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IOT GAS AND SELF-CONTAINED FIRE DETECTION SYSTEM

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ABSTRACT

The project helpe to create awareness and identify preventive measures to prevent fire from spreading and becoming worse. Most people do not consider fire as a serious problem because fire detection systems are widely used at homes, shops, factories, and industries. Commonly installed domestic system for fire detection only involves physical notification using LED or buzzer. This system is not applicable when the user is staying away from home because he or she will have a limitation to observe fire detection system at home. Most people need to be more concerned about fire prevention. This project allows users to take measures to protect their family members from fire. The fire detection system project will sense smoke and temperature, activate the water sprinkler and DC exhaust fan when the smoke and fire are present, and notify the user using IoT Blynk. Also, fire can cause air pollution to the environment when the smoke spreads through the air since some gases and particles will affect the thicknesses of the ozone layer (Mastorakis et al., n.d.). Thus, the proposed fire detection system ensures a green environment. The water sprinkler and DC exhaust fan in this project are intended to protect the facilities from damage and act as early steps to prevent air pollution. The DC exhaust fan will ventilate the room and help to diminish smoke particles. The IoT Blynk allows users to be notified about the temperature and smoke in the affected surroundings that have been installed with the fire detection system. The double chamber relay helps both the water sprinkler and DC exhaust fan to be activated individually and simultaneously detect the earlier presence of fire in the building. Hence, the harmful gases produced depending on the burnt material, such as carbon monoxide, 2 ammonia, hydrogen sulfide, and hydrogen cyanide, are reduced as they are the main cause of breathing problems and pollution to the environment (Vrushali et al., 2016)

Keywords: *IOT, Gas Sensor, Fire detector system.*

1. INTRODUCTION

A fire detection system is important for safety in a building (Saeed et al., 2018). This project focuses on the basic fire detection system normally used at home. There are many types of fire detection system categories, such as smoke, fire, and harmful gases (carbon monoxide) detectors (Pushpa et al., 2020). Based on the product of fire detection system produced by KS Engineering, there are many types of detectors for each category. For example, there are a few

types of smoke detectors, such as sampling smoke detectors, early smoke detection systems, and self-contained smoke detectors (KS Engineering & Service, n.d.) Hence, the main focus of this project is on the self-contained smoke detector, which is normally used in a regular home.

The self-contained smoke detector is a safety device used in buildings to detect smoke that may be caused by fire and will notify the occupants through the installed buzzer in the device (Tun & Myint, 2020). This fire detection system is chosen to increase the functionality of a basic self-contained smoke detector into a complex prototype of fire detection that consists of two input sensors, one microcontroller, and two actuators which will increase the safety features of that basic device.

This project aims to create a safety fire detection system that includes the detection of hazards and precaution steps in one process and notifies the owner through the IoT smartphone application. The basic self-contained smoke detector is improvised for the hardware prototype by using two sensing components in one device. A fire detection system will be developed through the MQ2 gas sensor that detects smoke and includes a self-made DC exhaust fan system if abnormal smoke is detected. Besides the MQ2 gas sensor, this project will also develop a flame sensor, with a self-made sprinkler system. When both sensing components are triggered, the devices will send the signal to the IoT application Blynk through the NodeMCU ESP32 in the prototype. The DC exhaust fan and water sprinkler systems use the actuator to function.

2. FINDINGS

The IoT-based fire detection system starts with the input sensors, which are the flame sensor to detect fire and the MQ2 gas sensor to detect smoke. The flame sensor and the MQ2 gas sensor led to different output triggers. As shown in Figure 1, when abnormal smoke and fire are detected, the input signal will be sent to the NodeMCU ESP32 and a notification to the IoT smartphone application through Blynk will also be triggered. Both inputs will also signal the buzzer and the LED to physically notify the user inside the room. However, the respective motor will be activated if one of the input sensors is triggered. The MQ2 gas sensor will activate the DC 5V motor for the DC exhaust fan, while the flame sensor will activate the 12V DC R3850 water pump to extinguish the fire. Thus, it is a separate system for input sensors regarding output involving the actuators.

3. METHODOLOGY

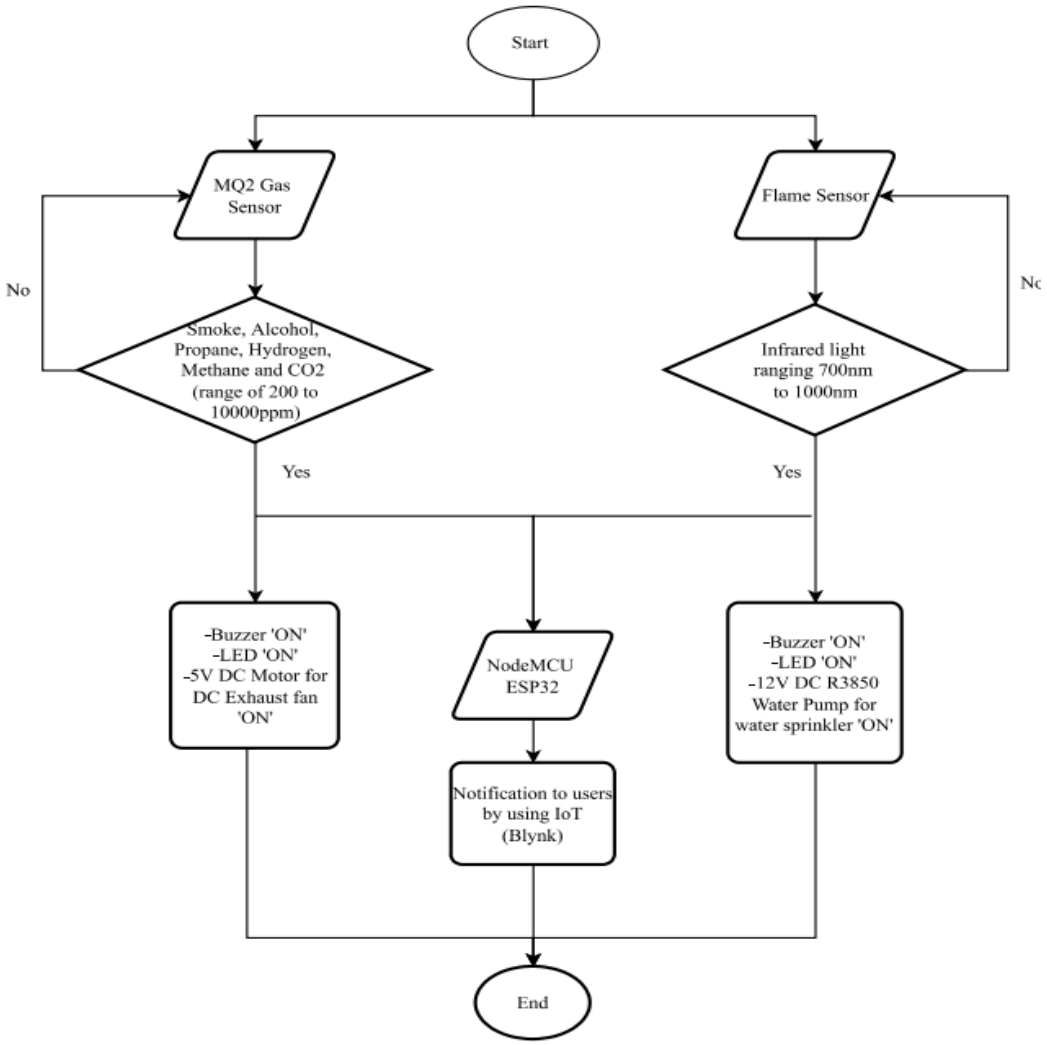

Figure 1 System Flowchart

4. CONCLUSION

In conclusion, the system is designed to notify users of an impending fire through IoT (Blynk). It is one of the efforts to prevent fire from spreading where the system will send a warning notification to the owner so that the next precaution can be taken accordingly. This project is designed based on the input that senses the smoke through the MQ2 gas sensor. The device will instantly alert the users by sending a notification via (Blynk), and the DC exhaust fan will turn on to ventilate the air. It will help ventilate the air regulation inside the room and act as a primary precaution to avoid the situation from becoming worse. Besides, in this project, the fire can be detected by using a flame sensor and will automatically turn on the water sprinkler system. It helps to extinguish the fire before it spreads and becomes worse. When any input sensors are triggered, the signal is sent to the NodeMCU ESP32 and activates the buzzer, LED, and output actuators. It also notifies the user through the IoT platform for further action. Hence,

this system achieves the purpose of this project; to help create a safety fire detection system that includes the detection of hazards and precaution steps in one process, and it notifies the owner through the IoT smartphone application.

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