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FIRE DETECTING AND ALERTING SYSTEM USING RASPBERRY PI PICO

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ABSTRACT

This project is developed using Raspberry pi pico processor ,this is controlling unit for devices such as GSM and GPS and many other sensors. The fire detection gathers all of the techniques and processes that contribute to early detection of a fire. We identify three main categories: Smoke detection, Flame detection and Temperature detection. Automatic fire alarm system provides real-time surveillance, monitoring and automatic alarm. An automatic fire alarm system based on wireless sensor networks is developed, which is designed for high-rise buildings. To provide early extinguishing of a fire disaster, large numbers of detectors which periodically measure smoke concentration or temperature are deployed in buildings. In this paper will we present the different techniques we had been already used to detect fire. Internet of things is an interconnection of physical devices embedded with electronics, software, sensor which is capable of collecting data from the surrounding and sending data over internet is called IOT.

Keywords: Raspberry Pico Microcontroller, Fire Alarm System, Wireless Sensor Networks, Sensor Etc And GPRS Modem.

I. INTRODUCTION

A fire alarm system warns people when smoke, fire, carbon monoxide or other fire related emergencies are detected. These alarms may be activated automatically from smoke detectors and heat detectors or may also be activated via manual fire alarm activation devices such as manual call points or pull stations. Alarms can be either motorized bells or wall mountable sounders or horns. Destruction of property due to fire accidents both natural and induced. Detection of fire can prove to be very important as it could mean the difference between life and death. Fires can occur from anywhere and at any point of time, hence the presence of Fire Alarm System helps in keeping your family safe. The Internet of Things (IoT) is a system of devices connected and accessible through the internet. The 'Thing' in IOT could refer to any physical device, varying from a toaster to an automobile. These devices can be connected through the internet and help us manipulate or collect data from them. In this paper, we will be using a wide variety of sensors to detect the presence of fire and alert its presence to the watchman and fire officials. It discusses in detail about the functions of each module and its implementation in an elaborate manner. It also discusses the application of Iot Technology in relation to fire detection technologies.

II. METHODOLOGY

The Method for this project is done in two parts ,the first part depicts the usage of siren ,indication and water pump which is useful for human life and basic property not to get damaged and the second part depicts the quick action using the GPS, and GSM modems and sending the information to the near by fire stations, hospitals and police stations ,as there would be no loss of life and property . And this entire project is implemented on Raspberry pico controller and some important modules like Sim module and GPS module and also the fire sensor. The figure below is the block diagram which is used to shows the block diagram of the entire module with the input units, the processing unit, and the output unit.

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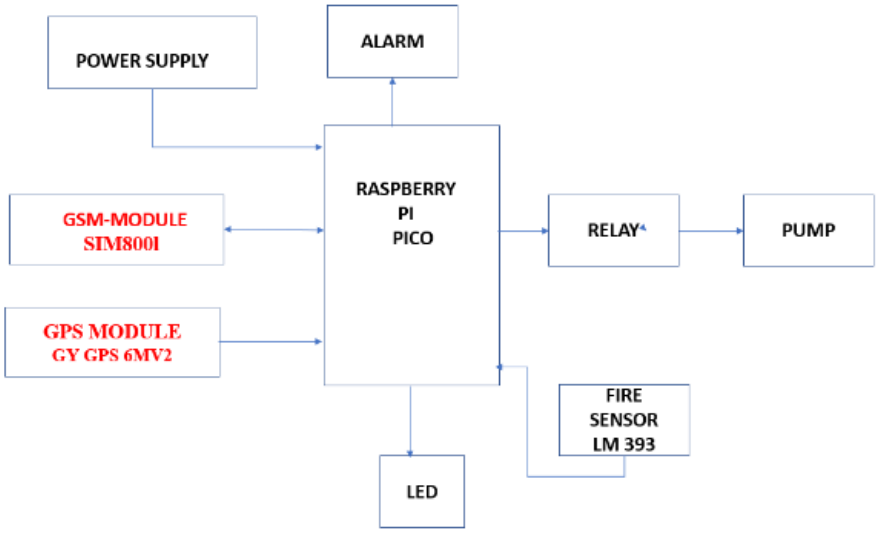

Figure 1: Block diagram Representation

The Hardware Components which are used in this research project:

1. Raspberry pi pico – A microcontroller that lets you build hardware projects with some code running.
2. GSM SIM 800l – Provides a wireless data link to a network.
3. GPS GY GPS 6MV2 – Directly receives data sent by satellites through dedicated frequencies.
4. Fire sensor LM 393 – Detecting fire and smoke.
5. Relay and DC motor – Used as a sprinklers.
6. Buzzer – Used as a Siren.
7. Led's – Used as an indication.

III. MODELING AND ANALYSIS

Model of this project is based on the place where this is places ,like we can install in public places like educational institutions, hospitals, and entertainment spots and also this can also be installed in forest with hotspots where the signals are available . And the system is available in such a way that it would be easy to operate and the programming is done in such a way that the function takes places in minute seconds gap and the buzzers ,siren and sprinklers also work in such a way that people can save themselves. A flame sensor is programmed to detect light that falls into a specific range of wavelengths. The sensor follows the visible spectrum. Specifications indicated that the range of detection is acceptable up to 33cm.The changes are between distance and wavelength values; the more the distance, the more the nm increase. The accuracy is higher when the distance is closer. Accuracy is higher when the distance is lower. In 5cm, the reading is 26, which is far from 100; less than 100 fire is detected. In 30cm, the reading is 97, which is critically close to 100, and sensors vary within close range, so it can go more than 100 in thunder moment and notdetecting fire due to sensitivity. And the analysis is done on the bases how the input is given and output is taken, and as we use Raspberry pi pico Controller ,there are number of input and output pins,it has a 40 pin GPIO, 26 pins are multi functional GPIO pins.These 26 GPIO pins can be used both as digital input and digital output.

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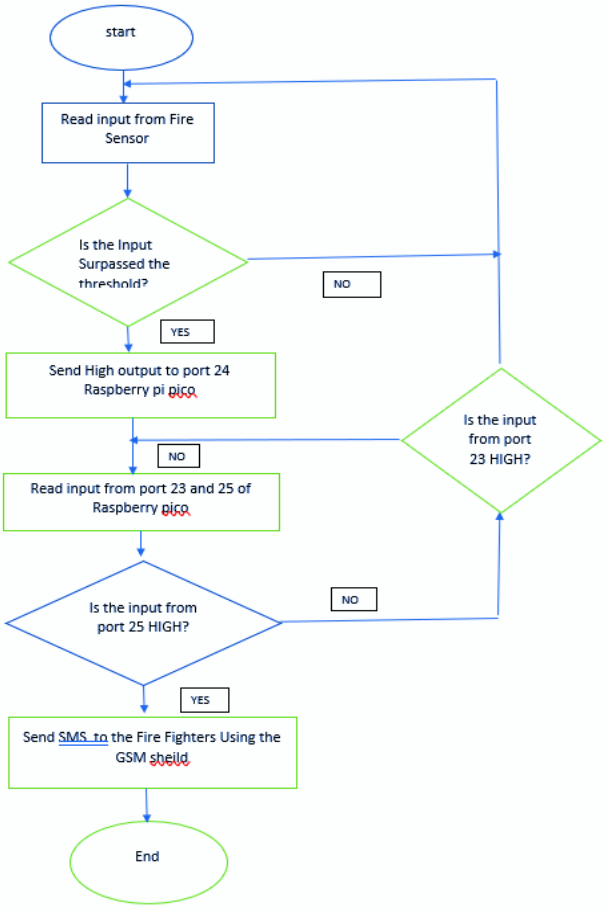

Figure 2: Algorithm and workflow

IV. RESULTS AND DISCUSSION

The Result of this project is shown through the fire detecting and alerting model which is developed using hardware as well as software and , for developing hardware we used some required components which are discussed in methodology and coming to software the raspberry pi pico is being run in the Micro Python language and the platform used for this to run is Arduino ide ,and this is very easy to execute ,just we need to select the bord after connecting it with usb to the system. The result of the project is when the system detects smoke or fire it gives an indication using LED, siren using buzzer and sprinkles water using sprinklers(DC motor pump), this function happens in minute seconds and a very quick task and next part is the very crucial thing is we can send SMS, call and current location to near by Fire station, Hospital and also police station ,so that there may be a quick action, and loss of life and property And the data base of the above main three rescue forces should be updated. And also there can be installed in near by forests or urban forestry, fields, natural resources fields, research fields ,and this system should be placed at certain hotspots where the signals is reachable, and the message can be sent and received.

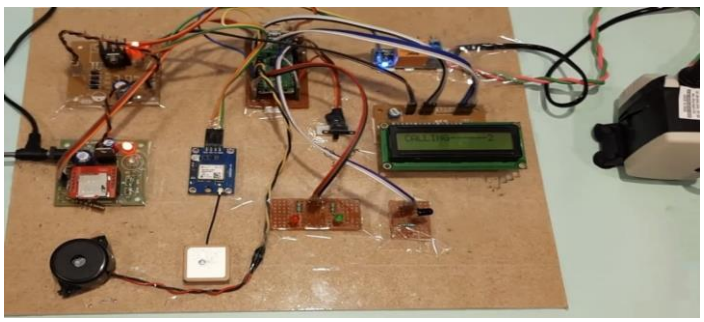

Figure 3: Hardware Kit

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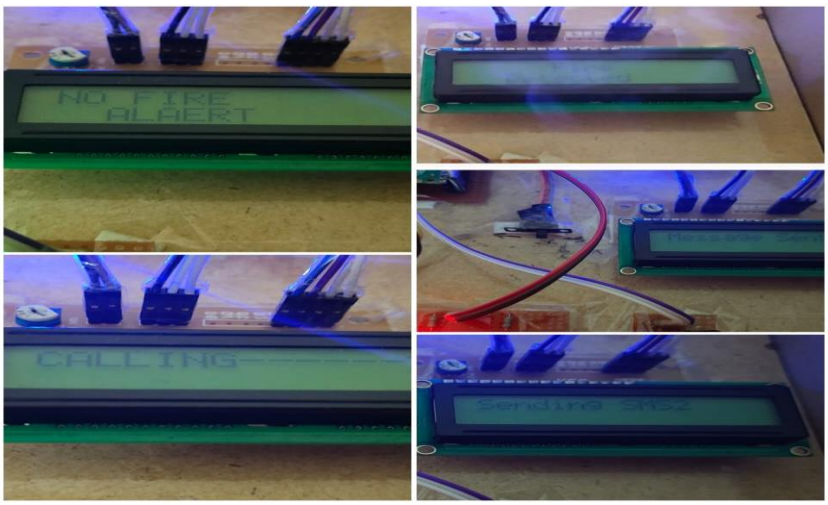

Figure 4: Display on LCD

Now the SMS , Call Notification and Location GPS link is sent to respective mobiles ,and the further purpose takes place ,and the official rescue teams take action.

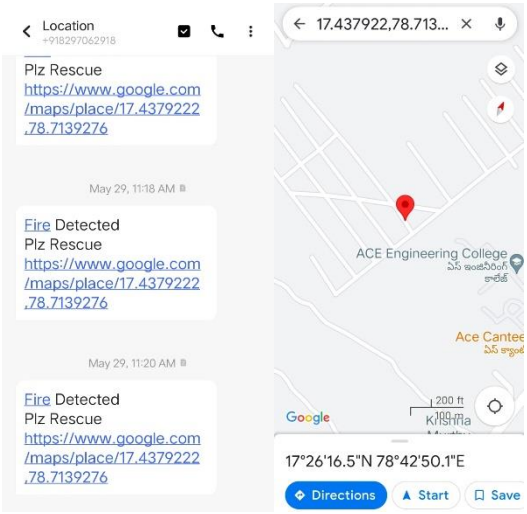

Figure 5: Notification Alert

The GPS location sends the latitude and longitude values.

The Outcomes of the Project:

- Local Alerts
- Fire Detected
- Sending SMS ,with location
- GPS longitude and latitude
- Message sent
- Calling ---- Approved and nearby help lines receive a call.

Applications:

- Emergency Power supply rooms
- Generator buildings
- Hospital rooms
- Operating rooms
- Server rooms
- Plants
- Institutions

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Advantages:

- Avoid Smoke Inhalation
- Early Detection
- Insurance Discounts
- 24/7 Monitoring
- Easy and affordable.

V. CONCLUSION

In this project we successfully implemented and designed a working model of Fire detecting and alerting system ,through this an individual or a group of people who are struck in a fire attack ,or fire accident can save their lives by this automated protecting system. And this system is easy to install in places where people come and spend of their time, and also this is affordable for public places ,and can also be helpful for people who work their and take safety precautions.

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