COLLEGE BUS FEE PAYMENT SYSTEM

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Abstract - *Automatic Fare Collection System implemented by RFID /Smart card. An RFID card is given to the passenger which holds passenger details including his/her destination and when the passenger gets into the bus he/she has to swipe the card near the RFID reader in the device and it will automatically calculate the fare and deduct the money. Hence people do not have to carry money. Conductor also feels ease in collecting the money from the people. All the record will be updated automatically in the server continuously. When more people are travelling, it's also easy to give the ticket. A web-page monitors the bus for amount, path taken, bus status, number of passengers and distance information. It overcomes all the problems faced in the bus.*

*Key Words***: RFID,PHP**

1. INTRODUCTION

Automated fare collection systems can be used in every public transport system around the world. As the name suggests, these are typically designed with the specific purpose of automating the ticketing system, easing public transport use for passengers and adding efficiency to revenue collection operations. In addition, automatic fare collection systems are used to enable integrated ticketing across different public trans-port modes and operators in urban areas. The main idea behind this project is to collect the fare automatically using the RFID in a cost efficient manner.

2. EXISTING SYSTEM

Usually, every bus is controlled by a conductor. The conductor will collect money from each passenger and issue ticket. Initially, printed papers or tokens are used as tickets. Nowadays, handheld machines are used to print tickets. This system has many disadvantages. The passengers must carry the ticket till they reach their destination and the conductor should ensure that everyone has got the ticket. Here, the time taken for ticketing is comparatively more and more amount of paper is needed to print the ticket. For example, if a passenger wishes to travel in bus. He must carry money with them. Then conductor will collect the money and he will give ticket. This must be repeated for all passengers. This will take more time and waste of human resource as well as energy.

3. PROPOSED SYSTEM

Recent advancements in various technologies have made remarkable developments in various fields for public welfare and public transport is one such area. In near future public transport bus system with advanced technologies like Radio Frequency Identification Device (RFID), and RF modules will gain spotlight due to their advantage of higher convenience and greater life standards as compared to the conventional bus systems. The study brings out improved solution in terms of cost, convenience, user satisfaction and future implementation.

3.1 Basic Working

The automatic bus fare collection will be working based on following components. As an electrical device, the computer needs power for its components to operate properly. The device is responsible for supplying power to the computer. In short, we could say that the main function of the power supply is to convert alternating voltage (AC), which is supplied by the electrical power system, into a constant voltage (DC). A Microcontroller is an IC chip that executes programs for controlling other devices or machines, in our case a NodeMCU is used as the micro controller. We use LED display to show the details to the user. A Radio frequency identification (RFID) uses electromagnetic fields that automatically identifies, and tracks tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. A wireless Wi-Fi module connects the device to a wireless network. The NodeMCU has an in-built wi-fi module. PHP provides MySQL connect function to open a database connection. A PHP means Hypertext Preprocessor (PHP) and it is a programming language that allows web developers to create a dynamic content that interacts with databases. The passenger and bus details must be maintained by MySQL database.

3.2 Design Methodology

This implementation is aimed at a real time usage of Automatic Fare Collection system and does not compromise on the security. It guarantees us that the proposed project is simple, efficient and cost effective. RFID is one of the emerging technologies in recent years. It consists of two component RFID tag and reader. RFID Tag contains information such as name, address and mobile number. RFID reader reads the above information from the RFID Tag.

4. IMPLEMENTATION

The basic block diagram is given below:
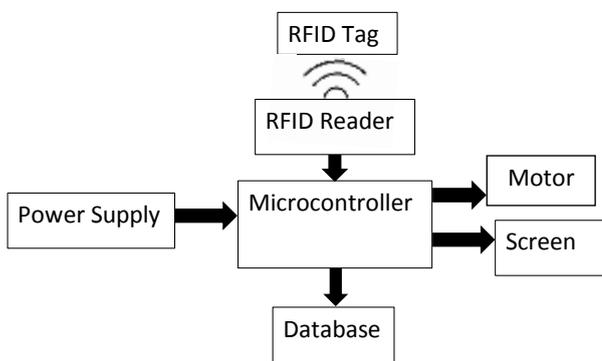
Fig-1: Block Diagram

4.1 Power Supply

Almost every electronics circuits need a power adaptor which converts an unregulated ac into dc in order to operate the electronics device. All devices will have a certain power supply limit and the electronic circuits inside these devices must be able to supply a constant DC voltage within this limit. That is, all the active and passive electronic devices will have a certain DC operating point (Q-point or Quiescent point), and this point must be achieved by the source of DC power. The power supply is designed to convert 230V AC to 12 V DC. This is then converted to 5V and 3.3V for the components' requirements.
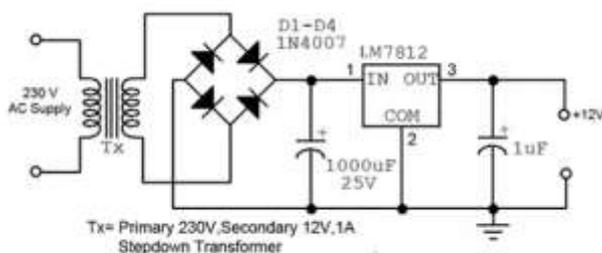

Fig-2: Power Supply Internal diagram

4.2 Microcontroller

Micro-controller is heart of the system. It has number of features and it controls the other components. We can write a program and load the controller to control real time application processes. The microcontroller used is NodeMCU. NodeMCU is an open source IOT platform. It has an in built wi-fi module.
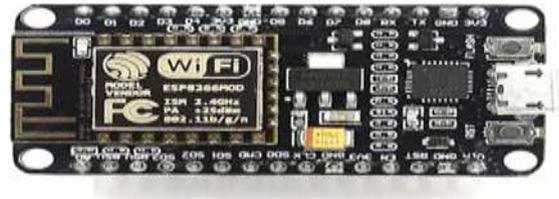
Fig-3: Node MCU

4.3 OLED

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted. OLEDs are emissive displays that do not require a backlight and so are thinner and more efficient than LCD displays (which do require a white backlight). OLED displays are not just thin and efficient - they provide the best image quality and they can also be made transparent, flexible, foldable and stretchable in the future. OLEDs represent the future of display technology.

Fig-4: OLED

4.4 RFID Tag

On receiving any signal from a tag it passes on that information to the data processor. These tags can be either active or passive. While the active tags have on-chip power, passive tags use the power induced by the magnetic field of

the RFID reader. Thus passive tags are cheaper but with lower range (<10mts) and more sensitive to regulatory and environmental constraints, as compared to active tags. The RFID device serves the same purpose as a bar code that provide a unique identifier for the object, but it was a scanning technology rather than using radio signal.

Fig-5: RFID tag

4.5 RFID Reader

 A radio frequency identification reader (RFID reader) is a device used to gathering the information from the RFID tag. Radio waves are used to transfer data from the tag to a reader. RFID is a technology similar in theory to bar codes. The RFID tag it must be within the range of an RFID reader.

4.6 SERVO Motor

A servo motor is used to control the opening and closing of entry gate in the bus. It is based upon the account balance of the student. If a student swipes the card and if he or she has enough balance in it, then that amount will be deducted from their account and gate will be open. Similarly, in case of insufficient balance the gate will not open.

Fig-6: Servo sg-390

4.7 DATA BASE

Php provides MySQL connect function to open a database connection. A PHP means Hypertext Preprocessor (PHP) and it is a programming language that allows web developers to create a dynamic contents that interacts with database.

5. EXPERIMENT AND RESULT

The design and implementation of the device is explained below.

### 5.1 Hardware Design
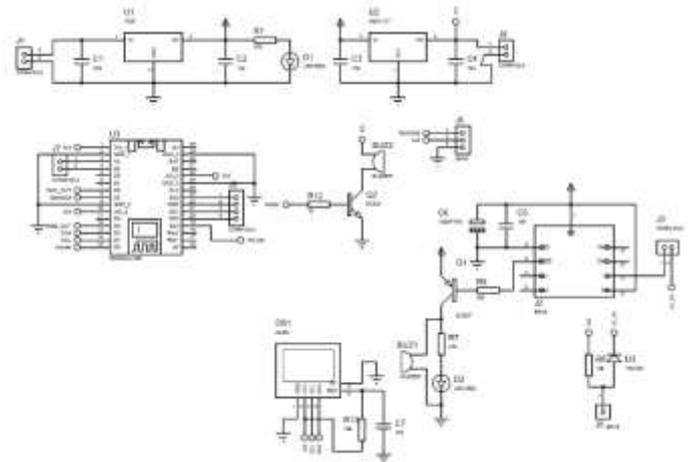
Fig-7: Circuit Schematic

Fig-8: Hardware connections

 Microcontroller contains full implementation of a standard microprocessor. Light emitting diode used for displaying information about the ticket processing A wireless Wi-Fi adapter connects a computer without wireless hardware to a wireless network by transmitting a Wi-Fi.

5.2 DEVICE WORKING

When the device starts it first connects to a network using the Wi-Fi module in the NodeMCU. It detects the presence of the network whose ssid and password is given in the program. While it is connecting, the screen displays a message that it is "Connecting to (network-name)" as shown in fig. 9 below. When connected it shows the message"Connected" (fig. 10). Then it will connect to the database and shows the message "Database Connecting…" (fig. 11) while connection to database is being established and "Connected" when it is done (fig. 12).
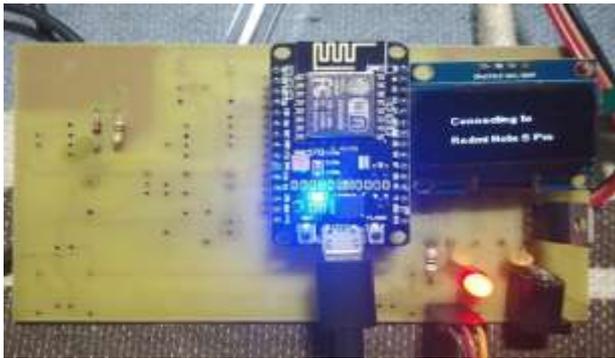
Fig-9: Connecting to network
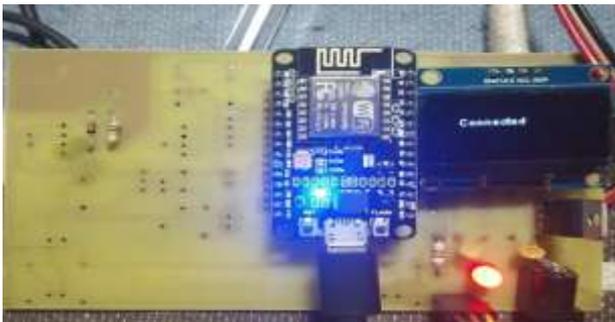
Fig-10: Connected to network
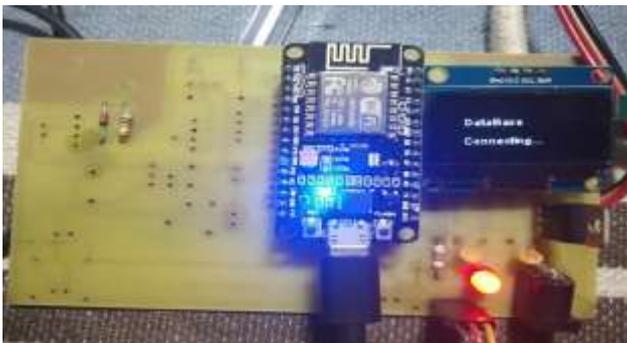
Fig-11: Connected to database

After all connections are made the screen shows a "WELCOME" as in fig-12.
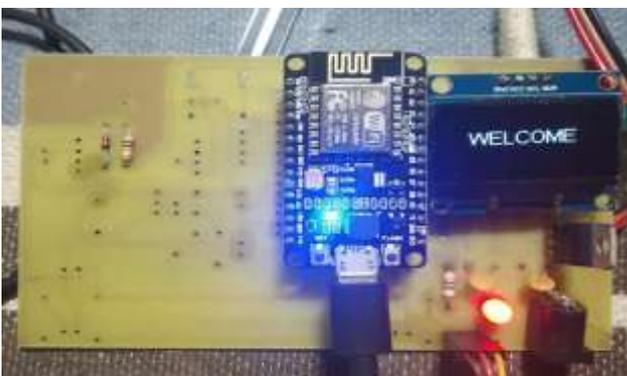
Fig-12: Welcome message

When a student needs to board the bus, he has to place his tag near the RFID reader. When the tag is identified, a beep noise is made by the reader and will now search the database for a match to the given id. When a match is found, the account balance corresponding to the id is read from the database. This balance is compared with the trip rate and if the student has sufficient balance in his account, he/she is allowed to enter the bus. First the charge is deducted from the account and the updated balance is displayed on screen for 3 seconds (fig. 14) and then returns to welcome screen. At the same time the motor is rotated and the door is opened.

But if the balance is not sufficient, then the screen shows "LOW BALANCE" for 3 seconds (fig. 6.7) before returning to the welcome screen and this means the student cannot use the bus unless he "recharges" his account. Also, database is unmodified and door will not be opened.


Fig-13: Showing the updated balance
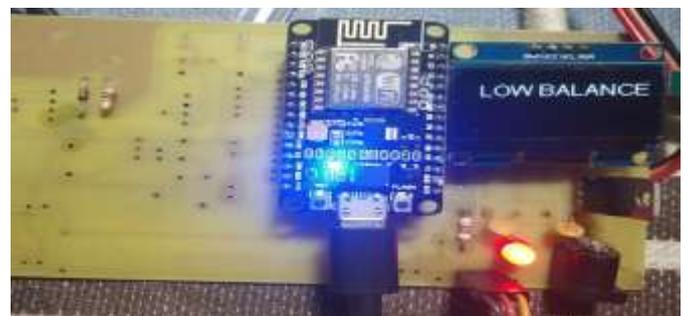
Fig-14: Showing low balance

6. FUTURE SCOPE

In future this system can be improved in the following ways:

- Can use the same system for college fee, canteen payments, fine payments etc. as well.

- Can be modified by differentiating fee payments for regular students and the ones who uses the bus rarely ,i.e., regular students can pay fee per month and temporary users can pay per day.

- Can add a seat scanning mechanism to keep track of seat counts etc.

7. CONCLUSION

The complexities in fare collection has been eliminated and the project is completed successfully using smart card. This project is made with pre-planning, that it provides flexibility in operation. This innovation has made more desirable and economical. This project "COLLEGE BUS FEE PAYMENT SYSTEM USING RFID" is designed with the hope that it is very much economical and helpful for teachers and students during journey.

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