MEC104

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Group Report Assignment

Group Number: A34

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Introduction— The temperature and the concentration of gas will occur on the screen. This system can then notify the dangerous situation to let people around to begin the urgent evacuation. This project was completed by Arduino board and through the procedure of exploration we have learned a lot about the Arduino and the circuit design.

Background / Objective

Background

In modern life, the guarantee of security is more and more important in the circumstances around citizens especially in skyscrapers. The biggest threaten and danger of skyscrapers is the fire hazard. Sometimes a small flame may cause bad catastrophe. In this case, a practical temperature and harmful smoke alarm system is needed. This system we designed is consists of a temperature sensor, a smoke sensor, an LED and a screen.

Methodology

The needed theory of this project is very clear and brief. The most important part is the principles of the temperature sensor. The thermistor is the most widely used electronic device in temperature sensors. It is a kind of resistor that is sensitive to the change of temperature and will change its resistance when the temperature goes high or low. In this project, we will use the TMP 36 sensor to test the temperature.

For the gas sensor the principles may be a bit complex. The air and the measured gas are diffused to the induction electrode through the diffusion film. The control circuit maintains a voltage between the induction electrode and the opposite electrode sufficient to initiate electrochemical reactions. Electrochemical reactions in the presence of the gas under test will create an electric current between the poles. The sensor's rapid response allows it to detect the surrounding air in real time and continuously. Those functions are connected and integrated by Arduino board.

In this project we mainly use five devices. Gas transducer, temperature sensor, buzzer, LCD display and a RGB light. The Potentiometer is used to adjust the LCD display's brightness. Gas transducer and temperature sensor are used to detecting the gas density and the temperature value. The buzzer is used to send alarm to people so that people will know the danger and quickly move away. The LCD display is used to show the current gas density and temperature value. The RGB light is a temperature alarm light. When the temperature is smaller than 50, the RGB will show green light. When the temperature is larger than 50 but smaller than 100, the RGB light will show yellow light. When the temperature is larger than 100, the RGB light will show red light.

Results and Discussion

Discussion

According to the similar principle, can also be adjusted to the buzzer. By setting different frequencies, you can get different sounds. You can even connect two buzzers to achieve reverberation effect by setting different frequencies, so as to feedback different conditions.

Due to the limitation of LCD display screen, only 32 letters or numbers can be displayed at the same time, but due to the limitation of interface and unable to connect several LCD display screen, you can consider the button control display data. Although there is no redundant interface, the code can count and convert numbers into time for display, so it can be improved to have electronic clock and other functions.

At the same time, consider logic gates to reduce the number of interfaces used in order to gain more operational space. There are still many improvements to be made based on this platform, and this article describes only those that the author can think of.

Results

After a long time of commissioning, we finally make the system working properly. When you start the simulation, you will see the current gas density and temperature value on the LCD. If you adjust the gas density or the temperature value, you will see the changes on the LCD display. Moreover, the RGB light and buzzer will also give feedback to you according to your changes.

Conclusion and Future Work

Conclusion

This project has come to a successful conclusion. The fire alarm did its job perfectly. Through this project, we have a deep understanding of the working principle and activation method of integrated multi-sensor and LCD display, and have a deeper impression on how to use them in our daily life. In fact, a real fire alarm is much more complicated than this project and we're just at the beginning of the project. The boundless power of Arduino will lead us to a brighter future of circuit design.

Future Work

This project can be considered to have only completed the basic rudiment, there is still a large room for improvement. Since RGB diodes can be changed to any color by changing the value, it is possible to loop the color into a gradual state.