

PUBLIC TRANSPORT OPTIMIZATION

INTRODUCTION

Public transportation is a critical component of India's urban and suburban infrastructure, serving as a lifeline for millions of commuters daily. However, India faces numerous challenges in providing efficient, reliable, and sustainable public transport services due to its vast and diverse population, infrastructural limitations, and rapid urbanization. In recent years, the integration of Internet of Things (IoT) technology has emerged as a promising solution to address these challenges and optimize public transport systems across the country. As a part of it, we could work on for the solutions to optimize the public transportation.

OBJECTIVES OF IMPLEMENTATION

The Main object of this project is to optimize the public transportation using IoT by improving the safety of passengers, use of cameras and sensors in traffic signals, dividing of lanes for different vehicles at bigger roads and more. Next to it, making the transport facilities available for all the urban and rural areas and everybody can have access to it.

PLANNINGS FOR IMPLEMENTATION

DEFINING OBJECTIVES

Our main goal is to increase the safety for the passengers, reduce traffics, and making the transports available for all urban and rural areas.

STAKEHOLDERS OF THE PROJECT

The Transport authority, few Government officials, Passengers, Software developers for integrated developments, Fund raisers, Data and Security Experts, Environmental activists, and even students interested to participate from Academic Institutions can be as Stakeholders. For a Successful implementation of such an project the Public's cooperation is most important.

AUTOMATED TRAFFIC SIGNALS

Automatic traffic signals using cameras and sensors, often referred to as Intelligent Traffic Management Systems (ITMS) or Intelligent Transportation Systems (ITS), are advanced traffic control systems that utilize cameras and various sensors to monitor and regulate the flow of traffic in real-time. These systems are designed to improve traffic efficiency, reduce congestion, enhance safety, and provide valuable data for traffic management.

SECURITY FOR PASSENGERS

The passenger's details (Name, Age, Contact number) are collected by digitalizing ticketing systems before. The details are collected in Government and Private Buses similar to Cabs operated by private companies (Ola, Uber and more). These details are stored in the government databases. Further, the improvement of standards in public transports like alarm systems to call emergency services, Seats have Seat-belts (Implemented for Long distance travelling Transports), Intimation of arrival and departure time of the Transport in any destination and more incoming.

RESOURCE ASSESSMENT

The required resources must be gathered before the start of implementation. It requires Skilled Person from fields of Civil, Computers, Electrical, and more. A proper reasonable budget must be set for each stage of the project without compromising the quality of work. Skillful architects and designers are required to make such a project come to reality. If all the planning and implementation of the project is successful then the final output is definitely a Success.

TECHNOLOGICAL SELECTION & SETTING UP OF INFRASTRUCTURE

IOT DEVICES

The Sensors, Databases, Data collection devices and Cameras with support to identify the Vehicles, Animals, Crowd, Human, Traffic level and more are required. The most important is the Connectivity all the devices must be integrated and controlled from a Control center. A group must be always active in monitoring the Systems to fix problems if found.

CONNECTIVITY POTOCOLS

For the Communication between the Servers, databases and the IoT devices, the best suitable and an affordable network protocol must be used to integrate and work with all of them at the same time. The Control or Monitoring center for all these services must active people all the time to fix any issues and bring everything back to normal.

DEPLOYMENT / INSTALLATION

CAMERAS AND SENSOR INSTALLATION

Installing sensors and cameras to identify humans, vehicles, animals, and other objects and connecting them to a monitoring center through the Internet of Things (IoT) is a key component of modern smart city infrastructure, security systems, and wildlife monitoring efforts. It involves

Video Cameras: These capture images and video footage of the traffic intersection.

Infrared Sensors: These detect heat signatures, allowing the system to identify vehicles, humans and animals.

Inductive Loop Sensors: Embedded in the road, these detect the presence of vehicles.

Acoustic Sensors: These can identify sounds associated with accidents or distress, such as screeching tires or car horns.

Data Processing Units: These units process the data collected by cameras and sensors in real-time. They can be located at the intersection or remotely, depending on the system design.

Monitoring Center: The central monitoring center receives data from various locations in real-time and makes decisions based on the information gathered by cameras and sensors.

SECURITY AND PROTECTION

As the data are collected and stored in databases about the passengers, there is no need to worry about security. Further, the improvement in the Seats, Seat-belts, railing, handles to hold, Alarm System, and more all are integrated together to give assurance of security and protections for the passengers using the public transport.

ANALYSIS IN MONITORING CENTER

CAMERA AS IOT DEVICE

The Cameras are designed in the way such that, it can detect the Vehicle and its type, the human, the animal and even it can detect the traffic levels. Further, if there is any unfortunate event, its captured and notifies the monitoring center.

SENSORS AS IOT DEVICE

The Sensors and again interconnected with the system, so it can do works similar to that of Cameras. And additionally it can detect the Noise, Air Pollution levels and even the agents present in Air.

DATA STORAGE SERVERS

The data from all the IoT devices are stored at least for about six months. The data about the passengers are securely stored in DB and maintained by professionals. The Leakage of data are avoided as the protocols are followed through the thoughts of the Cyber and Security experts. And as soon as the alarm is started in the Public Transports, a siren is started from the vehicle to get attention from nearby person and even the alert message is sent to the Emergency department (Medical, Fire, Police departments) with location tags.

WORK FOR EMERGENCY SERVICES

IN PUBLIC TRANSPORTS

The Alarm can be started in the public transports only from the Driver seat. During the emergency situation, only the Driver or Conductor decides to start alarm, tag location, call the emergency service providers, and they can even send information about the reason of activation of alarm. The alarm cant be stated simply by anyone to avoid disturbances and commotions. A proper identification of Driver or Conductor is required to use the alarm system.

IN TRAFFIC SIGNALS

The Cameras, Sensors and other IoT devices work simultaneously to do their work. If any unusual event is captured or identified, it is first notified to the Monitoring center before calling emergency services. But if the event occurred is known clearly to the Systems, it activates the alarm to call the services.

AWARNESS AND EDUCATION

The Public must be aware of implementation of such system, and its use and benefits must be educated to them through any medium (Speaker to announce, Awarness ad in Television, and more). The Traffic rules must be followed by each and every person accessing the public places. And nobody must intrude into another persons life. The Security department has to take initiative to educate people about the implementations of such systems and the rules to be followed on road and even on travel.

FUTURISTIC IMPROVEMENT IN FUTURE

On Continuous Monitoring and Survey analysis, the reviews must be collected for every 3 - 6 Months from both the Public and Workers / Developers and even the Officials. Based on the Surveys, if any improvements are needed, its implemented slowly without affecting the good system. Future Improvement ideas can be collected anyone and even give chances for the Students in Educational institutions.

The Level of Performance must be measure through various activities over time. The IoT device's conditions and maintenance are checked frequently by appointed workers. The errors and problems that are found by the public must be reported to the Monitoring center, the developers must fix the problems as soon as possible to avoid commotions in the day-to-day life of Public.

CONCLUSION OF PROJECT

The Public Transport Optimization involves not only the security of the Passenger, also the security for the public. This project can be implement and come to practice only after a deep research on the workflow of the Project and its members. The Public Transport Optimization project optimizes not only the Public transport but also the Traffic System which can make happy and safe journey for all who use road-ways to travel from Places to places.

The IoT enables real-time tracking, monitoring, and data analytics, offering commuters timely information, personalized services, and seamless payment options. It also empowers public transport agencies with the tools to streamline operations, reduce energy consumption, and enhance passenger safety. Moreover, the vast amount of data generated by IoT provides valuable insights for urban planners and policymakers, enabling data-driven decision-making and the improvement of public transport services.