Smart Campus Navigation: An IoT-Based Approach For Intelligent Administration

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Abstract- *Human life is becoming easier in this digital age as nearly everything is automated, taking the place of outdated manual procedures. These days, people cannot function without the internet, which has become an essential component of their daily lives. The goal of this project, which uses IoT technology to create a smart campus model, is to provide intelligent campus administration and services. This project aims to create an IoT-based smart campus model that integrates campus-oriented application services after examining a number of research projects. Digital electronic maps can be used to track the outdoor location.*

These maps are intended for usage in outdoor settings. The internal location cannot be searched due to a lack of coordinated technologies. Many smartphones utilize computerized maps to track their whereabouts.

Google maps, GPS navigation, and offline GPS maps created with the Android Software Development Kit (SDK) are examples of electronic maps. It is possible to install location tracking systems indoors. It gives developers access to an API (Application Programming Interface) so they may make programs for navigation inside buildings. This software is helpful for first-time visitors to the institute, those with visual impairments, and any external staff members by providing voice messages for sites that have been searched. The method for creating a mobile device graphical user interface for pedestrian use is explained. This application gives the user the ability to explore the school environment and locate routes to particular locations.

Keywords- Campus Navigation, IoT, Location-Based Services, Mobile Application, Smart Campus.

I. INTRODUCTION

The process of tracking and managing a person's, vehicle's, or craft's movement from one location to another is the main emphasis of the navigation technique, which includes land navigation, marine navigation, aeronautic navigation, and others. A smartphone software called Campus Navigator is primarily used to find your way around any campus, including malls, colleges, hospitals, etc.

These days, mobile phones are much more than just tools for communication.

One product that makes our daily lives and jobs easier is the smartphone. In recent years, the use of mobile applications has grown significantly in tandem with technological advancements and the widespread use of these devices. Location-based apps combined with augmented reality views are also feasible thanks to new methods like GPS, sensors, compass, and accelerometer that may be used to ascertain the device's orientation. Services offered to mobile users based on their geographic locations are referred to as location-based services.

These services make use of a mobile network's terminals to dynamically determine and communicate a person's location (Virrantaus et al, 2001). These services contain features that facilitate locating routes to predetermined destinations and the ability to search for information about a user's physical location. A web-based location assistance system is presented in this work to help new students and visitors find their way about the campus. The building of a prototype generally comprises up to 5 to 7 pages. These are:multi-label learning, more than one class can be assigned to an instance. With the increase in the number of data

OBJECTIVE:

The goal of this project is to create a system that integrates a mobile application that can both show a user's current location and facilitate easy campus navigation. The application will also be able to enhance reality by displaying 3D images of buildings and a hybrid road map to make location recognition simpler. Provide a practical, educational, mobile-based campus navigation solution that includes all the information required to guarantee precise, easy navigation and identification of different buildings and departments and assist visitors and students—especially new ones—in getting to their destinations without any problems.

II. LITERATURE SURVEY

The size of a college campus might be enormous. The college receives a large number of new students and visitors each year. There are no efficient resources for locating new locations on campus, such as departments, the library, the canteen, administrative buildings, etc., and figuring out how to get there from where you are now. These days, the majority of staff, instructors, and students utilize the widely used Android phone for personal use. With both online and offline navigation features, a GPS-based app with interactive markers can be useful for navigating around the campus.[1]. Navigation system for college campuses, January 2012, Venketesh R.V., Sangam Kumar, Purushotam Kumar, and Archana Naik. The authors of this paper describe how they created a path from the source to the destination using the Google API, the internet, and a cloud database.

The size of a university's campus can vary greatly; it may have multiple campuses. The university admits a large number of new students each year. Many new buildings have been constructed, new classes have begun, and there are several departments, canteens, libraries, etc. on campus. How can I discover such locations from where I am now? [2] Installing a system for tracking indoor whereabouts, May 2016 Muthukumaran, Annamalai, and Neelakandhan The writers of this work have developed an application that will direct the user to their intended location. PHP has been utilized on the server side. Both indoor and outdoor locations are tracked using digital electronic maps. The majority of electronic maps are helpful in outdoor settings.

Efficiency technology for searching indoors does not exist. Numerous smartphones utilize electronic maps to track their location. Google Maps, GPS navigation, Wage, and offline GPS maps are examples of electronic maps. These are only helpful in outdoor settings. The Indoor Atlas Android SDK can be used to create an indoor location monitoring system. It gives developers access to an API so they may make applications for inside building navigation.[3] Android platform for campus navigation. April of 2016 Ashutosh Shewale and Yogesh Bhangale The writers of this research have developed an application that provides a path to the desired destination. Additionally, it provides them with real-time notifications of any occurrences occurring on campus. Digital electronic maps can be used to track the outdoor location. These maps are intended for usage in outdoor settings. The internal location cannot be searched due to a lack of coordinated technologies. Many smartphones utilize computerized maps to track their whereabouts. Google Maps, GPS navigation, and offline GPS maps are examples of electronic maps. An indoor position tracking system can be put into place using the Android SDK. It gives developers access to an API so they may make applications for inside building navigation.[4]

IOT-Based Campus Navigation In May 2017, Vaishnavi.P, Sandhya.H, Shalini., Roopashree.R, and Mr. Bharath.J

THEORETICAL FRAMEWORK:

Figure 1 shows the block diagram of the suggested campus navigation system, which consists of the following blocks. User data is read from the RFID card and compared to the original data; if the two match, a servo motor is used. will let the door open.

The campus navigation system allows users to scan the QR code of the location they wish to visit, and the website will then direct them there.

SYSTEM IMPLEMENTATION :

Users can scan the QR code of the place they want to visit using the campus navigation system, and the website will take them there. This door lock system was designed using the Arduino UNO, servo motor, breadboard, jumping wires, and RF ID sensor. The user's input to the RF ID sensor will be verified by the Arduino Uno. If the ID entered is accurate, the servo motor will spin 180 degrees after receiving the signal from the microcontroller. If the ID entered is invalid, it indicates that the input is incorrect, and the motor will not turn.

KEY FINDINGS:

For new students and visitors, the usage of mobile-based navigation tools greatly enhances campus accessibility. By offering real-time position tracking and thorough navigation, the integration of GPS, augmented reality, and Google Maps API improves the user experience.

The approach lessens reliance on physical signboards and hand-drawn campus maps.

Movement inside buildings is made easier by improving interior navigation using IoT and RFID-based tracking devices.

Other services like emergency help, real-time event information, and department or professor locations can also be included into the smart campus navigation system. enhanced campus security through the use of RFID and QR

codes to combine authorized access management with real-time surveillance.

Possible addition of voice-assisted navigation for those with disabilities to the system.

III. CONCLUSION

A The Arduino UNO, servo motor, breadboard, jumping wires, and RF ID sensor were used in the design of this door lock system.

The Arduino Uno will validate the input that the RF ID sensor receives from the user.

The microcontroller will transmit the output to the servo motor, which will spin 180 degrees if the ID entered is correct.

The motor won't turn if the ID submitted is invalid, indicating that the input is incorrect.

Anyone unfamiliar with the campus grounds will find it easy to traverse thanks to this system's accurate route through the campus or any institution. Since the university campus is quite large and has a significant number of rooms, these kinds of systems are necessary.This system was designed utilizing the Blynk app, cloud, and NodeMCU as references.

IV. FUTURE ENHANCEMENTS

Integration with Smart Campus Systems: For smart classroom navigation, the system can be further integrated with campus IoT systems.

Voice Assistance: Giving visually handicapped students voice-guided navigation.

AI-Based Recommendations: Tailored route recommendations derived from previous searches and user activity.

Multilingual Support: Allowing foreign students to choose their preferred language

V. APPLICATIONS

An indispensable instrument for enhancing the ease and effectiveness of mobility on a university or institutional campus is the Smart Campus Navigation System. Students, employees, and guests may easily navigate vast and complicated areas because to its user-friendly design. The following are some important uses for this system:

1.   Advice   for   Visitors   and   New   Students

Visitors and first-year students who are not familiar with the campus layout will especially benefit from the method.

It cuts down on the amount of time spent looking for classrooms, libraries, hostels, and administrative offices by providing real-time turn-by-turn navigation. Augmented reality (AR) and interactive maps are used to improve navigation by allowing users to explore building plans in three dimensions.

2. Enhanced Route Scheduling

The navigation system makes sure customers arrive at their destination with the least amount of effort by determining the quickest and most effective route. Routes are dynamically updated in response to current impediments, such as closed roads, events taking place on campus, or maintenance activities.

3. Identification of the Department and Facility

A comprehensive list of campus amenities, such as departments, labs, libraries, auditoriums, residence halls, and sports complexes, is included in the application. Depending on where they are right now, users can search for specific places and get exact directions. Additionally, it offers details about faculty offices, services that are offered, and office hours.

4. Security and Emergency Support

The technology can direct employees and students to the closest hospitals, security posts, or evacuation routes in the event of an emergency.

Additionally, it may be integrated with campus security systems to give people in trouble real-time location tracking.

For prompt support, quick-dial options and emergency contact numbers are provided.

5. Integration with Notifications and Events on Campus

The app can offer up-to-date information about conferences, seminars, testing facilities, and university events.

In addition to receiving alerts about schedule modifications or venue updates, users can set event reminders. Students may RSVP to events and get directions to event locations thanks to interactive elements.

6. Accessibility for People with Disabilities

For those who are physically or visually handicapped, the system offers capabilities that make navigating the campus simple.

Users can get detailed instructions using text-to-speech capabilities and voice-guided navigation. For improved accessibility, the app indicates building entrances and wheelchair-accessible paths.

7. Support for Offline Navigation

By preloading maps, the system can facilitate offline navigation in places where mobile data connectivity can be erratic.

Even in areas with weak networks, this function guarantees that customers can receive necessary navigation services.

8. Support for Multiple Platforms

The navigation system is made to work on a variety of platforms, such as web-based apps, iOS, and Android. For a smooth experience, users can sync their information and preferences across several devices.

An inventive way to improve mobility, accessibility, and the general user experience on campus is the Smart Campus Navigation System. It clears up confusion, saves time, and gives consumers a methodical approach to effectively finding their destinations. This system changes how people navigate college campuses by combining GPS, RFID, and real-time notifications, making them more intelligent and engaging.

VI. ACKNOWLEDGMENT

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