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Concealing RFID: Authentication using Cloud

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Abstract: ***RFID (Radio Frequency Identification) has gone from unknown to well-known in recent years as it is frequently employed for security purposes. Because everyone's primary goal is to be safe, our project is heavily focused on security. Because everyone is concerned about data being leaked or misused, this project will ensure that security is increased and that RFID can be used safely. It is a wireless communication technique that allows computers to read the identity of electronic tags from a distance using computers. There are numerous advantages to RFID, but it also has certain disadvantages. This article use card/tag detection to ensure that RFID users are permitted.***

Radio frequency is the technology that allows smart labels to be attached to objects. As a result, even physical objects can take part in the computing process. It is gaining popularity as a result of its technological advancements and capacity to overcome line-of-sight issues. RFID has become commonplace in smart applications or IoT use cases such as smart education, smart housing, smart healthcare, and smart cities, to name a few. IoT, RFID, and a slew of other technologies and standards make it possible to connect the digital and physical worlds. When RFID technology is used to uniquely identify linked devices and things, it is critical to understand its utility in the authentication process as well as the security concerns that may arise. In wireless communication, RFID tags and RFID readers are used.

Keywords: Radio frequency Identification ,smart IoT applications, Internet of Things, cloud-based remote RFID authentication

I. INTRODUCTION

A. Concealing RFID: Authentication using Cloud

Animal identification, access control, passport verification, transit and payment cards, car access control, supply chain traceability, logistics, and toll payments are just a few of the applications RFID has seen in recent years, thanks to its ease of use and numerous practical applications.

RFID authentication is a common method for securing RFID systems and ensuring their privacy. Identifying a tag without validating it poses a significant security risk. Attackers can intercept, modify, and replay messages sent by the tag to make it appear as if they are holding the tagged object (like an ID smartcard). Despite the fact that RFID has become a commonplace technology, many public and private organisations have not made security a priority. Many commercial systems, in fact, have severe security weaknesses and vulnerabilities that make cloning possible.

Cloud-based RFID is becoming a new promising architecture as cloud computing develops [7-14]. The backend server's data storage and processing is relocated to a cloud that provides pervasive RFID services. It can be accessed via the internet using fixed or mobile readers whenever and wherever needed.

B. Application

This project is classified as a high-risk project in terms of security. The rfidtag/card of an individual will not be scanned without their permission. Users will be able to use the rfid tag as necessary. The project will protect the tag/card by reading specific details from it and then sending it to the cloud for further authentication. We'll have a cloud mechanism for our system once we've developed a secure way for tags. For example, if someone at the college wishes to pay a library fine or borrow a book, rfid can be utilised for that reason, providing a secure mechanism for people to exchange their needs. Second, if a person does not have enough money to go to the grocery store and buy his or her essentials, RFID cards can be used.

C. Objective

The main objective of our project is to protect every user of RFID tag/card. We will do that by finding materials that we can use to cover our tags or cards to prevent RFID tags from getting scanned by any fraud RFID readers. At the same time making a cloud based secured way for using RFID tags/Cards on daily basis. Making the scanner read only the tags which are verified by checking the UID number of the tags/cards and the frequency at which it works and by user response from mobile app.

D. Future Scope

RFID technology is expected to make substantial advances in the healthcare, retail, food safety, and other industries, according to analysts. As more industries and businesses invest in RFID, the technology's future becomes brighter and brighter. As a result, RFID is becoming more cost-effective than ever before in addressing real-world business problems. RFID (Radio Frequency Identification) technology sends data from an RFID tag to a reader via electromagnetic fields, allowing for accurate, real-time tracking. RFID readers do not need to be directed directly at a tag to scan it, unlike barcode scanners. Instead, RFID-enabled staff can receive a precise scan from a distance of several feet and analyse dozens of scans in seconds. RFID smart-sensing technology will bring the Internet of Things to the masses in the not-too-distant future.

II. PROPOSED SYSTEM

Concealing RFID card by blocking fraud RFID readers"s majorly divided into 4 modules for ease of implementation and better planning of the project.

A. Assembling the System

For assembling we need all hardware components to be arranged and assembeled .We have made the system as shown in the picture below we have connected arduino mega board with RFID scanner using bread board and it can scan RFID tags and cards and get its Uidnumber.The following are the components that we have assembled for our project:

1) *Scanner (MFRC522)}:* The 13.56MHz RC522 RFID Card Reader Module is a low-cost MFRC522 based RFID Reader Module that is simple to use and may be used in a variety of applications. The MFRC522 is a contactless communication IC with a highly integrated reader or writer operating at 13.56 MHz.

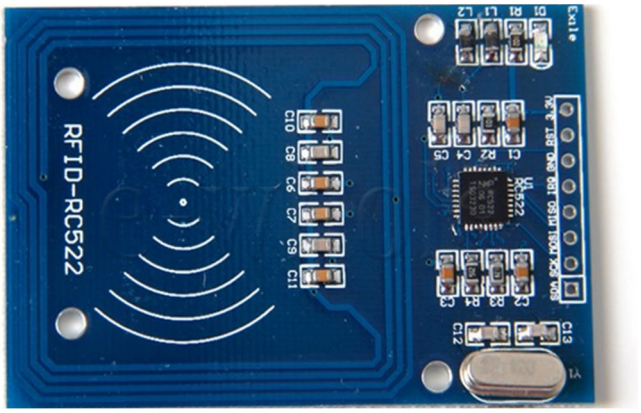

Figure 1.1:MFRC522

2) *NodeMCU):* NodeMCU is a LUA-based open-source firmware for the ESP8266 wifi chip. NodeMCU firmware comes with the ESP8266 Development board/kit, i.e. NodeMCU Development board, to explore functionality with the ESP8266 chip. NodeMCU is an open-source platform with an editable, modifiable, and buildable hardware design. The Analog (A0) and Digital (D0-D8) pins on the NodeMCU Dev Kit's board are similar to those on an Arduino.

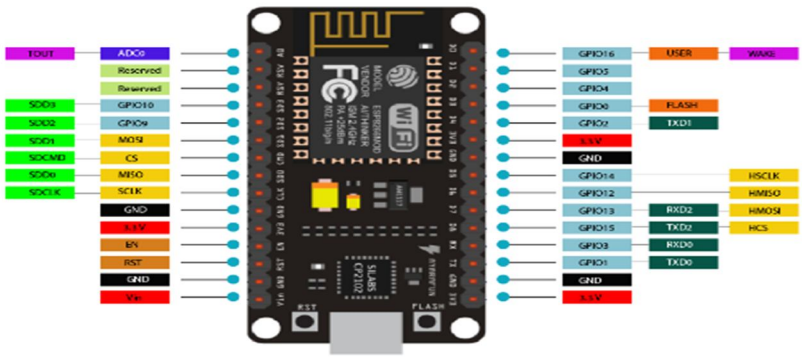

Figure 1.2: NodeMCU

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3) *LCD:* We'll learn how to connect and use an LCD (Liquid Crystal Display) with Arduino in this Arduino lesson. These kind of LCD displays are quite popular and widely utilised in many electronics projects since they are perfect for displaying simple information, such as sensor data, and they are fairly affordable.

Figure 1.3: LCD

4) *RFID Tags/Card:* RFID tags are a form of tracking technology that searches, identifies, tracks, and communicates with people using radiofrequency. RFID tags are smart labels that can hold a variety of data, including serial numbers, a brief explanation, and even entire pages of data. For a high level of verification and authentication, certain RFID tags contain cryptographic security capabilities. Low frequency, high frequency, and ultra-high frequency radio frequencies are used to identify RFID tags.

Figure 1.4: LCD

5) *System:* This is how we have connected our system:

Connections from NodeMCU to MFRC522:

3v:3.3v rst:D0
GND:G
Miso:D6
Mosi:D7 SCK:D5
SDA:D8

Connection from NodeMCU to LCD l2c:

GND:G
VCC:VU
SDA:D2
SCL:D1

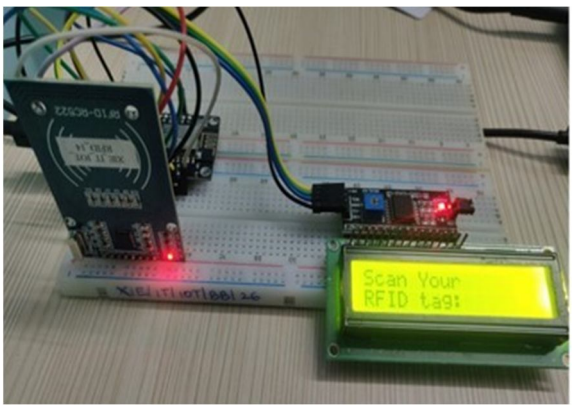

Figure 1.5: System

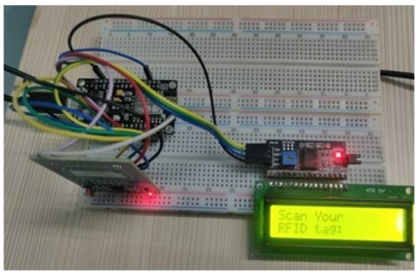

Figure 1.6: System

6) *Making of a secured way for using RFID tags securely:* By creating a cloud-based authentication system, we will create a secure mechanism for using our system. We will send the tag's Uid number to the cloud, i.e. Firebase, and then check to see if the Uid number is present. At the same moment, a pop-up will be delivered to the user's mobile phone via our application; if the user selects yes, the transaction/data sharing will be completed; otherwise, the transaction/data sharing will be cancelled. A methodology has been developed to automate the evaluation of security in commercial RFID systems. In our system, we have employed a variety of components. First, we acquired all of the necessary components. The wiring is then completed. Our system is made up with

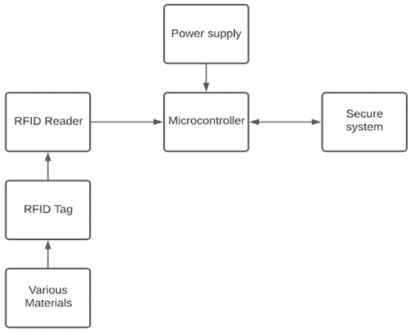

Figure 1.6:Flowchart

This is our strategy. We'll start with a single microcontroller, such as the NodeMCU, and attach an rfid reader to it, which will scan rfid tags/cards, before covering it with various materials. The secure system will be used by the microcontroller to validate the user.

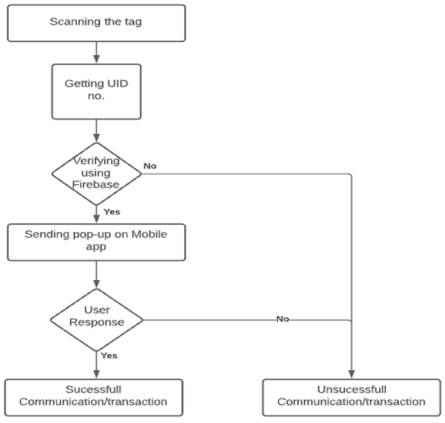

Figure 1.7: Secure system

The secure system is demonstrated using a flow chart in which we extract the uid number from the card/tag, send it to the cloud (Firebase), which authenticates the user, and the user receives a pop-up asking if he/she wants to do the transaction or not. If the person selects yes, the transaction will be successful; otherwise, it will not.

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B. Testing Materials

Various materials are being tested to see whether they can prevent RFID tags from being scanned. The majority of RFID systems are designed to work over a small distance, usually a few inches. However, strong RFID readers can read cards at a distance of a metre, and hackers are more concerned about distances of 30 metres or more. As a result, contactless cards are insecure.

RFID blocking technology, both passive and active. What is RFID blocking and how does it work?

RFID blocking cards, shields, and protectors function in a variety of ways. They can be both passive and active. RFID signals can be absorbed or deflected by passive shields or guards. A microchip is used in active RFID shields or guards. They usually put out a signal that interferes with others. It is basically impersonating another card, causing the reader to experience a card collision. Alternatively, it consumes the power required to power the chip in your card from the sending signal. The chip will not be able to deliver a response if it does not receive enough power to function.

Figure 2.1: Passive Blocker

Figure 2.2: Active Blocker

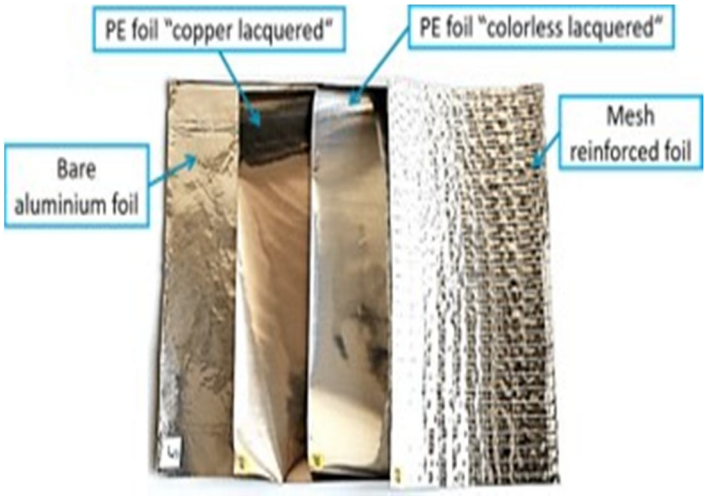

Figure 2.3: Foils

III. RESULTS AND DISCUSSION

As shown in figure 3.5 and figure 3.6 our system looks same as shown in above figures.Once a card is brought near to the reader the display will show card scanned and authenticating. NodeMCU will check the UID no. of the card present on firebase.

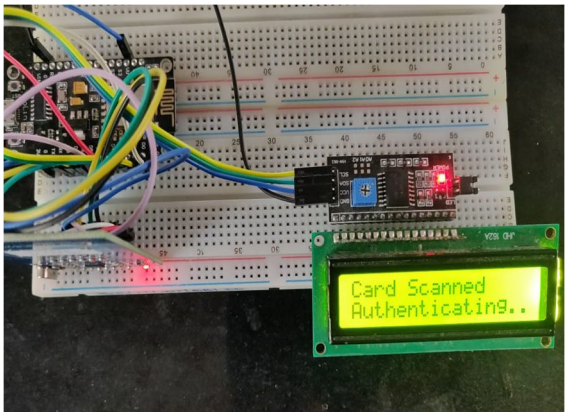

Figure 3.1:Card Scanned

Once the Card is authenticated from firebase and confirmation from mobile app the system will show ‘Authentiacted’ and data can be transferred.

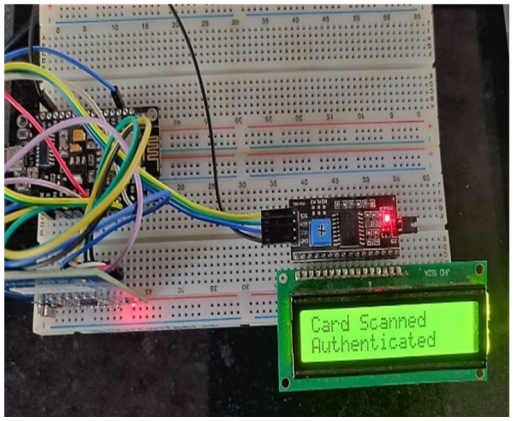

Figure 3.2:Card Authenticated

If the card is not authenticated the system will show ‘Failed’ on the display.

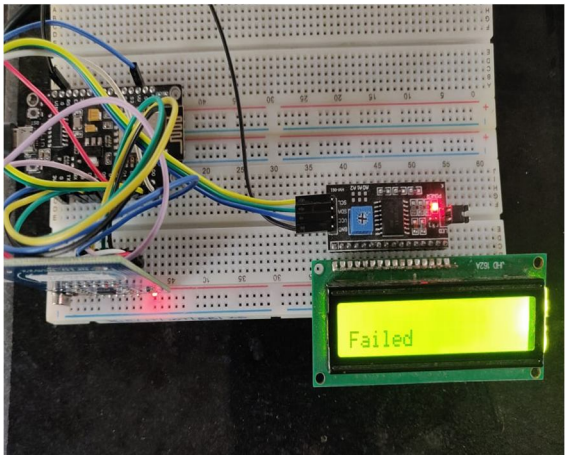

Figure 3.3:Card Authentication Failed

As shown in fig we will have option of yes and no once card is scanned based on your response the data will get transferred.

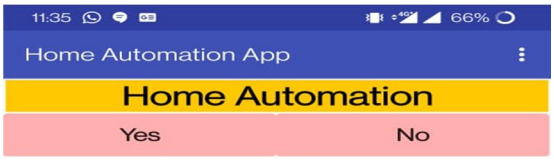

Figure 3.4:Mobile Application

IV. CONCLUSION

RFID tags can make a person's life easier by allowing them to perform a variety of tasks by simply tapping on a machine. It's also critical to keep your RFID tag/card in a secure location or to cover it in a substance that prevents it from being scanned. All RFID tags should be scanned and used in a secure manner. People will learn more about RFIDs on the market as a result of this, which will make their lives easier while also increasing security, as the major goal of our project is to create a secure system.

This endeavour will raise public awareness about these cards. Cloud-based RFID is attracting the interest of an increasing number of academics. However, three components of the current work remain lacking. (1) The majority of them are purely functional, with little regard for security or privacy. (2) There has been no research into the use of cloud computing in RFID authentication methods. (3) There is no research that has been done to improve traditional RFID methods to fulfil the unique security and privacy requirements of cloud-based applications.

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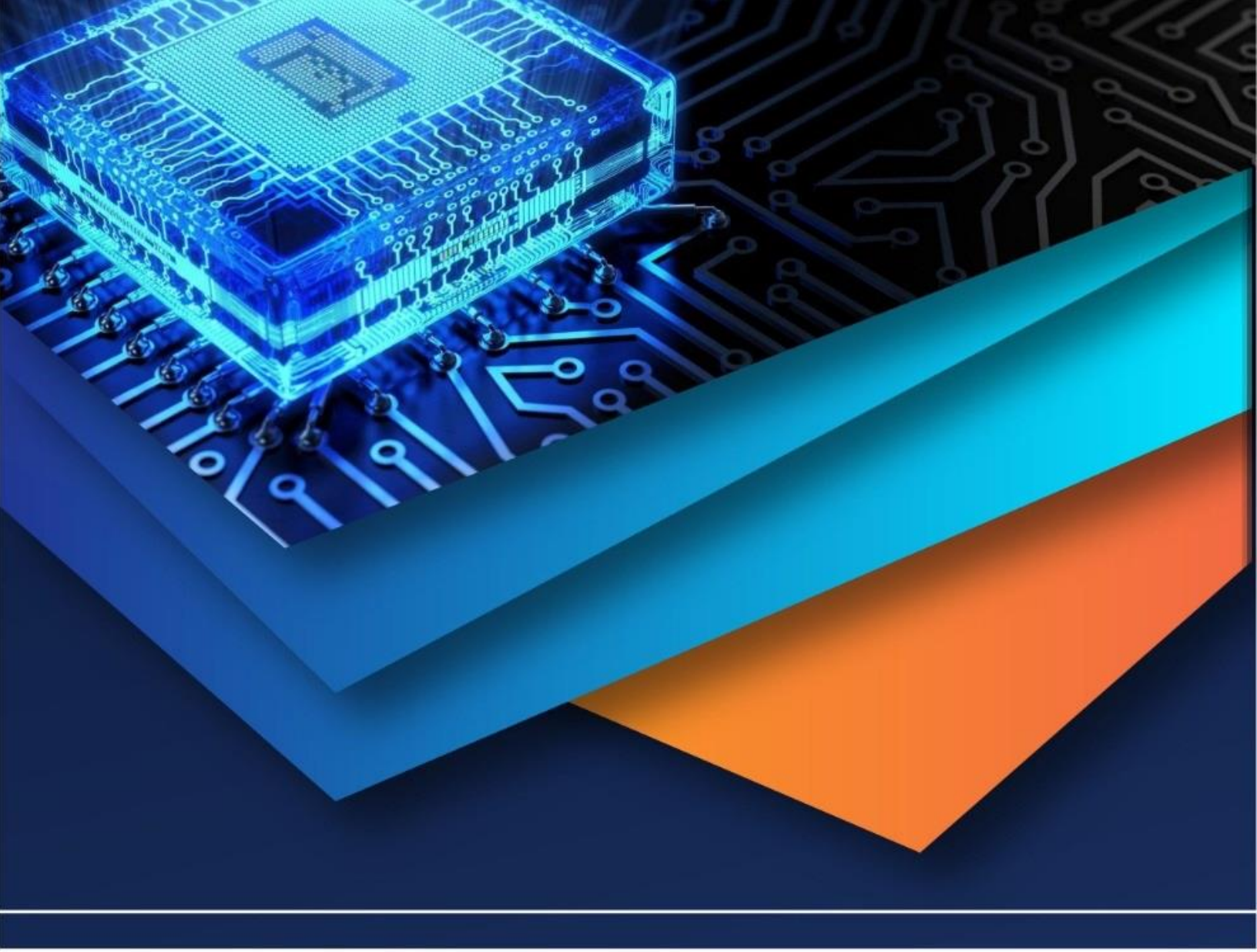

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