

# IOT-Based Real-Time Bus Tracking System Using GPS and ThingSpeak Platform

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**Abstract** - This paper presents an IoT-based real-time bus tracking system using GPS and the ThingSpeak cloud platform.

The system addresses the lack of real-time bus location information in public transport. GPS captures location data, and the ESP32 transmits it to the cloud via Wi-Fi. The data is visualized on ThingSpeak, enabling real-time monitoring. The system improves efficiency, reduces waiting time, and provides reliable tracking performance.

## 1. INTRODUCTION

Transportation is essential in daily life, but traditional systems lack real-time tracking, causing inconvenience for passengers. To address this issue, an IoT-based GPS bus tracking system is proposed to provide accurate and continuous location updates.

By integrating GPS with cloud platforms, the system enables real-time monitoring and improves passenger convenience and transport efficiency.

## 2. SYSTEM DESIGN

The proposed system is designed using hardware and software components, including a GPS module, ESP32 microcontroller, and ThingSpeak cloud platform. The GPS module captures real-time location data such as latitude and longitude from satellites. The ESP32 acts as the main controller, processing the received data and transmitting it to the cloud using Wi-Fi communication.

Component	Type	Function
ESP32 Microcontroller	Hardware	Processes GPS data and transmits via Wi-Fi
GPS Module (NEO-6M)	Hardware	Captures real-time location
Wi-Fi Communication	Technology	Sends data to cloud
Thing Speak Platform	Software	Stores & visualizes data

The collected data is uploaded to the ThingSpeak platform, where it is stored and visualized for real-time monitoring. This design ensures continuous tracking, efficient data transmission.

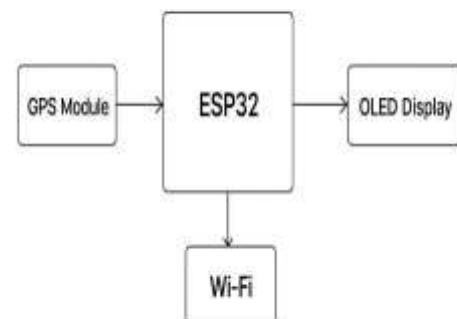


Fig.1: Block Diagram of Proposed System

### 3. RESULTS AND DISCUSSION

The proposed system was successfully implemented and tested in real-time conditions. The GPS module provided accurate location data, and the ESP32 ensured reliable transmission to the ThingSpeak platform using Wi-Fi communication. The data was updated continuously, enabling real-time tracking of the bus location.

The system demonstrated efficient performance with minimal delay, reducing passenger waiting time and improving overall transportation management. The results confirm that the system is reliable, cost-effective, and suitable for practical applications.



Fig.2: Real-Time Bus Tracking Output

### 4. CONCLUSION

The IoT-based GPS bus tracking system provides an efficient and reliable solution for real-time monitoring of public transportation.

By integrating GPS technology with IoT platforms, the system enhances passenger convenience, improves safety, and optimizes transport management. Its simple, low-cost, and scalable design makes it suitable for widespread implementation.

Future enhancements may include the development of a mobile application, integration of advanced data analytics, route optimization, and implementation of emergency alert systems.

These improvements will further increase the effectiveness and usability of the system and support the development of smart transportation infrastructure.

### 5. REFERENCES

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