ARDUINO BASED SECURE SYSTEM WITH ULTRASONIC & FLAME SENSORS

SUBMITTED BY:

(102166001) AJAYVEER DHILLON
(102116026) ARMAN BISHNOI
(102296003) DEEPANSHU THAKUR
(102117096) KIRAT KAUR RAI
(102116101) MADHUSUDAN
(102116056) SUKHMANDEEP SINGH

COMPUTER SCIENCE AND ENGINEERING
DEPARTMENT TIET,
PATIALA

OCTOBER 2023

OBJECTIVE :

The objective of our team project is to develop a secure system using Arduino. This system incorporates an ultrasonic sensor, a flame sensor, an LCD screen, and an I2C module. The key goal is to detect and alert users about any potential security breaches, such as unauthorized access or fire hazards.

WORKING METHODOLOGY :

Ultrasonic Sensor: The ultrasonic sensor is used to measure the distance between the sensor and any obstacle in front of it. The Arduino board is programmed to calculate the distance and trigger an alarm if the distance is less than a predefined threshold, indicating an intrusion.

Flame Sensor: The flame sensor is used to detect the presence of fire. It works by detecting the infrared light emitted by flames. When fire is detected, the Arduino triggers an alarm and activates the LCD screen to display a warning message.

LCD Screen: An LCD screen is used to provide visual feedback to the user. It displays information such as the distance measured by the ultrasonic sensor and alerts for any security breach or fire hazard detected by the system.

I2C Module: The I2C module is used to expand the number of available input/output ports for connecting the ultrasonic sensor, flame sensor, and LCD screen to the Arduino board. It provides a convenient way to interface multiple devices with the limited GPIO pins of the Arduino.

IMPLEMENTATION:

Hardware: The hardware components required for this project include an Arduino board, ultrasonic sensor, flame sensor, LCD screen, and I2C module. The components are connected as per the circuit diagram in Appendix A, ensuring a secure and efficient physical setup.

Software: The Arduino board is programmed using the Arduino IDE. The code includes logic for reading sensor data, processing it, and triggering appropriate actions based on predefined conditions. Libraries for the ultrasonic sensor, flame sensor, LCD screen, and I2C module are utilized to simplify the programming process.

NEED ANALYSIS :

The need for a secure system that can detect and alert users about potential security breaches and fire hazards is crucial in various settings. This project aims to address this need by utilizing affordable and easily accessible components like Arduino, ultrasonic sensor, flame sensor, LCD screen, and I2C module. The project offers a cost-effective and efficient solution to enhance security.

BENEFITS :

Enhanced Security: The system provides real-time detection of potential security breaches, such as unauthorized access, by utilizing the ultrasonic sensor.

Fire Hazard Detection: The flame sensor helps in identifying fire hazards and triggering immediate warnings, allowing users to take prompt action.

User-friendly Interface: The LCD screen provides a user-friendly interface, displaying relevant information and alerts in a clear and concise manner.

Cost-effective: The use of Arduino and readily available components makes the project cost-effective and accessible to a broad range of users.

DRAWBACKS :

Limited Detection Range: The ultrasonic sensor has a limited detection range, which may require multiple sensors for comprehensive coverage in larger areas.

False Alarms: The system may occasionally trigger false alarms due to environmental factors, such as interference or sensor limitations. Therefore, necessary calibration and testing are required to reduce false positives.

CONCLUSION :

The team project successfully implemented an Arduino-based secure system using an ultrasonic sensor, flame sensor, LCD screen, and I2C module. The system proved effective in detecting potential security breaches and fire hazards, providing real-time alerts to users. Despite some limitations, such as limited detection range and occasional false alarms, the project offers a cost-effective and efficient solution for enhancing security. Further improvements can be made by refining the detection algorithms and expanding the detection range. Overall, the project demonstrates the potential of Arduino-based systems in improving security and safety.

APPENDICES :

APPENDIX A : Circuit Diagram