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AUTO FIRE EXISTINGUISHING SYSTEM USING IOT

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Abstract - *House combustion is one of the main concerns for builders, designers, and property residents. Singular sensors were used for a long time in the event of detection of a fire, but these sensors cannot measure the amount of fire to alert the emergency response units. To address this problem, this study aims to implement a smart fire detection system that would not only detect the fire using integrated sensors but also alert property owners, emergency services, and local police stations to protect lives and valuable assets simultaneously. The proposed model in this paper employs different integrated detectors, such as heat, smoke, and flame. The signals from those detectors go through the system algorithm to check the fire's potentiality and then broadcast the predicted result to various parties using GSM modem associated with the system. To get real-life data without putting human lives in danger, an IoT technology has been implemented to provide the fire department with the necessary data. Finally, the main feature of the proposed system is to minimize false alarms, which, in turn, makes this system more reliable. The experimental results showed the superiority of our model in terms of affordability, effectiveness, and responsiveness as the system uses the Ubidots platform, which makes the data exchange faster and reliable.*

***Key Words*: Fire detection, IR Flame sensor, Temp sensor, Smoke sensor, IOT webpage, GSM technology.**

1. INTRODUCTION

Prevention of fire and fire risk level control difficulty are increased day by day. Fire-fighting and monitoring situations are very serious today. Public security keeps on insisting in increase of technology in firefighting and monitoring. They give special attention to improve the science and technology in resisting fire disasters. They are concerned about the application of new technology such as IoT and wireless sensor network in fire-fighting and monitoring field. IoT is very suitable for fire-fighting with wide scope along with wireless sensor network (WSN). IoT has high degree of intelligence for maintaining many product categories, quantities, complex fire danger factors and large range of equipment's for fire monitoring and fighting. IoT has high scalability and high resource sharing capabilities for handling various complex business information. IoT combined with WSN plays an important role in the fire alarm, fire control facility monitoring and fire equipment management. IoT technology is combined with fire fighting for hazard source monitoring, fire monitoring, fire-fighting rescue, fire early warning, prevention and early disposal. It is used effectively to enhance the fire brigade fire frightening and emergency rescue capabilities. Fires accidents are becoming more series because of bigger building density and higher urban buildings. Accidental fires caused 6% of all unnatural deaths in India. Exploding cooking gas cylinders and stoves accounted for nearly one-sixth of all deaths from accidental fires between 2010 and 2014, with a total of 19,491 deaths.

1.2. LITERATURE REVIEW

In this section we will discuss about various existing fire detection methods.

- A.V.Duraivel proposed a system using raspberry Pi 3. They designed the system by using a wide variety of sensors, a video camera and a sprinkler. It is highly compact and provides an authenticated detection process. The

disadvantage of this system is that it will need to be connected to a Wi-Fi network.

●S.Naveen proposed a system using Raspberry Pi , gas sensor , flame sensor and a temperature sensor. In this system, the gas and flame sensor are first triggered and then checked by the Raspberry Pi. The temperature signal is then activated for confirmation.

●R.Dhanujalakshmi designed a system which detected the presence of fire using image processing techniques. They used a Raspberry pi for the computation. The disadvantage was that the algorithm is very complex and needed perfect conditions to work efficiently.

●Sailaja Vungarala designed a system using sensors and an Arduino which identified the flames based on its shapes and colours. The disadvantage in this method is that it does not have a long range and needs monitoring for efficient usage.

●E.Saraswathi designed a system using sensors and an Arduino Uno board. In this system, The sensor networks are programmed with various user interfaces suitable for user of varying ability and for expert users such that the system can be maintained easily and interacted with very simply. The disadvantage is that the energy consumption is high and since there is no good authentication system, it may lead to many false alarms.

2. PROPOSED SYSTEM

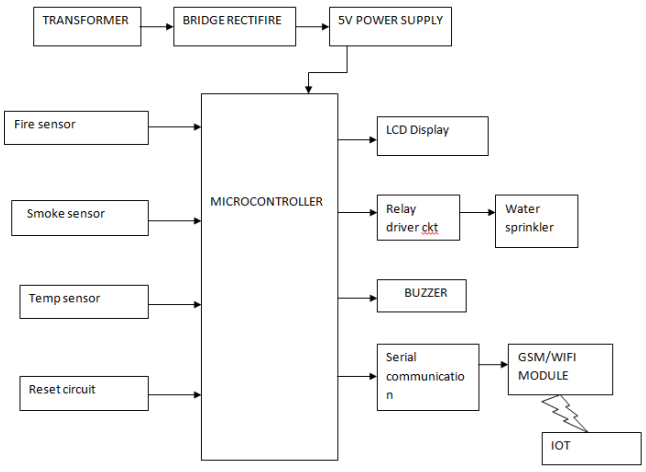

Fig 1: Block Diagram of System

In this, we present the theory on AUTO FIRE EXISTINGUISHING SYSTEM USING IOT. In this proposed block diagram consist of several sensors (fire sensor, smoke sensor, temp sensor) is connected to our controller. The controller is accessing the sensor values processing them and alert via display, alarm and emergency SMS also upload data over web server. In case of fire, temperature, and smoke sensors send continuous readings to the controller. Updated readings are sent into a Wifi module that translates the data into a graphical and statistical manner. A web page created to analyze the data and a response extracted conditionally to launch a water sprinkler as shown. Smart Fire Detection System with Automatic Water sprinkler has been developed to solve the slow response issue of fire accidents.

A. PIC 18f4520 microcontroller:

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

- Divided into 256-byte banks
- There are total of F banks
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip External
- On-chip program memory is either PROM or EEPROM.

- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig -2: **PIC18f4520**

B. Smoke sensor (MQ2):

MQ2 gas/smoke sensor is an electronic sensor used for sensing the concentration of gases in the air such as LPG, propane, methane, hydrogen, alcohol, smoke and carbon monoxide.

MQ2 gas sensor is also known as chemiresistor. It contains a sensing material whose resistance changes when it comes in contact with the gas. This change in the value of resistance is used for the detection of gas.

Fig -3: **MQ2 smoke Sensor**

C. Flame Sensor:

Flame Detection Sensor Module is sensitive to the flame, but also can detect ordinary light. Usually used as a flame alarm.

- It detects a flame or a light source of a wavelength in the range of 760nm-1100 nm.
- Detection point of about 60 degrees, particularly sensitive to the flame spectrum.
- Sensitivity is adjustable, stable performance
- Operating voltage 3.3V-5V

Fig -4: **IR flame Sensor**

D. LM35 Temperature Sensor:

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

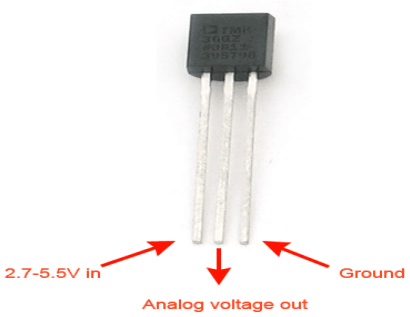

Fig -5: LM35 TEMP Sensor

E. LCD display:

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

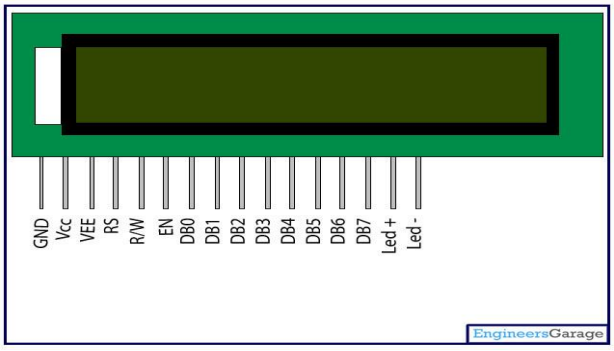

Fig -6 LCD display

F. GSM module:

This GSM modem has a **SIM800A chip and RS232** interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem.

Fig -7 GSM Module

3. CONCLUSIONS:

The fire detection systems proposed in the literature served fire stopping with no care of the responsiveness. Thus, this study considers the existing issues and builds an efficient and effective fire detection system based on IoT technology, flame, temperature, and smoke sensors to collect the data accurately and rapidly. The continuous readings sent over WIFI modules to the central unit to analyze the data and trigger the water sprinkle. This system structure enhances the efficiency and effectiveness of fire detection. However, this study's proposed approach obtained an average response of 5 seconds to detect the fire and alert the property owner. Meanwhile, the water pump activated to suck water from the tank and release it into the water sprinkler to minimize the fire until the property owners and emergency services reached. Hence, the proposed system overcame the challenges of the issues of affordability, effectiveness, and responsiveness. The proposed system still needs further enhancements. Thus, one of the enhancement

directions is integrating machine learning with the system to predict the potentiality of fire based on the collected data from different sources. Machine learning may help the operators find and overcome the vulnerabilities in their building to prevent fire instead of detection only.

REFERENCES

1.Anwar, F., Boby, R.I., Hussain, S., Rashid, M.M. and Shaikh, Z., 2018. A Real-Time Integrated Fire Detection and Alarm (FDA) System for Network Based Building Automation. Indian Journal ofScience and Technology,8(1).

2.Niranjana, R. and HemaLatha, T., An Autonomous IoTInfrastructure for Forest Fire Detection and Alerting System.

3.PI, W.U.R., AN IOT BASED FIRE ALARMING AND AUTHENTICATION SYSTEM FOR WORKHOUSE USING RASPBERRY PI 3.

4.Saraswathi, E., Kumar, A., Singh, J., Mohanty, J. and Mishra, Y., 2018. Arduino Based Home Automation System Using MQTT Protocol Incorporating Internet of Things (IOT).Journal of Network Communications and Emerging Technologies (JNCET)www. jncet. org,8(5).

5.Vungarala, S. and Kasi, A., . Professor (CSE), Marri Laxman Reddy Institute of Technology and Management Dundigal.

6.Reddy, M.S. and Rao, K.R., 2016. Fire accident detection and prevention monitoring system using wireless sensor network enabled android application. Indian Journal of Science and Technology,9(17).

7.Cho, B.H., Bae, J.W. and Jung, S.H., 2008, July. Image processing-based fire detection system using statistic color model. In Advanced LanguageProcessing and Web InformationTechnology,2008.ALPIT'08.InternationalConference on(pp.245-250). IEEE.