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IOT Based Fire Detection System

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ABSTRACT

Fire detection systems are the most crucial element of any constructing layout in recent times. In latest days, fireplace incidents are typically stated. This might be because of the negligence of humans in lots of cases. Consider some examples, in places like gas filling stations, crackers shops, homes, and specifically in workplaces, and so forth. There are almost hundreds of fireplace injuries suggested in a yr. By taking a majority of these into consideration, in this paper, an automatic fireplace detection the use of a fireplace sensor is brought. The present fireplace detection system detects the fire through the usage of a hearth sensor, however our proposed machine is different from that. The present systems are with fire alarms and signals with the aid of raising alarm when the fireplace is detected inside a restrained area. The proposed machine carries the fireplace alarm, further to that it sends a notification to our cellular and mail can be sent to the attached mail identification so that you can be having the records of the twist of fate-inclined area, and also the records needed to alert the hearth station about the incident. This carried out fire detection machine will be more efficient and offer more protection hile as compared to the traditional fireplacealarm systems to be had.

Keywords: - IOT,Node mcu

1. INTRODUCTION

Fire detection systems are the most vital detail of any building layout in recent times. For highrise homes and multi-winged structures together with inns and hospitals, these designs can become complicated and it's miles mandatory to have it hooked up nicely earlier. Fire detection systems are designed to discover fire incidents early in their improvement itself. This might assist in the secure evacuation of occupants, while time will nonetheless be available. Early detection of hearth additionally plays a considerable role in protection and alerting the emergency response personnel. By doing so, existence loss and property loss may be reduced, and the time taken for the emergency reaction operation can be minimized via early detection.

Intelligent fire detect and alarm control system is of fire sig nal detected, transmitted, processed and controlled system. And smoke fog, temperature, and flame of fire detect and al arm system is proposed based on IOT. Fire is very dangero us situation and it's very much necessary to monitor and gi ve warning before anything unwanted happens. In many de veloping countries, houses do not come fitted with fire alar m system This results in fire being attended and leading to l ot of loss of property, human and so also in developing cou ntries like India we do not have strict laws pertaining to ins tallation of Fire Alarm system So there is an urgent need to wards developing an automated fire monitoring and warnin g system.

At gift, safety is still attracting the attention of worldwide. And in th-e all varieties of catastrophe, the hearth occurrence frequenc
y of fire is hig-h fee and damages more. With the speedy development of technological know-how and generation, late-version fire monitor and alarm systems are me-rged new semiconductor technique and artificial smart theoryAlthough traditional hearth locate and alarm gadget can be satisfied either fire de tection in a sure extent, there are some defects, such as uncertainty sensitivity of fireplace detector, deficiency capability in self-analysis and self-elimination which fireplace detection system is adopted in structure. There is a few scarcity in transport and comm-unication fireplace signal in real system is not satisfied with hearth detecti-on in current time.

LITERATURE SURVEY

Surapong Surit, Watchara Chatwiriya [8] proposed a method to detect fire by smoke detection in video. This approach is based on digital image processing approach with static and dynamic characteristic analysis. The proposed method is composed of following steps, the first is to detect the area of change in the current input frame in comparison with the background image, the second step is to locate regions of interest (ROIs) by connected component algorithm, the area of ROI is calculated by convex hull algorithm and segments the area of change from image, the third step is to calculate static and dynamic characteristics, using this result we decide whether the object detected is the smoke or not. The result shows that this method accurately detects fire smoke. P. Piccinini, S. Calderara, and R. Cucchiara [2] proposed a method based on the wavelet model and a color model of the smoke. The proposed method exploits two features: the variation of energy in wavelet model and a color model of the smoke. Smoke is detected based on the decrease of energy ratio in wavelet domain between background and current. The deviation of the current pixel color is measured by the color model. Bayesian classifier is used to combine these two features to detect smoke. R.Gonzalez proposed a method to detect fire based on Wavelet Transform. Stationary Wavelet Transform is used to detect Region of Interest. This method involves three steps preprocessing, SWT, histogram analysis. In preprocessing unwanted distortions are removed and image is resized and transformation of resized image is performed. High frequencies of an image are eliminated using SWT and the reconstruction of image is done by inverse SWT. Image indexation is performed to group the intensity colors that are

closed to each other. Histogram analysis is used to determine the various levels of indexation. After analysis a comparison is made with non-smoke frame and non-smoke images are eliminated. These three are combined and fire is detected. Osman Gunay and Habiboglu [4] proposed a system based on Covariance Descriptors, Color Models, and SVM Classifier. This system uses video data. Spatio-temporal Covariance Matrix (2011) [13] is used in this system which divides the video data into temporal blocks and computes covariance features. The fire is detected using this feature. SVM Classifier is used to filer fire and fire-like regions. This system supports only for clear data not for blur data. Dimitropoulos (2015) [1] proposed an algorithm where a computer vision approach for fire-flame detection is used to detect fire at an early stage. Initially, background subtraction and color analysis is used to define candidate fire regions in a frame and this approach is a non-parametric model. Following this, the fire behavior is modeled by employing various Spatiotemporal features such as color probability, flickering, spatial and spatiotemporal energy. After flame modeling the dynamic texture analysis is applied in each candidate

2. IMPLEMENTATION DETAILS OF MODULE

We are developing a fire monitoring and controlling device which sense the fire and display the message on monitor screen and if the value of sensor will cross a specific threshold value it will take action autonomously. A basic web page has been designed for displaying the temperature, humidity value. It also has some other buttons to take control action regarding relay which will turn on and off different AC equipment of the building. We are storing the reading of sensor in the database for further analysis of the system. ESP8266 Wifi module has used in our project. All devices with specific IP address are connected to router this connection gives us best result for local operation purpose through XMLHTTP request we are handling the webpage with the help of set interval function for reading the value of Temperature and Humidity. The data of temperature and humidity has been collected by GET method and stored in targeted variable %temp for temperature and %humidity for humidity. Asyncwebserver has been used for updating specific parameters only the value of temperature and humidity get updated regularly at an interval of 10 seconds.The function has been called by getElementbyid(“temp”) for temperature readings and getElementbyid(“humidity”) function for humidity readings Interfacing of temperature has been done with Nodemcu ESP8266 a three floor model will have sensors placed in it which will work as optical and ionisation. The working principle of optical sensor is the transmitting and receiving light in optical sensor the object to be detected reflects light beam sent by emitting diode on the basis of this the interruption or reflection of light beam is calculated The working principle of ionisation smoke detector is that they have small amount of radioactive material between two electrically charged plates, which ionizes the air and cause current to flow, when is disrupts the flow of ions the flow of current reduces and the alarm activates For accessing web page we will introduce a security feature of login id and password so any unknown

random person can't access the webpage thus making it fully secure. Drives will be used for handling high voltage AC devices for turning them on and off. A software program related control action of relay has been uploaded in device so that by clicking button on webpage we can turn it on/off. This action is highly essential for controlling different equipments of the model a backup inverter can be provided in case if the power supply fails so that the system doesn't fail to work. Fire extinguishing elements can be selected based on our choice here we are using water which will be sprinkled by sprinklers for putting off the fire the sprinklers are installed on top of floor for putting of the fire if the floor contains to many electric appliances it is not advisable to use water we can use Carbon dioxide gas in sprinklers this will not damage the electric appliance Fig 2. Nodemcu Fig 3 Control action using relay III COMPONENT DETAILS temperature is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously. temperature humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. temperature is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor. NODEMCU: Nodemcu is an open source development board and firmware based in the widely used ESP8266 - 12E Wifi module. It allows you to program the ESP8266 Wifi module with the simple and powerful LUA programming language or Arduino IDE. With just a few lines of code you can establish a Wifi connection and define input/output pins according to your needs exactly like Arduino, turning your ESP8266 into a web server and a lot more. It is the Wifi equivalent of Ethernet module. RELAY: A relay is a form of electrical switch that is operated by electromagnet which changes over the switching when current is applied to the coil. These relays may be operated by switch circuits where the switch cannot take the high current of the electrical relay, or they may be operated by electronic circuits, etc. In either circumstance they provide a very simple and attractive proposition for electrical switching.

3. CONCLUSION

Fire monitoring and controlling system plays an important role in Industries, malls, residential areas, parking etc. They help in detecting fire or smoke at an early stage and can help in saving lives. Commercial fire detecting system usually have an alarm Signaling, with the help of a buzzer or siren. We have designed an IOT based Fire Alerting system using Temperature and a smoke sensor which would not only signal the presence of fire in a particular premise but will also send related information through IOT..

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