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TrackIt - A GPS based Cross-Platform mobile application to track the buses

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Abstract - *With so many advancements in the field of technology, we can now obtain the details about the location of any vehicle onto our mobile devices. Today when we instantly want information about everything, the need for location based services have increased even more which saves time, money and effort. The GPS system has already been implemented and anyone who wants to use it can get access to it. For this system to be implemented we need the GPS facility and a GPS device which calculates the location based on the data obtained from the GPS. The devices that we chose for this purpose are Android phones. Modern handheld devices such as smartphones have become very popular in recent years mostly because it is cost effective and offers multidimensional purposes due to a lot of special in-built features. Dramatic breakthroughs and extra features in these devices have opened doors to a wide range of commercial possibilities. As mobile devices become more and more advanced, we are able to introduce features that were once impossible to imagine, and one of those features is getting locations of nearby places and also sharing our locations with others. Using this ability, our project aims to detect the locations of the moving buses and provide information to the users through a user-friendly mobile application. Another aspect of this project is digitization of the data in the Transport section. As we all know that in this new era where we have data everywhere, digitization is important because it makes our life easier by bringing all the information on our fingertips. Digitization has various advantages like: it improves accessibility and facilitates better information exchange, helps to keep the data safe and secure, there is a reduced risk of damage and most importantly it requires low-cost maintenance. The proposed methods also find application in the industry and use many of the technologies widely used today.*

***Key Words*: *React, React-Native, GPS, ThingSpeak, Firebase*.**

1.INTRODUCTION

SJC Institute of Technology, Chikkaballapur has a huge transport system which ferries majority of students and faculty every day. The buses are identified to cater to designated routes covering Bangalore city, Bangalore rural, Chikkaballapur and Kolar districts. The average distance from the starting point is approximately 60kms. The buses start from the designated starting point and en route to the college, picking up all the students including faculty members. Similarly, the buses leave the college campus and drop the students & faculty back to their stoppages. This is a practice being adopted in terms of ferrying the students & faculty, which by itself is a herculean task, considering the safety of the students and faculty. However, a few hurdles are faced by the transport department in their day-to-day activities, for example the arrival and departure timings of the buses are usually uncertain and most of the students and faculty depend on the bus drivers or their friends from the prior bus stops to know the location of the bus. The buses at times come too early resulting in missing the bus or too late, wasting a lot of time for both, the students and the faculty, this scenario becomes further tedious during the time of exams. The delay of the bus could be due to various reasons, such as the breakdown of the bus, traffic jam etc., and on the other hand the buses could arrive early because of less traffic. Further, there is no alternative in case the regular bus is missed and hence the students are forced to make an alternative arrangement i.e., Government buses or cabs. Hence, to resolve this problem, we have proposed to develop a Mobile App, which facilitates students and faculties to keep track of the bus on a regular basis. Also, with the application the transport department can monitor the live location of all the buses. This Mobile application will be enabled after the authentication by the students and the staff; it enables them to choose their bus's name (through a dropdown) and shows the current location of the bus and other necessary details. The second problem that we are trying to solve is with respect to storing the data of the students and staff in the Transportation Department. The Transportation Department of the college uses the traditional method of writing down the names and details of the registered students in a register according to the bus they travel in. This would be a lot of physical work and also has security issues. With the help of the website, they can add the student details easily which is stored onto the databases which can be accessed anytime. This method of digitally storing data also keeps it safe and secured. With the help of the Google Maps API, the exact location of the bus is being displayed on the mobile application. The location of the bus is tracked using the Neo 6M GPS, which sends the information onto ThingSpeak. The tracking applications are not much feasible for use and are limited only to android. By using

the React Native, the same source code is used for both Android and iOS applications.

1.1 Disadvantages of the current system:

- The current system uses the traditional method to store the details of students and also gives the fee receipt which can be misplaced easily. Registering the name of students using the pen and paper method can also be a threat to security.
- Currently there is no proper facility to track the college bus. It becomes difficult for both students and staff, especially during the examinations.
- It is mandatory for the students to carry a physical pass, it takes a long time to issue the physical pass and it becomes a problem if the pass is lost.
  It is difficult to keep track of the transportation fees of all the students

1.2 Proposed System:

In this proposed system, a cross-platform app is used for tracking and getting the exact GPS location of the buses. This makes it easier for the students and the faculty to get the exact location of the buses and hence reduces the waiting time for the bus. A web application is used to store the details of the students, and also create a virtual pass for the registered students. The details of the students are stored onto the database which stores the data efficiently and increases its security. With the physical pass a long procedure has to be followed, starting by writing the should re-apply for the pass and have to go through the same tedious procedure again. Hence, the virtual pass is easier for the students to carry and has a very low probability of getting misplaced. This web application also helps the officials in the Transportation Department to keep a track of the student fees.

1.3 Objectives:

- To provide the exact location of the selected bus.
- To provide a web-based application to store the details of the students.

2. Methodology:

The large transportation system in our college makes it difficult to keep track of the bus. TrackIt helps in tracking the exact location of the bus using GPS. To develop the tracker, we are going to use NodeMCU and integrate it with Neo 6M, the GPS module. For the mobile application, the front end shall be developed with React-Native and the real time database of Firebase would be used for the backend This will help us give the exact location of the bus using the GPS, and thus becomes easier for the students and faculties to keep a track of the bus. A cross platform mobile application is used for tracking purposes. A digital platform is also available to store the data of the students and the route details., which makes it easier for the officials in the transportation section to keep a track.

The proposed system uses React Native to develop a cross-platform mobile application. The application provides the exact location of the bus using ThingSpeak which is an IoT analytics platform service that helps to integrate, visualize and analyze live data streams. It uses sensors, instruments, and websites to send data to the cloud where it is stored in either private or public channels but by default the data is stored in private channels. Once data is in a ThingSpeak channel, you can analyze and visualize it, calculate new data, or interact with social media, web services, and other devices.

The hardware module communicates with the satellite and constantly generates the latitudinal and longitudinal values, these values need to be stored and analyzed which is done using the ThingSpeak Web Server. ThingSpeak helps to make sure that all the data generated by the hardware module is in sync with the Google API, and all the values generated are continuously uploaded onto the ThingSpeak Web Server and each value has a unique id. A JavaScript code is used to trigger this process i.e. when the code is run the hardware module communicates with the satellite and the latitudinal and longitudinal values are generated which are stored onto the ThingSpeak server from where they are mapped onto the Google maps.

After the hardware devices have been set up, the next step is to create a ThingSpeak Channel. Once the channel has been created successfully, we should open the “API keys” tab which displays the:

1. Channel ID
2. Write API Key
3. Read API Key

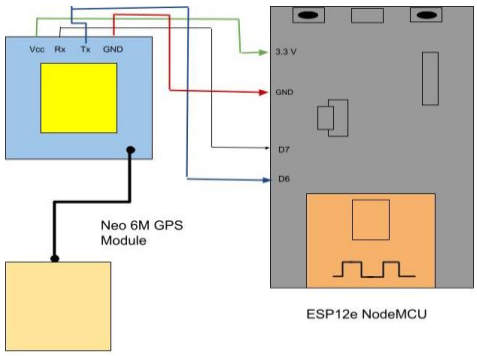

Fig-1: Hardware Module

The connections are done as shown in figure 1.

These are used for writing and reading the data from the ThingSpeak Server. The next step is to program the ESP12e to upload the GPS data on ThingSpeak. The program is flashed with ESP12e NodeMCU Module, after which a LED light on the Neo 6M module starts to blink. The ESP12e starts updating the channel on ThingSpeak after a delay of 15 seconds. The json data from ThingSpeak is used along with HTML and JavaScript, this displays the exact GPS location of the bus on Google Map along with a marker. The location of the bus is accessed using the mobile application.

Fig-2: The latitude and longitude values obtained from the Neo 6M GPS Module and plotted by ThingSpeak

The web-based application is used to store the data of the students and also add new information and edit the existing information of the students. The web application also uses React and also provides the virtual pass for the students and helps to keep track of the student fees and information. It uses Firebase to store the data entered.

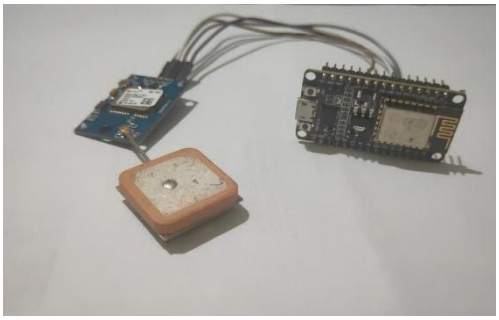

Fig-3: The connection of the NodeMCU and Neo 6M module

Result:

The mobile application used to track the exact location of the bus:

The registered students can access the mobile application to retrieve the GPS location of the bus. Once the bus is been selected the location is displayed. Each student has a unique University Seat Number which is used for logging in the mobile application.

Fig-4: The first page the Application

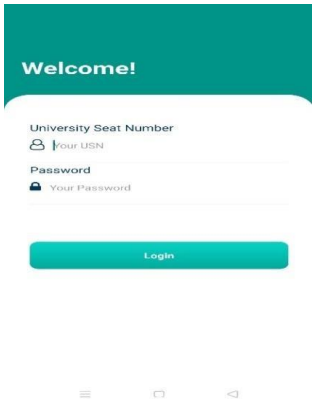

Fig-5: Login page for the of student

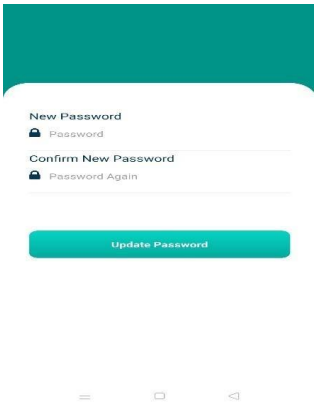

Fig-6: Change password

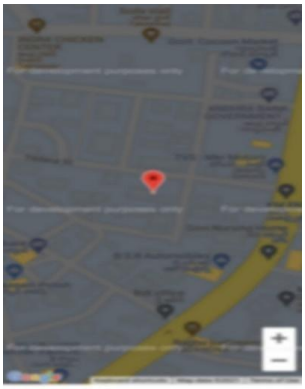

Fig-7: The GPS location using Google Map

The web- based application is used to store the details of the students:

Each student has a unique ID called the University Seat Number (USN) and with this, searching the details of the students would be easier. The details of all the students travelling in a particular bus is displayed.

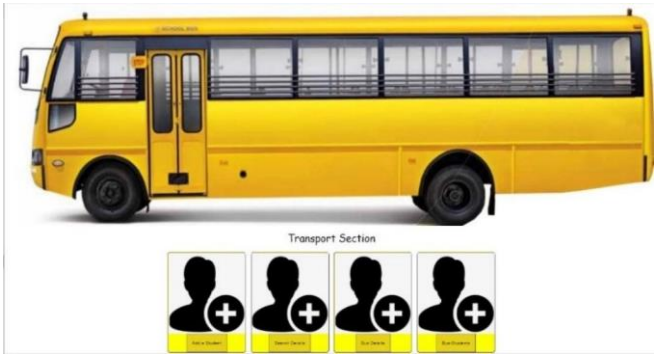

Fig-8: The first page of the web application

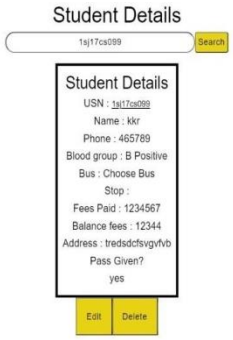

Fig-9: The student details are displayed once the University seat number is entered in the search box

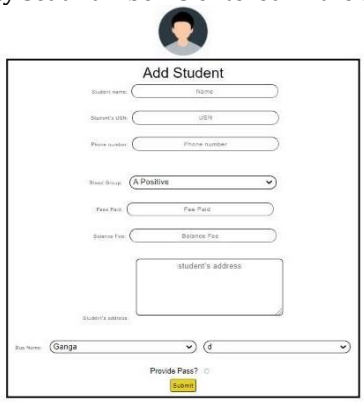

Fig-10: Details of the new student is been entered and stored onto the Firebase

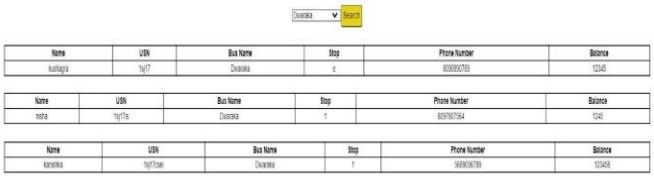

Fig-11: Details of the students travelling in a particular bus is been displayed

4. CONCLUSION

The GPS can be tracked using both android and IOS devices, which becomes easier for the students and the faculties travelling in the bus and also reduces the time spent on waiting for the bus. This can be very helpful during the examinations, since the college bus is the only option for most of the students travelling from far places. With the exact GPS location of the bus the student and staffs can plan their time schedule easily. A web-based method is used to store the details of all the students which makes the process faster and reduces a lot of physical tasks.

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