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Vellore Institute of Technology

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Efficient Living

Innovative Strategies for smart life to reduce Human effort

Date : 14, July , 2023

Course : Internet of things

Course code: BECE351E

Teammates :

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Content

Problem Statement :

The main objective of this project is to develop a modern technology-based system that will allow people to access their homes and other facilities without having to interact with humans. This system will use a single Arduino Uno microcontroller and a sensor system to detect the presence of people and to control the opening of gates and the turning on of lights. The system will be designed to be low-cost and easy to install.

The specific problem that this project will address is the need for a more efficient and convenient way for people to access their homes and other facilities. Currently, people often have to interact with humans in order to gain access to these places. This can be inconvenient and time-consuming, especially if the person is in a hurry or if the human is not available. The system that this project will develop will eliminate the need for human interaction, making it easier and faster for people to access their homes and other facilities.

- The system that this project will develop will have the following benefits:

- It will be more efficient and convenient for people to access their homes and other facilities.
- It will be more secure, as it will eliminate the need for people to interact with humans.
- It will be low-cost and easy to install.

The system that this project will develop will be a valuable addition to the modern world. It will make it easier and more convenient for people to access their homes and other facilities, and it will be more secure than traditional methods of access control. The system will also be low-cost and easy to install, making it accessible to a wide range of people.

Abstract

Introduction:

this project is to develop a system that can automatically open doors when a person is near the vehicle. This would be especially useful for people who have difficulty opening doors, such as the elderly or people with disabilities. It would also be helpful for people who are carrying groceries or other heavy objects.

The system would use a combination of sensors to detect the presence of a person and the proximity of the vehicle. The sensors could include ultrasonic sensors, radar sensors, or even cameras. Once the system detects a person near the vehicle, it would then open the door automatically.

The system would also be able to detect smoke and other hazards. If the system detects smoke, it would sound an alarm and open the doors to allow people to escape. This would be especially important for people who are sleeping in the vehicle or who are unable to escape on their own.

The system would be designed to be affordable and easy to use. It would be powered by a battery and would not require any special maintenance. The system would also be small and lightweight, so it could be easily installed in any vehicle.

The development of this system would have a number of benefits. It would make it easier for people to get in and out of their vehicles, and it would help to prevent accidents. The system would also be a valuable safety feature, as it would help to detect and respond to hazards.

Here are some additional details that could be included in the technical report background:

The system would use a variety of sensors to detect the presence of a person and the proximity of the vehicle. These sensors could include ultrasonic sensors, radar sensors, or even cameras.
The system would be able to detect smoke and other hazards. If the system detects smoke, it would sound an alarm and open the doors to allow people to escape.
The system would be designed to be affordable and easy to use. It would be powered by a battery and would not require any special maintenance.
The system would be small and lightweight, so it could be easily installed in any vehicle.

COMPONENTS REQUIRED:

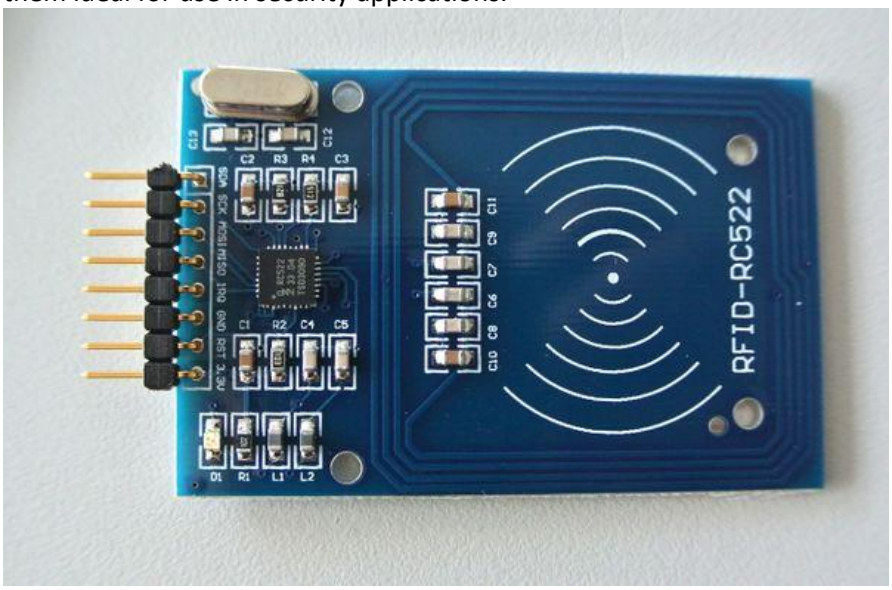
Arduino UNO

- Arduino Uno R3 is a versatile and easy-to-use microcontroller board that is ideal for beginners and hobbyists who want to learn about electronics and programming.

RFID :

Radio Frequency Identification (RFID) is a technology that uses radio waves to identify and track objects. RFID tags are small, electronic devices that are attached to objects. When an RFID tag comes within range of an RFID reader, the reader sends out a radio wave that activates the tag. The tag then sends back a signal that contains the tag's unique identification number.

RFID has a number of advantages over traditional identification methods, such as barcodes. RFID tags can be read from a distance, so they do not need to be in direct line of sight with the reader. This makes them ideal for use in applications where objects are moving quickly or where there is a lot of clutter. RFID tags can also be read through walls and other objects, which makes them ideal for use in security applications.



NFC tag

An NFC tag is a small, passive device that can be used to store and exchange data with other NFC-enabled devices. NFC stands for Near Field Communication, and it is a wireless technology that uses radio waves to communicate between devices.

NFC tags are typically made of a small chip and an antenna, and they can be embedded in a variety of objects, such as stickers, cards, and even clothing. When an NFC-enabled device comes close to an NFC tag, the two devices can exchange data.
Even we use our id card

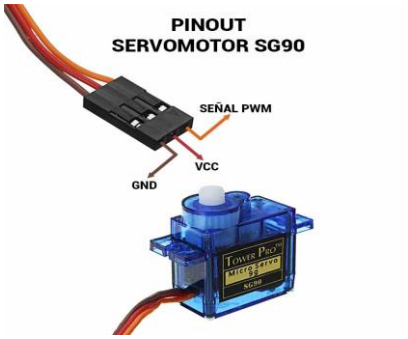
Passive RFID Tag-125KHZ

IR Sensors

An IR (Infrared) sensor is an electronic device that detects infrared radiation emitted by objectsin its surroundings and converts it into an electrical signal that can be processed by a microcontrolleror other electronic device. It is commonly used in applications such as remote controls, motion
detectors, temperature sensors, and proximity sensors.

Servo motor:

A servo motor is a type of motor that can rotate with great precision. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servo motors are used in a wide variety of applications, including robotics, automation, and machine tools. They are also used in consumer electronics, such as DVD players and video game consoles.

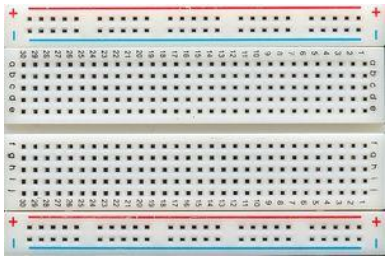


Relay Module

Relays are electromechanical switches that can be used to control the flow of electricity in a circuit. PCB mounted relay modules are commonly used in a variety of applications such as automation, robotics, industrial control systems, and home appliances. They are especially useful for applications that require high-speed switching, high current or voltage, or isolation between the control and power circuits.

4. Breadboard

Breadboards usually consist of a plastic board with a grid of holes that are connected by metal stripsunderneath. The holes are arranged in rows and columns, with each row and column electrically connected. The metal strips allow electronic components, such as resistors, capacitors, and
transistors, to be easily inserted and connected without the need for soldering.

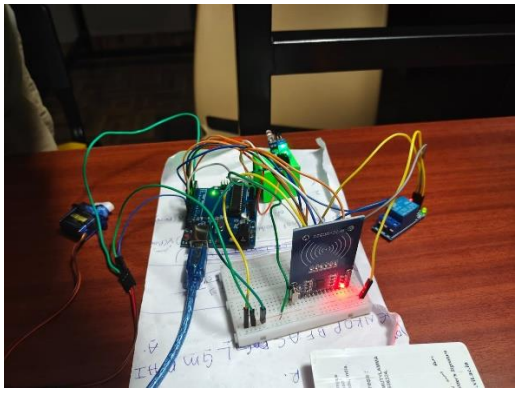


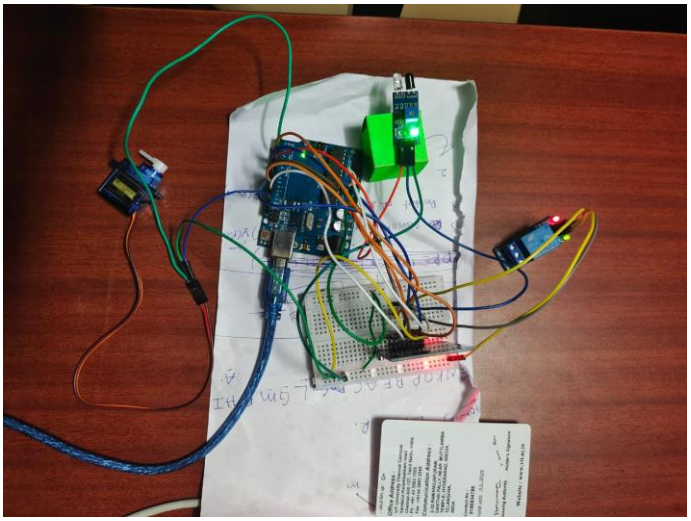
Budget:

Products	Quantity	Price in rupees
Arduino uno r3	One	599
RFID	One with tags	250
IR sensor	One	30
Servo motor	One	150
Wires	1 set	20
Breadboard	One	100
Relay module	One	150

Cost estimation : 1,350 rupees

Systematic circuit:





Code and Working:

To see the code and execution, follow this link:

https://github.com/manoharreddyvoladri/IOT_Efficient-life

The GitHub repository contains the code.

Code;

```
#include <Servo.h>
#include <SPI.h>
#include <MFRC522.h>
 #include <EEPROM.h>
 int flag=0;
```

```
 int ir=7;
#define SS_PIN 10
#define RST_PIN 9
#define SERVO_PIN 3
Servo myservo;
int led=5;
#define ACCESS_DELAY 2000
#define DENIED_DELAY 1000
MFRC522 mfrc522(SS_PIN, RST_PIN); // Create MFRC522 instance.
void setup()
{
pinMode(led,OUTPUT);
Serial.begin(9600); // Initiate a serial communication
SPI.begin(); // Initiate SPI bus
mfrc522.PCD_Init(); // Initiate MFRC522
myservo.attach(SERVO_PIN);
// myservo.write( 70 );
// delay(7500);
myservo.write( 0 );
pinMode(ir,INPUT);
Serial.println("Put your card to the reader...");
Serial.println();
}
void loop()
{

if(!digitalRead(ir)){
  digitalWrite(led,LOW);
  myservo.write( 0 );
  delay(500);
  // Serial.println("motion detected");
}

// Look for new
cards++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++++++
if ( ! mfrc522.PICC_IsNewCardPresent())
{
return;
}
// Select one of the cards
if ( ! mfrc522.PICC_ReadCardSerial())
{
return;
}
//Show UID on serial monitor
Serial.print("UID tag :");
```

```
String content= "";
byte letter;
for (byte i = 0; i < mfrc522.uid.size; i++)
{
Serial.print(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " ");
Serial.print(mfrc522.uid.uidByte[i], HEX);
content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
content.concat(String(mfrc522.uid.uidByte[i], HEX));
}
Serial.println();
Serial.print("Message : ");
content.toUpperCase();
if (content.substring(1) == "41 9A 53 DF") //change here the UID of the card  93 6D 3E A6,
08 0D 8A AD
{
Serial.println("Authorized access");
Serial.println();
digitalWrite(led,HIGH);
myservo.write( 180 );
delay(500);
}
else {
Serial.println(" Access denied");

delay(DENIED_DELAY);

}

}
```

Result:

The RFID system is always active, scanning for tags. When a tag is detected, the system reads the tag's ID and compares it to a list of authorized tags. If the tag is authorized, the system grants access and the door of the garage or gate is opened with the help of a servo motor. The lights in the garage or gate area are also turned on automatically.

An IR sensor is placed at the exit of the garage or gate. When the sensor detects motion, the lights and the door are closed automatically. This ensures that the garage or gate is secure even when the system is not actively being used.

The system can be programmed to allow or deny access to specific individuals or groups of people. It can also be programmed to send alerts if the system is tampered with or if an unauthorized person attempts to gain access.

The system is a cost-effective and secure way to control access to a garage or gate. It is easy to install and maintain, and it can be customized to meet the specific needs of the user.

Go through the link above a video available.

Advantages :

Convenience: This system would be very convenient for people who have to open and close their garage doors or gates frequently. They would no longer have to fumble with keys or remote controls.
Security: This system would also be more secure than traditional methods of opening and closing garage doors or gates. The RFID tags would be difficult to duplicate, and the system could be programmed to only allow authorized people to access the garage or gate.
Efficiency: This system would be more efficient than traditional methods of opening and closing garage doors or gates. The servo motor would open and close the door quickly and smoothly, and the lights would only be on when they were needed.

Disadvantages:

Cost: This system would be more expensive to install than traditional methods of opening and closing garage doors or gates. However, the long-term savings in convenience and security could offset the initial cost.
Complexity: This system would be more complex to install and maintain than traditional methods of opening and closing garage doors or gates. However, the complexity would be reduced by using off-the-shelf components and software.
Privacy: This system could potentially track the movements of people who use it. However, this could be mitigated by using anonymous RFID tags or by limiting the amount of data that is collected.

Further expansion:

Add a **camera to the system.** This would allow you to see who is approaching the door and grant access accordingly. You could also use the camera to track people's movements in and out of the garage or gate.
Add a voice recognition system. This would allow you to give voice commands to open the door, turn on the lights, or close the door. This would be especially helpful if you have your hands full or are unable to reach the door.
Connect the system to the cloud. This would allow you to control the system remotely from anywhere in the world. You could also use the cloud to store data about the system, such as who has accessed the door and when.
Add other sensors to the system. For example, you could add a temperature sensor to the system to turn on the lights if the temperature drops below a certain level. You could also add a humidity sensor to the system to turn on the dehumidifier if the humidity gets too high.
These are just a few ideas for further expanding this project in IoT. With a little creativity, you could come up with many other ways to improve the system and make it more useful.

Remote access: You could remotely control the system from anywhere in the world, which would be especially helpful if you are away from home.
Data collection: You could collect data about the system, such as who has accessed the door and when, which could be used to improve the system or to track the usage of the system.
Security: The system could be made more secure by connecting it to the cloud, which would allow you to use security features such as two-factor authentication.

Conclusion:

The project is a prototype of an automatic door opening system using RFID technology. The system consists of an RFID reader, a servo motor, a light sensor, and an IR sensor. The RFID reader is used to detect the presence of an RFID tag. If the tag is authorized, the servo motor will open the door. The light sensor is used to turn on the lights when the door is open. The IR sensor is used to close the door and turn off the lights when the area is clear.

The system was tested with a variety of RFID tags, and it was found to be effective in opening the door only when the authorized tag was present. The lights were also turned on and off as expected. The IR sensor was also effective in closing the door and turning off the lights when the area was clear.

The system is a proof-of-concept that shows that it is possible to create an automatic door opening system using RFID technology. The system is relatively simple to build and can be used in a variety of applications.

The future of the project would be to improve the accuracy of the RFID reader and to make the system more user-friendly. The system could also be extended to include other features, such as the ability to detect multiple authorized tags and the ability to control the door from a remote location.

Overall, the project was a success and it has the potential to be a valuable tool for a variety of applications.

Here are some of the benefits of the project:

Convenience: The system allows users to open and close doors without having to touch them, which can be especially helpful for people with disabilities.
Security: The system can be used to control access to restricted areas, which can help to improve security.
Cost-effectiveness: The system is relatively inexpensive to build and maintain.
Here are some of the limitations of the project:

Range: The RFID reader has a limited range, so the tag must be within close proximity of the reader in order to be detected.
Security: The system could be vulnerable to hacking if the RFID tags are not properly secured.
Privacy: The system could be used to track users' movements, so it is important to be aware of the privacy implications before using it.
Overall, the project is a promising development that has the potential to improve the convenience, security, and cost-effectiveness of door opening systems. However, there are some limitations that need to be addressed before the system can be widely adopted.

The End