

Smart BRT Management System

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Abstract: *Bus Rapid Transit (BRT) has increasingly become an attractive urban transit alternative in many developing cities due to its cost-effective and flexible implementation. However, it still seems difficult to introduce BRT to these cities because almost all their city structures have been built solely under a road transport development city plan which causes many problems, such as urban sprawl, traffic congestion, and air pollution. This system introduced several strategies to support BRT implementation in developing cities. These proposed strategies were evaluated by applying demand forecasting and emission models to the BRT project plan. It was demonstrated that the proposed strategies could effectively improve BRT ridership, traffic conditions, and air pollution emissions of the entire system. This study could be further extended to include strategy recommendations if a BRT system was introduced to other developing cities.*

Keywords: Bus rapid transit (BRT), Intelligent Monitoring, Urban Public Transportation

I. INTRODUCTION

This is a flexible, high-performance, rapid transit mode that uses exclusive rights-of-way, specifically designed stations, to provide a reliable, fast, comfortable, and cost-effective service. BRT can also serve as a complement, extension. Image processing-based Bus rapid transit management system successfully removes unnecessary traffic delays, enabling faster and more reliable processing, and keeping an eye on unauthorized vehicles, etc. In this project, we present a model based on image processing that can be employed for real-time automatic vehicle BRT management. camera was used to capture a number plate of incoming vehicles. This is followed by the process of feature extraction. Verification of the vehicle is done based on the observed features.

1.1 Problem Statement

Bus rapid transit (BRT) is a bus-based public transport system designed for better capacity and reliability than a conventional bus system. In this special Lane the corridor is dedicated to buses and its separators bus from other traffic in a real scenario we have observed that any unauthorized vehicles get access to the Bus corridor The main Aim of the Smart BRT management system is to prevent private vehicles from illegally entering the lane which is specified to public transport. Manual opening and closing of highway barricades are time-consuming and may cause heavy traffic jams.

1.2 Objective

- The main objective of our project is to better management of public transport.
- We can also achieve punctuality in public transport running schedule.
- The major objective of our project is to avoid unauthorised vehicle from entering in BRT lane.

II. LITERATURE SURVEY

Gang Xiong et al. proposed a -Bus Rapid Transit is an effective way to increase urban traffic capacity. But its operation and scheduling optimization are difficult. It can assess, improve, and optimize emergency management during holidays, public events, accidents, and other emergency situations. It can improve the quality of real-time scheduling functions by using the measurement results detected from traffic videos, and so on. which was applied for BRT's monitoring, warning, forecasting, emergency management, real-time scheduling, and other purposes, to improve BRT's smoothness, safety, efficiency, and reliability. [1]

Taotao Deng et al. came up Bus rapid transit, character by modern vehicle, dedicated busway is increasing and has also cost efficient In this This paper intends to provide an over-view of the recent developments of BRT across the globe, and discusses the current issues and debates relating to the land development impact of BRTThe paper concludes that appropriately designed and operated BRT systems offer an innovative approach to providing a high-quality transport service, comparable to a rail service but at a relatively low cost and short implementation time. [2]

Debapriya Tripathy et al. proposed Bus Rapid Transit System is a high user capacity transport system which delivers very fast, reliable, comfort and cost-effective mode of movement for the customers. Since BRTS run in their exclusive lanes, there are very few chances of congestion and accidents.

BRTS has proper provisions for right of way, easy boarding, and alighting facilities for passengers.[3]

Ajay Mishra et al. volunteered Bus Rapid Transit System is the Safe, Economical, Rapid, Convenient & New concept of public transport in Indian scenario perhaps in India there are more than 150 series of B.R.T.S was running successfully worldwide the few examples are Bogota, Beijing, etc., Ahmedabad (India) is also a successful example of BRTS Approximately 42 million people's lives in the growing cities.[4]

Thaned SATIENAM et al. invented a Bus Rapid Transit has increasingly become an attractive urban transit alternative due to its cost-effective and flexible implementation. The purpose of this study was to introduce several strategies to support BRT implementation in developing cities, such as a strategy to appropriately integrate the paratransit system into BRT system as being a feeder along a BRT corridor to supply demand. [5]

III. METHODOLOGY

3.1. System Block Diagram

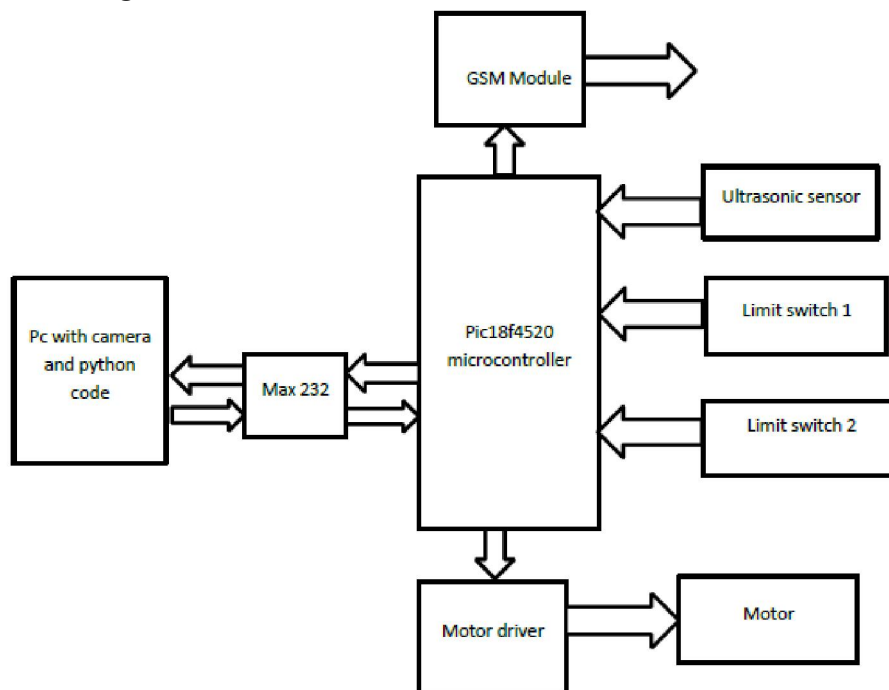


Fig 3.1. Basic Block Diagram

3.2 Hardware/ Software Requirements

1. PIC18F MICROCONTROLLER
2. MAX 232
3. L293D Motor Driver
4. GSM Module
5. LCD display
6. ESP32 - Cam

3.2.1 Software Requirements

- Python with PC and webcam,
- Proteus software
- Language Used: Python

3.3 Circuit Diagram

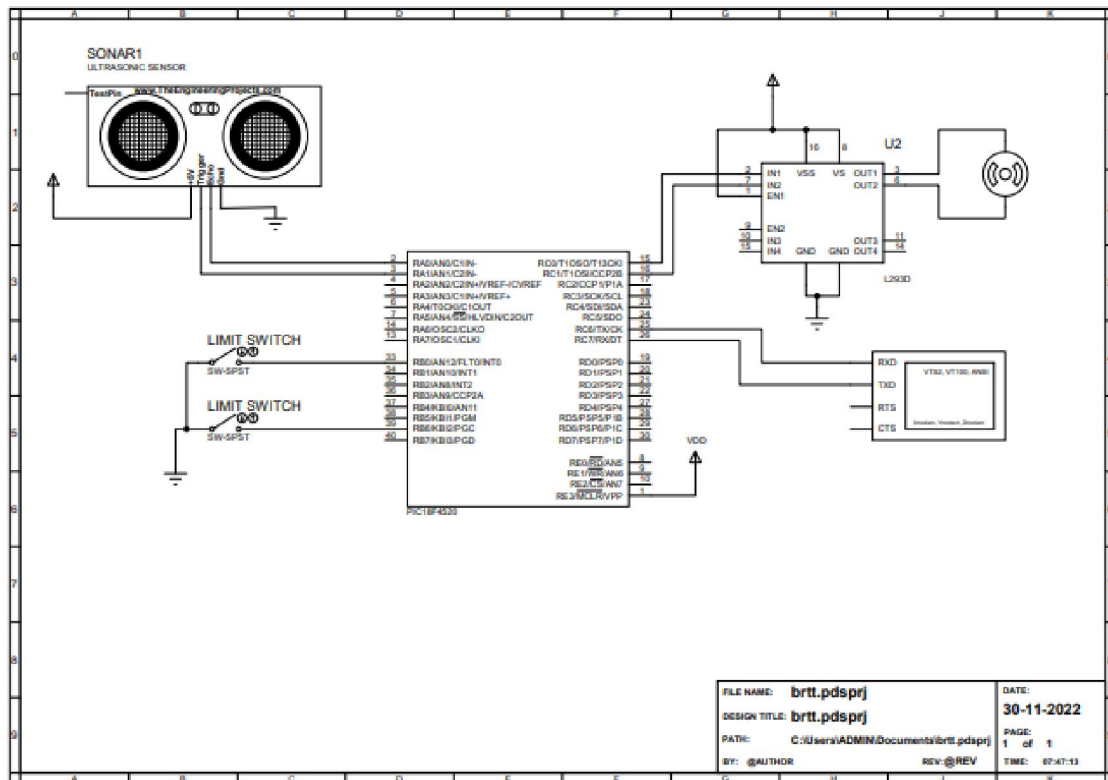


Fig 3.2. Circuit Diagram

When any vehicle enters the special lane the camera captures images of the vehicle's number plate, but we can't directly search the database. Therefore, we must convert the image of the vehicle's number plate into numbers and characters using OpenCV. Depending on whether the database search is valid, the process continues, otherwise, it remains closed. PC will transmit a signal to Max232 which is a universal dual transmitter and dual receiver. It is used for serial communication between the PC and the microcontroller to send signals to the motor driver. Microcontroller will instruct the motor driver to open the barricade.

IV. RESULTS

- As soon as a vehicle reaches that specific lane camera will capture the detection of the vehicle Number plate and convert that photo to a Number and Characters and search in the database.
- If an unauthorized vehicle enters BRT lane, then the system knows, and it will send an SMS to the owner of the vehicle as a penalty.
- If the vehicle is found in the database, then it will send controls to Microcontroller. and Microcontroller will give instructions to the motor driver to open the barricade.

4.1 Outcomes

- Reduced manpower, cost efficient.
- Smart way of Avoiding unauthorized vehicles entering from lane hence prevent road traffic.
- It provides a good essential transportation service in metropolitan areas.

VI. CONCLUSION

BRT is a good alternative to improving and upgrading transportation systems. There has been a decrease in travel time and accidents as well as increases in safety and speed through the network. This is when influenced by the BRT system. The Smart City agenda entails improving citizen's quality of life, strengthening, and diversifying the economy while prioritizing environmental sustainability through the adoption of smart solutions.

6.1 Future Scope

- This system can be used for emergency services like the health care sector and fire extinguishers (e.g. heart transplant transportation).
- This system can also be used in sensitive areas like military bases.
- This system can also be used in Government administrative complex.

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