IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 14, Issue 3, March 2025

DOI: 10.17148/IJARCCE.2025.14341

Implementation on Automatic IOT Based Smart Public Transport Bus And Station System

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Abstract: This project proposes an IOT-based smart public transportation system for buses and bus stations. The system aims to enhance the efficiency, safety and passenger experience of public transportation. The proposed system integrates various IOT sensors and technologies, such as GPS, RFID and WI-FI, to provide real –time monitoring and automation of bus operations.The rapid urbanization and increasing population density in cities have led to a pressing need for more efficient and user-friendly public transportation systems. This paper proposes an IOT-based automatic smart public transport bus and bus station system designed to enhance the reliability, safety and convenience of urban transit.

Keywords:

•IOT and Technology
1. IOT (Internet of Things)
2. Smart Transportation
3. Intelligent Transport System (ITS)
4. Real-Time Data Analytics
5. Wireless Communication (Wi-Fi, RFID, etc.)
6. Sensor Networks
7. GPS Tracking
8. Automation

•Bus and Bus Station Management
1. Smart Bus
2. Automatic Bus Station
3. Public Transportation Management
4. Passenger Information System (PIS)
5. Bus Scheduling and Tracking
6. Crowd Management
7. Passenger Counting

I. INTRODUCTION

The system is used to automate a traditional system of bus station in which, when bus enters in the premises of bus station, the name of the bus is only identified by the name plate on the bus. In many cases these name plates are not present on the bus or its paint is faded or removed therefore the passenger`s faces many problems to identify the buses on bus stations. Also the announcement of name of the bus and records of bus arrival and departure is in manual process so there is chance to wrong announcement and records is possible. To overcome these problems we are developing an IOT based system.

This system is placed at every platform of bus station. In this system the RFID technology is used to identify the bus and IR sensors are used to check the presence of bus. Audio playback module is used to announce the name of the bus which is prerecorded and Wi-Fi module is used to upload name of the bus to the web page using internet. The RFID card is placed on each bus. When bus is parked in platform, microcontroller read the id of card placed on the bus with the help of RFID reader. According to id of bus, microcontroller gives the commands to audio playback module to announce the name of the bus and also displays it on LCD as long as bus is parked in platform. The same name of the bus is also uploaded to web page. So record is maintained automatically using Internet of Things (IOT) technology.

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Trustworthiness in public transport is of great importance today. Citizens who use public buses waste a lot of time waiting for the bus at bus stop. In daily operation of a bus system, the movement of buses is affected by unknown conditions as the day progresses such as traffic or dispatching buses at irregular time from the depot. If people travelling by bus it will increase the trustworthiness in the public transport. This project proposes a system to track public bus using GPS (Global Positioning System), tell the count of number of passengers in bus and also the status of the bus. The location of bus, passengers count, bus status, bus timings can be accessed by public using IOT technology. All these details of particular bus are accessed by simply scanning QR code of link in smart phone. The QR code for each bus is attached to every bus stop.

II. PROPOSED METHODOLOGY

1. PLANNING AND RESEARCH:

- Conduct a thorough analysis of the current public transportation system.

- Identify areas for improvement and define projects goals.

- Research IOT technologies and their applications in public transportation.

2. System Design:

-Design the overall system architecture.

- Define the components and functionalities of the smart public bus and automatic bus station.

- Create a detailed blueprint of the system.

3.Hardware Installation:

- Install IOT sensors and devices on buses and at bus stations.

- Set up communication infrastructure. (e.g., Wi-Fi, cellular).

-Ensure robust and secure hardware in infrastructure

4. Software development:

- Develop software applications for data analytics, passenger information and system Management.

- Integrate IOT data with existing transportation management systems.

- Ensure user- friendly interfaces for passengers and administrators.

5. Data analysis:

- Collect and analyse data from IOT and other sources. Apply data mining and machine learning techniques to optimize routes, reduce congestion, and improve services.

6. Testing and quality assurance:

-Conduct through testing of the entire system.
-Ensure reliability, scalability, and security.
-Perform quality assurance checks to meet project requirements.

III. LITERATURE REVIEW

In past works given in SeokJuLee, they have actualize transport vehicle tracking for UCSI University, Kuala Lumpur, Malaysia. It is developed for settled course, giving the candidates with status of bus after determined time period utilizing LED panel Smartphone application, Technique used is Arduino micro-controller Atmega 328 based Arduino

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UNOR3 microcontroller. Additionally, for GPS, GSM/GPRS Module a similar controller is used. Program to control them is composed in C programming language, compiled and saved in microcontroller's Flash memory. The testing results in this paper give; testing in vehicle module, testing web server and database, testing smart phone app.

In PengfeiZhou, foreseeing transport entry time with cell phones is given. Innovation utilized is participatory detecting of users. This model framework with various sorts of Android based cell phones and thoroughly explores different avenues regarding the NTU grounds carry transports and in addition Singapore transports over a seven-week time span, then taken after by London in four-weeks. The proposed framework is arranged all the more for the most part accessible and is vitality agreeable. The assessment comes about recommend that the proposed framework accomplishes extraordinary expectations exactness contrasted and those operator initiated and GPS based solution .The model framework predicts transport entry time with average tolerance of 80 sec.

In MamanAddurohman, versatile tracking framework is utilized to monitor vehicles position and in uncommon cases there are much helpful data can be studied, for example, speed, cabinet temperature, And No .of passenger. This monitoring procedure is done utilizing GPS module, and sending the information to a server through GSM Modem. It is proposed machine-to-machine (M2M) communication from which Open machine Type Communication (open MTC) as correspondence platform for collecting and preparing area information. The area is shown on Google outline. The Open MTC platform that is produced by Fraunhofer FOKUS in view of ETSI M2M Rel.1 specification.

Data Analysis:
• Collect and analyze data from IOT and other sources. Apply data mining and machine learning techniques to optimize routes, reduce congestion, and improve services.

Synthesis of Findings:
- Real-Time Tracking & Fleet Management
- Passenger Information & Ticketing
- Sustainability & Green Initiatives

IV. CONCLUSION AND FUTURE WORK

A smart bus and station system enhances public transport efficiency, sustainability, and user experience. While challenges exist, ongoing advancements in AI, IoT, and green technologies will drive future innovations. Smart public transport systems will play a critical role in urban mobility, reducing congestion and promoting sustainable city development.

Future Work:
5G & Edge Computing: Improve data processing speed for real-time decision-making.
AI-Based Demand Prediction: Enhances route optimization.

Integration with Autonomous Vehicles: Future of driverless public transport.
Technological Innovation:
This IoT-powered smart transport system ensures efficiency, security, and eco-friendliness while enhancing the passenger experience..

Lifecycle Assessments:
A Lifecycle Assessment (LCA) for an IoT-based smart public transport bus and station system evaluates the environmental impact at each stage, from raw material extraction to disposal.

Consumer Awareness:
To ensure successful adoption of an IoT-based smart public transport system, raising consumer awareness is crucial. The public must understand its benefits, usage, and impact on efficiency, sustainability, and convenience

Result:
Real-Time Tracking – GPS and IoT sensors provide live location updates to passengers and transport authorities.
Predictive Maintenance – Sensors monitor bus health (engine, brakes) to prevent breakdowns.
Passenger Monitoring – IoT-enabled cameras and sensors count passengers, optimizing occupancy and reducing overcrowding.
Smart Ticketing – Contactless payment and automated fare collection improve efficiency.

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