FACULTY OF COMPUTING
UTM Johor Bahru

SECP 1513: Technology Information System

Semester 01, 2024/2025

PROJECT PROPOSAL

Real time Bus tracking system

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1. Introduction

Efficient transportation systems play a crucial role in university campuses, ensuring students, staff, and administrators can access campus facilities in a timely and reliable manner. However, traditional bus systems often face challenges such as delays, lack of accurate schedules, and inefficiencies in route management.

The proposed IoT-based real-time bus tracking system aims to address these issues by leveraging GPS, IoT, and cloud-based technologies. This system will enable users to monitor bus locations, estimate arrival times, and receive alerts about delays or approaching buses. Additionally, administrators can optimize routes and schedules using real-time data, enhancing operational efficiency.

Need (N)	The proposed system is designed to prevent the following problems: ● **Uncertainty in Arrival Times** Users frequently experience long waiting times due to a lack of real-time bus updates. ● **Route Inefficiencies** Without monitoring tools, administrators struggle to optimize routes, leading to increased delays and fuel costs. ● **Limited Communication During Emergencies** In case of breakdowns or deviations, there is often no immediate way to inform users or administrators.
Approach (A)	The proposed system uses a combination of hardware and software to provide live bus tracking. A GPS module on each bus collects location data, which is sent to a cloud server via a communication module. The server processes the data and displays the bus locations on a mobile or web app, showing estimated times of arrival (ETAs) and other important details. The system also includes features like route optimization, alerts for

	delays, and the ability to view past data to improve future bus schedules. (Xia F., 2020)
Benefit (B)	The real-time bus tracking system offers several key benefits: ● More efficiency Users get accurate ETAs, reducing wait times and improving bus usage. ● Increased Safety Administrators can track buses in real-time and respond quickly in emergencies. ● Cost Savings Optimizing routes and schedules helps save on fuel and reduce delays. ● User Satisfaction Students and staff will appreciate knowing exactly when buses will arrive, reducing frustration, and ensuring user's satisfaction.
Competitor (C)	Current competitors like TransLoc, Moovit, and NextBus offer real-time bus tracking, but they are usually designed for larger cities or public transportation networks. These systems are not tailored for specific needs like university campuses. Our proposed system focuses on a more personalized approach, with features like campus ID card integration and AI-based predictions for delays, making it a better fit for university transportation.

2. Existing Systems

Current existing system for bus service in UTM is UTM Fleet. After the restructuring of the Deputy Vice-Chancellor (Development) Office, the Vehicle Unit was branded as the UTM Fleet Unit under the Asset Management Division, this unit is responsible for managing student and staff transportation via Vehicle Reservation Management System (VRMS). UTM Fleet Unit is responsible for managing shuttle bus services within the campus to ensure smooth mobility of students to the faculty. UTM Fleet committed to meet the requirements for the use of official UTM vehicles for activities and programs with efficiency and safety, subject to established regulations.

Functions of this unit:
- Manage to procurement of UTM vehicle allocation.
- Manage university pool vehicle reservation requests.
- Coordinate the disposal process of UTM vehicles.
- Manage the shuttle bus service within the campus.
- Coordinate the repair and maintenance of UTM vehicles.

An issue that we identify as users of UTM Fleet service is that we cannot detect the real-time location of the shuttle bus around the UTM. This causes the UTM shuttle bus users to wait without knowing when the bus will arrive . Thus, we believe our proposed system will be able to solve this problem.

Table 1: Comparison of existing system and proposed system

System	Existing system	Proposed system
Real-Time Tracking System	- Likely operates on fixed schedules without real-time tracking. - Passengers rely on static	- GPS-enabled real-time bus tracking via a mobile app or website. - Features include:

	timetables or estimated arrival times, which can be unreliable.	☐ Live location updates of buses. ☐ Estimated Time of Arrival (ETA) at specific stops. ☐ Notifications for delays or route changes. ● Reduces uncertainty and waiting time for passengers.

3. Proposed System

The system We propose uses reliable methods that have been tested and implemented with huge success in other areas of the world, and even other areas of malaysia, a system of the scale of our project has never been implemented in UTM, and this system will have :-

1.   Location Tracking

•   A GPS module installed in the bus collects real-time location data.

•   The microcontroller processes this data and sends it to the cloud server via the communication module.

2.   Data Processing

•   The cloud server receives the GPS coordinates and timestamps.

•   Using a mapping API (e.g., Google Maps API), the server plots the bus location on a map.

3.   User Interaction

•   Students and staff use a mobile or web application to view the bus's current location.

•   The app displays:

   •   Live location of buses.

   •   ETA based on the user's selected bus stop.

   •   Alerts for delays or approaching buses.

4.   Alerts and Notifications

•   Users can subscribe to receive notifications (via SMS, push notification, or email) when a bus is near their stop or if there are delays.

•   Notable features:

   ○   Live Tracking

   ○   View buses in real-time on a map.

   ○   ETA Calculation

5.   Route Optimization

•   Admins can monitor routes and optimize schedules based on real-time data.

6.   Historical Data

•   Analyze past data to identify delays and improve efficiency.

7.   Geofencing

•   Set boundaries and notify administrators if a bus deviates from its route.

PROJECT SCHEDULE

TIMEFRAME	TASK
1 DECEMBER 2024 - 10 DECEMBER 2024	• Brainstorm ideas and discuss project scope among team members • looking for a client and conduct client interviews to discuss challenges with their current system and gathered insights on desired improvements.
11 DECEMBER 2024 - 21 DECEMBER 2024	• all group members contribute ideas on potential system improvements • start designing the project, including determining the title, features and functions • review and analyze similar existing systems for inspiration and benchmarking.
22 DECEMBER 2024 - 30 DECEMBER 2024	• conduct consultation with the lecturer regarding the project concept. • received feedback from the lecturer and made necessary adjustments to the project plan • identify potential challenges and risks related to the project and brainstorm mitigation strategies
1 JANUARY 2025 - 23 JANUARY 2025	• start developing the project prototype • do preparation on presenting the project with group members • record and edit the video presentation

4. References

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[3] V. Mishra & M.K. Yadav. (2022) *"IoT based Smart Transportation System: Implementation and Security Challenges"*. International Journal of Vehicle Structures and Systems.

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[6] M. Kumari, A. Kumar and A. Khan (2020) *"IoT Based Intelligent Real-Time System for Bus Tracking and Monitoring"*. Mathura, India, Mathura: IEEE, International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC).

Appendices

URL

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- **https://chatgpt.com/**
- **https://www.scribd.com/**
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Marking Criteria	Marks

Introduction
   ● *Needs*
   ● *Approach*
   ● *Benefits*
   ● *Competitors*
	12 marks

Existing Systems	*4 marks*
Issues or problem with existing systems	*4 marks*
Proposed System	*10 marks*
Project Schedule	*5 marks*
References	*2 marks*
Overall report quality	*3 marks*
Report Total marks	*40 marks*