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# RFID BASED SMALL TRANSACTION SYSTEM

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**ABSTRACT**

Shops are notoriously known for issuing their own currency (plastic currencies) and often issuing chocolates instead of remitting the proper change to the customer. These plastic coins issued are not accepted at other places. This work is used for providing sophisticated customer balance using RFID and microcontroller for solving the aforementioned problem. Unlike other transaction services this system can only be used for transactions ranging from 1 to 9 rupees. Each user is provided a RFID Tag and the microcontroller remembers all the RFID cardholders by maintaining a database of all transactions and updating the balance amount as and when used. The RFID tags here are similar to our college ID cards or even voter IDs. All the balances are digitized. When a customer uses the card or swipes the card against RFID module the system authenticates the transaction by asking for a password and once authenticated the system shows transaction options available to the customer. This system provides an efficient balance returning to customers and also saves time and money. It is an eco-friendly method as it aspires to eliminate all plastic coins from the environment.

**Keywords:** RFID, microcontroller, transactions, authentication.

## 1. INTRODUCTION

Radio Frequency Identification (RFID) based Small transaction System is a radio frequency based transaction system that is based on the reader and tag mechanism [1]. The readers detect the signal from the tag and send it to further processing to microcontroller, which checks it against the security pin for valid user and give options to add or remove from the account. For new user you have to again swipe the card and it will do the same.

Secured Small Transaction Handling System - A Digital Innovation to eliminate Coin Shortage Problems in Vellore Institute of Technology (VIT) based on NFC/RFID Read-Write, Retailer and Customer POV Dual Screen Display.

The problems faced by VIT faculties, staff and students when dealing with shopkeepers has only been increasing over time. For instance, if you buy something for Rs.5 but you give Rs.10. Now instead of giving back Rs.5 they will hand you Cadbury, Éclairs, etc. People who want their money back find this idea very stimulating and can very well be extended to be used in other places like buses, metros etc.

India has a problem with small change. Hotels, Restaurants, Auto-Taxi drivers [2], Retail Shops [3], Public Buses, Markets everywhere people suffer from coin shortage problem and tend to bill the amount rounded to the nearest multiple of Rs.10. RBI supplies billions of coins every year in various denominations across India. However, the common man still faces shortage of change and often being paid in chocolates, mints and chewing gums. The reasons to shortage of coins are many like the most common being the rise of the illegal market. Coins are exported to other countries illegally where they are melted to make blades and sold at a higher price. Other misuses like accumulating it and selling at a premium price later.

Slower adoption rate of card based payments and a mobile payment system is another big reason. The reasons include absence of high-speed internet connectivity, security concerns, service charges and long transaction times and coin saving habit of people in their home. Implementation of the proposed idea can help in overcoming these problems.

## 2. IMPLEMENTATION METHODOLOGY

An automatic Identification and Data Capture (AIDC) technology uses RFID which is a fast and reliable means of identifying objects. The Interrogator (RFID Reader) which transmits and receives the signal and the Transponder (tag) are the two main components that is attached to the object. A miniscule microchip and antenna is inbuilt in the RFID tag itself.

Once the microcontroller receives the information from RFID, it starts processing the information based on the instructions given to it at the time of programming the controller. The goal is to completely eliminate the system of issuing plastic coins and the problem of small change shortage throughout VIT. The hardware process flows as shown in Figure-1.

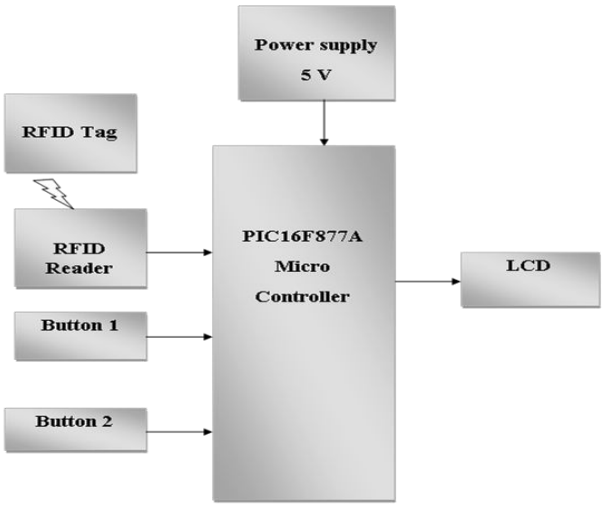


**Figure-1.** Hardware process flow.

The system alarms the patient at the assigned time with the help of a buzzer sound, and green LEDs to pinpoint from which box the medicine should be taken. This alarm can be snoozed by using keypad buttons. There is also a calling function wherein the device calls the user's mobile phone if the alarm is not attended to. In addition, there is a facility to check if the boxes are empty and need to be refilled. If the level of pills is low, the LCD displays 'L' for medicine status, the buzzer goes off, and red LEDs pinpoint the boxes which need to be refilled. These boxes can be refilled based on the type of the medicine they are storing, as opposed to referring to the prescription every time.

## 3. RFID MODULE

RFID uses radio frequency. Radio frequency identification (RFID) tags basically use two kinds of data transmission, depending on the behavior of electromagnetic fields at the frequency used. RFID tags classified as active, passive and semi-passive. Passive RFID operated using a small electric current created in the antenna instead of internal power supply. In Active RFID tags consists of internal power source, which provides longer range with huge memory on the tag itself. Semi-passive RFID tags is similar to active RFID tags in terms of power supply but it has the restriction to broadcast the signal.

## 4. DESIGN APPROACH AND DETAILS

### A. Algorithm

- Include header files.
- Define variable for use.
- Declare the functions like password verification, change balance etc.
- Declare array which contains LCD parameters like clear, increment etc.
- Define the interrupt function for the RFID module.
- Define LCD display functions like int_char (integer to character), cmd (to inform the LCD that we are going to send data), data (to send data), string (to parse string to characters) etc.
- Define additional functions for retailer convenience like UART module if need be.
- Define the delay functions according to your requirements.
- Define a function to match the RFID data with the database.
- Then use a variable called user to remember which user you are dealing currently.
- Make functions for crediting and debiting the customer account.
- Keep printing the data on the LCD all along the process.
- Finally show the balance in the account after every successful transaction.
- Get back to see if any other card has been swept.

### B. Alternative method

NFC [4-6] is the alternative which can be used instead of RFID but the problem being each and every user must have NFC enabled mobile phone which is generally not the case. But, everyone one most certainly will have college ID cards or some other identification on them.

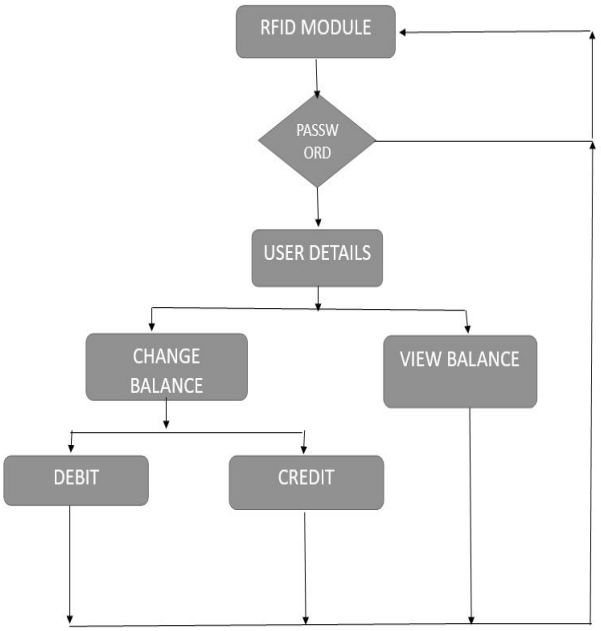


**Figure-2.** Process flow chart of rfid based small transaction system.

**Figure-3.** RFID based small transaction system.

## 5. RESULTS AND DISCUSSIONS OF VARIOUS MODULES

In this paper, we have presented the methodology and implementation procedure to design RFID based small transaction system. This work utilizes the present RFID technology on the college ID cards accordingly actualizing the procedure completed. The PIC Microcontroller board is interfaced with RFID controller shield using the

libraries developed for SPI protocol. An RFID integrated campus ID card is tapped to the RFID antenna in order to launch the correspondence and will not be interrupted until the session is complete and the card is swiped again. Thus, a smart campus payment system is developed using RFID controller shield.

## 6. CONCLUSIONS

The proposed work is verified by properly visualizing in the real time and rigorous checking of the hardware. Time lag between the successive events is very small and the process is smooth.

The proposed work uses a very sophisticated RFID technology which can be implemented in college ID cards of the students, staff and faculty eliminating the need for carrying another device. The data of all the students can be managed by managing the database.

The use of PIC microcontroller (16f877A) which eliminated the need of external analog to digital converter has help to reduce the cost of the proposed module. As it is a standalone system there is no need to have a PC to operate this which makes it usable by each and every individual.

The further extensions include the wireless transfer of commands from apps with either using a Bluetooth or a UART based communication which can further make it user-friendly. This work can be extended to public transportation, large corporate, and this product can greatly reduce the plastic coins in the circulation and the consumer will no longer has to be paid in chocolates and other plastic coins.

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