International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 04 | Apr 2024 www.irjet.net p-ISSN: 2395-0072

Exam Control Room Smart Security System using Arduino

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Abstract - *The implementation of a smart security system using the RC522 RFID module in an exam control room offers a technologically advanced solution for ensuring the integrity and confidentiality of examination processes. This paper presents the design, development, and deployment of such a system, which leverages RFID technology for secure access control and monitoring within the exam control room. By integrating the RC522 RFID module with a comprehensive security infrastructure, including cameras, alarms, and centralized monitoring software, the system enables efficient management of exam-related activities while preventing unauthorized access and malpractice. This paper discusses the key components, functionalities, and benefits of the smart security system, as well as its potential applications in educational institutions and examination centers.*

Key Words: **Arduino , RC522, Leds, Lock, ID cards, LCD**

1.INTRODUCTION

Exam control rooms are crucial spaces where strict adherence to the security and integrity of examination procedures is required. The efficiency and effectiveness of traditional security measures, including physical locks and surveillance cameras, in preventing illegal entry and malpractice are limited. As a result, creative solutions that make use of cutting-edge technology are becoming more and more necessary to improve test security and reduce administrative load. The RC522 RFID module is the primary component used by the proposed smart security system for monitoring and access control in the exam control room. Contactless operation, excellent security, and simplicity of connection with current infrastructure are just a few benefits of RFID technology. The method minimizes the danger of malpractice and security breaches by limiting access to the control room to only authorized staff, such as exam invigilators and administrators, who are issued RFID-enabled identity cards.

2. LITERATURE REVIEW

This document provides detailed information on the "Door Lock System," which allows us to unlock the door using a predetermined password. This solution allows the user to reset or modify their password in the event that they forget both of them. An infrared sensor has been employed in this proposed study to raise the security level. This study presents a password-protected door lock with an LED-based resistive screen input panel that senses changes in light intensity reflected by the finger and emitted by surrounding red LEDs. The photo diode records this variation in light intensity. Because Arduino is easier to interface with, it has been used in this suggested article. After working on a component of the project that involved using ARDUINO and ultrasonic sensors, it was discovered that this concept is widely searched for and considered to be cutting edge. The innovations that were used were not only reliable and fruitful, but also financially feasible. Not only that, but additional really helpful uses for ultrasonic sensors were also noted here. This project describes a monitoring system that uses an Arduino microcontroller to measure the height of a river and the pace of its waves through the use of an ultrasonic sensor. The event known as a flood or surge occurs when all of the water submerges beneath land due to a waterway's inability to handle the volume of water. By measuring the water's height beforehand and keeping an eye on its velocity, we can solve the flooding issue. We can solve an issue before it becomes a crisis if we recognize it early.

3. EXISTING SYSTEM

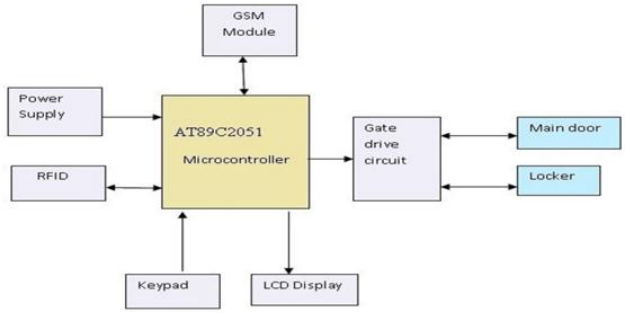

Fig -1: Existing System

4. PROPOSED SYSTEM

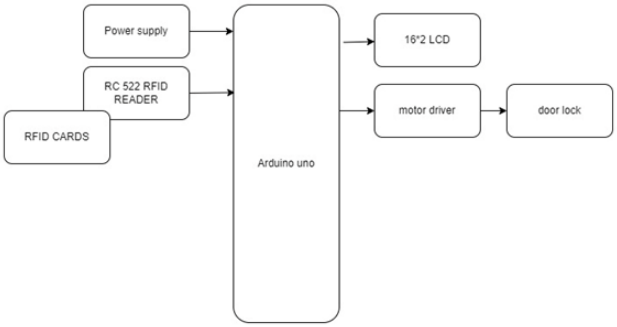

Fig -2: Proposed Architecture

5. HARDWARE DESCRIPTION

5.1 ARDUINO UNO

A microcontroller board based on the ATmega328 is called the Arduino Uno (datasheet). It contains six analog inputs, a 16 MHz crystal oscillator, 14 digital input/output pins (six of which may be used as PWM outputs), a USB port, a power connector, an ICSP header, and a reset button. It comes with everything needed to support the microcontroller; all you need to do is power it with a battery or an AC-to-DC adapter or connect it to a computer via a USB cable to get going. The FTDI USB-to-serial driver chip is not used by the Uno, setting it apart from all previous boards. Rather, it has the Atmega8U2 configured to function as a serial-to-USB converter.

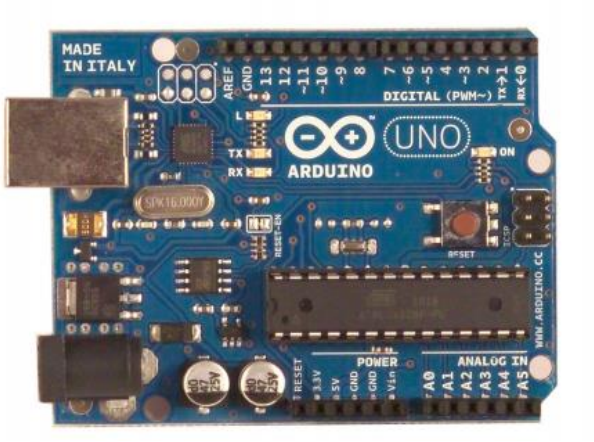

Fig -3: UNO Board

5.2 LCD

A small, flat display device known as a liquid crystal display (LCD) is composed of any number of color or monochrome pixels arranged in front of a reflector or light source. A column of liquid crystal molecules hanging between two transparent electrodes makes up each pixel, as do two polarizing filters with perpendicular polarity axes. Light traveling through one would be obstructed by the other if there were no liquid crystals between them. To enable light entering one filter to pass through the other, the liquid crystal twists the polarization of the light.

5.3 RC522 RFID READER

The MFRC522 controller from NXP semiconductors serves as the foundation for the 13.56MHz RFID module known as the RC522. The module often comes with an RFID card and key fob and supports I2C, SPI, and UART. It is frequently utilized in applications for person/object identification and attendance systems.

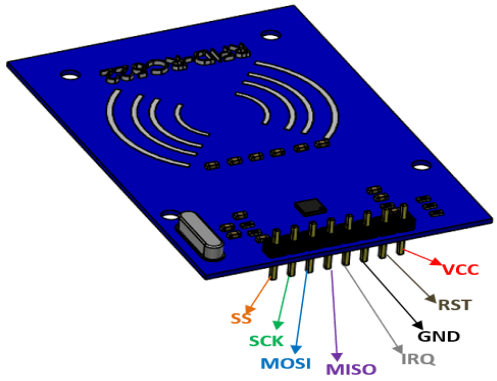

Fig -5: RFID Reader

5.4 RELAY

An electronic switch that can be managed by a low-power electrical signal, such the output from an Arduino microcontroller, is called a single-channel relay. Lights, motors, and appliances are examples of high-voltage or high-power equipment that may be controlled from your computer or mobile device with an Arduino Uno and a single-channel relay module. This blog post will explain the operation of a relay, show you how to connect an Arduino Uno to a single-channel relay, and walk you through a basic example of using a 5v relay module to drive a lamp.

Fig -6: 1-Channel relay

5.5 solenoid lock

The term "solenoid lock" refers to an electrical latch for locking and unlocking. It may be utilized in a variety of scenarios and is available for unlocking, locking, and retaining in the power-on mode type. Only when the solenoid is powered on does the power-on unlocking type allow unlocking. This kind of door offers exceptional safety since it is secured and will not open in the event of a power outage or disconnected cable.

Fig -7: Lock

5.6 RFID CARDS

An RFID reader or interrogator is what is created when the transmitter and scanning antenna are joined. RFID readers come in two varieties: fixed readers and mobile readers. An RFID reader is a network-connected gadget that may be fixed or carried about permanently. It transmits impulses that activate the tag via radio waves. The tag transmits a wave back to the antenna when it has been activated, where it is converted into data. The RFID tag itself houses the transponder. The read range of RFID tags is contingent upon several elements, such as the kind of tag, the kind of reader, the RFID frequency, and any interference from nearby objects or other RFID tags and readers. Longer read ranges are associated with tags with greater power sources.

Fig -7: ID'S

6. Results

This project demonstrated the smooth integration capabilities of the Arduino with the RC5222 module in addition to the promise of RFID technology. These developments provide a window into the future of security systems and highlight the possibilities of fusing contemporary technology with conventional security measures.

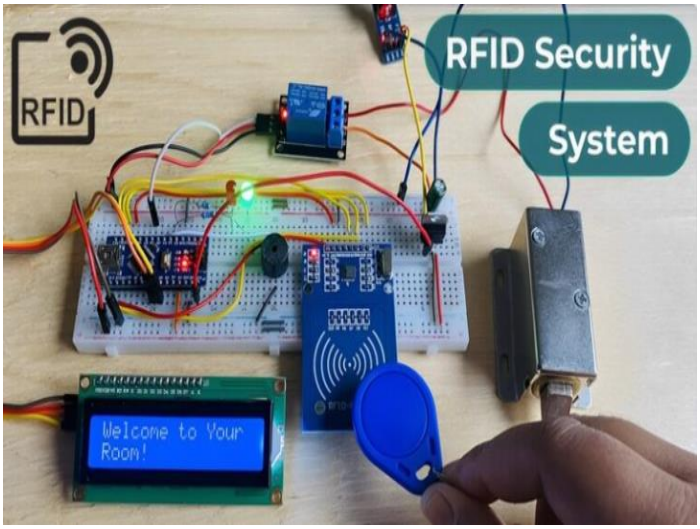

Fig -6: Results

7. CONCLUSIONS

In summary, a solid method for boosting the security and integrity of examination control rooms is the installation of a smart security system that makes use of the RC522 RFID module. The solution minimizes the danger of malpractice and security breaches while enabling effective administration of exam-related activities through the use of RFID technology for access control and monitoring. The efficiency of the system in protecting exam procedures and upholding confidentiality is further improved by the incorporation of centralized monitoring software and enhanced security infrastructure.

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