RFID Based Authentication Using Cloud Services for Health Care

Ms. Shwetha M[1], Ganeshswaminathan R[2], Hemanth M E[3], Karan J[4], Karthik[5]

[1]Guide, Assistant Professor, Department of Electronics and Communication Engineering, Dr. Ambedkar Institute of Technology Bengaluru, India

[2,3,4,5] Department of Electronics and Communication Engineering, Dr. Ambedkar Institute of Technology, Bengaluru, India

Abstract--The healthcare sector plays a crucial role in the development of emerging countries, and the quality and reliability of medical services are key factors in its success. One area that presents challenges is maintaining accurate and accessible health records, as the data associated with patient histories can be unstable and complex to manage. To address this, a proposed system utilizing RFID technology aims to provide precise, up-to-date, and comprehensive information at the point of care and during emergencies by integrating various medical entities. This system automates the maintenance of health records, eliminating the need for paper-based systems, and ensures the security of medical data through cloud storage. In today's fast-paced world, patients often find themselves seeking medical assistance remotely, which can be both time-consuming and costly. Therefore, there is a growing need to streamline these processes and reduce human effort.

Keywords: Medical services, RFID, cloud storage.

1. INTRODUCTION

Enhancing the efficiency of healthcare infrastructures is a significant challenge today. The primary objective is to provide high-quality care to patients while simultaneously reducing healthcare costs. Within the medical field, physicians often consult and refer patients to each other for their treatment. Referral, also known as patient transfer, refers to the process of moving a patient from one physician to another. It occurs when a patient at a lower level of the healthcare system lacks the necessary resources (knowledge, medications, equipment, skills) to manage a particular clinical condition and seeks assistance from a better-resourced facility or healthcare professional at a higher level. To address these challenges, a referral management solution can provide extensive benefits. One potential solution is the utilization of Radio Frequency Identification (RFID) technology. RFID uses radio waves to transfer data between an electronic tag (RFID tag/label) attached to an object and a reader, enabling identification, and tracking of the object. Some RFID tags can be read from a distance, even when not in the reader's line of sight.

1.1 PROBLEM STATEMENT
INTRA HOSPITAL CO-ORDINATION

- In an hospital, there are several departments like oncology, radiology, pathology, neurology etc. In most cases, a patient will be referred to several departments for conclusive diagnosis. Most often than not,
- A lot of time is wasted during the communication between these departments, sending the appropriate reports etc.
- A lot of time is also wasted when the final patient summary must be prepared and given to the billing section to process the discharge of a patient.

NTER HOSPITAL CO-ORDINATION

- Now there can be another scenario where a patient is not satisfied with the initial diagnosis and wants a second opinion, here also a lot time and energy will be wasted to redo all the tests.
- An extension to such a scenario would be where a part of the patient's problem is solved by initial treatment and another part of it must be referred to a specialist.

1.2 OBJECTIVES

- To be able to provide quicker access to previous health history of patients & thereby enabling inter-hospital coordination.
- To cut down the delays that are caused due to lack of co -ordination among different departments of the hospital & hence optimizing the hospital workflow.

2. LITERATURE SURVEY

1. Cloud Based Patient Referral System with RFID Based Clinical Information Retrieval In Emergency Cases.

Tanaya Jagtap, Pranav Khole, Karan Singh, Shubhangi Girme

The authors of this paper aim to address the challenges faced by patients who require medical assistance from remote locations in today's fast-paced world. Currently, patients often must invest significant time and money to access the necessary medical help. To alleviate this issue, the authors propose an integrated system that focuses on streamlining the referral workflow and retrieving patients' medical records, particularly in emergency cases.

2. A Smart E-Health System using RFID Module and Secured Cloud Storage

Niveditha H R, Aisiri J, Kavya Jakkali, Radha and Tejas G Gowda, Niveditha H R

The focus of this paper is to enhance the efficiency and reliability of the medical sector by emphasizing service quality and ease of maintenance. The proposed system utilizes an RFID module to achieve these objectives, enabling the integration of different medical entities and ensuring the provision of accurate, up-to-date, and comprehensive information at the point of care and during emergencies.

3. Web Server Based Patient Tracking System in hospitals

Shilpa Batwal and Dr. S. K. Yadav

This paper focuses on a method that enables electronic access to patient information within a hospital setting using radio frequency identification (RFID) technology. The proposed system utilizes RFID tags embedded in wristbands, allowing the information stored on these tags to be read by RFID readers.

4. Design of e-Healthcare Management System Based on Cloud and Service Oriented Architecture

Rasha Talal Hameed, Omar A. Mohamad, Omar T. Hamid, Nicolae Tapus

This paper introduces an E-healthcare management system that focuses on centralizing patient information within a database. The system is built on Service-Oriented Architecture (SOA) and utilizes cloud services. SOA offers several key benefits, such as platform independence, standards-based implementation, and robust capabilities for handling diverse states.

3. METHODOLOGY

3.1 BLOCK DIAGRAM
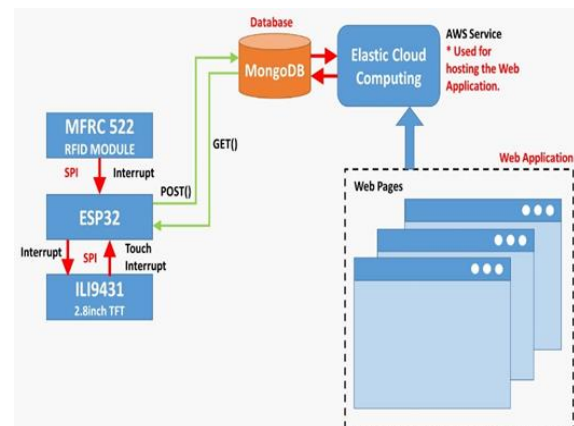
3.2 WORKING

When the RFID tag is scanned in the reader the UID (Unique Identification Number) of the tag is sent to the Microcontroller (ESP32). The communication between RFID Module and ESP32 takes place via SPI (Serial Peripheral Interface) communication protocol. Using post () method this UID is sent to Data Base where the UID is authenticated. If the UID is authenticated that means the patient using the card is already having the account in the cloud. Then the person can retrieve his

account using his credentials through website. And will get a message from database stating 'you are already registered' from database which will be displayed in TFT display. Message from database to microcontroller reach with the help of get() method. Again, communication between TFT and microcontroller takes place through SPI protocol.

## 3.3 REGISTRATION FLOW CHART
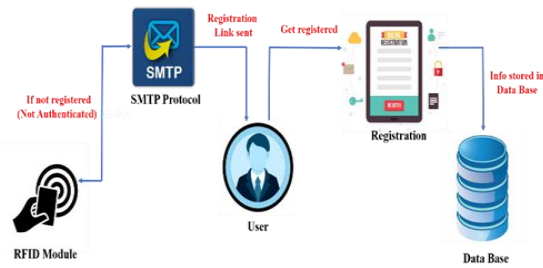
In case when the card is not authenticated that means the person need to get registered. In that case the message will be displayed in TFT display asking you 'whether you want to get registered. If you click yes then it will ask you to enter your E-MAIL ID. Once you enter your mail ID, the registration link will be sent to respective MAIL. Then the person can get into our website through the link and can register themselves. Once registration is completed the user UID and info will be sent to the data base. So next time when they scan their card it will get authenticated.

4.   IMPLEMENTATION

4.1 ESP32 and RC522 INTERFACING

The major pins used in the SPI communication are SCK (Serial Clock), MOSI (Master Out Slave In), MISO (Master In Slave Out), and SS (Slave Select). MOSI and MISO enable bidirectional communication.
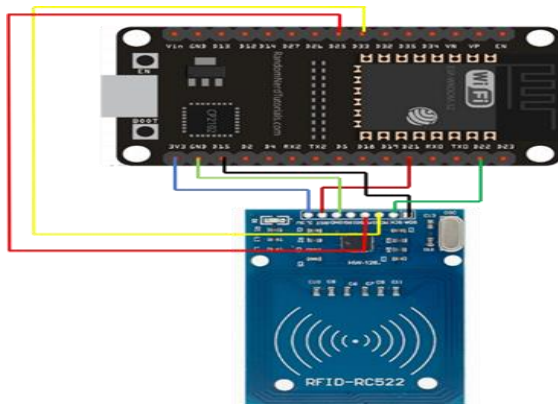

The SCK pin provides the clock signal to synchronize the communication between the microcontroller (master) and the connected devices (slaves). In this setup, only a single slave select (SS) line is used since only the RFID module is connected via SPI. The SS line is set to HIGH only

when data needs to be transmitted or received.
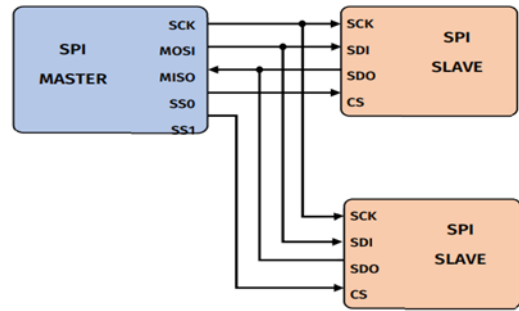
4.2 ESP32 AND TFT DISPLAY INTERFACING

The interfacing between ESP32 and TFT is shown above. The communication between microcontroller and TFT takes place through SPI which follows Master and Slave principle, where Microcontroller acts as Master and TFT acts as Slave, here communication takes place via MISO (Master In Slave Out) pin.
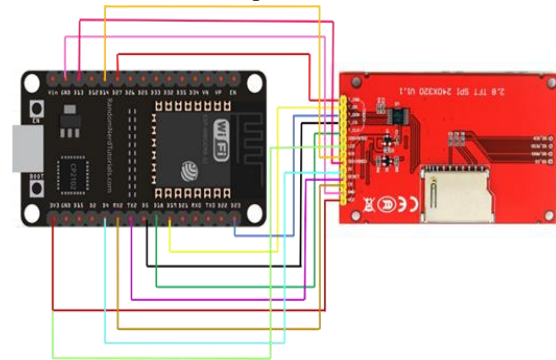
4.3 WORKING OF RFID

Tracking the objects using RFID technology involves the use of a radio transponder, radio receiver, and radio transmitter. For an RFID tag to transmit digital data about itself, it needs to be activated by an RFID reader device. The RFID is defined as a wireless system consisting of two main components: Tags and Readers. The RFID tag contains both a transmitter and a receiver.

SERVER:

In order to connect to cloud services, we use the ESP32 Wi-Fi module. The microcontroller is connected to a Wi-Fi network, using the Wi-Fi module. Now when UID is read by the RC522 module, it communicates the same to the microcontroller, which in turn sends it to the EC2 server. The EC2 server, now is connected to the

database, where an algorithm will compare the incoming UID with existing UIDs

DATABASE:

Now when it comes to database, it stores, information specific to a user and information only accessible by the admin. The admin information is basically a list of all UID registered to the system. The user information includes personal information like name, age, & other common information associated to health care. Major portion of information is associated to the patients' health records, which will be sorted by departments for intra hospital communication and all reports categorized in a single document for the user.

WEB APP:

The web app itself is the interface between the patient and the hospital and between various hospitals. This is through which the patient can access all his medical records, medical history, references, etc. This interface is also for various departments in the hospital where all of them can have access to the medical reports instantaneously, thus saving a lot of time and energy.

The same will also act as an interface between hospitals, where records will be sent based on demand only. The communication to EC2 server & database can be established through Node server, which handles all the data communication logic.

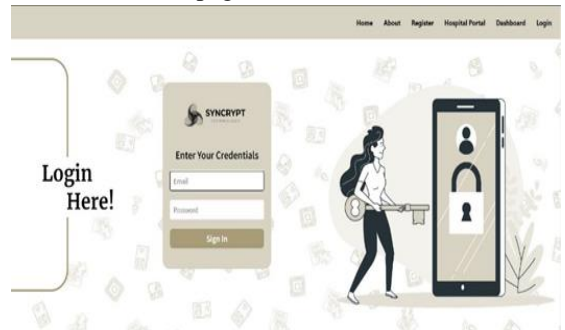4.4 CIRUIT
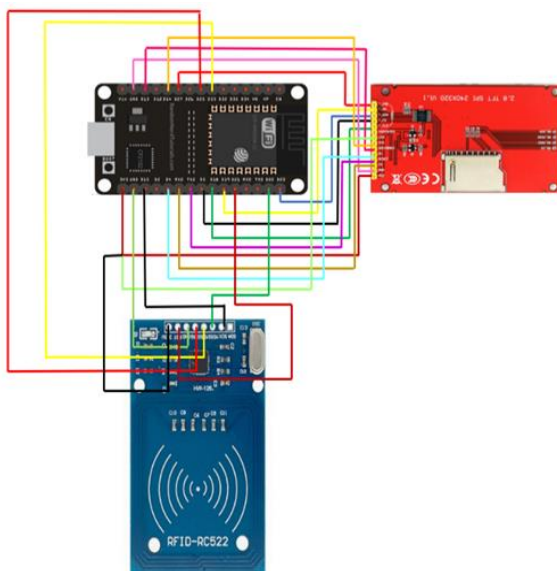
5. RESULTS
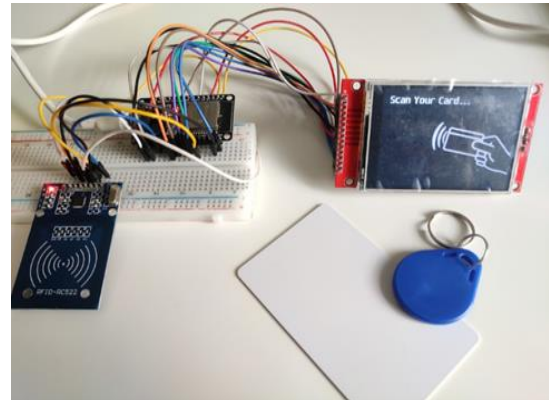
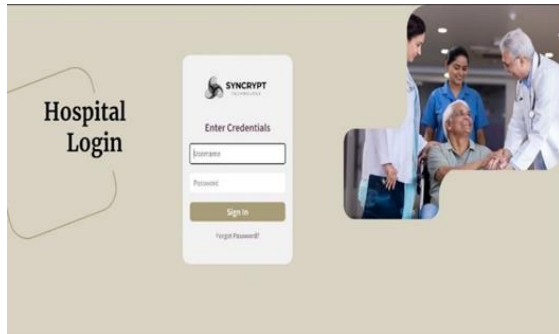
Final Hardware circuit

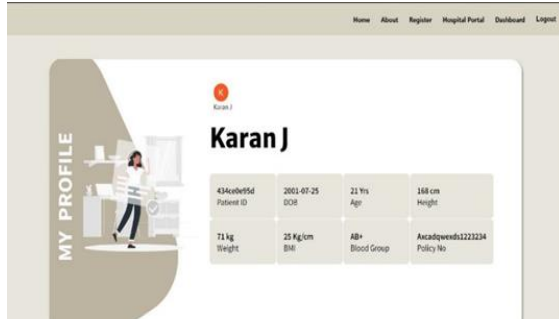
Pictures Showing Status of Registration

Home page

Login page

Hospital Login for Uploading records

Profile page of user

6. CONCLUSION

This proposed system can shift the paradigm of communication within several departments of the hospital as well as between cluster of hospitals & provide a new, accurate, & less cumbersome way of managing the patients records. In this project, we aim to utilize the versatility of RFID & make use of various cloud services by implementing a system with minimum cost & making efficient use of the cloud services. Thereby optimizing the hospital workflow.

REFERENCES

[1] "Lightweight RFID Protocol for Medical Privacy Protection" in IoT. Kai Fan, Member, IEEE, Wei Jiang, Hui Li, Member, IEEE, and Yin tang Yang, 2018.

[2] "Cloud based NFC health Card system" Gunjan V. Ukalkar and Prasad S. Halgaonkar, IEEE,2017.

[3] Rasha Talal Hameed, Omar A. Mohamad, Omar T. Hamid, Nicolae Tapus, "Design of E-Healthcare Management System Based on Cloud and Service Oriented Architecture", The 5th IEEE International Conference on E-Health and Bioengineering – EHB 2015.

[4] Debas Chetana, J.P. Gupta," A Cloud Computing Architecture Framework for Scalable RFID" Proceedings of International Multi-conference of Engineers and computer scientists 2010 Vol IMECS 2010, March 17-19,2010.

[5] RFID Applications and Adoptions in Healthcare: A Review on Patient Safety By Moutaz Haddara, Anna Staaby, Conference on Health, and Social Care Information Systems & Technologies, CENTERIS/ ProjMAN/HCist 2018.

[6] Radio frequency identification (RFID) in a hospital environment, Panagiotis K, Ria B, Journal on Information Technology in Healthcare., 4 (2) (2006), pp. 83-91.

[7] Azevedo SG, Ferreira JJ, "Radio frequency identification: a case study of healthcare organisations", International Journal of Security and Networks, 5 (2-3) (2010), pp. 147-155.