DISCUSSIONS:

We have successfully completed our project with proper demonstration; the screenshots of our outputs are given below**:**

1) GSM module sent a message to our phone with fire alert message and the google location along with temperature and humidity at that particular location we used a sim card for communication from the setup to our mobile phone

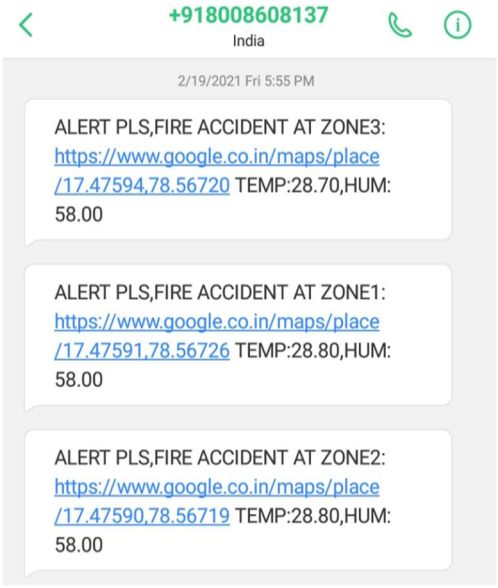

Fig:3-Fire Alert message sent to Phone.

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We get a mail also with some alert message, the mail id to which the message should be sent will be given in the code this is shown below.

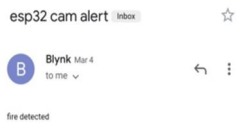

Fig:4- Message receiving on E-mail stating that Fire is detected.

The interface of the blynk app on which we can see the snap took by the esp-32 web cam is shown below I have given it a name as IOT_fire we can see the pic in the rectangular box called as the virtual memory(v4) as soon as the pic is clicked .

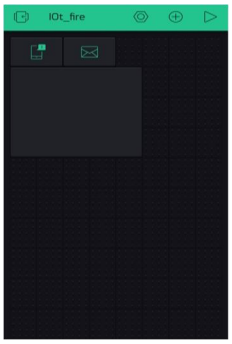

Fig 5: Interface on Blink App.

VI. CONCLUSION

This project is made and tested successfully in order to make the monitoring of fire accidents in an effective manner at some industry. Generally, there are many sensitive zones in an industry which are tough to monitor manually so this monitoring with web cam which rotates as soon as the fire is detected at any particular zone makes the life easier. In fact, the project which is developed is a bit cheap when compared to other systems which are already present. The ability to detect the temperature and humidity is undeniable because of presence of dht11 sensor in the system. This device can be applied in various areas due to its simplicity in handling, for areas related to gathering of crowd, people. Users can simply apply this setup in their areas for early alerting them from fire . Whenever a flame of fire is detected by the fire sensor placed in a zone it alerts the fire savers through gsm as well as the people around through buzzer and also fire will be blow off by the dc motor by pumping water on-to it however the capacity of the motor depends on your application .

VII.FUTURE SCOPE

In our project we made use of only three zones assuming they are fire sensitive zones but we can have n number of zones as per your requirement and also we can incorporate 24/7 live cam recording for even more effective monitoring so that the event of the disaster can be retrieved from the records for even more better analysing of why the cause happened and we can make this system as prediction system rather than sensing system by making use of some machine learning techniques by providing some data sets as input to the system based on which the system is made even more worthful.

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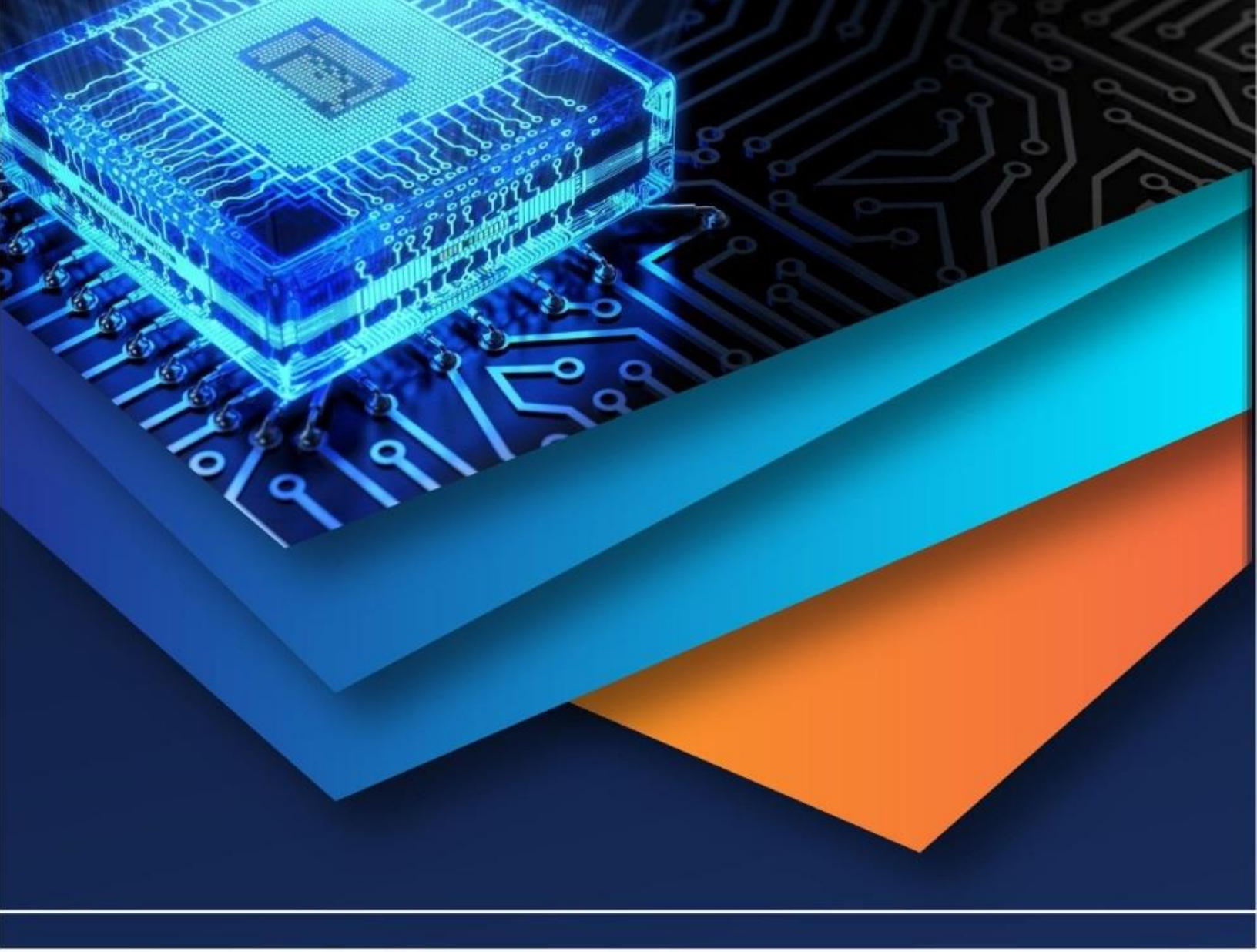

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