

Smart Campus Bus Monitoring Application

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ABSTRACT

The Smart Campus Bus Monitoring Application is a system designed to track and display the realtime location of campus bus using embedded hardware and an Android application. A GPS module is used to continuously track the latitude and longitude of the bus. This data is processed by an Arduino UNO microcontroller and displayed on an LCD screen for local visibility. To enable remote monitoring, the NodeMCU (ESP8266) is used to upload the location data to the ThingSpeak server via Wi-Fi. The system is powered by a 12V battery, ensuring continuous operation. Through the Android application, users can view the live location of the bus and receive updates on the next stop, providing a convenient and efficient way to monitor campus transportation. A Smart Campus Bus Monitoring Application is a system designed to enhance transportation efficiency, safety, and convenience within a university or corporate campus. This application enhances safety, improves time management, and adds transparency to the transport system within the campus..

Keywords: GPS, Bus module, Tracking, Location and College Bus, Server, Mobile Application

I.

INTRODUCTION

The modern world is guided by the change in the technology day by day. Cell phones are now equipped with navigation systems such as GPS (Global Positioning system) to help travelers get the most accurate view of their current location. In today's world, time is essence to students. Being a high-tech product, mobile phones are widely and increasingly used famous. The vehicle tracking system is widely used for vehicle tracking application. Due to traffic congestion and road work, most buses are delayed. People have to wait for their bus at the bus stop for a long time without knowing when the bus will arrive. Thus, the timing of the bus arrival cannot be guaranteed. GPS means it is handled to track real-time bus location the main purpose of this is to track the bus location and transfer it to users through the SMS alert. Therefore, this help the user to prepare and save his/her time properly in the morning and catch the college bus on time. A vehicle tracking system is one of the most common applications used for tracking vehicles which is also used to prevent vehicle from theft. Today Android Applications are very good source for tracking the vehicles. It provides real time data on the movement of vehicles. Android phones are widely used for this purpose because they have GPS device attached with it. A vehicle tracking system combines the use of automatic vehicle location in individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations. Modern vehicle tracking systems commonly use GPS for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via the Internet.

Urban public transit authorities are an increasingly common user of vehicle tracking systems, particularly in large cities. By combining GPS tracking with an easy-to-use platform, the system makes the overall transport experience on campus smoother. It optimizes time management, minimizes waiting times, and encourages a better-organized and efficient transit service. The system also allows campus administrators to track bus usage, maximize route optimization, and maintain safety and operational effectiveness.

II.

LITERATURE REVIEW

1. Title: Bus Monitoring System using Android Application

Authors: Suraj Phadatare¹, Prathamesh Kudtarkar², Jignesh Seth³, Asst. Prof. Vaishali Yeole⁴

Abstract: - In this Modern and Competitive world where everyone is worried to achieve their targets on time where people value each and every seconds to optimize their Goal. As though time is an illusion in this cosmic but it plays an ultimate role in this Money Controlled World. Being step into this highly advance Nano technology world where everything on this Planet appears to be in our Hand, where everything is been control by just one click, so why we should waste our time waiting for the travelling means. Where we can Track our Traveling means through GPS i.e. for Buses we can have the Bus Monitoring System using Android Application. In this Competitive world where Time is Money and if we waste our Money just because of traffic and waiting for the Transport means that will be very unfair for our Goals. Being lived in the Developing Country where everything is Under-construction where we are building new roads and new Projects just to make best of our time, we can't afford to lose the opportunities while waiting for our Transport Means. The main objective of our Project is to achieve our Goal on time and to Utilize each and every seconds of our life Span without wasting them at least on our Transport Means. In this article we are sharing our project ideas which can be implemented for our Public Transport which is most preferable and convenient mean of transport i.e. BUS.

2. Title: Smart College Bus Transport System

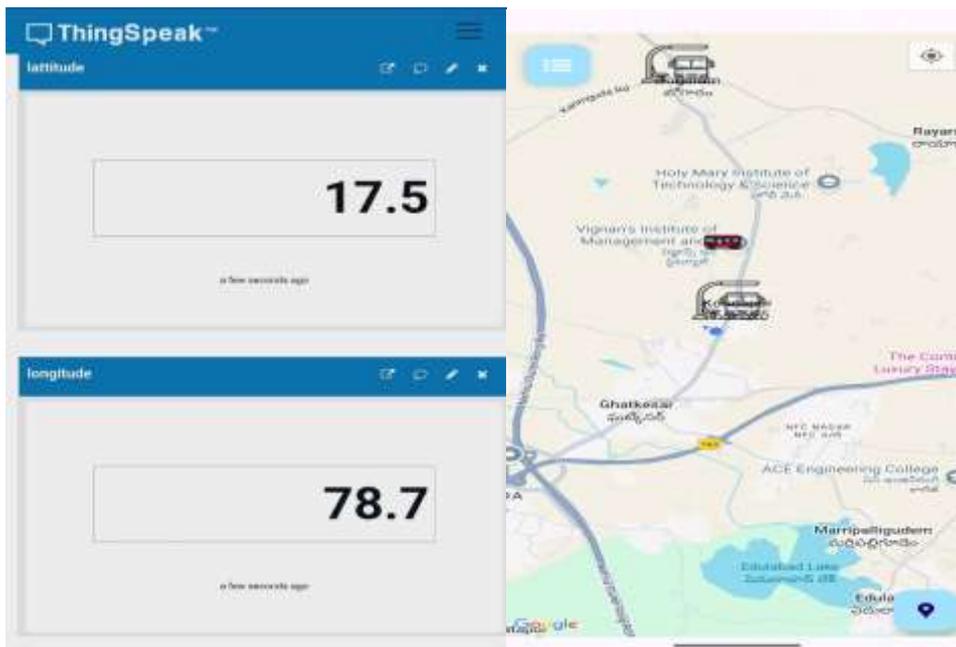
Authors: Ms. Rahesha Mulla, Ms. Tayyaba Mujawar, Mr. Sumit Sutar, Mr. Rushikesh Shelke, Mr. Shivraj Hippargi

Abstract: In almost every college, they provide their bus transportation facility. Under this, updating & maintaining daily bus records such as bus km, timing, driver and bus details. This every day activity is time consuming & there is chance of manual mistakes /interference. Paper presented here describes a system that intended to overcome the flaws in the existing system & bring out accuracy, safety of records. Proposed system uses GPS & map API for the student, staff to track the bus. Additionally, biometric attendance can be recorded. From the online recorded data on central college server, admin can generate essential report.

3. Title: Intelligent Campus Transport Management System Authors: R. V. Viswanathan , A. Harini , N. Yoga Preethi , S. Shalini

Abstract: The "Intelligent Campus Transport Management System" enhances campus mobility through an integrated Android app and website, catering to four user roles: administrator, student, faculty, and driver. Administrators manage comprehensive data for buses, students, faculty, and drivers. Students access real-time bus tracking, submit personal details, and report grievances.

Faculty utilize the platform for similar bus tracking and grievance submission. Critically, for sensitive inquiries, the system facilitates escalation to the bus manager for personalized attention. Leveraging Wi-Fi API modules in buses, the central control unit collects real-time location data, updating the central database. This data, combined with user-provided information, empowers the system to provide accurate, up-to-the-minute transit information. The system improves communication, streamlines issue resolution through the grievance mechanism, and ultimately enhances the campus transportation experience by providing transparency and responsiveness.



The system uses a GPS module to continuously track the bus's location by capturing its latitude and longitude. This information is processed by an Arduino UNO microcontroller, which also displays the current location on an LCD screen for local viewing. To allow remote monitoring, a NodeMCU (ESP8266) sends the live location data to the ThingSpeak IoT server through Wi-Fi. The entire system is powered by a 12V battery to ensure it operates smoothly while the bus is in transit. Students and faculty can then view the bus's live location through a custom Android application, which provides real-time updates and notifications about upcoming stops. Overall, this system improves safety, saves time, and makes campus transportation more transparent and efficient.

VII. CONCLUSION

Installation and development of Smart Campus Bus Monitoring Application are an important milestone toward campus transportation infrastructure modernization. As more students, staff, and faculty members increasingly depend on shuttle services for traversing vast campuses, the requirement for a secure, real-time tracking mechanism has never been more vital than it is today. This system solves the long-standing problems of conventional campus transportation unpredictability, poor routes, and a lack of communication-by tapping into GPS technology to provide timely and accurate information to users. Fundamentally, the Campus Bus Tracking System employs GPS units mounted on all campus shuttles to continuously report location data to a central server. This data is processed and presented via a user interface that is available on a mobile app. The system is made to deliver users real-time updates of bus locations, estimated arrival times at designated stops, and routes, all in real time. This does not only enhance the journey experience but also enables users to manage their time more effectively.

VII. FUTURE SCOPE

In the future, the system can be enhanced beyond RFID-based attendance and GPS tracking to provide more intelligent and secure transportation. Advanced algorithms can be integrated for better bus route optimization and more accurate real-time ETA predictions based on current traffic patterns. The RFID attendance process can be upgraded with biometric verification for higher accuracy and security. Parental notifications can be expanded to include emergency alerts, bus breakdown updates, or route deviations. The mobile app can turn into a comprehensive campus transportation hub by offering features such as trip history, analytics dashboards for administrators, driver performance monitoring, and automated integration with academic attendance systems. With these additions, the system would truly evolve into a

fully automated, intelligent smart mobility management platform for educational institutions.

VIII. REFERENCES

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