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IoT BASED RESPONSE SYSTEM FOR GLOBAL APPLICATIONS USING RASPEBERRY Pi

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Abstract— IoT (Internet of Things) is an arrangement of entomb relating PC gadget, objects, individuals, computerized and mechanical modules that are outfitted with intriguing identifiers and ability to trade data over a framework without anticipating that human to human or human to PC association. In present situation the cataclysmic mischances that are happening in instructive organizations, doctor's facilities, processing plants, and ventures are for the most part because of flame. To keep away from the harm because of these fire mishaps, the proposed framework will actualize a fire identification and confirmation framework utilizing Arduino which will give the quick reaction and can give the data of influenced locale alongside the area. This proposed framework will be under the control of IoT. The proposed framework will end up being more compelling and supportive. Along these lines, by using the proposed structure it can diminish the death toll and property in light of the fire disasters and the nation economy won't be influenced by these sad mishaps. In this framework will utilize an Arduino, sensors, Wi-Fi module and a camera. A Servo engine will be associated with the camera so that; it can pivot and can see the zone where the fire is identified. Arduino programming is utilized keeping in mind the end goal to execute the proposed framework.

Keywords—IoT, Arduino, Buzzer, sensors, Digital camera

I. INTRODUCTION

George Osborne, the past British Chancellor of the Exchequer, set that the Internet of things is the accompanying period of the information insurrection and referenced the between system of everything from urban transport to remedial contraptions to family unit machines [6]. The ability to compose introduced peripherals with limited CPU, memory and power resources infers that IoT finds applications in relatively every field. Such systems could be in charge of social affair information in settings going from consistent organic networks to structures and mechanical offices, in this way finding applications in fields of natural identifying and urban orchestrating. For example, smart shopping systems could screen specific customers purchasing inclinations in a store by following their specific PDAs. These customers could then be outfitted with phenomenal offers on their most cherished things, or even zone of things that they require, which their icebox has normally passed on to the phone.

Additional points of reference of recognizing and affecting are reflected in applications that plan with warmth, water, power and imperativeness organization, and furthermore voyage helping transportation structures. Different applications that the Internet of things can give is empowering expanded home security highlights and home mechanization. The idea of a "Web of living things" has been proposed to depict systems of natural sensors that could utilize cloud-based examinations to enable clients to think about DNA or different molecules. In order to avoid the accidents that are causing due to fire [7], we have implemented a system which is mainly based on Arduino and Internet of Things. The Internet has just brought a huge number of individual's together and made associations that were at no other time conceivable. IoT will interface for all intents and purposes each protest the Internet, preparing everything from furniture and ways to nourishment and toiletries with sensors to gauge and send information to the cloud[1]. At the end of the day, everything will be "keen." The ramifications of IoT are enormous: The whole planet will wind up brought together, cerebrum like framework. In basic we can state the Internet of Things (IoT) is an arrangement of interrelated figuring gadgets, mechanical and computerized machines, articles, creatures or individuals that are given one of a kind identifiers and the capacity to exchange information over a system without expecting human-to-human or human-to-PC cooperation. In addition to this we have used Arduino as our platform because it makes our system more efficient and also cost effective. So, this proposed system is used to reduce many of the factors such as loss of life, property etc., in this system we have used Arduino, Temperature sensors (DS18B20), GSM module, NodeMCU module and a Buzzer.

II. BACKGROUND

Robert Sowah et al. (2016) "Design and Implementation of a Fire Detection and Control System for Automobiles Using Fuzzy Logic" ISSN No: 978 IEEE conferences. In this paper [2] they proposed a method to reduce the accidents that are happening on the roads due to unwanted fire. The huge advantages of flame in street transport can't be over accentuated. In any case, in excess of two thousand vehicles are harmed by undesirable fire once a



day. On a worldwide scale, combustible misfortunes to the car and protection ventures have kept running into billions of dollars in the course of the most recent decade. A not really far off contributory factor is the absence of an advanced fire security framework on the car. This has been tended to by planning and actualizing fluffy rationale control framework with input over an Arduino smaller scale controller framework. The robotize framework comprising of fire sensors, temperature sensors, smoke sensors and a re-designed versatile carbon dioxide cooling unit was tried on a medium measured physical ear. Results demonstrate that the car fire discovery and control framework without false cautions recognizes and stifles fire under 20 seconds. A creative, exceptionally encouraging arrangement module for equipment execution in flame location and control for autos has been produced by utilizing new calculations and fuzzy logic. At long last in this paper they have reasoned that confirmation that fire episode has not any more deadly outcomes in the car and particularly in electric autos where the a large number of battery cells driving the vehicle have a tendency to overheat, burst into flames and detonate conveys new quality to street transport well-being. Calculations got from sound thinking thoughts have been executed and tried, utilizing fuzzy logic innovation inserted on an Arduino board. Vehicle fire has been identified and smothered viably without driver's intercession and is without false cautions in light of ebb and flow testing. This multi-sensor fire recognition and control framework is a helpful ease modern framework, which can likewise be tried and sent on different frameworks where forced air systems have been introduced. With framework's magnificent execution under 20 seconds, it is normal that framework will represent no risk to human life albeit broader testing may be required. In addition, fabricating a fused usefulness that arrangements with forecast of the soundness of sensors will be helpful to the continuous identification and control of in-vehicle flames and fill in as mode for preventive support. Genuine framework usage in vehicles without existing versatile carbon dioxide cooling blowers ought to be finished with the 2Kg chamber mounted in the upright position, ideally behind the back seats of the traveller lodge.

Liyang Yu et al. "Real-time Forest Fire Detection with Wireless Sensor Networks" ISSN No: 7803 IEEE conference 2005. In this paper [3] they proposed a method based on wireless sensor network paradigm for real-time forest fire detection. The main aim of them is to identify and foresee wood fire quickly and precisely with a specific end goal to limit the loss of timberlands, wild creatures, and individuals in the backwoods fire. The remote sensor system can recognize and estimate woods fire more instantly than the customary satellite-based identification approach. This paper for the most part portrays the information gathering and preparing in remote sensor systems for constant timberland fire discovery. A neural system technique is connected to in-arrange information preparing. They assess the execution of our methodology by reproductions. Remote sensor organize worldview for continuous backwoods fire identification. The remote sensor system can distinguish and estimate wood fire more expeditiously than the conventional satellite-based recognition approach. This paper mostly depicts the information gathering and preparing in remote sensor systems

for constant backwoods fire location. A neural system technique is connected to in-organize information handling. They assess the execution of their methodology by reproductions. In this paper they investigate the utilization of remote sensor arrange innovation continuously woods fire recognition. The forest fire is a deadly risk on the planet: it is accounted for that an aggregate of 77,534 rapidly spreading fires consumed 6,790,692 sections of land in USA for 2004. Satellite based checking is a prevalent technique to recognize backwoods fire now. Be that as it may, the long output time frame and low goals of satellites confine the adequacy of the satellite-based timberland fire identification. Also, satellites more often than not can't conjecture woods fires before the fire is spread wild. At last they have inferred that they utilized neural systems to draw out the lifetime of the sensor organize. The reproduction results demonstrate that their in-organize preparing approach is proficient to decrease interchanges between sensor hubs. They trust their neural system situated in-arrange handling approach can be connected to other observing and identifying sensor systems.

Thou-Ho (Chao-Ho) Chen et al. "The Smoke Detection for Early Fire-Alarming System Base on Video Processing" ISSN No: 7695 IEEE conference 2005. In this paper [4] they proposed a strategy which is totally founded on smoke-location technique for early fire-disturbing framework in light of video handling. The essential methodology of smoke-pixel judgment is made out of two choice standards: a chromaticity-based static choice lead and dispersion based powerful trademark choice run the show. The chromatic choice manage is derived by greyish shade of smoke and dynamic choice run is reliant on the spreading characteristics of smoke. Test results demonstrate that the proposed technique can give an early caution at a lower false alert rate before the fire consumes, and henceforth is exceptionally alluring for the essential military, government managed savings, business applications etc. In this they have for the most part utilized video based fire identification framework. At long last they have reasoned that this exploration builds up a smoke-identification technique in view of picture preparing to give an early alert to the fire mischances. Both static and dynamic highlights of smoke are included into the choice capacity to enhance the unwavering quality of smoke location. Trial results demonstrate that the proposed technique can give a dependable and practical answer for smoke location, and it might be more alluring than the ordinary methods for smoke recognition.

III. PROPOSED WORK

A. Methodology

All the four temperature sensor information sends to the Arduino and the Arduino is constantly screen the information that is originating from the sensors. On the off chance that any temperature sensor information esteem ascends than the limit esteem at that point, the information sends to Wi-Fi module and from the Wi-Fi module the information again sends to the cloud server. From the cloud server the information has been sent to blynk versatile application. The circuit diagram for the proposed system is shown in Fig.1

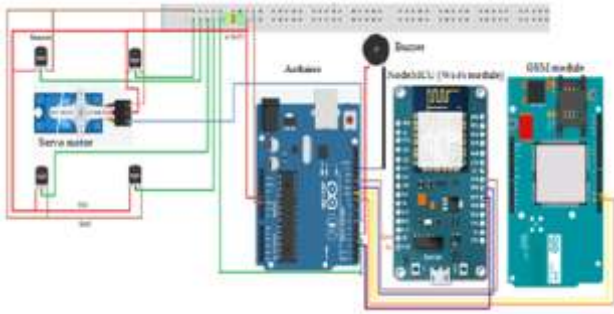


Fig. 1. Circuit for Proposed System

In the application if we confirm it as fire, the data that is received is send back to the Arduino. The Arduino sends a command to the GSM module and this module immediately send an alert message to the nearest Fire station or Fire rescue people [7].

IV. RESULTS AND DISCUSSION

A. NodeMCU

NodeMCU module has been associated as appeared in the Fig. 2 to the pc utilizing USB link so as to dump the program in NodeMCU. For this module control supply has been directly taken from the USB link which gives 5v input to the NodeMCU module. Here the NodeMCU is enrolled with a Wi-Fi and a video gushing Widget is put in Blynk application in request to see the video where the fire has been recognized. In expansion to this we have set LCD show and LED's for showing the warning and to recognize the course in which the fire is happened all the while.

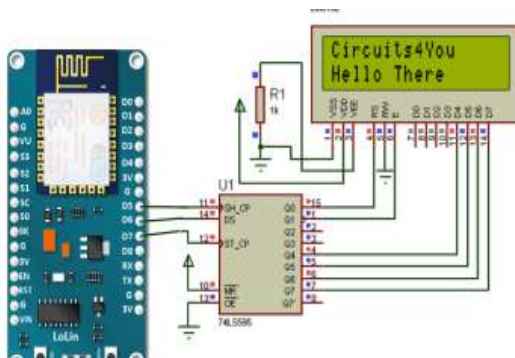


Fig. 2. Circuit diagram of NodeMCU



Fig. 3. Fire Initiation and Detection

The above Fig.3 the fire initiation and detection in the Blynk application. It shows the initiation of fire in the West direction, due this the temperature have been raised than the threshold temperature value, the camera has been turned to the west direction along with that there is a notification shows that Fire detected in West direction.

B. Serial Monitoring

In this Fig.4. Shown below we have taken the SIM900A GSM module for transmitting and receiving the messages. Here, 9th pin of the Arduino is taken as a receiver pin and is connected to transmitter of the GSM module. In the similar fashion 10th pin of Arduino is taken as transmitter and is connected to receiver of the GSM module. Coming to power supply we have taken 12volts 1A constant power supply from adapter to run GSM module.



Fig. 4. GSM Module



Connections for the GSM module is shown in the circuit diagram after the connections are done, we write the program for GSM as shown in the program. In the program we use header file software serial, which has been developed to allow serial communication between other digital pins of Arduino. Since we are required to send a message when the fire is detected, we have developed a program in the Arduino software for GSM using Attention commands. First we should set the GSM module in the text mode next we should give the phone number to which the message should be sent then, we have to type the message to be sent. Here as we are dealing with fire detection system we are sending a message that fire is detected.

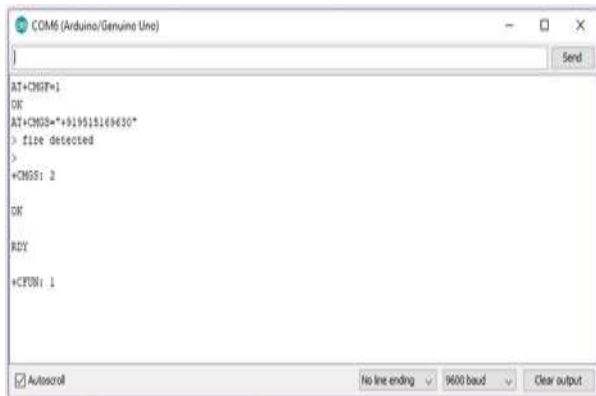


Fig. 5. Serial Monitoring Output

In the Fig.5 we have taken four temperature sensors that are placed in four directions namely North, South, East and West. In this we have connected all the Ground pins of temperature sensor's parallel to the ground rail and similarly all Vcc pins are connected to +ve rail of bread board. In between source and data pins a 4.7K Ω resistor is connected. All the data pins of sensors are connected parallel and a one wire bus is taken from it and is connected to one of the Arduino digital pins. The use of one wire bus is for getting all the data from the sensors. For this setup we have given 5v Power supply from voltage regulator that is IC7805 to the sensors and ground pins of the sensors is connected to the ground pin of Voltage regulator.

The main purpose of sensors is to get temperature values from all directions. We have taken the SIM900A GSM module for transmitting and receiving the messages. Here, 9th pin of the Arduino is taken as a receiver pin and is connected to transmitter of the GSM module. In the similar way 10th pin of Arduino is taken as transmitter and is connected to receiver of the GSM module. Coming to power supply we have taken 12volts 1A constant power supply from adapter to run GSM module. From GSM module we have taken 12v and give as input to voltage regulator where we get constant 5v supply used for powering up all modules. We have connected servomotor for rotating the camera. For this we have connected the signal pin of servomotor to the one of the PWM pin's of the Arduino. For the power supply we have connected Vcc of servomotor to regulator output pin. In the similar way

ground pin of the servomotor is connected to ground of Voltage regulator. A NodeMCU module has been connected for transmitting the data from Arduino to BLYNK application. Power supply for NodeMCU is given from Arduino 5v pin. Data pins D5, D6, D7 of NodeMCU are connected to 12th, 11th and 2nd pins of Arduino respectively. A buzzer have been connected to 4th digital pin of Arduino and similarly ground pin of buzzer is given to ground pin of Arduino[4].

All the connections of proposed system have been done and an external power supply is given to GSM module with help of adaptor. The program for Arduino and NodeMCU module has been written and dumped individually using Arduino Software. Temperature value of sensor is gradually increased in one direction using flame. As we got the temperature value greater than threshold value that is 50°C, a notification is sent to Blynk application through NodeMCU and simultaneously we get an alert from the buzzer, at the same time camera is rotated in the direction where the fire has occurred. With the help of camera we can cover an area where fire occurred. In the BLYNK application, we have four LEDs which shows the state of temperature sensors. When LED is showing GREEN light it states that sensor is in normal position. If LED shows RED light the sensor is getting heated and it is an alert. If the temperature value is above threshold, then we get red light in the affected direction and a message in LCD Widget that is present in the application shows that fire has been detected in a specified direction. We can also watch the fire initiated region through a camera Widget located in application. Once we observed it as fire, we tap OK button that is present in the application. After tapping on that button a signal is passed to Arduino and Arduino will trigger GSM module so that GSM module will sent information and alert for the nearest fire department as shown in the Fig.6. Then the action from the fire department will be quick so that they can control fire quickly while it is damaging impact is more. Once the fire has been controlled, the not LED that showing the RED light will again come to the Original position that is showing the GREEN light that represents normal state of the surrounding environment. Here we have given fire in south direction placed sensor .As the temperature has been crossed threshold value that is specified, a notification and LCD display has been got a message that fire detected Southside. This is shown in the Fig.7. From this we can take the action immediately and can reduce loss of life and property.

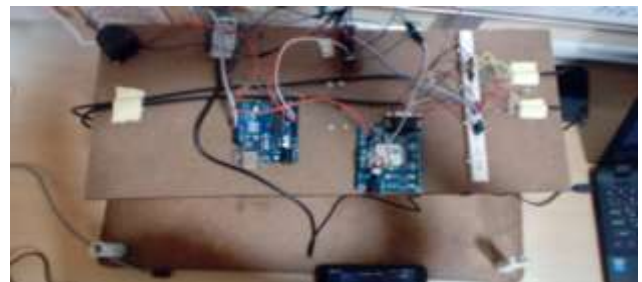


Fig. 6. Top view of the proposed system



Fig.6. is the top view of this paper. Here, all the required connections have been connected and when the power supply is given to the Arduino and other components in the design we will definitely get the output.

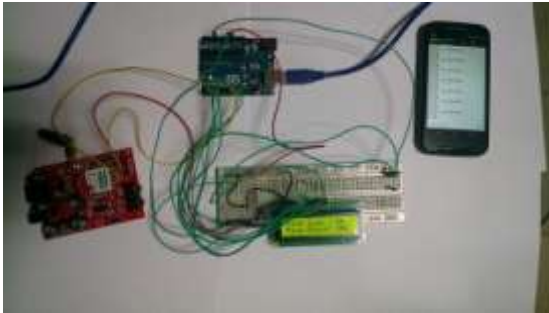


Fig.7. Fire alert and receiving SMS from GSM

When the fire is detected it will show an alert message in mobile. After confirmation of fire in Blynk application, GSM will send message to fire station that fire detected as shown in Fig.7.

V. CONCLUSION

There were various difficulties distinguished identifying with fire detection and response. The fundamental test distinguished under flame discovery were high false alert rates by identification gadgets others being exorbitance of a portion of the gadgets and absence of adequate mindfulness on the significance of introducing these gadgets. The high false cautions particularly by smoke sensors and warmth/warm sensors emerged as the real test. The principle motivation was to research the issue and in this manner build up an answer that tackled the false caution issue as while thinking about the expense of the last item. To accomplish this, we have built up a model, which takes a shot at Internet of Things utilizing Arduino whether the issue happened is because of discharge or in light of any specialized issue or by the defective sensors. Partners in flame division administrations ought to embrace the system proposed in this exploration for flame identification as a venturing stone towards a quicker reaction time to flame occurrences. This will go far in sparing lives and property. Information gathered from the discovery gadget additionally give a chance to better revealing and information investigation which could help during the time spent enhancing fire identification benefits particularly in Kenya where there is inadequate account and distributing of data identifying with flame. In this manner we can reason that a model was been actualized which is a mechanized for the fire location.

VI. REFERENCES

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