Design and Test Android-Based Early *Fire Detection* Tools

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ABSTRACT

The impact of global change causes people's lives to become more vulnerable to fire problems. Fire hazards have severe impacts such as the loss of property and even casualties. Preventive measures are necessary to avoid, prevent and minimize the occurrence of fire disasters. The research aims to design and build sensor-based gas, fire and temperature detection systems, mikcro controllers and IoT, which can be used to detect potential hazards. fire inside a particular house or building.This research method uses experimental methods in prototyping models. Components used are gas sensors, fire sensors, temperature sensors, micro controllers, LEDs, alarm buzzers, which are integrated with the Blynk IoT platform. The results of the study are in the form of an IoT-based gas, fire and temperature detection system, which serves to provide early warning of \fire emissions through alarms and message notifications. text on a smartphone. This system can be used to help detect and avoid potential fire hazards.

Key Words: Sensors, Detection, Alarm, Systems

INTRODUCTION

A fire disaster is a condition or condition in which a building in a place is engulfed in fire. This resulted in loss of assets / property and death of fatalities in places such as factories, buildings, markets, housing, gas stations and other places[1]. House fires can occur without us knowing it and can occur suddenly, caused by accidents such as electrical short circuit, LPG gas leaks, cigarette sparks / matches. Many communities are quite slow to respond or respond to this due to lack of knowledge about fires. And sometimes the public also does not know the phone number of the fire or also there are still many people who provide information on the location of the fire is not accurate [2-5].

Technological innovations have created a lot of equipment that is able to work automatically, in other words it can operate without human intervention (operator) in carryingout its functions[6]. The concept of smart home based on IoT (Internet of Things) technology today and in the future needs to be continuously explored and developed so that it is worthy of being an IIoT (Industrial Internet of Things) product. The presence of IoT products is a very potential driver because it is one of the strengths of the modern economy based on appropriate technology[7, 8].

During this time, when a fire occurs in a building usually the fire unit will be contacted. But often the oppressor arrives at the location when the fire gets bigger. Some factors are indeed an obstacle to extinguishing such as long distance to the location. expanding. The innovation of Android-based early detection tools is a development tool, which aims to improve the quality of the technology competition that is so fast growing. Android or gadet that we often use in carrying out all activities is there to facilitate all affairs. Utilizing sensor components and Wi-Fi Module connections (ESP8266), the design of this tool will be a new purpose in increasing vigilance in handling a fire disaster[4, 9, 10].

Precautions are absolutely necessary so that fires can be avoided or minimized as a result. The solution offered through this research is to create a monitoring and detection system for smoke and fire that has the effect of causing fires. The problem formulation in this study is how to detect smoke and fire using sensors and microcontollers and internet of things (IoT) platforms. The purpose of the study is to create smoke and fire detectors that are separated from sensors and microcontrollers connected to microcontrollers and Blynk IoT platforms to be able to monitor if there is smoke and fire in the room and provide notification if there is a potential fire[11-14].

MATERIALS AND METHODS

This research is carried out by experimental methods by developing existing research, it is hoped that this research can provide better benefits. Based on the analysis of Android-based early fire detection tools that have been carried out independently from several parts, including the sender / transmitter circuit, receiver / receiver software, monitoring display / Human Machine Interfacing. Sender Circuit (Transmitter) In the working system of android-based early fire detection devices that implement wireless systems, there must be a sending part (transmitter) and receiver circuit (receiver). The sender circuit or transmitter circuit (Figure 1.1) is a series consisting of several parts, including gas sensor (MQ-5), Wifi Module ESP8266, Buzzer, circuit in transmitter It can be seen in Figure 1.1.

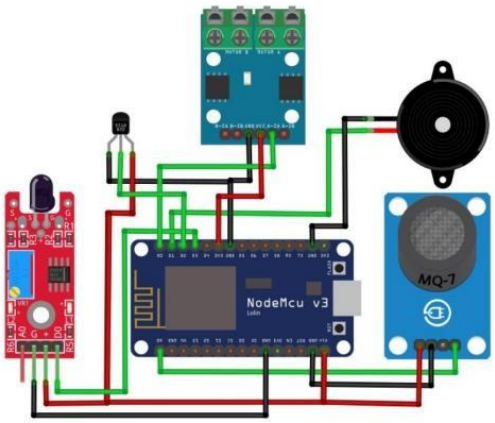


Figure 1.1 Transmitter Circuit

The sender circuit (transmitter) serves as a circuit that sends data to applications on smartphones and also to receivers. In addition to being a data sender, the sending circuit (transmitter) also contains sensors as gas readings and LCD and buzzer as indicators and interfaces of air conditions.

This research was conducted based on important stages that were carried out with a success indicator in connecting the NodeMCU ESP8266 module and other devices so that they could be used to complete the success indicator in connecting the NodeMCU ESP8266 module and other devices so that they could be used to complete the completion multiobjective problems.

The following is the design of a fire alarm detection system presented in the form of aflowchart.

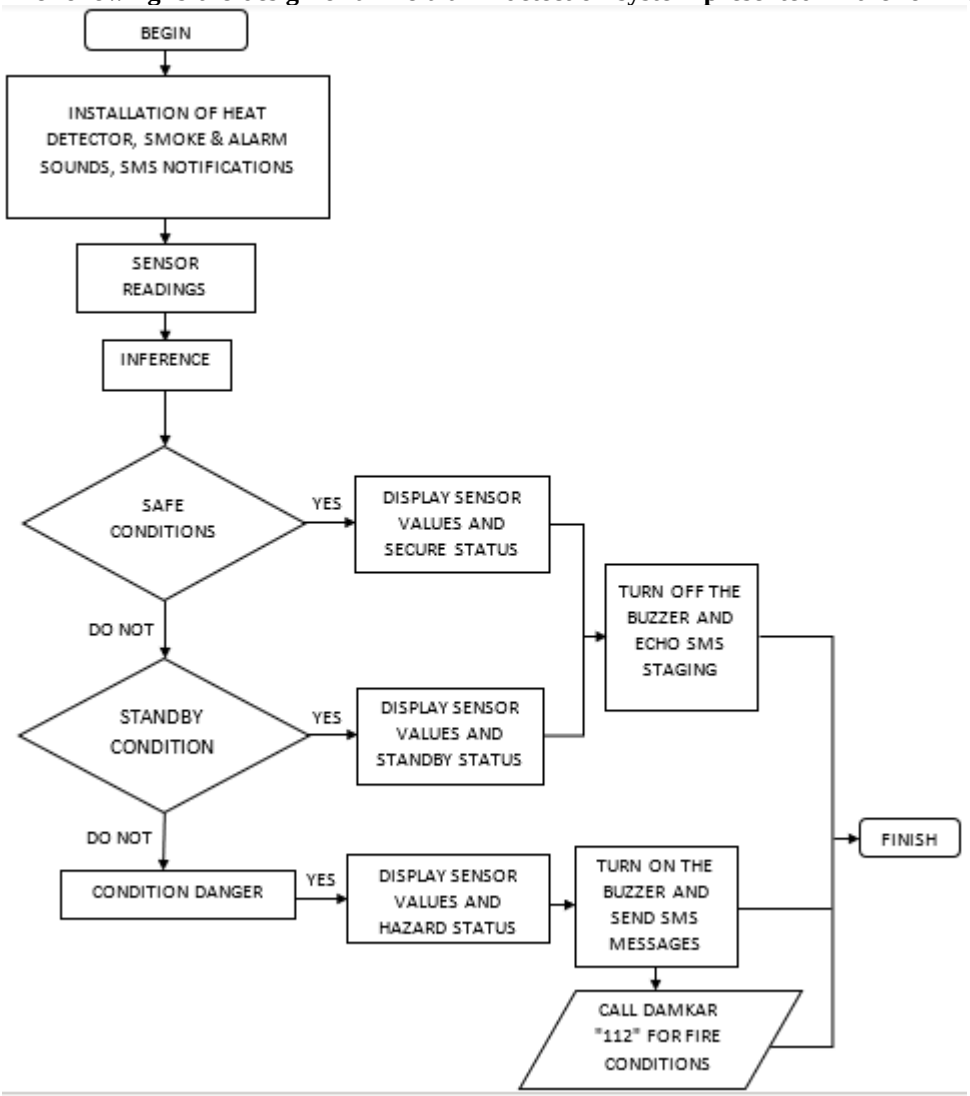


Figure 1.2 Flowchart Fire Safety Alarm System

In figure 1.2 presents the flow of the alarm system works first of all by installing gas, fire,and temperature detectors. The next step is for the detector sensor to perform readings and draw conclusions about the environmental conditions reached.

If the condition is safe, the detector will display the sensor value and safe status and then disable the buzzer and send sms messages.

When the alert condition, the detector will display the sensor value and alert status and then disable the buzzer and send sms messages.

If the danger condition occurs, the detector will display the sensor value and danger status and the buzzer is on and send an sms message to make an emergency fire department call, which is 112, after it's done.

RESULTS AND DISCUSSION

The hardware that was successfully made in this study is an early fire prevention automation system through coordinating using notifications that will be sent over the internet on mobile phones connected to the internet. Blynik software.

With the gas leak detection system, fire sensor detection system and temperature sensor in accordance with ISO 7240-5 of 2014, the Gas sensor (MQ2), fire sensor and temperature sensor can detect leaks. gas, temperature rise and fire so directly send data to the Blynk application. The test results showed the insertion of this sensor for class A1 according to ISO 7240-5 standard.

How the tool works when there is a gas leak and fire sensor detect, then notify by sendinga message to the ESP8266 Module and proceed to the Blynk application on the HP display that there is a gas leak and fire. Then the Buzzer (alarm) sounded.

Discussion of the test and the results obtained is presented as follows.

1. MQ-2 Sensor Testing (Gas Sensor)

This test is done using a portable gas stove that is opened. The goal is to find out the level and concentration of gas oleh MQ2 sensor used to detect carbon monoxide gas in the room.

Table 1.1 MQ-2 Gas Sensor Testing Results

Distance	Picture	Result
50 cm		

From table 1.1 shows the first test is to detect monoxide gas directed at the MQ2 sensor detecting the smell of gas and the sensor directly detects and sends data to Bylnk that the gas detected.

2. Fire Sensor Testing

The purpose of the ini sensor is used to detect the presence of a fire that ignites towards the sensor. Testing is carried out by means of measurement with input devices with wood materials.

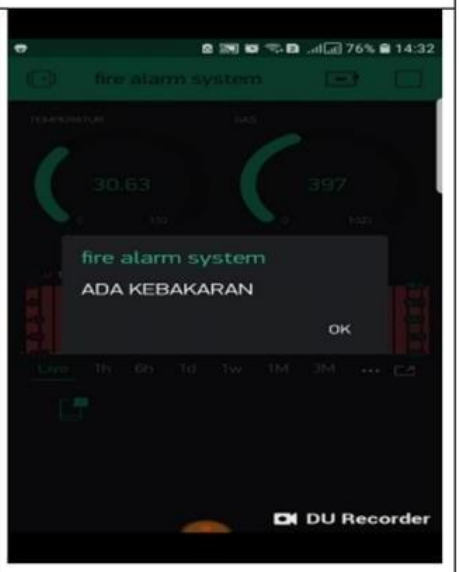
Distance	Picture	Result
100 cm		

Table 1.2 Fire Sensor Testing Results

The second test detects fire and temperature, from table 1.2 states that the fire sensor works well, when the fire that is burning the direct sensor detects the presence of fire and directly send data to Bylnk that fire and temperature are detected.

3. Temperature Sensor Testing

This sensor helps the fire sensor so that there is no alram fake in a fire event. Temperature sensor testing uses a portable gas stove that ignites the fire, in order to determine the speed of propagation on the temperature sensor.

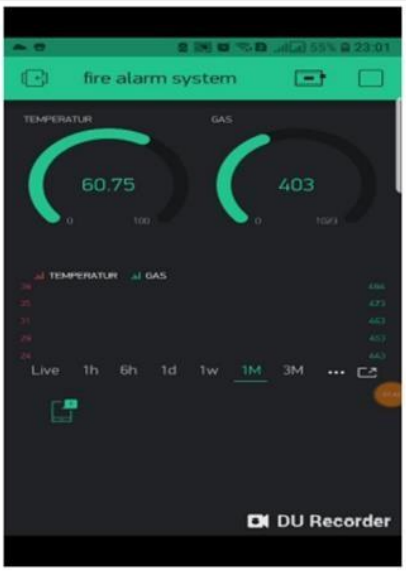
Distance	Picture	Result
100 cm		

Table 1.3 Temperature Sensor Test Results

In table 1.3 shows the results of temperature sensor testing with sensor data working well and in accordance with ISO 7240-5 standards, temperature sensor testing is carried out at room temperature of 30 °C.

CONCLUSION

From the results of research can be concluded, among others, the prototype of anandroid-based fire prevention early detection system is able to monitor the potential for fire by the presence of fire. This system is able to provide remote information on the condition of the presence of fire and gas in real time through the Blynk application on android smartphones. The results of this study are expected to be used to help detect and avoid potential fire hazards.

Even if this android-based early fire detection device has been successfully made, it is recommended to remain careful to pay more attention to the use of gas cylinders and put easy materials burned in a good place.

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