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RFID door lock system using Arduino

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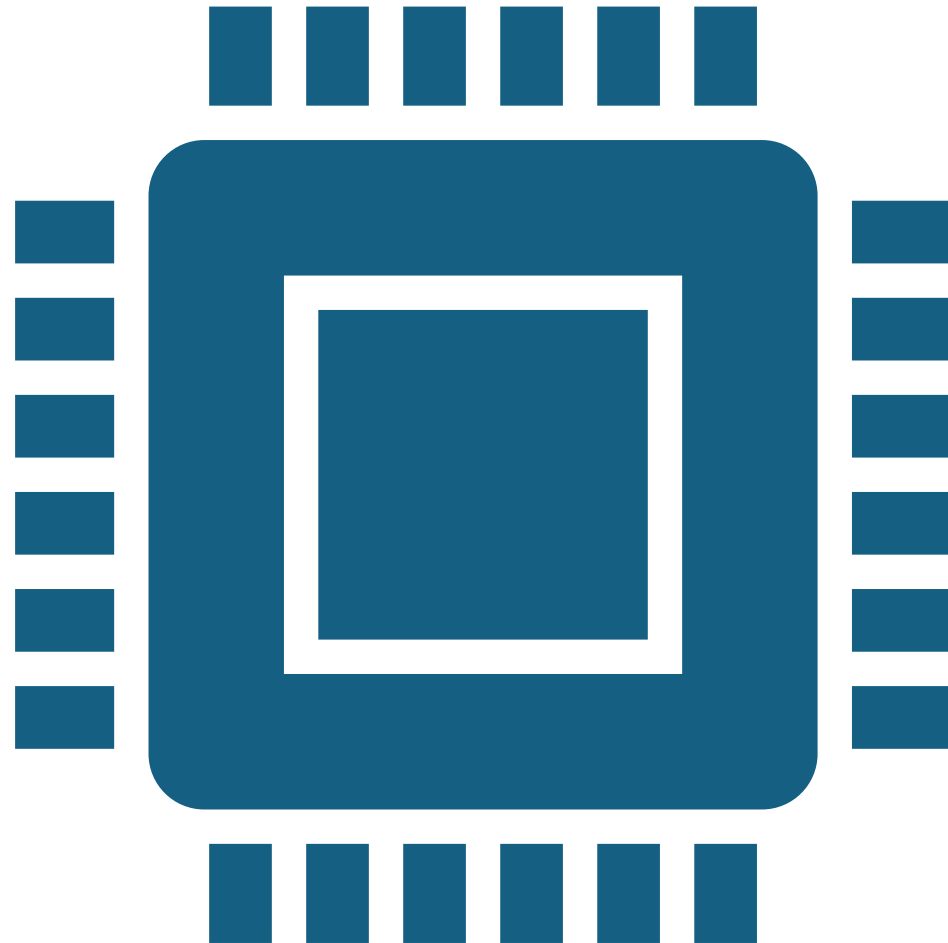Mohamed Adel Hussein Elsaidy   *1358*

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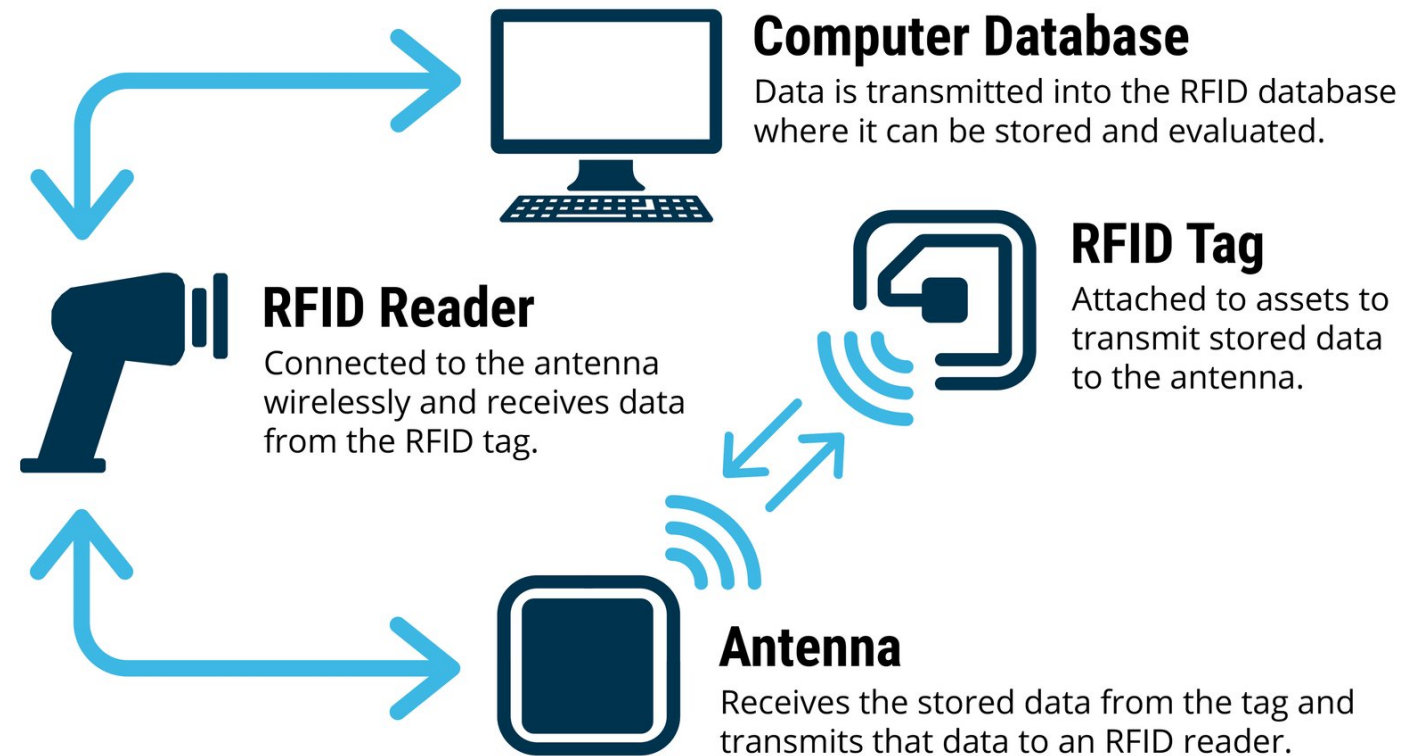# RFID Lock System

What in this report :

ⅰ. RFID Technology

- RFID stands for Radio-Frequency Identification. It's a technology that uses radio waves to transmit data wirelessly to identify, track, and manage objects, animals, or people. RFID systems typically consist of three components : RFID Tags: These are small electronic devices that contain a microchip and an antenna. The microchip stores information about the item it's attached to, and the antenna allows the tag to communicate with an RFID reader via radio waves . RFID Reader: This device emits radio waves and reads the data stored on RFID tags within its range. The reader then processes this data and sends it to a computer system for further analysis or action . Computer System: This is where the data collected by the RFID reader is processed and utilized. It can be a standalone system or integrated into a larger network, depending on the application.

Basic RFID System

Computer Database
Data is transmitted into the RFID database where it can be stored and evaluated.

RFID Tag
Attached to assets to transmit stored data to the antenna.

RFID Reader
Connected to the antenna wirelessly and receives data from the RFID tag.

Antenna
Receives the stored data from the tag and transmits that data to an RFID reader.

What is our project :

- Our project, the RFID lock system, is built upon the foundation of RFID (Radio Frequency Identification) technology, representing a significant leap forward in digital security solutions. Unlike its predecessors, such as traditional mechanical locking systems, RFID technology offers a robust and sophisticated means of access control.

- The primary goal of our project is to enhance security measures by harnessing the capabilities of RFID technology. Unlike mechanical systems that rely on physical keys or combinations, RFID technology operates through digitally encoded tags and readers. These tags emit unique identifiers that are authenticated by the system's reader, providing a highly secure method of access control.

- One of the key advantages of RFID technology lies in its encryption capabilities. Each RFID tag is equipped with a unique digital signature, making it exceedingly difficult for unauthorized individuals to replicate or tamper with. Additionally, RFID systems can be programmed to implement advanced security features such as access logs, user permissions, and remote monitoring, further bolstering security protocols.

- By leveraging RFID technology, our project aims to establish a more robust and reliable security framework. This technology not only enhances the integrity of access control systems but also minimizes the risk of unauthorized access and security breaches. In essence, our RFID lock system represents a cutting-edge solution designed to meet the evolving security needs of modern environments.
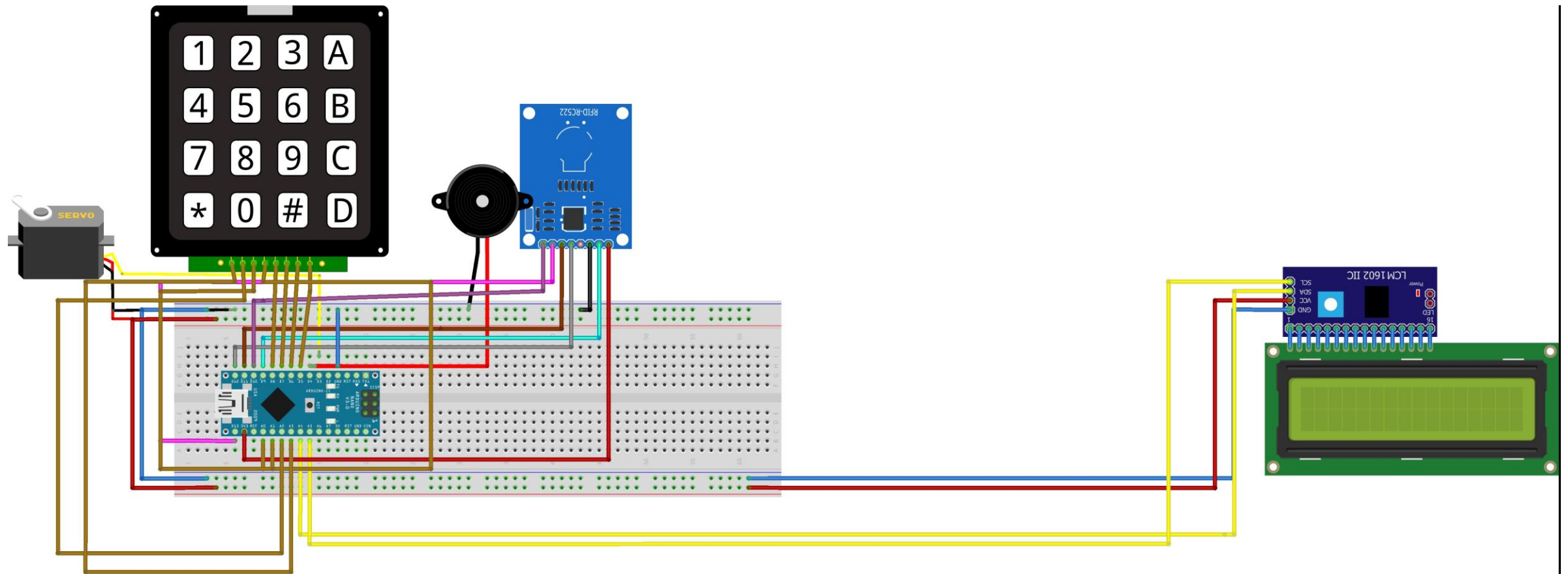
Components :

- RFID Module
- RFID tags
- Arduino nano
- Servo motor
- Lcd screen
- I2c module
- Keypad
- Buzzer
- 4 Batteries 1.5v
- 4 slots series battery holder
- Battery 9v

Connections :

The Mechanism Of Our Project

- The system operates seamlessly: the user initiates the process by scanning their tag with the RFID module, acting as the RFID reader. If the tag matches an entry in the Arduino's database, representing the computer system, the door grants access. However, should an incorrect tag be scanned, a message promptly appears on the LCD screen, notifying the user of the discrepancy.

- To bolster security, an additional feature has been integrated into the system. This feature allows users three attempts to scan their tag incorrectly. After the third unsuccessful attempt, an alarm is triggered, signaling an unauthorized access attempt. This alarm persists for a predetermined duration, serving as a warning that someone without proper authorization has attempted entry. During this period, the system temporarily suspends tag scanning and instead prompts the user to enter a preset password. Only upon successful entry of this password does the door grant access. This multifaceted mechanism provides a significantly higher level of security compared to traditional mechanical locking systems.