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AUTOMATIC TRANSPORT TICKETING SYSTEM BASED ON TRAVELLED DISTANCE USING GSM, GPS, RFID

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ABSTRACT

This paper presents an advanced public transport system that addresses the limitations of conventional bus fare systems. It proposes the implementation of smart card readers at designated entry and exit points in buses, allowing passengers to use rechargeable smart cards for fare payments. The system utilizes GPS to track the distance traveled, enabling automatic fare deduction at the exit point. Additionally, a GSM module sends SMS notifications to passengers regardiDr.K.RAKESHng their travel distance and fare deductions.

Keywords: GPS, GSM, RFID, Distance Traveled

I. INTRODUCTION

Modern gadgets have become integral to daily life, simplifying tasks and minimizing manual errors. In cities like Pune, traditional public transport systems often rely on paper tickets, leading to confusion over fares and potential corruption. The lack of effective oversight allows private operators to monopolize services, resulting in arbitrary fare increases and diminishing trust among passengers. Furthermore, the inefficiencies of manual ticketing can lead to long wait times and increased operational costs for transport companies. To address these challenges, this paper introduces an automated bus ticketing system that utilizes RFID and GPS technologies. By streamlining the fare collection process, the system not only enhances efficiency and accountability but also significantly improves passenger convenience. With real-time tracking and automated notifications, passengers can enjoy a more reliable and user-friendly travel experience, ultimately promoting greater usage of public transport.

II.LITERATURE REVIEW

1. Arul Das, S.V.K. Lingeswaran

Title: GPS Based Automated Public Transport Fare Collection Systems Based on Distance Travelled by Passenger Using Smart Card

Abstract: This paper presents an innovative fare collection system for public transport utilizing GPS and smart card technology. The proposed system automates fare calculation based on the distance traveled, thereby eliminating the need for manual fare

collection and reducing potential disputes. By implementing RFID technology, the system enhances passenger tracking and data management, making it a more efficient solution compared to traditional ticketing methods.

2. Suresh Sankaranarayanan, Paul Hamilton
Title: Mobile Enabled Bus Tracking and Ticketing System
Abstract: This research explores the integration of mobile technology in public transport systems, focusing on bus tracking and automated ticketing. The study highlights the benefits of real-time tracking using GPS, which provides passengers with accurate information on bus locations. The automated fare collection process via mobile applications significantly streamlines operations and enhances user experience by minimizing wait times and reducing fare evasion.

3. Ignacio Parra Alonso et al.
Title: Accurate Global Localization Using Visual Odometry and Digital Maps on Urban Environments
Abstract: This paper investigates the use of visual odometry in conjunction with GPS for precise localization in urban settings. The authors discuss the challenges of relying solely on GPS due to signal loss in dense environments. The integration of visual odometry offers a complementary approach that improves localization accuracy, which can be beneficial for applications such as automated transport systems where precise tracking is essential.

4. Ana Aguiar et al.
Title: Personal Navigator for a Public Transport System Using RFID Ticketing
Abstract: This study introduces a personal navigation system that leverages RFID technology to enhance public transport usability. By providing passengers with real-time information about routes and distances, the system facilitates a smoother travel experience. The integration of RFID for ticketing simplifies fare collection, allowing for contactless payments and reducing the reliance on paper tickets, thereby promoting sustainability in public transport.
The reviewed literature underscores the significant advancements in public transport systems through the use of GPS, GSM, and RFID technologies. The integration of these technologies not only improves operational efficiency but also enhances user experience by providing accurate fare calculations and real-time tracking. As urban populations grow, these automated systems present a sustainable solution to the challenges faced by traditional transport methods.

II. EXISTING SYSTEM

Currently, public transport systems predominantly rely on paper tickets issued from manual ticketing machines. These machines are typically equipped with a keypad that allows passengers to select their destination. Upon selection, the machine prints the corresponding ticket, which is then ejected for the passenger to collect. While this system has been in place for many years, it has several inefficiencies and limitations that hinder its effectiveness.

A. Limitations

One major disadvantage of the existing ticketing system is that it does not capture passenger details. This lack of information can pose challenges, especially in situations where passenger identification is crucial,

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such as in emergencies or public safety incidents. Additionally, the reliance on manual ticketing creates a need for personnel to oversee ticket issuance. This not only increases operational costs but also leads to potential human errors, such as issuing incorrect tickets or failing to collect fares from certain passengers.

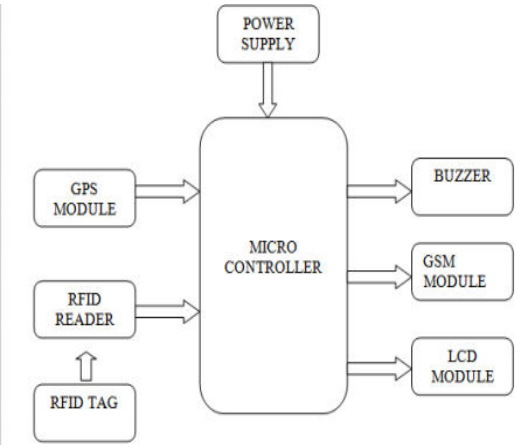
For infrequent travelers, navigating the ticketing process can be particularly daunting. While regular commuters may be familiar with the routes and fare structures, those who travel less frequently often find themselves unsure of their destination options and the associated costs. This confusion can discourage potential users from opting for public transport, ultimately affecting overall ridership and service efficiency.

Moreover, the current system lacks real-time tracking capabilities, leaving passengers without timely updates on bus locations or delays. This can result in longer wait times and increased frustration, further diminishing the appeal of public transport.

In summary, the existing paper-based ticketing system is burdened by significant limitations, including the absence of passenger data, the need for manual oversight, and a lack of real-time information. These challenges highlight the necessity for an automated solution that enhances user experience and operational efficiency, which our proposed system aims to address.

III.PROPOSED SYSTEM

The proposed system introduces an innovative automated bus ticketing solution that accurately measures the distance traveled by passengers and deducts the corresponding fare directly from their accounts. This system utilizes smart card technology, with readers strategically placed at entry and exit points of the buses. Passengers are issued smart cards that store their account information, allowing for seamless fare management. At the entry point, passengers must insert their cards into the reader, which verifies that they have a sufficient balance before granting access. This process logs the passenger's entry and identifies their account, ensuring that fare calculations are based on actual distance traveled rather than relying on the vehicle's built-in meter. Upon exit, the smart card reader captures the data again, calculating the fare and deducting the appropriate amount from the passenger's account. The readers are conveniently located near the bus doors, enabling easy access and compliance. Additionally, a driver or assistant can monitor the process to ensure proper card insertion and adherence to rules. This automated fare



collection not only enhances the passenger experience by streamlining transactions but also provides valuable data for transport authorities, allowing them to optimize routes and improve overall service delivery, ultimately making public transport more efficient and user-friendly.

A. Description

1. ATmega328 Microcontroller

The core component of the system is the ATmega328 microcontroller, a low-power CMOS 8-bit device based on the AVR enhanced RISC architecture. It executes powerful instructions in a single clock cycle, achieving throughput close to 1 MIPS per MHz. This capability allows system designers to balance power consumption with processing speed, making it ideal for embedded applications.

2. GPS

The Global Positioning System (GPS) is a sophisticated navigational tool capable of pinpointing locations anywhere on Earth. It provides essential data such as latitude and longitude by receiving signals from satellites through a GPS antenna. This data is then interfaced with the microcontroller, enabling real-time tracking of the bus's location.

3. GSM

The GSM module facilitates communication between the microcontroller and mobile networks. As a widely adopted architecture for mobile communication, it enables the system to send and receive messages. The GSM module comprises a power supply circuit and various communication interfaces (e.g., RS-232, USB) essential for connectivity. The integrated modem serves as the heart of this module.

4. RFID System

Radio Frequency Identification (RFID) technology operates wirelessly using radio waves. In this system, RFID tags contain specific data, which is transmitted as a signal when queried by an RFID reader. This reader, equipped with an antenna, transceiver, and decoder, periodically emits signals to detect nearby tags, allowing for efficient data collection and processing.

5. Liquid Crystal Display (LCD)

Liquid Crystal Displays (LCDs) are utilized to present information visually. These displays combine liquid and crystal properties and are commonly found in devices such as watches and calculators. The LCD connects to the microcontroller via a parallel interface, using eight data pins along with two control pins to manage display functions.

6. Buzzer

The buzzer serves as a signaling device, commonly employed in various applications, including automobiles and household appliances. Its primary function is to provide auditory alerts to users, enhancing the system's interactivity.

IV. CONCLUSIONS

This project addresses several shortcomings associated with traditional ticket collection systems by introducing an automated fare collection mechanism. By sending text messages that detail the traveled distance and total fare deducted, the system ensures transparency and enhances user experience. The reliance on cash is eliminated, as passengers can use contactless smart cards loaded with substantial amounts, removing the need for exact change. This user-friendly approach significantly improves travel comfort. Furthermore, the system can be enhanced by integrating rechargeable RFID tags akin to ATM or debit cards, enabling direct bank transactions. Overall, this automated fare collection system harnesses GPS technology to streamline public

transport operations while minimizing the need for human intervention.

V.REFERENCES

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