

## International Journal of Innovative Research in Science, Engineering and Technology

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# Detection and Monitoring of Unauthorised Vehicles in BRT System

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**ABSTRACT:** Effective public transit is central to development. For the vast majority of developing city residents, public transit is the only practical means to access employment, education, and public services, especially when such services are beyond the viable distance of walking or cycling. Unfortunately, the current state of public transit services in developing cities often does little to serve the actual mobility needs of the population. Bus services are too often unreliable, inconvenient and dangerous. However, there is an alternative between poor public transit service and high municipal debt. Bus Rapid Transit (BRT) can provide high-quality, metro-like transit service at a fraction of the cost of other option. For successful implement of BRT system we need to create a surveillance module to keep a track on unauthorized and commercial vehicles from entering the BRT lane. This module provides municipal officials, non-governmental organizations, consultants, and others with an introduction to the concept of righteous application of BRT as well as a step-by-step process for successfully utilizing a BRT system.

**KEYWORDS:** Bus Rapid Transit, RFID, Arduino, Sensors, Camera, Detection, Monitoring

### I. INTRODUCTION

Bus Rapid Transit (BRT) offers the opportunity for developing cities to develop a high-quality mass transit system at an affordable cost. This module of the Sustainable Transport Sourcebook provides an overview summary of the BRT concept and a brief description of the BRT planning process. Effective public transit is central to development. For the vast majority of developing city residents, public transit is the only practical means to access employment, education, and public services, especially when such services are beyond the viable distance of walking or cycling. Unfortunately, the current state of public transit services in developing cities often does little to serve the actual mobility needs of the population. However, there is an alternative between poor public transit service and high municipal debt. Traditional approach is not efficient enough for finding the unauthorized entry of vehicles. We cannot rely on the traditional approach as it is very inefficient. Hence we are trying to present an automated system so that we could address the above mentioned issue with maximum efficiency and help BRT system to get back to the primary objective.

#### 1.1 Proximity Sensors :

A proximity sensor is an electronic sensor that can detect the presence of objects within its vicinity without any actual physical contact. In order to sense objects, the proximity sensor radiates or emits a beam of electromagnetic radiation, usually in the form of infrared light, and senses the reflection in order to determine the object's proximity or distance from the sensor. Proximity sensors are commonly used in industrial applications, from manufacturing and food production to recycling. They are also used in vehicles for detecting the proximity of other vehicles relative to one's own car, as well as for parking-assist functions. In mobile devices, especially phones, the proximity sensor is used to detect whether the user's face is close to the phone during a phone call, prompting the screen to turn off to prevent false touches on the touchscreen.

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## 1.2 RFID Technology

RFID is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves. RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time.

## 1.3 Arduino :

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

## 1.4 Python Programming in Arduino :

Bridge is a python application that communicate with Arduino using pySerial. It replace the Serial Monitor from the Arduino IDE and make use of it's command line interface to upload and verify code, all in a single window. It's purpose is to provide a more flexible and lighter way to interact with arduino compatible boards using an external editor. The script has a command line interface that ease the communication with other applications. Each uno file opened with Bridge has it's own profile that save the last used board type (ie: uno, nano), serial port and baudrate. When also using the provided arduino script, it may serve as a standalone application that can send data to serial input, and monitor serial output through external parser software, allowing easy development of arduino/python interactive scripts.

## II. LITERATURE SURVEY

In India most of metro cities are finding their public transport system inadequate due to the fast improvement in socioeconomic condition in metro cities, which had resulted into increased demand for travel. It has been observed that with increase in the sprawl of the city, average trip lengths would naturally increase. The maximum trip length in metro cities is higher compared to medium and small cities. It has been observed that the average trip length is 2.4 km with population 5 lakh and it is 10.7 km for cities with population greater than 80 lakh. Significant decrease in public transport and a very high increase in private mode share for all city categories are predicted and due to this phenomenon more street congestion develops in the metro city.

A variety of modes such as walking, cycling, two-wheelers, Para-transit, public transport, cars etc. are used to meet the travel needs in urban areas. Public transit systems world over are struggling to complete with private modes and the shift is noticeable in the developing countries as well; the predominant modes being cars, two wheelers and other intermediary modes. People's personal choices and freedom get expressed in increased ownership and use of personalized vehicles. The public agencies operating public transport systems often fail to restructure service types to meet with the changing demand pattern. As a result public transport becomes financially less viable, speeds reduce, and congestion levels increase and the transportation becomes a source of environmental problem. The agencies operating public transport often fail to respond to demands. The resultant outcomes in most Indian cities have been of increasing

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congestion due to increasing private modes, accidents and rising air pollution levels. Difficulties in foretelling the traffic levels, mode choice, affordability and willingness to pay for better services have compounded the problem.

In 2007, it has been observed that about 39% of total trips in Indian cities are carried by walk and bicycles, whereas public transport carries nearly 27% of trips. Public transport share is considerably low, around 10% in metro cities, whereas it is 20-40% for mega cities which indicate the need of public transport in metropolitan cities. Kolkata is having highest share of trips by public transport modes; nearly 80%; followed by Mumbai with nearly 60%. Maximum share of trips by walk is observed in Kanpur with at 70% followed by Ahmedabad and Bangalore with more than 40% walk trips. In Pune usage of public transport and private motorized vehicle is 41% and 22% respectively. Cities like Kanpur and Lucknow having usage of less than 5%. In general, the larger the city size, the higher the percentage of urban trips served by public transport in India: 30 percent in cities with population between 1 and 2 million, 42 percent for cities with populations between 2 and 5 million, and 63 percent for cities with populations over 5 million.

Thus, the especially rapid growth of large cities suggests a further rise in future demands for public transport in India.

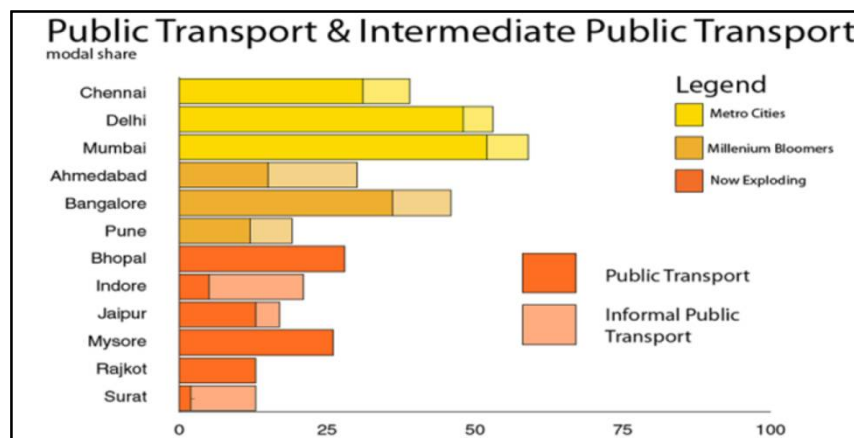


Fig 2.1: Describes the ongoing trends of the public and private transport in major cities of India. It classifies the different categories of the population and their way of commute.

## III. PROPOSED SYSTEM

### 3.1 Working :

Any vehicle (2/3/4 wheelers and others) enters the BRT route. As soon as it enters the route, width of the vehicle will be checked. If the width is less than the BRT bus, the camera will be notified. If the width is equal to the bus, then the RFID tag status will be checked. If tag is scanned, it allows the vehicle to proceed freely otherwise it will notify the camera to click the picture of the number plate and send it to respective authority for further legal actions.

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## 3.2 Algorithm:

1. If a vehicle passes at the start of BRT , its width will be calculated using Proximity sensor.
- 2.If the width is less than the width of the BRT bus ,the camera which is present at the beginning of the BRT will be notified to capture the image immediately.
- 3.If the width is similar to the width of the BRT bus , then RFID tag status will be checked there itself.
- 4.If the tag status is not scanned then the camera will be notified to capture the image otherwise the vehicle will be a BRT bus and it will pass freely .

## 3.3 Representation of the Proposed Model

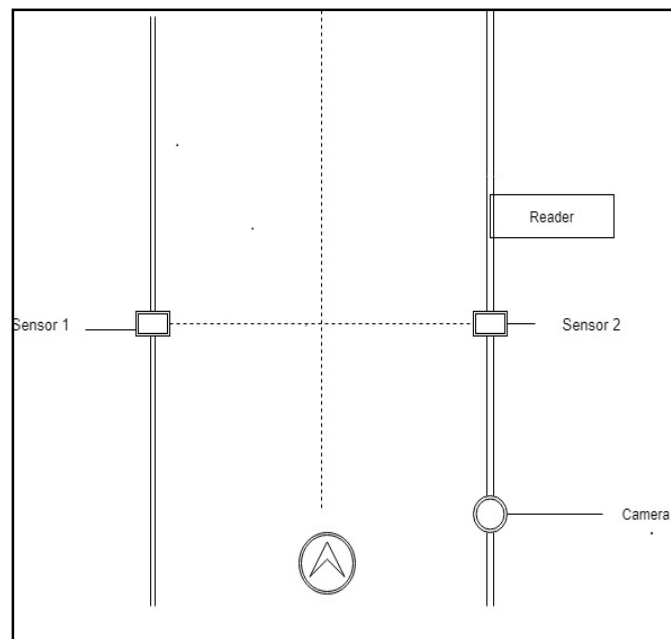


Fig. 2.1 Working of the proposed system : The vehicle enters from the bottom as symbolized by the arrow . The camera module is placed behind to capture the image as soon as it is notified . The two sensors check the length of the vehicles and if it is true , then the RFID is notified to scan the tag and notify the camera to perform necessary action .

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## 3.4 System Architecture

### A. For Bikes and Cars

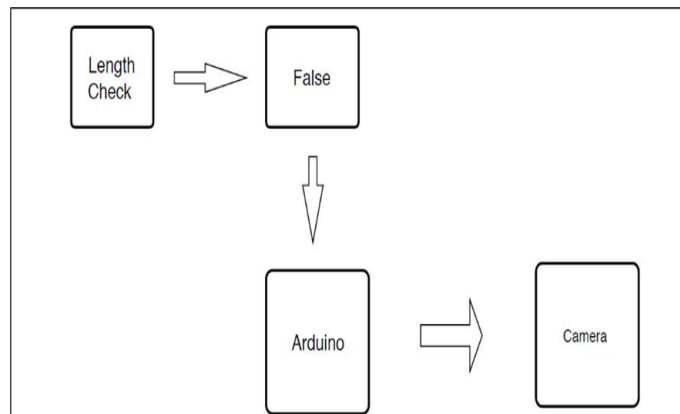


Fig. 2.2 Condition check for vehicles other than buses : Their length checked is calculated and if it is true , it is allowed to pass otherwise the camera module is notified to capture the image .

### B. Vehicles similar to BRT

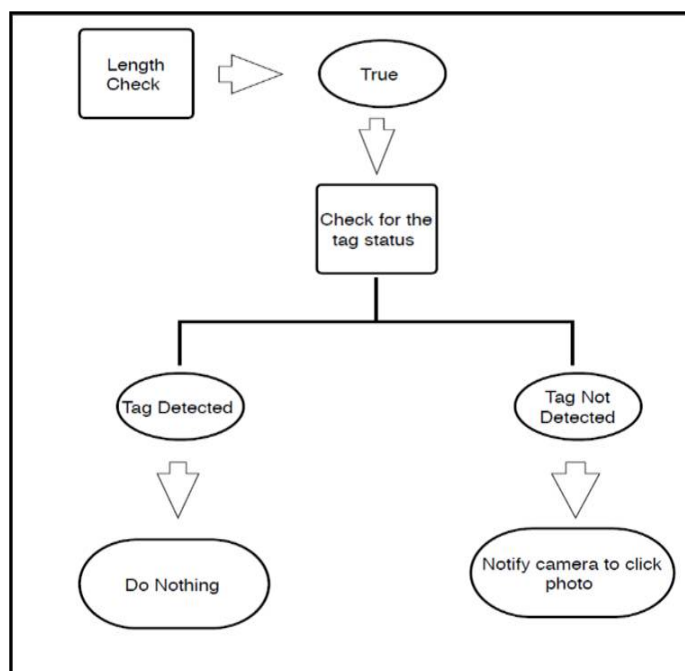


Fig.2.3 Condition check for buses similar to BRT: After the length check is true , the RFID Scanner checks for tag on specific vehicles . If tag is present the status is changed and it is allowed to pass otherwise it notifies camera module to capture image .

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## IV. EXPERIMENTAL RESULTS WITH FIGURES

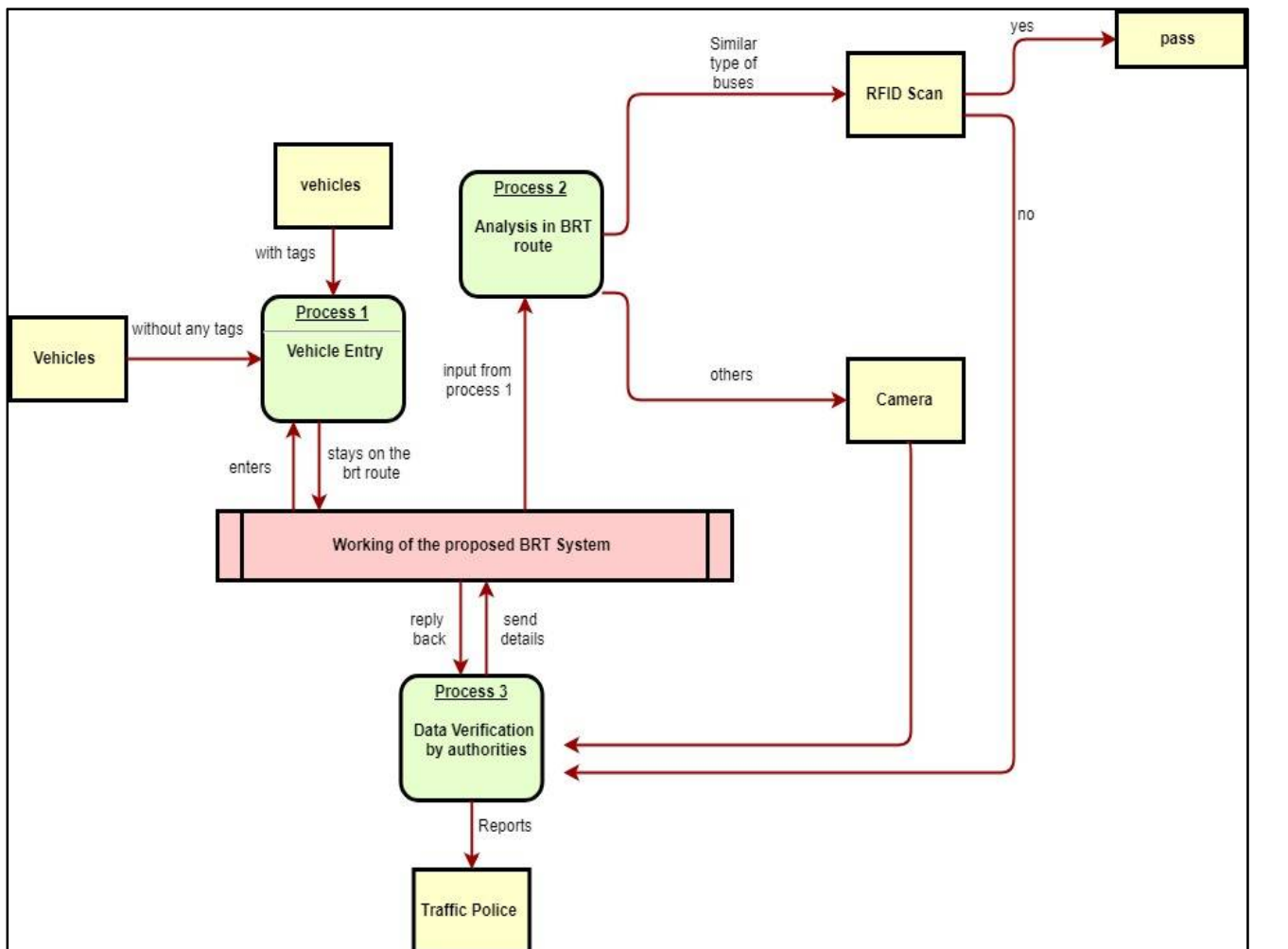


Fig 4.1 Working of the proposed system : This model consists of four processes which work simultaneously in a single environment . Vehicle entry checks for the length and informs to conduct the analysis of the unchecked vehicles and concerned authorities are notified by the information of the law breaking vehicle(s).

## V. CONCLUSION

An Iot system will be developed in order to track and report the unauthorized entries into the BRT. The system will successfully detect all the unauthorised vehicles and capture picture of those vehicles. The main aim of capturing the picture is to capture the number plate of the vehicle. The system will further send those captured pictures to the respective authority for further legal actions. In future , the system can be used by the government in order to track the unauthorized entries into the BRT, satisfying the main purpose behind the BRT.

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