RFID - BIKE CONTROLLER

MINI PROJECT REPORT

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BONAFIDE CERTIFICATE

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TABLE OF CONTENTS

ABSTRACT

Motorcycle theft crime index is recorded the highest crime in our country with many cases of losses reported at the police station. This happens due to lack of their security systems on the vehicle. Other reason is due to the negligent attitude of the owner of the security measures taken charge of the vehicle and the attitude of the owners. The aim of this paper is to invent a security system against motorcycles theft by using RFID (radio frequency identification) technology. It is based on RFID technology on ultra high frequency range (905-925 MHz) which can be applied to use in access control by using RFID tag attached to motorcycles. Additionally, the system can be modified to use for protecting other kinds of assets stealing such as cars, notebooks, bags, etc. The RFID tag contains a unique set of number as a code, so it can be identified. The qualifications and information of each property are recorded on a database interfaced to RFID reader. When the RFID tag responds to the RFID reader, it can read the data which is kept in tag and send these data to proceed in order to compare with the data on the database. The system alarms security guards for further investigation. In addition, it can send a signal to activate an additional circuit to shut the motorcycle engine off and turn the closed circuit television (CCTV) on for recording as the theft occurs. The purpose of this project is to build an increased security system for motorbikes using radio frequency identification (RFID). Radio Frequency Identification (RFID) technology offers a promising solution due to its reliability, versatility, and ease of integration. This paper introduces an advanced security system for bikes, leveraging RFID technology to provide robust protection against thefts. The system employs RFID tags, readers, and a centralized control unit to monitor and manage bike access

LIST OF FIGURES

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CHAPTER 1

INTRODUCTION

RFID Security Access Control System using 8051 Microcontroller is an RFID Technology based security system. Using this system, authorization of personnel is carried out with an RFID card and only those with access can enter a secured area. The security of any organization is a priority for the authorities. The security concern is for the physical property and also for the intellectual property. For this reason automatic identification and access control system has become necessary to overcome the security threats faced by many organisations.This project deals with an interesting manner of security access control with the help of RFID Technology, where only people with valid cards are allowed to access the door or any secure area.

A radio –frequency identification(RFID) based access-control system onlyAuthorised people to enter a particular area of an establishment.authorised People are provided with unique tags, using which they can access that area. This RFID based security system is based on micro controller AT89C52 and comprises a RFID module, a LCD module for displaying the status and a reply for opening the door.

CHAPTER 2

2.1 BLOCK DIAGRAM

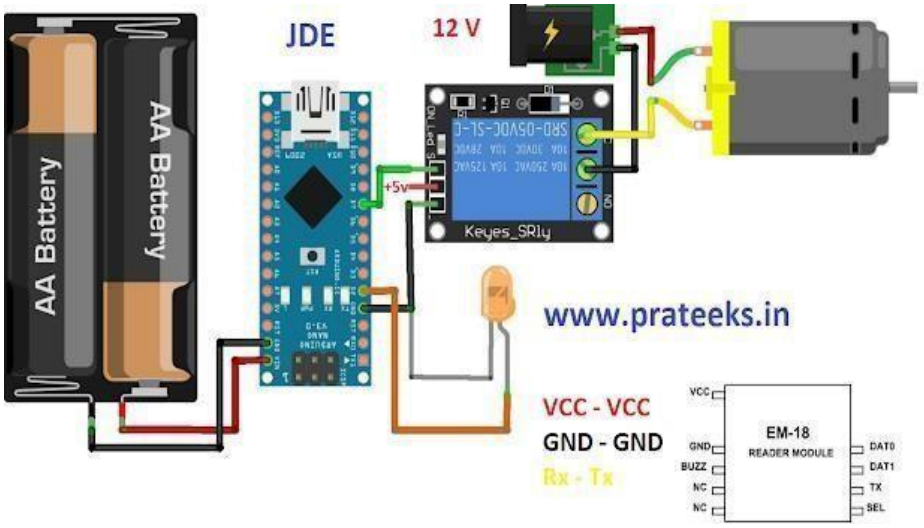


Fig 2.1 Block diagram

RFID READER

This is a low frequency (125 KHz) RFID reader with serial output with at range of 8-12cm .it is a compact units with built in antenna and can be directly connected to the PC using RS232 protocol.

ARDUINO BOARD

Arduino is an open-source electronics platform based on easy-to-use hardware and software.Arduino boards are able to read inputs-light on a sensor, a finger on a button, or a twitter message-and turn it in to an output- activating a motor, turning on an LED, publishing something online. The Arduino based project requires an ultrasonic sensor, the sensor released the waves which we want to measure the distance of an object. The microcontrollers of the Arduino board can be programmed using C and C++ languages

BUZZER

A buzzer is an audio signaling device, which may be mechanical, electromechanical,or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

DC MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy in to mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically changet the direction of current flow in part of the motor.

RELAY

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals.

CHAPTER 3

COMPONENTS

The components used in the RFID based security system

- RFID Reader Module
- Buzzer
- 5V DC Motor
- Relay
- Reset Button
- LCD Display
- Magnetic Cards
- LED-Indication

3.1 RFID READER MODULE

Radio Frequency Identification or simply RFID is a wireless technology generally used for automatic identification and data collection.RFID technology is used for accessing data from a uniquely identify RFID card or tag by combining the radio frequency and microchip technologies i.e. the data is retrieved or stored into the RFID cards without making any physical contact.

Fig 3.1 RFID Reader module

With the help of RFID technology we can create smart systems that can be used personnel identification, product monitoring, individual or organisation security, transportation, maintenance of inventory and supply chain tracking.RFID systems usually comprises of three components: an RFID Card, an RFID Reader Module and a host device.RFID Card or Tag consists of the data in the embedded microchip. RFID Reader is used to read the data from the RFID Card and transfer it to the host device.

3.2 BUZZER

A Buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as mouse click or keystroke. The buzzer consists of an outside case with two pins to attach it to power and ground. Inside is a piezo element, which consists of a central ceramic disc surrounded by a metal vibration disc.

Fig 3.2 Buzzer

3.3 5V DC MOTOR

A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Fig 3.3 5V DC motor

3.4 RELAY

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations of Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

Fig 3.4 Relay

The traditional form of a relay uses an electromagnet to close or open the contacts, but other operating principles have been invented, such as in solid-state relays which use semiconductor properties for control without relying on moving parts. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called protective relays.

Latching relays require only a single pulse of control power to operate the switch persistently. Another pulse applied to a second set of control terminals, or a pulse with opposite polarity, resets the switch, while repeated pulses of the same kind have no effects. Magnetic latching relays are useful in applications when interrupted power should not affect the circuits that the relay is controlling.

3.5 MAGNETIC CARDS

A magnetic card is a card that contains either a magnetic strip or a magnetic object in the card, encoded with digital data. A magnetic card may contain information about an individual, such as available credit on a credit card or pass codes for entering secure buildings. It's usually the size of a business card or credit card. ID Tech Solutions manufactures and supplies ultra high- quality UHF RFID Cards also known RFID smart cards or long-range RFID cards. These UHF RFID cards are widely used in schools, colleges, campuses, offices for attendance, access control and other custom applications. Apart from this these cards are widely in demand for the health care industry, banking industry and entertainment.

Fig 3.5 Magnetic Cards

3.6 LED INDICATION

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. The LED consists of a chip of semiconducting material doped with impurities to create a p-n junction. As in other diodes, current flows easily from the p-side, or anode, to the n-side, or cathode, but not in the reverse direction. Charge-carriers electrons and holes flow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon.

Fig 3.6 LED Indication

A RFID tag having a LED is provided. The RFID tag includes an antenna, a RF processor, a controller, a memory, at least one of LED.The RF processor receives and transmits a wireless signal through the antenna, and modulates and demodulates transmitted and received signal and data. The controller analyzes a received data outputted from the RF signal processor and generally controls the RFID tag. The memory stores the received data in response to the controller. The LED switching unit turns on/off at least one of the LEDs in response to the controller.

CHAPTER 4

WORKING

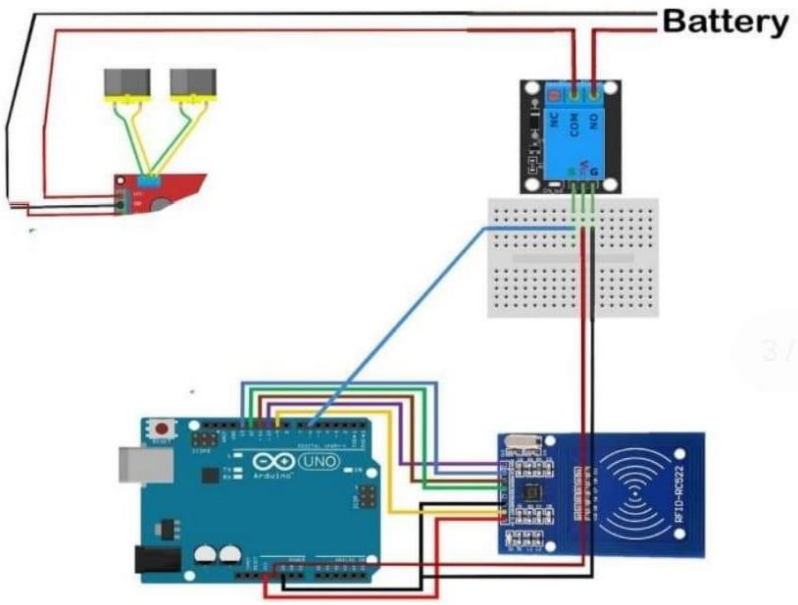
An Automatic Gate opening system for vehicles with RFID and campus access control system RFID based were proposed. The systems grant access to authorized persons with valid tags and deny the unauthorized persons with invalid tags but the system slack ability to intimates security personnel through SMS. In this system RFID monitor access, sensor to monitor the temperature, lighting and gas leakage and GSM send SMS to the owner of the house when safety of the home is not guaranteed. The system emphasized more of safety than security of the home or office.

This system uses RFID and GSM technologies to provide security for distribution of petroleum products. The system was made up of control unit and tanker unit that are far from each other but can easily communicate with each other. The tanker unit monitors the fuel level continuously and displayed it on LCD at the front for driver's convenience. The second is RFID assembly which will read the authentication code of the petrol pump.

The amount of fuel poured at a particular petrol pump and petrol pump ID will be sent to central office through GSM techniques. The pitfall here remained that the system does not operates as a stand-alone system security measure. An Access Control by RFID and face recognition based on neural network was design and implemented. This system recognizes the face of the person holding the RFID card and denies access if they do not match. A Radial Basis Function Neural Network (RBFNN) was adopted to learn the face of authorizedcard holders.

It can signal to activate an additional circuit to shut the motorcycle engine off and turn the Closed Circuit Television (CCTV) on for recording as the theft occurs. The system would have been better with SMS to the guards to avoid commotions. The present study aims at the design and implementation of a security access control system that uses a wireless and automatic identification system knows as Radio frequency Identification (RFID) system, Microcontroller as a control unit, GSM/GPRS modem that can send SMS when signalled by the controller, a relay to close and open the system, the Buzzer that form the alarm system and LCD that displays the result of the controller processing.

How it Works:



1. **Setup:**
   Replace authorized ID with the UID of your authorized RFID tag.
   The relay module is connected to RELAY_PIN (pin 8).
2. **Motor Control:**
   When the authorized tag is scanned, the motor toggles ON/OFF.
3. **UID Detection:**
   The program reads the RFID tag's UID and compares it with authorized ID.

Wiring:

- **RFID Reader:**
  VCC → 3.3V
  RST → Pin 9
  GND → GND
  MISO → Pin 12
  MOSI → Pin 11
  SCK → Pin 13
  SDA → Pin 10
- **Relay Module:**
  VCC → 5V
  GND → GND
  IN → Pin 8

CHAPTER 5

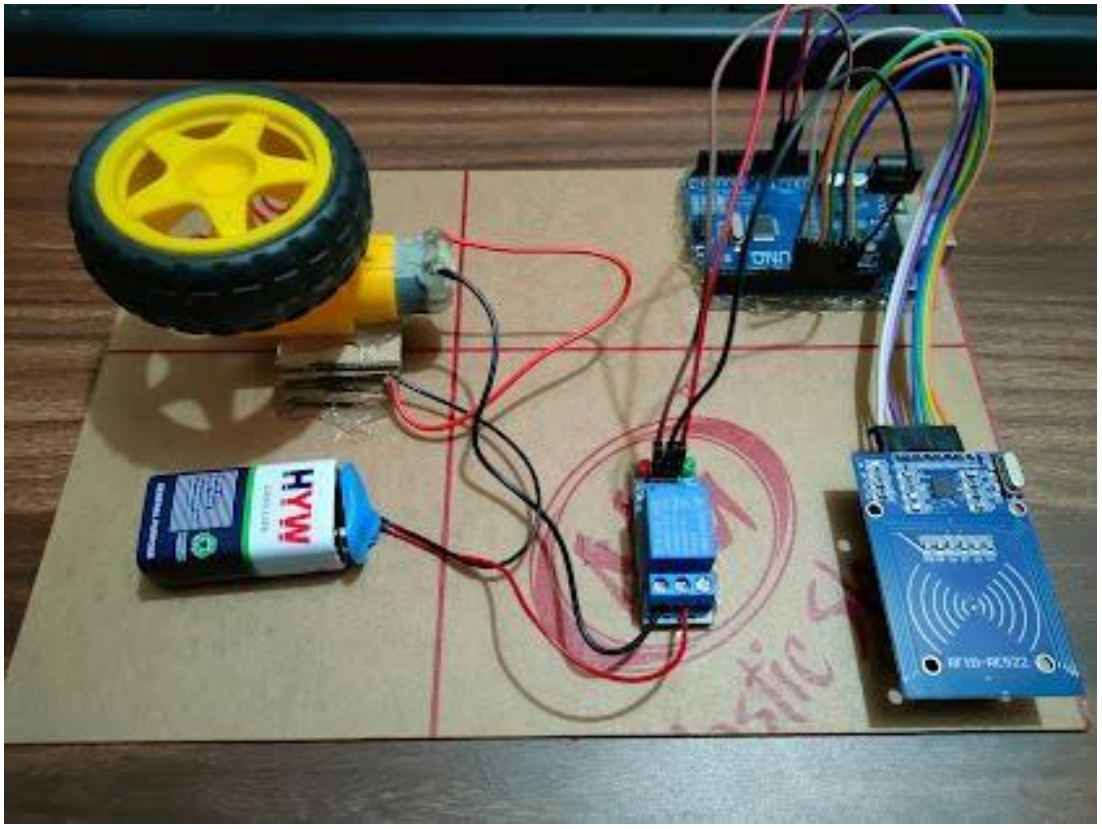
CODING

```
#include <SPI.h>
#include <MFRC522.h>

#define RST_PIN 9   // Reset pin for RFID
#define SS_PIN 10   // Slave Select pin for RFID
#define RELAY_PIN 8 // Pin connected to relay module

MFRC522 rfid(SS_PIN, RST_PIN);

bool motorState = false; // Motor state: false = OFF, true = ON
String authorizedUIDs[] = {"12345678", "87654321"}; // Replace with your two tag
UIDs

void setup() {
  Serial.begin(9600);
  SPI.begin();
  rfid.PCD_Init();

  pinMode(RELAY_PIN, OUTPUT);
  digitalWrite(RELAY_PIN, LOW); // Ensure motor is OFF at start

  Serial.println("Place your RFID tag near the reader.");
}

void loop() {
  // Check if a new card is present
  if (!rfid.PICC_IsNewCardPresent() || !rfid.PICC_ReadCardSerial()) {
    return;
  }

  String uid = getUID(); // Get the UID of the scanned tag
  Serial.println("Scanned UID: " + uid);

  if (isAuthorizedTag(uid)) {
    toggleMotor(); // Toggle motor state if UID matches one of the authorized tags
  } else {
    Serial.println("Unauthorized tag!");
  }

  rfid.PICC_HaltA(); // Halt communication with the card
}
```

```
// Function to toggle motor state
void toggleMotor() {
  motorState = !motorState; // Flip the motor state
  digitalWrite(RELAY_PIN, motorState ? HIGH : LOW);

  if (motorState) {
    Serial.println("Motor turned ON");
  } else {
    Serial.println("Motor turned OFF");
  }
}

// Function to read the UID from the RFID tag
String getUID() {
  String uid = "";
  for (byte i = 0; i < rfid.uid.size; i++) {
    uid += String(rfid.uid.uidByte[i], HEX);
  }
  uid.toUpperCase();
  return uid;
}

// Function to check if the scanned tag is authorized
bool isAuthorizedTag(String uid) {
  for (String authorizedUID : authorizedUIDs) {
    if (uid == authorizedUID) {
      return true;
    }
  }
  return false;
}
```

CHAPTER 6

OUTPUT



CHAPTER 7

CONCLUSION

RFID's potential benefits are large, and we're sure to see many novel applications the future—some of which we can't even begin to imagine.

The components that go into RFID readers and tags are simple radio communications, but their smaller size and broad deployment enhance the power of the technology and raise concerns about the privacy effects of RFID deployment. These concerns are often premised on unlikely assumptions about where the technology will go and how it will be used. RFID based security and access control system is more secure and fast responded as compared to the other system like biometric. The advantage of the RFID system is contact-less and works without-line-of-sight. By using arduino it is easy to access and works very quickly while burning the code it is like plug and play device. Users can change the function accordingly by using arduino. It is easier to use and accurate also. Hence this project can be useful for implementation of access control application for tracking system as well as providing the security benefits. This project can improve by raising the range of reader in which the tag read.

CHAPTER-8

COST ESTIMATION

Arduino UNO circuit board	=	220
R&D Arduino Pro Mini	=	120
Relay	=	90
Jumper wire	=	60
NANO Wire	=	50
DC Motor	=	30
Battery	=	30
Total cost of the project	**=**	**600**

CHAPTER 9
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