

# IOT based Smart School Bus Monitoring and Notification System

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**Abstract - School is the second best place for kids to inculcate education and ethical values next to home. Providing safety for the students throughout transportation to and from the school plays a vital role. The school will scale back the range of accidents during the transportation. This project helps both parents and therefore the school administration to manage and monitor numerous factors like number of students aboard, details of each student, pickup and drop timings, location, attendance system etc. parents can monitor the situation of the school bus together with the pickup and drop timings of the student through an android application. In our project, a GPS unit and a fingerprint sensing element that is connected to the Node MCU over Wi-Fi through an Arduino Uno. The geographic coordinates of the school bus within which the SKG13 GPS is located updates the location within the database unit. The fingerprint scanner detects the identification of the student once the student boards the bus. The bus unit uses Node MCU to push the data into the database i.e. the school unit. the school unit will add range of students' information in the web application created. solely the admins will manage and access the database unit. By taking these necessary steps, the child's safety throughout the fleet is achieved.**

**Keywords - Fingerprint sensor, GPS Module, Arduino, Node MCU, Android application.**

## I. INTRODUCTION

Parents are often concerned with their child's safety and are stressed from an ever-increasing number of accidents that occur on a daily basis. They cannot help but wait until evening to know about their child's well-being with all those unpleasant thoughts held-in. Thus tracking school buses have a very vital role to play not only in regard of a child's safety but also in regard of a parent's well-being and the school's responsibility. The proposed system addresses these very problems in an efficient and cost effective way. This system helps track live location of students, pick-up and drop times with the aid of real time monitoring. In emergency conditions, parents and school

administration, along with necessary help can quickly reach out to children's aid, with the help of real time monitoring.

This system describes a school bus display that is low price and tracks varied parameters like students aboard, adherence to route and schedule, location, speed and different data necessary for school and parents. Notification system helps to confirm individual safety of wards and additionally wastage of your time whereas students await delayed buses are self-addressed during this system with the assistance of real time observation. Moreover, instructional boards like CBSE have started advocating the need for varsity bus observation systems. The geographical coordinates of the bus are browsed by the GPS module and are then uploaded into an information within the remote server over Wi-Fi. This information is then utilised by parents, bus drivers and school administration through a database which may be accessed by them via a mobile application.

## II. METHODOLOGY

The system consists of three units namely bus unit, school unit and parent unit.

The School unit consists of softwares namely SQL Yog which is used as the Database software and Microsoft Visual Studio used as the web application software. The SQL Yog software helps us to store the student's information such as Register Number, Fingerprint ID, Parents' Contact details taken at the time of admission. Along with this, the location latitude and longitude is being updated to the school unit using the Wi-Fi Module in the system. The Microsoft Visual Studio software is used for the access of the webpage of the system. The admin can access the webpage using a valid Email and password. Using this, the admin can track the location of the bus using the Google Maps and the pickup and drop time of the student.

The Bus unit consists of Fingerprint sensor and GPS module to issue the updates to parents when their children

boards or leaves the bus. Each student consists of an individual Student ID enrolled at the School Data base at the time of admission. The information of the Fingerprint Sensor is pushed to the School Database using the Microcontroller. Parents and school unit can receive an updates using the developed Android application. LCD is used for the validation of the fingerprint of the student when he/she boards the bus. The entire data in two units will be processed by using ESP8266 microcontroller.

The parent unit consists of the developed Android application named “Bus Tracking” where parents can view the exact location of the bus, the pickup and drop time of their ward.

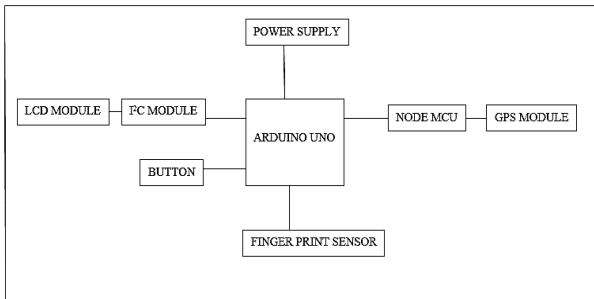


Figure 1: Block Diagram

ALGORITHM OF THE SYSTEM

a) First, the student boards the bus. Student then places his finger on the fingerprint sensor and the data is scanned and stored in the microcontroller. The server collects the data and compares with the database which is already collected during the admission of the student. If the data is a valid one, then the fingerprint scanner shows it as SUCCESS through a LCD display.

b) SENDING NOTIFICATION TO PARENT

Parent login in their device through android app and enter

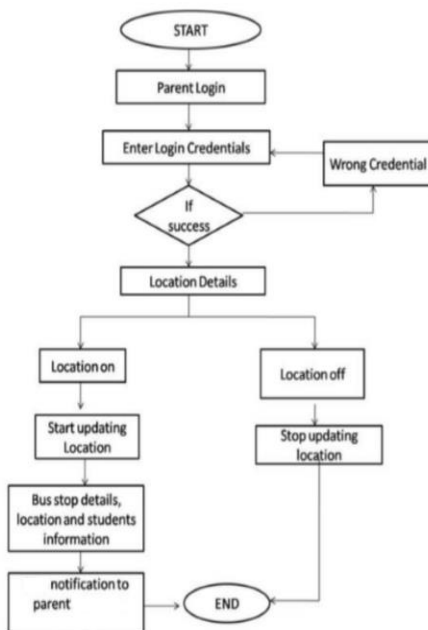


Figure 2: Flowchart for Parent login

the valid credentials. If success, location details along with the bus details is shown in order to track the bus. If the transportation is completed, location turns off.

c) UPDATING SCHOOL DATABASE

Student boards the bus. The attendance is updated along with the time and location. After completion of the ride, the total database of the school is completed.

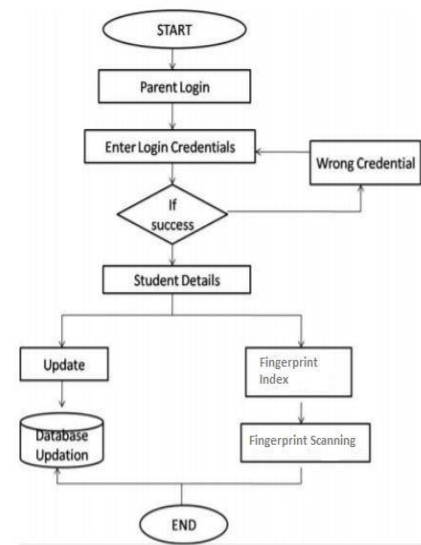


Figure Figure 3: Flowchart for Fingerprint Validation

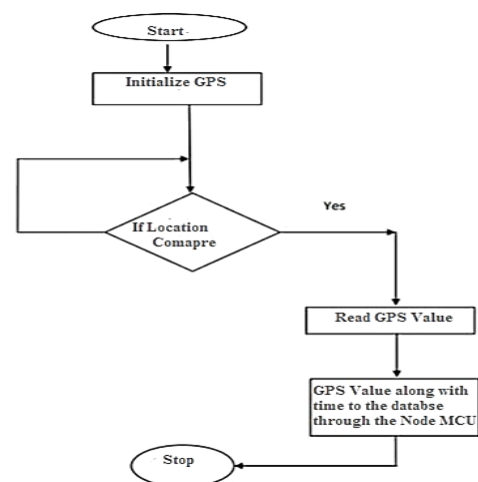


Figure 4: Flowchart for Location Tracking

III. SOFTWARE SPECIFICATION

Microsoft Visual Studio Ultimate is the designing software program used. It uses Microsoft improvement platforms including Windows API, Forms, Store and Presentation Foundation. We can develop PC programs, websites, applications, and mobile apps. In our challenge, we use visual

studio to design the admin, login and password retrieval pages. It can produce each native code and controlled code. It offers gear together with code editor, debugger, windows forms dressmaker, net designer etc.

SQLYog is a software that manipulates databases. It is used as an effective manager of databases, an admin and a GUI tool for MySQL. It is a fast and effective graphical device that handles MySQL databases. It offers a variety of tools and provides the best experience for beginners. It favours the work in visual environment and also governs handwritten SQL.

Arduino software(IDE) is a popular software that is easy both to put into coding and to interface with hardware boards. It is compatible with windows, Mac and Linux. The piece of software used to program the Arduino is written in Java. This plays a vital role in debugging, enhancing and compiling the code. It helps the language C and C++and the use of special regulations of code structuring. User written code only requires two basic functions, starting the sketch and the main program loop. It has an inbuilt software program library which provides common input and output procedures.

Android Studio is the legitimate incorporated improvement surroundings for Google’s android running device, constructed on jet Brains' IntelliJ idea software and designed mainly for Android improvement. It is for download on home windows, macOS and Linux based OS. Android applications are commonly advanced in the java language and the usage of the Android software program improvement package and once evolved, Android packages may be packaged easily and bought out both through a store which include Google Play or the App store.

### V. RESULT

#### 1) SCHOOL UNIT

##### A. WEB PAGE LOGIN

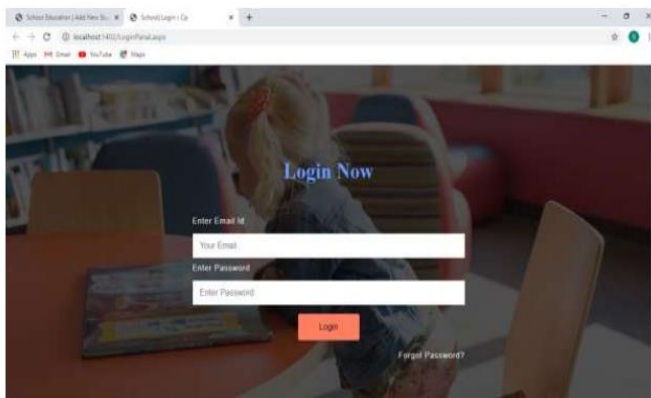


Figure 5: User Login

The code created for login page is run on Microsoft Visual Studio. This directs us to the login page in the web browser that we have designed. Here, in the Login Page, we enter the valid Email ID and Password that has been assigned during the admission process and click on the LOGIN button to proceed further.

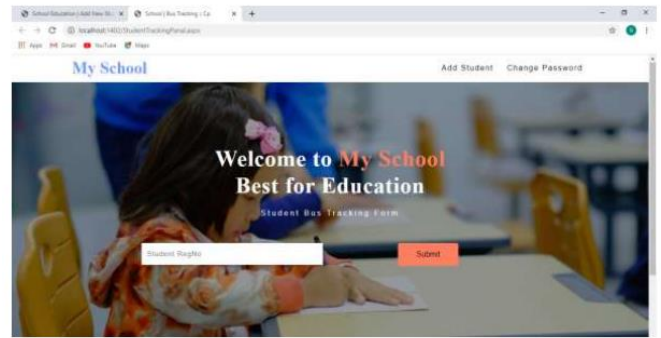


Figure 6: Student Login

After the user login page is loaded successfully, it directs us to the 'Student Bus Tracking Form' with a message displayed as, "Welcome to My School, Best for Education". In this page, we need to enter the student register number assigned during the admission process and click the submit button which directs to the next page.

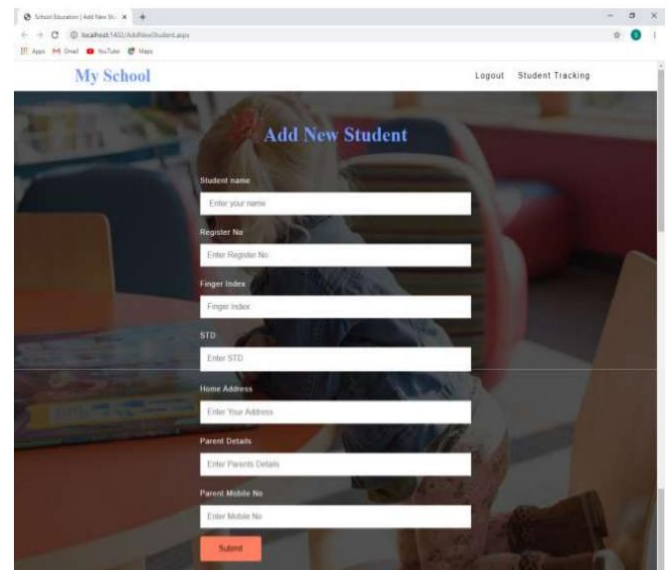


Figure 7: New Student Entry Details

This page shows the addition of the New Student Details. We add the details such as Student Name, Register Number, Finger Index, STD, Home Address, Parents Details and Parent Mobile Number.

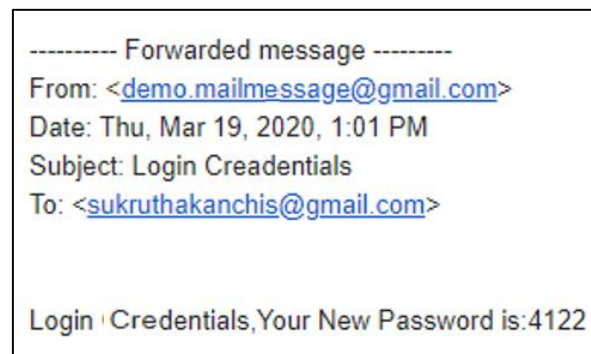


Figure 8: New Password

This page displays the Password received to the admin's email when the forgot password option is enabled. This new password helps the admin to login as usual.

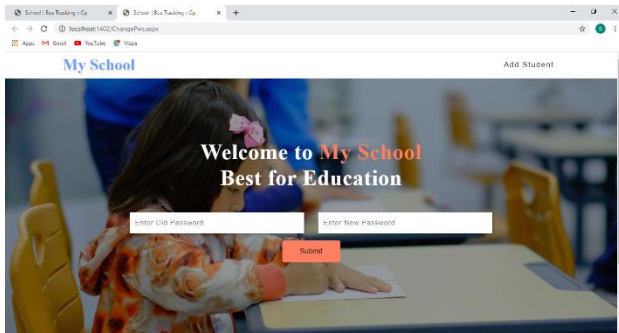


Figure 9: Reset Password Page

This page is used to reset the password which is generated by the database sent to the email and allows the user to create a new password.

DATABASE LOGIN

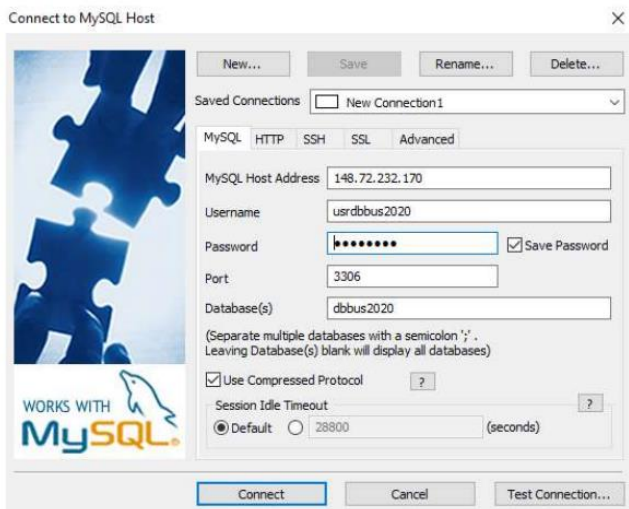


Figure 10: Admin Access

SQL Yog is a database management software. My SQL database displays the information of all the students enrolled for the school bus transportation. Information to the database will be uploaded by the school unit and it is monitored by the school unit. The admin can access it by entering the Username and Password, the public IP address of the device, the database and connect. If the entered details are correct, then the database details are displayed.

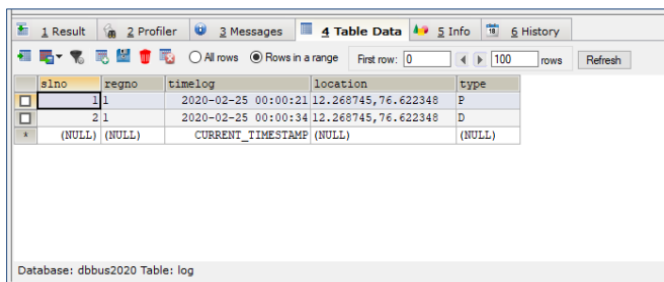


Figure 11: Pickup and Drop Time

The above picture displays database consisting register number of students obtained from Add new student page along with the status of registered students pickup and drop location and their time log. After every pick up and drop, time and location will be shared and updated in real time.

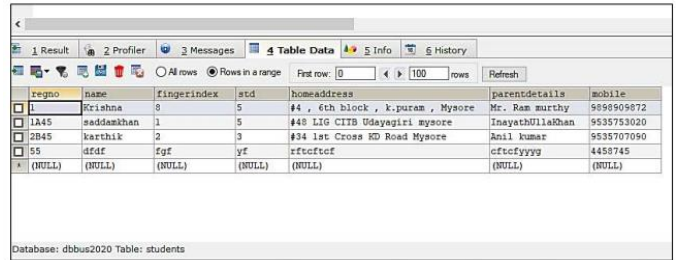


Figure 12: Student Details Stored in Database

This picture displays data base consisting of details of students like register number, name, Finger index, home address, parent details and phone number provided in the Add new student page.

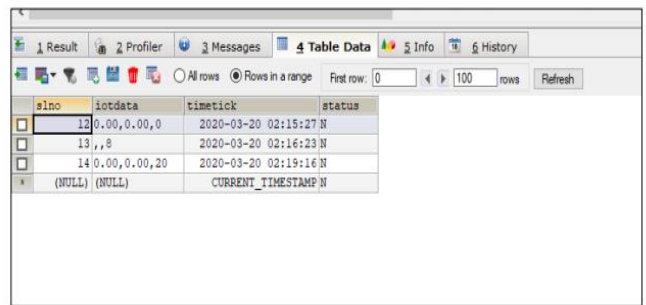


Figure 13: User Details Stored in Database

The above picture displays the live location of the student in the form of latitude and longitude along with their unique register number. Location will be updated in real time while the bus is in motion.

2) PARENT UNIT

The code created on Android studio is developed and designed as an application named "Bus Tracking" as shown below.



Figure 14: App Icon

Once the application is opened, we can see a login page displayed below. Enter the user name and mobile number provided by the admin to proceed additional.



Figure15: App Login



Figure17: Bus Location

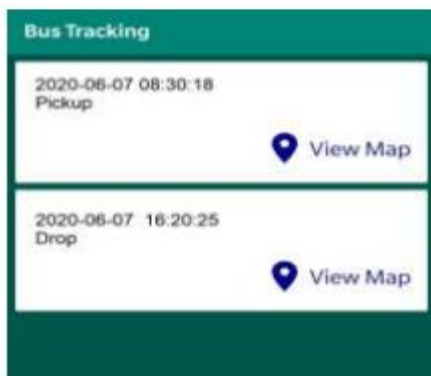


Figure16: Pickup and Drop Time

Once the login credentials are validated, the Pickup and Drop time are being updated and displayed.

To proceed further, we need to click on the View Map and the live location of the bus is displayed on the app screen as shown.

### VII. CONCLUSION

Users can effortlessly track the bus and confirm it's way shifting at safe speeds, preserve the authorities in charge of delays or deviations, be up thus far on the changes in agenda and speak to drivers or authorities if necessary. Admin will see the vicinity of all buses, see the list of passengers on-board, add new students, replace bus schedules and route. The school bus app could be a person friendly tool for parents to visualize their wards and school management to observe the drivers. In summary, this task has made a school bus protection device that has comprehensive protection to the commute. The device has real time following, student identification, delays, and scholar absence.

### ACKNOWLEDGEMENT

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