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Conductor-less Bus Ticketing System Using RFID

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ABSTRACT

We propose an automatic fare collection system utilizing Radio Frequency Identification (RFID) technology to eliminate the need for a conductor. The system calculates fares based on the distance travelled by the passenger. The implementation of this system is facilitated by a PIC microcontroller for controlling various interface operations. An infrared (IR) sensor is employed to count the number of passengers entering the bus, with the count sent to the microcontroller for processing. The RFID cards are rechargeable at the bus depot, using a microcontroller and displayed via a Liquid Crystal Display (LCD) for real-time fare information. This system replaces human conductors with automated ticketing methods such as smart card readers, mobile payment systems, and contactless RFID technology. Additionally, AI-powered surveillance ensures proper fare compliance, reducing revenue losses. The integration of GPS tracking and real-time passenger information systems enhances operational efficiency and user convenience by providing accurate bus arrival times and occupancy details.

Index item- *Automatic fare collection, RFID, PIC microcontroller, IR sensor, rechargeable RFID, LCD, distance calculation.*

INTRODUCTION

The advancement of fare collection systems in public transportation has led to the development of automatic systems that aim to improve efficiency and reduce operational costs. Traditional methods involving conductors are becoming less efficient, leading to increased operational time and costs. This paper proposes a system that leverages Radio Frequency Identification (RFID) technology to automatically calculate and collect fares based on the distance travelled by the passenger. This system eliminates the need for conductors, providing a more streamlined process for both passengers and operators.

The project also shows that how we can ensure that a passenger with valid ticket can only be allowed to travel in a bus. The project is implemented using RFID card and Arduino and servomotors. The system uses Arduino microcontroller, as it is very much advance so certain applications such as automatic opening and closing of doors on basis of RFID cards can be easily implemented. This paper shows how RFID cards can be used to generate bus ticket. With the help of this RFID cards a passenger can be authenticated, leading to an effective step toward security of passenger

Problem Statement

Public transportation systems are essential for urban mobility, but they often rely on conductors to collect fares and manage passenger boarding. This can lead to several operational inefficiencies, including increased lab our costs, fare evasion, and delays due to cash handling. Furthermore, during peak hours, conductors may struggle to

manage the large volume of passengers, causing delays and passenger dissatisfaction. In light of these challenges, there is a need for a Conductor less Bus System that leverages automated fare collection, passenger counting, and real-time monitoring to streamline the boarding process.

PROPOSED SYSTEM

In our proposed work, The Conductor-less Bus System is designed to replace traditional fare collection methods with automation, improving efficiency, reducing costs, and enhancing passenger convenience. This system eliminates the need for conductors by integrating smart technologies for ticketing, security, and real-time monitoring The Conductor-less Bus System aims to improve the efficiency and convenience of public transport by eliminating the need for conductors and incorporating advanced automated technologies.

This system enhances fare collection, passenger management, and security while reducing operational costs.

LITREATURE SURVEY

1. Koushik R., Jeevan K. P., and Surabhi M. V., "***RFID Based Bus Ticket Generation System Using IoT,"*** International Journal of Advanced Research in Computer and Communication Engineering. The most convenient and reliable way of generating tickets. This paper also shows how one can provide security to the travelling passengers. Also checking of tickets become easy by automatic opening and closing of door. Moreover, automatic fare collection ensures conductors does not overcharge to the passengers. Gate will Open and amount will be deducted based on distance travelled.
2. K. S. Vairavel, D. R. Jayashree, and M. Manimekalai, "***Automatic Bus Ticketing System***," International Journal of Trend in Research and Development, The IR sensor, slot sensors, GPS, Global System for Mobile Communication (GSM), RFID and microcontroller. The sensors are used for calculating the distance and counting the number of passengers travelling in the bus and the amount is debited from the RFID.
3. S. Sathish, G. Anbarasan, T. Aravind, V. K. Naveena, R. Prasanth, and B. Ragul, ***"IOT Based Ticket Generating and Crowd Controlling Smart Bus System,"*** International Journal of Advanced Research and Innovative Ideas in Education (IJARIIE), The sensor for collect the data of precise count of the passengers of the bus The data are updated into the created website by the Wi Fi module, then they are display in LCD panel which placed in the smart bus stop. Passengers know the status of the bus and they decide their journey with comfort.
4. Shanmugapriya R, Sowmya A, Sowmya S, Sriram Sr, "***Smart Bus Monitoring And Ticketing System Using IoT***", May 2022, International Research Journal of Engineering and Technology (IRJET), The IR sensor is used to calculate the number of available seats and it is displayed using the LCD and two LED lights are used to indicate whether the seats are full or vacant.
5. Nishtha Agarwal, Kartik Bansal, Vedant Verma and Nidhi, ***"Conductor Less Bus Ticketing System Using RFID Technology"*** 2022, International Journal for Research in Applied Science &Engineering Technology (IJRASET) The system which has an RFID-based Ticketing system for public transport. In this, authors have used RFID Tags (Tickets) which has the right of entry to any bus service of the city only incoming passenger's current location and passenger destination point on the keyboard attached to each bus.

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WORKING METHODOLOGY BLOCK DIAGRAM

The Arduino processes the RFID input and communicates with an LCD display to visually convey information, such as system status or the results of RFID scans. Concurrently, the Arduino interfaces with a motor driver, which acts as an intermediary to control two types of motors: a BO motor and a servo motor. The motor driver receives commands from the Arduino to regulate motor movements, ensuring precise control over the motor functions. Arduino UNO as the central controller for integrating multiple components to achieve specific functionalities. The system receives input from an RFID module, which is responsible for reading RFID tags and transmitting the data to the Arduino for processing

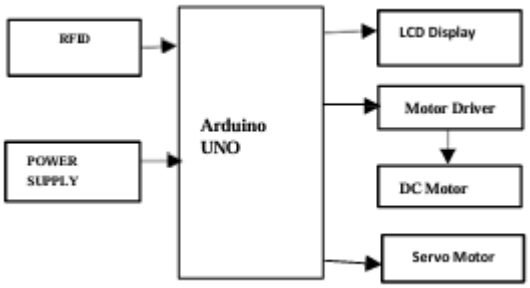

Fig 1: Block Diagram

HARDAWARE DETAILS

2.1 Arduino UNO

The Arduino Uno (Fig 2.1) is a highly popular microcontroller board built around the ATmega328P microcontroller, Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board.

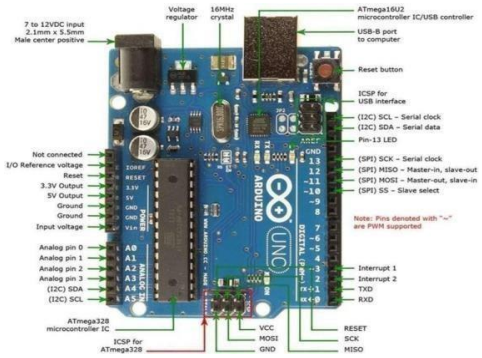

Fig2.1Arduino UNO pin diagram

2.2 16x2 LCD display

The (Fig 2.2) shows that 16x2LCD display, Liquid crystal cell displays (LCDs) are used in similar applications where LEDs are used. These applications are display of numeric and alphanumeric characters in dot matrix and segmental displays. The function of each pin of LCD are VCC, VSS and VEE while v and v provide +5v and ground, respectively, v is used for controlling LCD contrast. There are two very important registers inside the

LCD. The RS pin is used for their selection as follows. If RS=0, the instruction code register is selected, allowing the user to send a command such as clear display, cursor at home, etc. If RS=1 the data register is selected, allowing the user to send data to be displayed on the LCD.

Fig2.2 16x2 LCD display

2.3 DC Motor

The DC motor converts direct current (DC) electrical energy into mechanical energy, widely used for its simplicity and precise control. (Fig 3.3) consists of a stator, which provides a constant magnetic field, and a rotor (armature) that rotates within this field. The interaction between the magnetic field and the current in the rotor generates torque, causing rotation. Speed and direction can be controlled by varying the input voltage or current. This makes DC motors ideal for applications in robotics, vehicles, and industrial machinery

Fig2.3 DC Motor

2.4 RFID Reader

In (Fig 2.4) RFID stands for Radio Frequency Identification. It is one of the members of Automatic Identification and Data Capture (ADIC) technologies and is a fastest and reliable in identifying the objects. There are two main components: The Interrogator (RFID Reader) which transmits and receives the signal and Transponder (tag) that attached to that object. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data. An RFID tag is composed of a miniscule microchip and antenna.

Fig 2.4 RFID Reader

2.5 Servo Motor

This type of motor (Fig.3.5) that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to

rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor. It is just madeup of a simple motor which runs through a servomechanism.

Fig 2.5 Servo Motor

2.6 Motor DriverL293N

Motor Driver (Fig 3.6) The L293N can drive up to two DC motors or a single stepper motor. The L293N is a popular integrated circuit (IC) used to control the direction and speed of DC motors, stepper motors, and other inductive loads. It is a quadruple high-current half-H driver, which means it can control up to two DC motors or one stepper motor.

Fig2.6 Motor DriverL293N

2.7 Power Adapter

In (Fig 2.7) The Standard 12V1APower Supplywith5.5mm DC Plug Adapter is 2 pin EU plug type adapter and 1.2 meters long connecting cable. These adapters are designed to meet all types of power requirements of tablet pc, notebook, and other electronic gadgets

Fig 2.7 Power Adapter

2.8 I2C Module

The NEO-6M GPS module (Fig 3.8) is a high-performance GPS receiver designed for accurate location tracking and navigation applications. It uses the NEO-6 series chipset to provide precise positioning data with a high update rate, supporting various positioning systems like GPS. This module is commonly used in robotics, drones, and other embedded systems for real-time location tracking and navigation.

Fig 2.8 I2C Module

HARDWARE RESULT

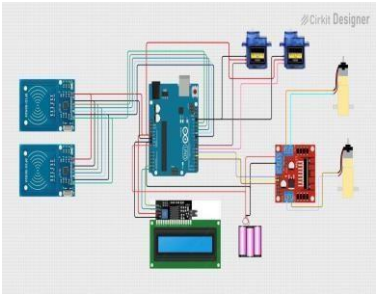

Fig 3:Hardware Implementation

RESULT

The implementation of a conductor-less bus ticketing system using RFID technology yielded significant improvements in efficiency and passenger convenience. The system utilized RFID cards issued to passengers, which were effectively read by the RFID readers installed at bus entry and exit points. The automated fare collection process ensured accurate fare deductions based on the distance traveled, significantly reducing the need for manual ticketing. Passengers experienced a smoother and faster boarding process, as the system quickly validated their RFID cards and displayed their balance and fare details on an LCD screen. The initial balance of 50 units allowed passengers to make multiple trips, and only those with sufficient balance were allowed to board, ensuring fair usage.

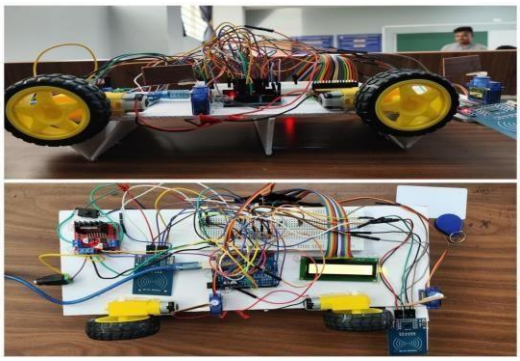

Fig4 Hardware Module of Conductor Less Bus

CONCLUSION

In conclusion, Conductor less buses are a modern solution to make public transport more efficient and cost-effective. They use automated systems for ticketing and monitoring, which reduces the need for conductors. While some challenges like helping passengers and preventing ticket misuse need to be managed, these buses can improve public transport and make it smarter and more convenient for everyone. However, their success depends on addressing challenges like fare evasion, system reliability, and passenger assistance. With proper implementation and public adaptation, conductor less buses can pave the way for a smarter, more sustainable transit future.

REFERENCES

[1]. Koushik R., Jeevan K. P., and Surabhi M. V., "***RFID Based Bus Ticket Generation System Using***

IoT," International Journal of Advanced Research in Computer and Communication Engineering.

[2]. K. S. Vairavel, D. R. Jayashree, and M. Manimekalai, "***Automatic Bus Ticketing System***," International Journal of Trend in Research and Development.

[3]. S. Sathish, G. Anbarasan, T. Aravind, V. K. Naveena, R. Prasanth, and B. Ragul, ***"IOT Based Ticket Generating and Crowd Controlling Smart Bus System,"*** International Journal of Advanced Research and Innovative Ideas in Education (IJARIIE).

[4]. Shanmugapriya R, Sowmya A, Sowmya S, Sriram Sr, "***Smart Bus Monitoring And Ticketing System Using IoT***", May 2022, International Research Journal of Engineering and Technology (IRJET).

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