BRT Traffic Management using RFID Technology

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Abstract **– This research focuses on the designing and implementation of a BRT Traffic Management System using RFID Technology. The main objective of this system is to control unnecessary traffic in the BRT lane by avoiding all private vehicles from entering the BRT lane. This system consists of an RFID scanner and card, Infrared Sensors, Servo Motor, Arduino and Arduino IDE embedded system, and Python programming.**

Index Terms **– Bus Rapid Transit, RFID, Arduino, Sensors, Monitoring.**

I. INTRODUCTION

BRT is ameliorated system that offers reliable and quality indulgence that improves trip moments, indulgence responsibility, and ridership. The common ideal of BRT is to maximize the PMPML bus through faster trip moments than the traditional fixed-path system.

In 1974, the first Bus Rapid Transit system was Set up in Curitiba, Brazil. There it was called the Rede Integrada de Transporte ('Integrated Transportation Network'). The first BRTS in India was Rainbow Bus Rapid Transit System in Pune City, which was set up in 2006.

The transit system has undergone various and major changes in terms of leveraging level-boarding mechanisms that would eliminate the necessity of lifts or ramps.

This system helps in managing traffic efficiently and prevents system bunching, which helps in keeping the operations on track.

This system would enhance people's security due to operative lighting arrangements at various places in and around the stations. This system would be a life-deliverer where lanes are demanded to be kept free from the passage for ambulances and conflagration team instruments. This would be an ultimate time-deliverer for quotidian passengers in cosmopolises with heavy business. BRT reduces the common number of kilometers traveled in a municipality. Setting up a new BRT system will ensure the reduction in pollution, and traffic, and also it will allow us to remove the old, outdated system. Introducing a new BRT corridor, therefore, has major implications not precisely for GHG emigrations, devoted system lanes that separate BRT buses from mixed-paid boarding and position platforms to speed up passenger boarding, while business signal operation prioritizes BRT buses. Highfrequency system indulgence also minimizes staying moments to support saving trip time for passengers.

Effective public transit is central to the government. The government is taking steps to build smart cities by improving public services like Bus services, Train services, etc. The Bus Rapid Transit System (BRT System) is one of the few steps taken to build better public transit for bus services. There are several rules which are to be followed by bus drivers as well as private vehicle drivers. Unfortunately, not everyone follows these rules, especially private vehicle drivers. The rule says only buses are allowed to run in the BRT lane, but many times, private vehicles rush into the BRT lane to reach their destination more quickly. But private vehicle drivers just ignore the rules leading to unwanted traffic in the BRT lane.

II. METHODOLOGY

A.Materials and Components –

1) RFID Technology –

Radio Frequency Identification is a type of wireless communication that uses electromagnetic or

electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to identify an object.

2) Arduino –
Arduino Uno is a cost-friendly and entry level microcontroller. It acts like the brain of the project.

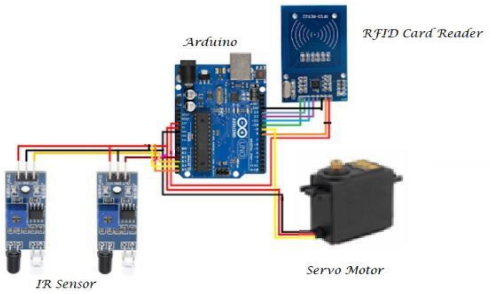
2) Infrared Sensor –

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment and also can be used for motion detection.

3) Servo Motor –

A Servo motor is a type of motor that 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.

- Circuit Diagram:



- Working of the Model:

When the bus arrives near the RFID scanner, it scans the RFID card fixed on the windshield of the bus. Each card has its unique identification number which is stored in the chip present in the RFID card. After scanning the card, the unique ID number is sent to Arduino. The Arduino checks whether the RFID card ID number is authorized or not. If the card is authorized, then it will check whether the bus is detected by the IR sensor or not. There are two IR sensors in this model, one is set before the gate which is set up in such a way that the distance between the gate and the IR sensor is equal to the length of the bus, and the other IR sensor is placed after the gate to ensure that the bus has completely passed through the gate. If the first IR sensor detects the object and the RFID card is authorized (as checked by Arduino), then only the gate will be open. Only BRT buses and Emergency vehicles will have this unique RFID card. This system will ensure the passage of only BRT buses and Emergency vehicles, too (if needed) as the gate won't open if any duplicate or fake RFID card is used. Thus, private vehicles won't be able to enter the BRT lane.

III. RESULTS AND DISCUSSIONS

1) Increased security: RFID technology can be highly secure, as the unique identifier on each card ensures that only authorized users can gain access to the system or physical space.

2) Ease of use: RFID cards are easy to use and can be quickly scanned by a reader, which can save time and reduce the risk of human error compared to other security methods such as manual entry of passwords.
3) Cost-effectiveness: Compared to other security systems, RFID can be a costeffective solution that requires less maintenance and fewer resources to implement.
4) Scalability: RFID systems can be easily expanded or modified to accommodate changes in the security environment or the addition of new users or resources.

IV. CONCLUSION

Problems which are existing in the BRT system and also given solution to it. The BRT system using RFID cards can effectively control access to only BRT buses and not to private vehicles. The technology provides a unique identifier that can be recognized and verified by a reader, which can help to prevent unauthorized access or theft. RFID cards are also easy to use, cost-effective, and scalable, making them popular for many security applications.

The literature review conducted as part of this study also provided valuable insight in order to understand the BRT system in terms of its working, rules, implementation, history, present condition of the system, and measures taken to overcome the problems which passengers and bus drivers are facing.

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