

**SHIV NADAR UNIVERSITY**

**KALAVAKKAM-603110**

**STIRS PROJECT – 2022**

**RFID MESS BILLING SYSTEM**

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**Budget: ₹ 5000**

**Project Duration: 8 months**

Signature of the Project Students Signature of the Project Guide(s)

Signature of the HOD

**1.Project Title:**

RFID MESS BILLING SYSTEM

**2. Broad Subject:**

To develop a real time application of a RFID based mess billing system for a simpler and environmentally sustainable process.

**3. Project Duration (in months):**

8 months

**4. Budget (in thousands):**

₹ 5000

**5. Project Summary:**

The proposed application will use a simple Arduino board and other simple devices like a RFID tag, RFID sensor, LED display etc. This would make the daily mess billing system a little easier and sustainable economically but most importantly environmentally. Currently, students who are staying in the hostel of SSN along with Shiv Nadar University, are accustomed to the old mess billing system where, they are made to scan their fingerprint and a piece of paper with the details of the student and their meal is printed and handed out. This paper bill is then given to the catering faculty who give the students the food and then throw the paper away. This process happens for every meal. Paper wastage, Time wastage and a lot of confusions take place if the bill is misplaced. A very simple solution to this is an RFID based billing system which upon scanning will display the data on a LED board. The Name and food preference (Veg\Non-veg) will be stored in a database along with the amount of money each person is required to pay. Upon scanning, the product will verify if the student is a valid and authorized user of the mess, and the display will show the validity of the student along with his/her food preference. The proposed device will also be capable of calculating the bill for each student per month based on the daily cost of food. It will also be able to record and store the details of each student in a simple and easy spreadsheet format. All the relevant data will be stored on a server for backup. There will also be a SD card installed into the device which will be able to protect the data in case of power or mechanical failure. This device is also extremely cheap to make and use and would be a great replacement to the currently existing system.

**6. Keywords:**

RFID sensor and RFID tag, Data sorting, Cloud storing of Data, Arduino Board.

**7. Objectives:**

* The development of a hardware device used to record, store and manage data of the mess bill using RFID tags and Arduino board to make a small contribution to reduce the wastage of large amounts of paper.
* This system introduces efficient and fast techniques for identifying a member of the mess and recording and storing the data regarding their mess bill

**8. Introduction:**

Currently, there are around 4000 students who are living in the hostels of SSN, this includes students form Shiv Nadar University and SSN College of Engineering. The mess for these hostels provides food to them 4 times a day that is breakfast, lunch, snacks and dinner. This shows us that on a daily basis, 16000 slips of mess bill is being printed just to be thrown into the waste.

The first aspect is the natural aspect, the paper used here is a thermal paper roll and on an average, 2-5 rolls of a this paper is used per meal. This means, 14500 cm of thermal paper is wasted daily, 435000 cm monthly on ONE roll of paper. It’s evident from these calculations that extremely large amount of paper is used. Now coming to the effects that thermal paper has, thermal paper is a paper roll or sheet that is impregnated with a combination of a dye and acid that changes colour when exposed to heat. Since it consists of these chemicals and also requires the use of virgin paper from mills, discarding this type of paper in the environment can be a hazardous proposition. One of the main concerns of this paper is that it contains high levels of Bisphenol A, which acts as an endocrine disruptor. Bisphenol A is also known to cause various types of cancer to humans and hard to other wildlife.

Coming to the economical aspect of this paper, Assuming, an average of 2 paper rolls is used per meal, the college has to shell out around 57,600 rupees yearly for each mess(calculation for one device). Now since, there are 4 devices in each mess and we have 2 mess facilities that is the Gents mess, and the PG mess, it is safe to say that 4,56,000 rupees is spent yearly on this paper.

With this device that we are proposing to develop, we will not only prevent the loss of a large number of trees, but also reduce the production of and risk of catching harmful cancer causing toxins. Along with this, we will be able to save the college from spending Rs 4.5 lakhs on paper.

**9. Definition of the Problem:**

The world is currently developing at a fast pace but causing a large causality to the environment. The current system of the mess facilities in SSN college of engineering is environmentally unsustainable. It uses an unnecessary amount of paper on a daily basis to meet its billing needs and as responsible citizens, we need to take active steps to prevent this. Even a small change in the billing system will go a long way in helping to preserve countless trees and reduce the amount of toxins exposed to the students and environment.

The proposed device is a simple application of the use of basic hardware structures, microcontrollers and programming to help make the mess billing systems **paper free**.

**10. Review of status of Research and Development in the subject:**

**10.1 National Status:**

* FASTag Tracking System using RFID

FASTag uses the Radio Frequency Identification Technology (RFID) to promote the cashless payment of toll taxes by the drivers/vehicle owners of four wheelers across all toll plazas over the national highway. A FASTag scanner is a device installed at the toll gates enabling the cashless payment of toll taxes by the users passing through the toll booths across the Indian national highways. So, when you cross a toll plaza, you don’t have to stop your vehicle for making a cash payment as the toll tax. You can, instead, continue to drive through the toll plaza and let the FASTag scanner read your FASTag, upon success of which, the toll amount will automatically be paid. A FASTag scanner reads your FASTag while your vehicle is still in motion by emitting a signal to your FASTag card. This signal requests the payment of toll tax which immediately gets deducted from your linked wallet.

**10.2 International Status**

* Use of RFID for Patient and Medical Staff Tracking

RFID tracking helps medical staff to pinpoint the location of any patient in the hospital to ensure their safety and sustain the care process. Patient tracking is especially relevant in neonatal units, paediatric departments, mental health facilities, or for tracking geriatric patients. Medical specialists wear RFID-equipped bracelets or badges, and their locations and interactions are displayed for medical supervisors in IoT tracking software. This data helps the supervisors find the doctors or nurses in case of emergencies, identify bottlenecks in hospital workflows (e.g., lack of doctors in the ER), reduce overwork, etc.

* RFID in Inventory Management and Retail

RFID in retail involves the placement of RFID tags on items that emit signals to RFID readers which are then processed by software, generating real-time results for stock taking, transactions, inventor levels, or individuals customer purchase order history. Inventory management is what keeps your retail store in running efficiently. Retail inventory management is either taken by hand or electronically. Managing your retail inventory electronically makes everything easier and faster. RFID tags are available in different shapes and sizes with features and options specific to certain environments and applications. Use your RFID reader and manage products with the RIOT application to generate accurate data.

**11. Novelty / Importance of the proposed project in the context of current status:**

As a hosteller who regularly uses the mess facilities, it is disheartening watching paper being used, just to be thrown away in less than 10 seconds. It’s even worse when you realize that the paper had no use to begin with. We aim to put an end to the unnecessary waste of paper as it is not only environmentally unhealthy but also not efficient. Our proposed idea of an RFID billing system will have the same functionality of the current system with the added benefit of saving paper. Another issue we find at the mess every day is the number of students who try to use a token that does not belong to them. Our proposed system will also see to put an end to this illegitimate attempt as the staff will be able to see if the student truly is who they say they are.

**12. Patent details (domestic and international):**

N/A

**13. Work plan and Detailed technical information:**

* Develop/upgrade prototypes of the device until satisfactory
* Run trials on a regular basis to track the real life experience and outcomes of the project
* Improve upon the speed of the scanning and data recording

**14. Time schedule of activities giving milestones**

2 months – Learning embedded c and c#, and extra required knowledge of an Arduino

RFID scanners.

2 months- Developing the hardware structure

2 months- Developing the database and managing the data (sample data)

2 months-Fine tuning the device, making an outer shell/structure for the device

**14.1 Time Schedule of Activities through BAR Diagram:**

**15. Deliverables:**

* RFID tool for authentication of the valid members who have access to the mess facilities, without the use of paper.

**16. Target beneficiaries of the proposed work:**

* Helps the College save money on their expenditure on the Mess Facilities.

**17. Suggested plan of action for utilization of research outcome expected from the project:**

* 1. **Project preparation for submission to external funding:**  To install our proposed billing system to our college.

**18. References:**

* <https://transmitter.ieee.org/makerproject/view/cae4d>
* https://ieeexplore.ieee.org/document/9617350

**19. List of facilities and Equipment available with Department for the project:**

N/A

**20. Budget Estimates:**

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| --- | --- | --- | --- |
| **S.NO.** | **Description of required item** | **Quantity** | **Estimated cost** |
| **1** | Arduino Uno R3 ATmega328P with USB Cable  (Quotation from *www.amazon.com)* | 1 | ₹1200 |
| **2** | Robotbanao RC522 RFID Kit-13.56MHz RFID-RC522 Reader/Writer Module+Standard Blank RFID Chip+Straight Header Strip+Right-Angle Header Strip+A Special Shaped RFID Tag Keychain (Quotation from *www.amazon.in)* | 1 | ₹500 |
| **3** | REES52® ARDUIN0 3.5" INCH TFT LCD Touch Screen Display Shield Ili9486 Compatible For Arduino UNO and MEGA | 1 | ₹1500 |
| **4** | IEIDidactics™ Jumper Wires (Pack of 20) Female to Female jumper wires | 1(pack) | ₹100 |
| **5** | Robotbanao MB102 830 Points Solderless Breadboard-830 Tie Points-For Experimenting with Circuit Designs-For Circuit Testing-Solderless-Connect Electronic Components | 2 | ₹600 |
| **6** | 3D printing (exterior shell for device) | 1 | ₹600 |
| 7 | Miscellaneous | NA | ₹500 |