

IoT Based Bus Tracking System

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Abstract-

The IoT-based Bus Tracking System implemented at Sandip University represents a cutting-edge advancement in campus transportation management. This system utilizes IoT technology to equip university buses with GPS and IoT devices, allowing real-time tracking through a dedicated Android mobile application. This innovative platform not only empowers students to conveniently monitor the exact location of university buses but also offers advanced features such as real-time notifications in case of bus delays due to unforeseen circumstances. By providing students with this level of transparency and proactive communication, Sandip University's IoT-based Bus Tracking System significantly enhances the overall campus transportation experience, promoting efficiency, convenience, and peace of mind for students and staff alike.

Key Words: IoT technology, Bus tracking, GPS devices, Android mobile application, Real-time tracking, Notifications, Transparency.



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INTRODUCTION

Sandip University has ushered in a new era of campus transportation management through an innovative system that harnesses the power of IoT technology. This cutting-edge solution represents a paradigm shift in enhancing the overall experience for both students and staff members. By integrating GPS and IoT devices onto university buses, this system offers a sophisticated real-time tracking mechanism. Through a dedicated Android mobile application, students can effortlessly access and monitor the precise location of these buses, providing them with unprecedented convenience and control over their commuting schedules.

What sets this system apart is its proactive approach to communication. It stands out by promptly notifying users about any unexpected delays in bus schedules caused by unforeseen circumstances. This real-time notification feature not only empowers students with greater command over their time management but also ensures a smoother and more efficient campus transportation service. Sandip University's commitment to leveraging technology for the benefit of its community is vividly demonstrated through this revolutionary transportation management system..

1. PURPOSE

• Identify need of Project

In the dynamic landscape of university life, a sophisticated transportation management system like the one implemented at Sandip University becomes an indispensable asset. With a burgeoning student population and a sprawling campus, the need for efficient and reliable transportation is paramount. This system, built on IoT technology, addresses this need by providing real-time tracking of university buses. It caters to the demand for transparency and convenience by enabling students to access bus locations through a dedicated mobile application. This level of accessibility significantly eases the daily commute, empowering students to plan

their schedules effectively and ensuring timely arrivals at their destinations, thereby fostering a more productive academic environment.

Moreover, the system's ability to proactively notify users about any unforeseen delays plays a pivotal role in mitigating the impact of unexpected disruptions. In a bustling educational setting, where students and faculty members rely on punctual transportation, such notifications serve as a crucial tool for managing expectations and minimizing inconveniences. This system's proactive approach not only adds a layer of reliability to the transportation service but also fosters a sense of trust and assurance among the university community, making it an indispensable component of Sandip University's commitment to enhancing campus life.

OBJECTIVE OF SYSTEM

- The primary goal is to streamline and optimize the campus transportation system. By integrating GPS and IoT devices onto university buses, the system aims to provide real-time tracking, reducing wait times and enabling efficient route planning.
- The project aims to offer students and staff an easily accessible means to track buses through a dedicated mobile application. This transparency fosters convenience, empowering individuals to monitor bus locations and plan their commutes effectively.
- The system seeks to mitigate the impact of unexpected delays by providing real-time notifications. This objective aims to keep users informed about any schedule changes caused by unforeseen circumstances, ensuring a smoother and more predictable transportation service.
- Ultimately, the project aims to elevate the overall campus transportation experience. By providing reliable, transparent, and proactive communication, it aims to contribute to a more seamless and stress-free commuting process for the university's students and staff.

LITERATURE SURVEY:

Dr. N. Dhanasekar, "IoT based Intelligent Bus Monitoring System,"[1] 2019 - This paper On reviewing the past work of college bus tracking, monitoring and alerting system, there is a possibility to categorize various methodologies and identify new trends. One among them is a challenge for vehicle tracking, monitoring and alerting system. Now- a-days with the increase in the crime rate and accidents, parents worry about their wards when they are going to colleges. And many Students find themselves locked in a college bus in the bus parking lot after falling asleep on their way to college, miss the bus, or leave at the wrong station. This project makes use of the applicability of radio frequency identification (RFID) technology for tracking and monitoring Student during their trip to and from college on college busses. And it has the advantage of efficient tracking capabilities, low cost and easy maintenance. The individual RFID tags are effective and it is used for tracking and monitoring Student. Fire sensor is also used in this project to detect any fire accidents. Speed of the bus also can be calculated and send a message to the parents through GSM. The system consists of three main units, bus unit, parent unit and college unit. The bus unit is used to detect when a Student enters/exits from the bus using RFID Card. This information is communicated to the parent unit and college unit that identify the presence of Student. The system tracks the college bus by the IOT and also gets an alert if the bus crosses the speed limit.

K.Sridevi, " Smart Bus Tracking and Management System Using IoT,"[2] 2017 – Bus tracking is an application that tracks a bus and gathers the distance to each station along its route. Tracking System involves the installation of an electronic device in a bus, with an installed Android App on any SMART phone to enable the Administrator/User to track the bus location. Based on IoT this project is implemented as android application. There are two applications one for server and the other for the client. Buses carry GPS devices to track their positions. By this positions to server are periodically updated. Client application displays map showing the position of bus. It shows where buses are on a map and provide students and staffs the updated information at different time interval using RTC. The server will monitor location and will store its data in the database. It is a real-time system as this method automatically sends the information on the GPS system to a system/SMART phone. The students/staffs can get flexibility of planning travel using the app, to decide when to catch the bus. Arduino UNO microcontroller is used to programming for software and hardware module. And it is connected to the cloud and following through the android app. The waiting time of the user can be reduced. Simple mode of communication is the key feature of the Bus Tracking system. This

application can be easily extended for central tracking system to keep track of all the buses. The different queries and efficient route management can be easily done through central server system.

Juthuga Sri Jyothi Satya, Shaik Anwar, " IOT BASED BUS TRACKING AND MONITORING SYSTEM USING GPS AND RASPBERRY PI,"[3] 2018 - The Internet of Things(IoT) is the network of physical objects or things embedded with electronics, software, sensors, and connectivity to enable objects to exchange data using Internet. IoT is present up going and future technology, it is estimated that 25 billion things are interconnected by the end of 2020. This project aims at implementing an advanced and real time system for monitoring and tracking the bus to ensure the safety of public on IoT platform. The system is about providing information of emergencies such as accidents, break down, fire accidents, defilement by immediately sharing the location and images of the inside environment of the bus to the concerned authorities by Email alert. This system provided with user keys. In case of vehicle break down, siren is on through provided key. In case of accidents and defilement an email alert will be sent to the authorities with the images of the inside environment of the bus along with the GPS location of the bus. The complete system uses Raspberry Pi build around using ARMI76JZF-S Micro processor. This project has interface devices such as camera, GPS, speakers to Micro processor. The basic goal of this project is to provide information about location and images of the inside environment of the bus to the concerned authorities by Email alert. The images are captured by using Pi camera and location by GPS module.

Sharmin Akter, " A Cloud-Based Bus Tracking System Based on Internet-of-Things Technology,"[4] 2019 - The technological rise in public transportation is on the horizon, but the bus network structure and intelligent bus tracking system should first be in place. Bus transport service is on the edge of digital revolution, generating real-time tracking information about the bus service using smartphones. In this paper, a cloud-based bus tracking system based on IoT is proposed to reduce human intervention, waiting time and energy. The exact location and arrival time of the bus can be tracked dynamically by using a mobile application to provide better and efficient bus service. Furthermore, passengers can buy tickets without queueing and book the available seats by making online payments. The proposed scheme allows more flexibility and user satisfactory service to the rider in terms of time loss and encourages more people to ride by providing real-time bus tracking information to improve passenger satisfaction. The main objective is to minimize the unnecessary waiting and queueing time uncertainty of passengers. Riders can utilize their waiting time more productively by choosing the nearest route and alternative transportation. The sustainability of public transport service can be maintained by providing noteworthy benefits to the passengers using the proposed IoT-based bus tracking system..

ADVANTAGES

- Enables precise tracking of buses in real time, allowing students and staff to monitor bus locations and plan their commutes effectively.
- Optimizes the transportation system by providing accurate bus locations, reducing wait times, and improving route planning.
- Offers a dedicated mobile application for easy access to bus locations, enhancing convenience and providing transparency in the transportation process.
- Notifies users in real time about any delays, enabling proactive adjustments to schedules and minimizing the impact of unexpected disruptions.
- Empowers students and staff with greater control over their schedules, leading to better time management and punctuality.

SYSTEM REQUIREMENTS

- **Software Used:**
 1. Programming Language – Python
 2. Libraries – LCD, Sensor
 3. Database – IOT Cloud
 4. Tools – Arduino IDE
 5. Algorithm – Hashing

- **Hardware Used:**
 1. Processor – i3 or above
 2. Hard Disk – 150 GB
 3. Memory – 4GB RAM
 4. NODE MCU
 5. Jumper Wires
 6. GPS
 7. GSM

CONCLUSION

In conclusion, the proposed IoT-based Bus Tracking System represents a transformative solution for Sandip University's campus transportation management. By integrating GPS and IoT technology, along with a user-friendly mobile application and real-time notification system, the university aims to address existing challenges related to transparency, efficiency, and convenience. This system promises to provide students and staff with unprecedented control over their commutes, reducing uncertainty and enhancing the overall transportation experience. Furthermore, the proactive communication features and data-driven insights are expected to lead to improved efficiency in bus operations and a more sustainable approach to campus mobility. Sandip University's commitment to implementing this innovative system underscores its dedication to providing the highest level of service to its community while embracing modern technology for the betterment of campus transportation.

REFERENCES:

1. H. Chen, Y. Chiang, F. H. Chang and H. Wang, "Toward RealTime PrecisePoint Positioning: Differential GPS Based on IGS Ultra Rapid Product", SICE AnnualConference, 2010.
2. Asaad M. J. Al-Hindawi and Ibraheem Talib, "Experimentally Evaluation of GPS/GSMBased System Design", Journal of Electronic Systems, vol. 2, no. 2, June 2012.
3. Chen Peijiang and Jiang Xuehua, "Design and Implementation of Remote monitoring system based on GSM", vol. 42, pp. 167-175, 2008.
4. Saylee Gharge, Manal Chhaya, Gaurav Chheda and Jitesh Deshpande, "Realtimebus monitoring system using GPS", An International Journal of Engineering Science and Technology, vol. 2, no. 3, June 2012.
5. M. B. M. Kamel, "Real-time GPS/GPRS based vehicle tracking system", International Journal Of Engineering And Computer Science, Aug. 2015.
6. Abid Khan and Ravi Mishra, "GPS-GSM based tracking system", International Journal of Engineering Trends and Technology, vol. 3, no. 2, pp. 161-164, 2012.
7. Iman M. Almomani, Nour Y. Alkhalil, Enas M. Ahmad and Rania M. Jodeh, "Ubiquitous GPS Vehicle Tracking and Management System", IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT), 2011.
8. Leonardo D'Errico, Fabio Franchi, Fabio Graziosi and Claudia Rinaldi, "Design and implementation of a children safety system based on IoT technologies", Francesco Tarquini Center of Excellence DEWS University of L'Aquila Via Vetoio 1 67100 L'Aquila Italy
9. Anwaar Al-Lawati, Shaikha Al-Jahdhami, Asma Al-Belushi, Dalal Al-Adawi and Medhat Awadalla, "RFID-based System for School Children Transportation Safety Enhancement", roceedings of the 8th IEEE GCC Conference and Exhibition, 1-4 February, 2015.
10. Juan Zambada, Ricardo Quintero, Ramon Isijara, Ricardo Galeana and Luis Santillan, "An IoT based scholar bus monitoring system", Computer Science Department Technological Institute of Culiacan. Sinaloa Mexico.
11. J. Saranya and J. Selvakumar, "Implementation of Children Tracking System on Android Mobile Terminals", International conference on Communication and Signal Processing, April 3-5, 2013.