

Live Track

BUS MANAGEMENT AND LIVE TRACKING SYSTEM

Live Bus Tracking – IOT Project

Overview

This IoT-based bus tracking web and application is designed to enhance the convenience and efficiency of university transport for students. The system integrates GPS modules with MongoDB for real-time location tracking, an admin panel for centralized management, and a user-friendly interface for commuters.

Key Feature

The primary feature of this app is **real-time bus tracking**, allowing students to monitor bus movements and plan their commutes effectively. This reduces waiting times and enhances overall transport efficiency.

System Architecture

1. **IoT Integration:** *GPS module* installed on buses sends real-time location data to a MongoDB.
2. **Database:** *MongoDB* is used for storing bus locations, user data, routes, stops, and administrative records.
3. **Web Interface:** Frontend is built using React.js for dynamic user experience. And Backend is on Node.js/Express.js is used to handle API requests and communicate with MongoDB.

Features

Admin Panel

Admins can add, edit, and remove:

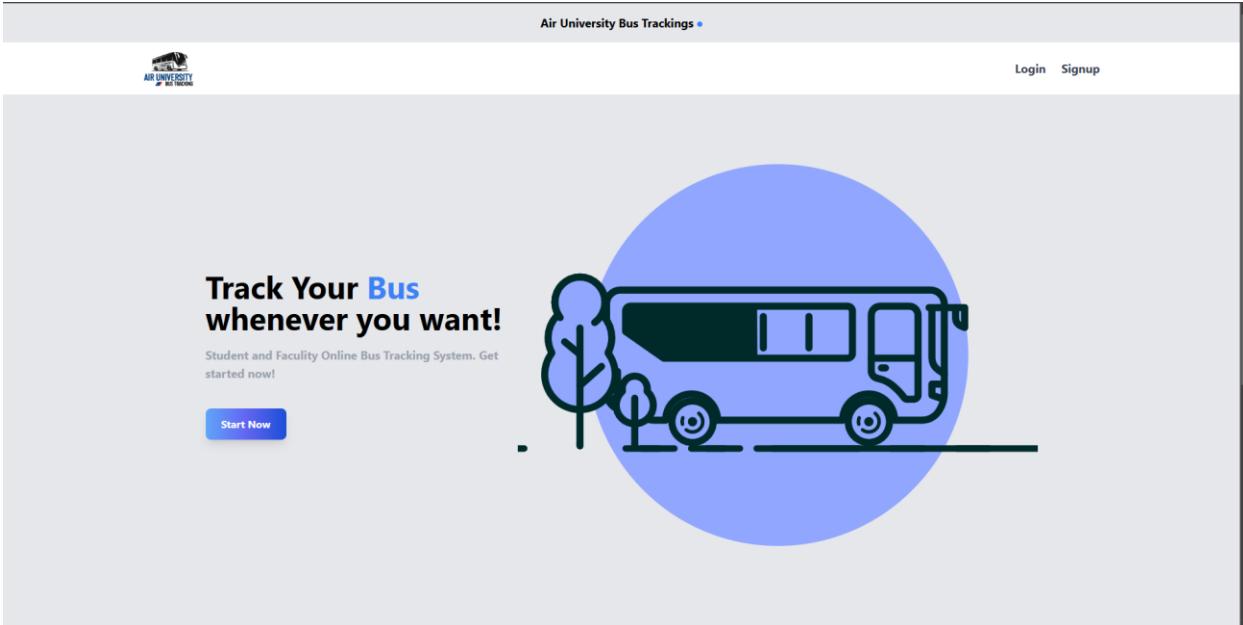
- **Buses:** Maintain buses records.
- **Drivers:** Maintain driver records linked to buses.
- **Routes & Stops:** Manage routes and stops assigned to buses.
- **Users:** Control students access and details.

User End

- **User Registration & Login:** Secure authentication for personalized experiences.
- **Profile Management:** Users can add personal details and preferred stops for tracking.
- **Live Location Tracking:** Real-time display of bus location on **Google Maps**.
Integration with user-specific stop data for an enhanced tracking experience.

Website Interface – “Abdullah Tareen – 210690”

Landing Page.



Signup Page / Registration Page

A screenshot of the Air University Bus Tracking Signup/Registration page. It features a logo at the top with the text "AIR UNIVERSITY BUS TRACKING". Below the logo, a message encourages users to register with their university email. The form consists of several input fields: "Name" (with placeholder "Full Name"), "ID" (with placeholder "# Student ID (6 digits)"), "Email" (with placeholder "Student_id@students.au.edu.pk"), and "Password" (with placeholder "*****"). At the bottom of the form is a dark blue "Register - Free forever" button. Below the button, a link says "Already have an account? [Login](#)".

Login Page.

←



AIR UNIVERSITY
BUS TRACKING

Dear Student, Please enter your Student Email and Password to login.

Email

Password

Login

Forgot Password? [Reset Here!](#)
Don't have an account? [Sign Up!](#)

Home Page / User Dashboard where user can see their selected stops, and can track live location of the bus.

 [HOME](#) [STOPS](#) 

Air University Bus Tracking •

Route: Wah

Stop: NewCity

Click here to see your Bus schedule



Google Keyboard shortcuts | Map data ©2025 | Terms | Report a map error

Email: support.bus@students.au.edu.pk
Contact UAN: +92-311-0587824

 **Bus Trackings - Air University**

Allowing user to change their stop.

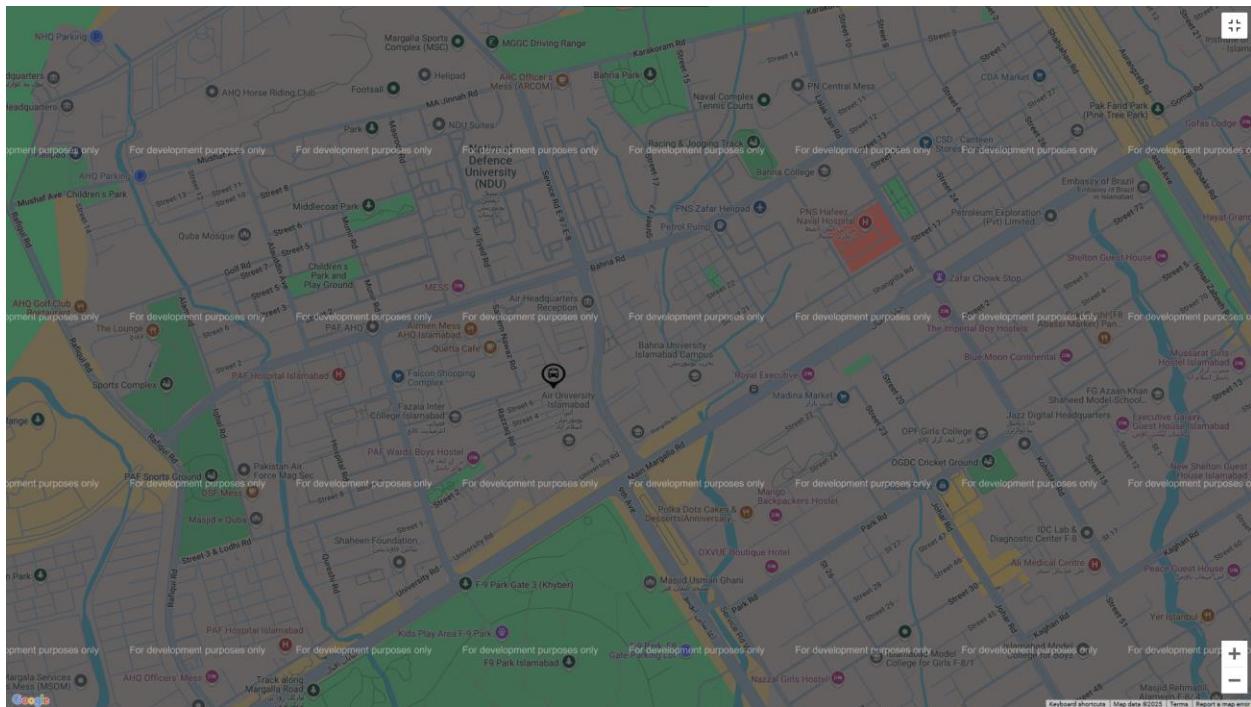
The screenshot shows the 'Select Your Route' page of the Air University Bus Trackings website. At the top, there is a navigation bar with links for 'HOME' and 'STOPS'. Below the navigation bar, the title 'Air University Bus Trackings' is displayed. The main content area features a heading 'Select Your Route' with a sub-instruction: 'By selecting your route, every day you will get updates of the bus location on your route.' A note below states: 'Note: You can change your route anytime.' There are four icons representing stops: Islamabad, Wah, Rawalpindi, and Peshawar. A blue button labeled 'Select Stop' is located below these icons. At the bottom of the page, there is contact information: 'Email: support.bus@students.au.edu.pk' and 'Contact UAN: +92-311-0587824'. The footer includes the 'AIR UNIVERSITY BUS TRACKING' logo and the text 'Bus Trackings - Air University'.

The screenshot shows the same 'Select Your Route' page, but a modal dialog box is overlaid on the screen. The dialog is titled 'Select a Stop' and contains two options: 'G10' and 'G11'. To the right of each option is a small bus icon and the time '7:00AM'. Below the options are 'Cancel' and 'Confirm' buttons. The background of the page is dimmed, and the 'Select Stop' button is still visible at the bottom. The footer information and logo are also present at the bottom of the page.

Allowing user to add or edit their personal details.

A screenshot of a web-based application titled "AIR UNIVERSITY BUS TRACKING". At the top center is a logo featuring a bus icon above the text "AIR UNIVERSITY" and "BUS TRACKING". Below the logo is a user profile section with a placeholder name "Abdullah" and an email address "210690@students.au.edu.pk". The main form area contains three input fields: "Cell No" with value "03110587824", "Parent Phone" with value "03345499493", and "Address" with value "D-293 1/2". Below these fields are two buttons: a blue "Update" button and a red "Logout" button.

Allowing user to track Live location of their Bus.



Now, Lets move towards Admin Dashboard.



Dear Student, Please enter your Student Email
and Password to login.

Email

adminabdullah@gmail.com

Password

.....

Login

Forgot Password? [Reset Here!](#)

Don't have an account? [Sign Up!](#)

Bus Management .

MAIN

- Dashboard**

MANAGEMENT

- Students**
- Buses**
- Drivers**
- Bus Routes**
- Assignment**

SETTINGS

- Settings**

Logout

Dashboard

Welcome back Admin
Abdullah!

Students

Add New Student

Name

Email

Password

Add Student

Admin can Add users and see existing user details, with the right to delete a user.

The screenshot shows the 'Students' section of the Bus Management application. On the left, a sidebar menu includes 'Dashboard', 'Students' (which is selected and highlighted in blue), 'Buses', 'Drivers', 'Bus Routes', 'Assignment', 'Settings', and 'Logout'. The main content area has a dark header 'Students' and a sub-header 'Add New Student' with three input fields: 'Name', 'Email', and 'Password'. A green 'Add Student' button is at the bottom. Below this is a table listing two students:

Name	Email	Phone	Parent Phone	Address	Route	Stop	Actions
Abdullah	210690@students.au.edu.pk	03110587824	03345499493	D-293 1/2	Wah	NewCity	<button>Delete</button>
Ayesha Shahzad	210680@students.au.edu.pk	N/A	N/A	N/A	Wah	Basti	<button>Delete</button>

At the bottom of the main content area is a dark bar with the text 'Bus Management' and a green 'Add New Bus' button.

Admin can Add Buses and see existing bus details, with the right to delete or modify any bus details.

The screenshot shows the 'Buses' section of the Bus Management application. The sidebar menu is identical to the previous screenshot. The main content area has a dark header 'Bus Management' and a sub-header 'Add New Bus' with three input fields: 'Bus Number', 'Registration Number', and 'Chassis Number'. A green 'Add Bus' button is at the bottom. Below this is a table listing three buses:

Bus Number	Registration	Chassis	Actions
3A	89	1289812891	<button>Edit</button> <button>Delete</button>
4F	tF-09	54454545	<button>Edit</button> <button>Delete</button>
1B	LPT-8675	312456781263	<button>Edit</button> <button>Delete</button>

At the bottom of the main content area is a dark bar with the text 'Drivers'.

Admin can Add Drivers and see existing driver details, with the right to delete or modify any driver details.

Name	ID Card	Experience	Age	Phone	Actions
Saim	123456789	2	24	03115331153	<button>Edit</button> <button>Delete</button>
Abdullah	12345678	5	32	1234567	<button>Edit</button> <button>Delete</button>
Sanaullah x	123456789	12	60	23456754	<button>Edit</button> <button>Delete</button>

Admin can Add Routes and Stops against each route, see existing route details, with the right to delete or modify any the details.

Route	Stops	Actions
Islamabad	G10 - 7:00AM G11 - 7:10AM	<button>Edit</button> <button>Delete</button>
Wah	Basti - 9:00AM NewCity - 9:10AM Taxila - 10:00AM	<button>Edit</button> <button>Delete</button>
Rawalpindi	Saddar - 7:00AM Polo Ground - 7:15AM	<button>Edit</button> <button>Delete</button>
Peshawar	Saddar - 9:00AM Dalazak Road - 9:20AM Warsak Road - 9:40AM Peshawar Model Boys 6 - 10:00AM	<button>Edit</button> <button>Delete</button>

Admin can Assign Buses with Drivers and Routes, each driver and route can only be assigned to one bus at a time. Admin can see existing assignment details, with the right to assign any bus with any of the available drivers and routes.

The screenshot shows the 'Bus Management' application interface. On the left is a dark sidebar with navigation links: MAIN (Dashboard), MANAGEMENT (Students, Buses, Drivers, Bus Routes, Assignment), and SETTINGS (Settings, Logout). The main content area has a header 'Peshawar Model Boys 6 - 10:00AM'. Below it is a section titled 'Assigned Routes and Duties' with a table:

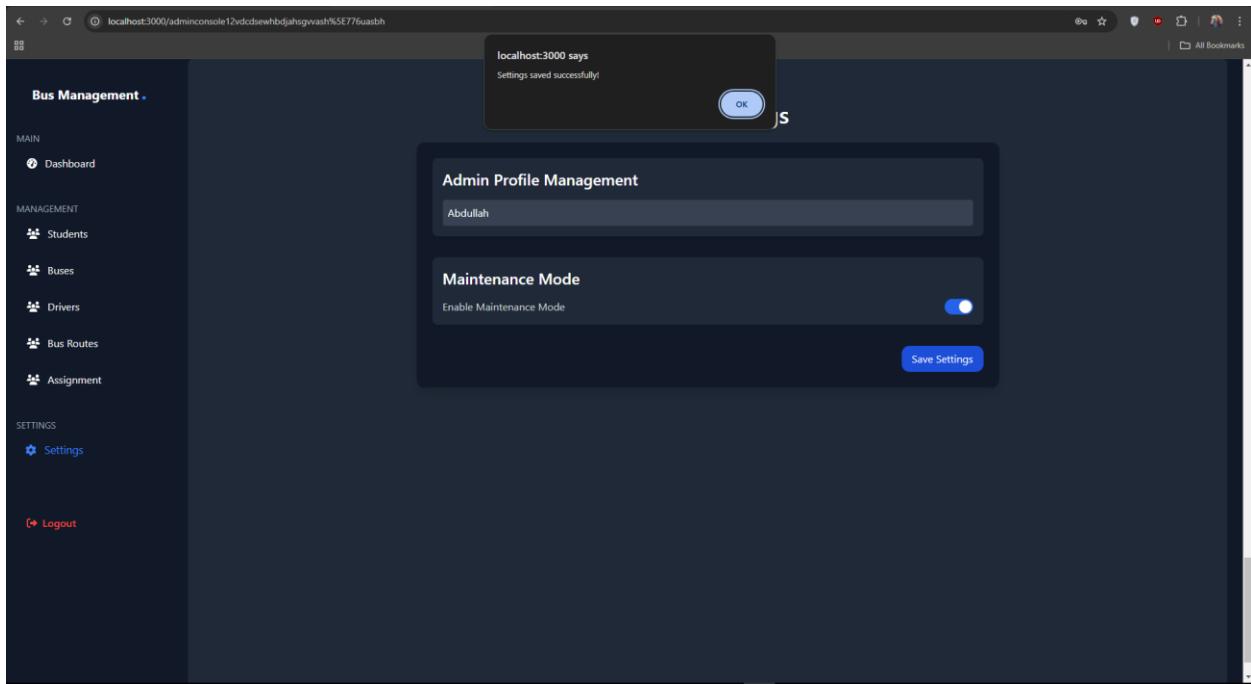
Bus Number	Driver Assigned	Route Assigned	Actions
3A	Abdullah	Islamabad	<button>Edit</button>
4F	Saim	Wah	<button>Edit</button>
1B	Sanaullah x	Rawalpindi	<button>Edit</button>

Below this is a 'Admin Settings' section with two sub-sections: 'Admin Profile Management' (Abdullah) and 'Maintenance Mode' (checkbox is off). A 'Save Settings' button is at the bottom right.

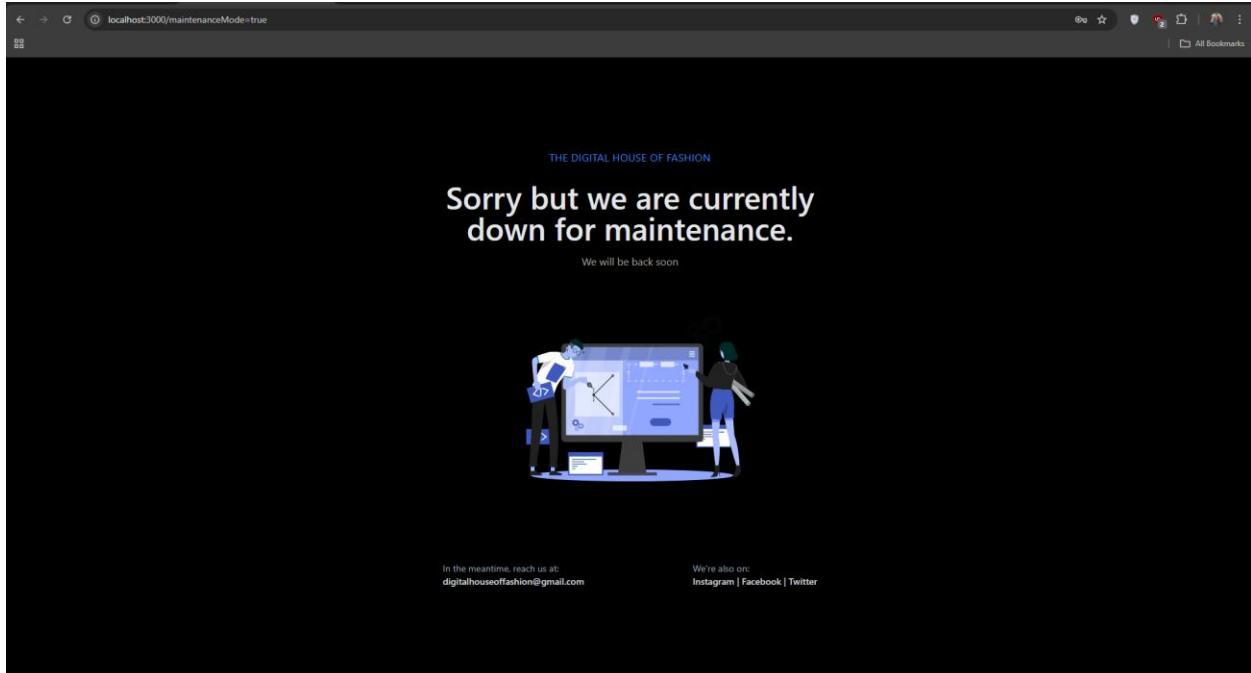
Admin can change Admin name which will be displayed on the top, and can also put the website into maintenance mode.

This screenshot shows the same 'Bus Management' application interface as the previous one, but the 'Admin Settings' section is more detailed. It includes 'Admin Profile Management' (Abdullah) and 'Maintenance Mode' (checkbox is off). A 'Save Settings' button is located at the bottom right of the settings panel.

Maintenance mode demo... Let's turn on the Maintenance mode...

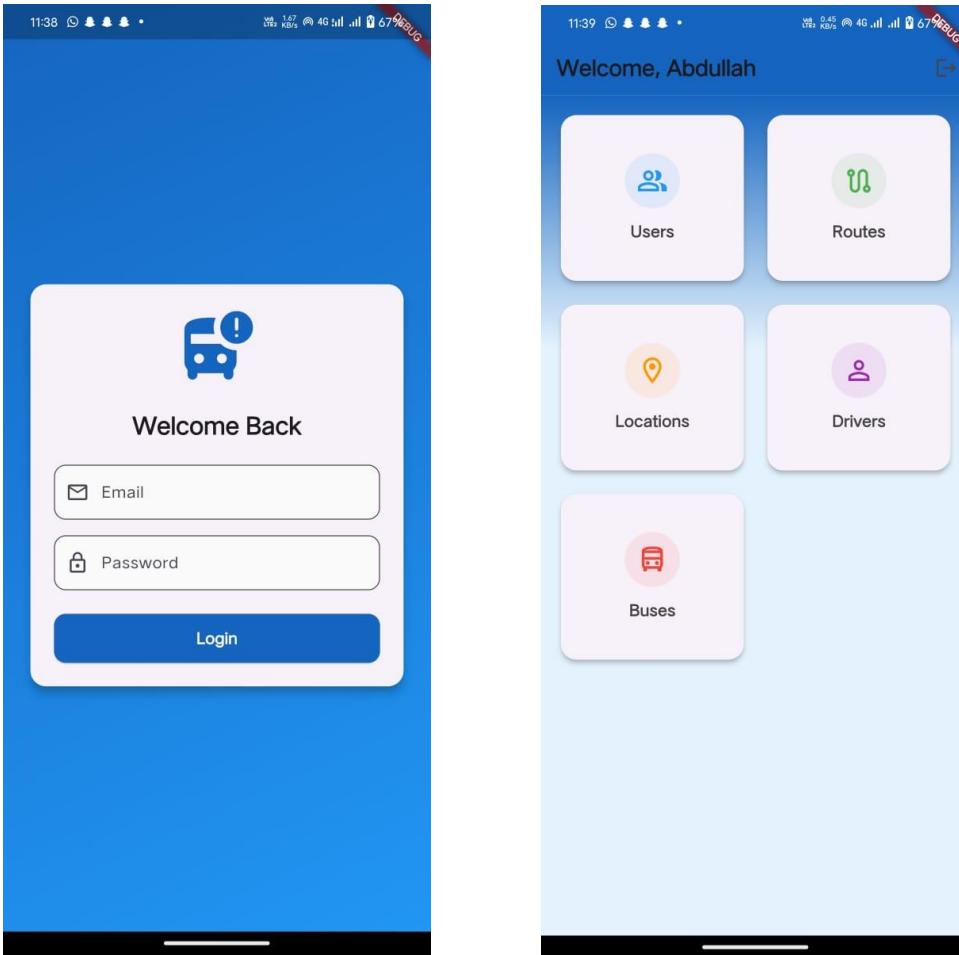


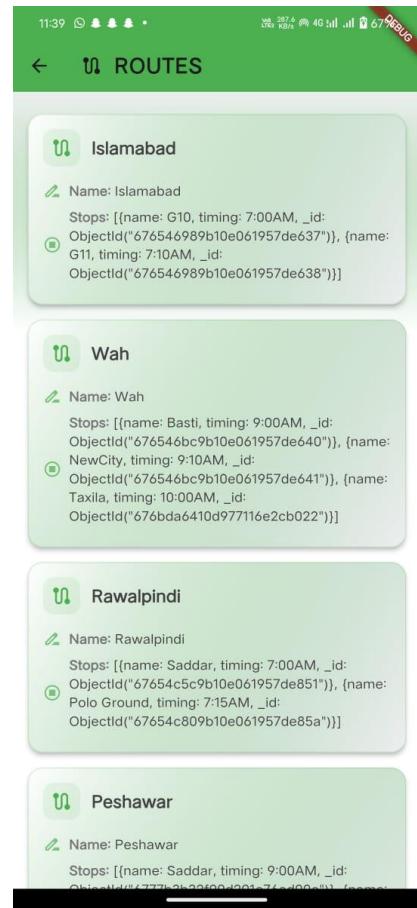
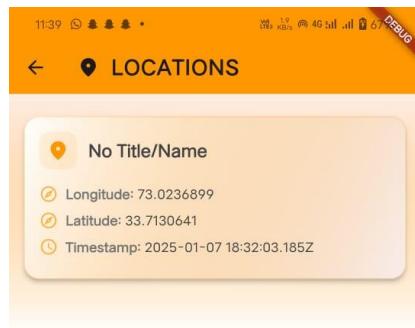
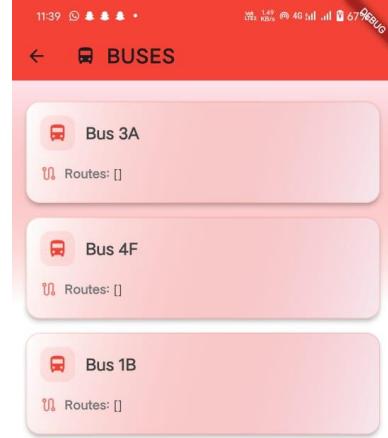
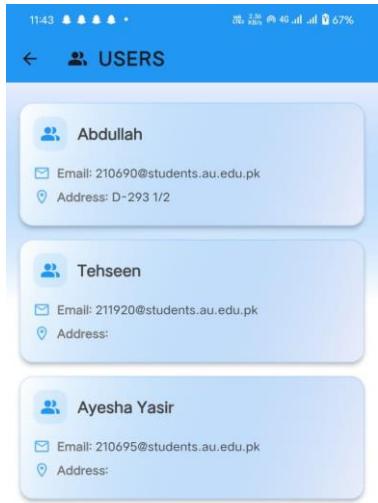
Now let's access the website... It should not be accessible anymore until admin turns off the maintenance mode.



Application Interface

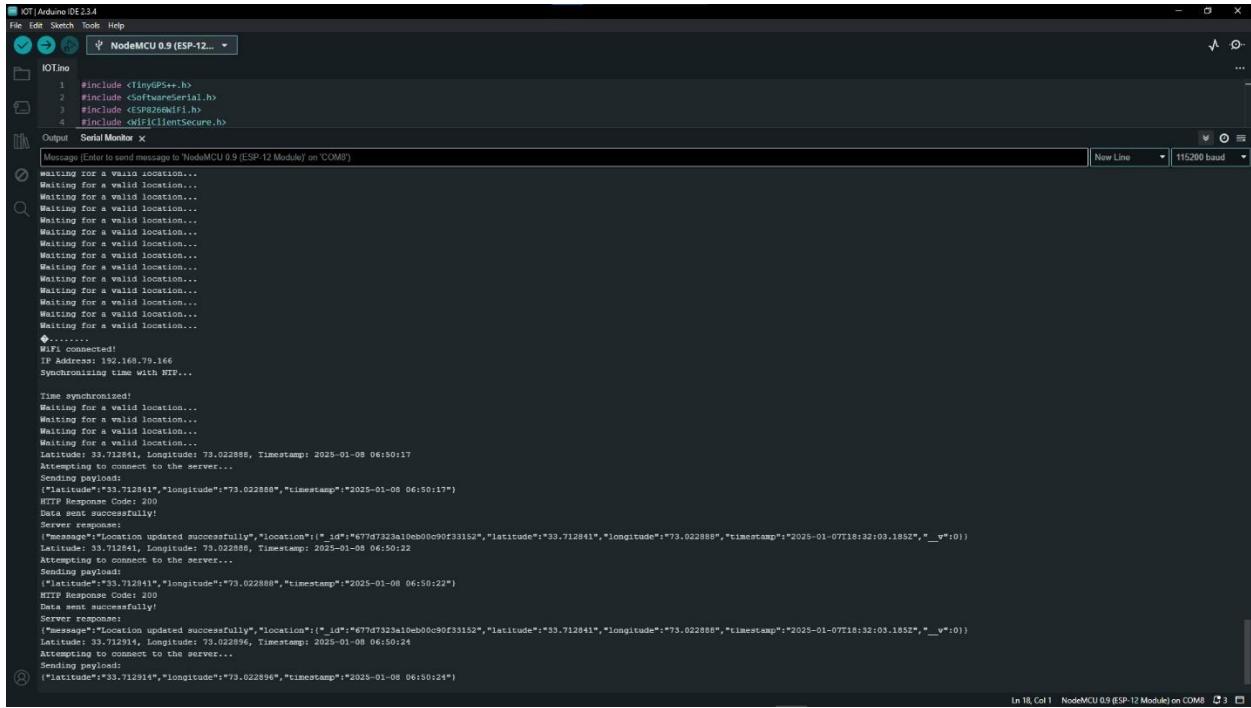
Now let's access the mobile application... Student can login using the details existing inside Database. If not, user must have to register first using Web. And then student see the details.





Arduino and Hardware

Arduino sending location coordinates via GPS Tracker.

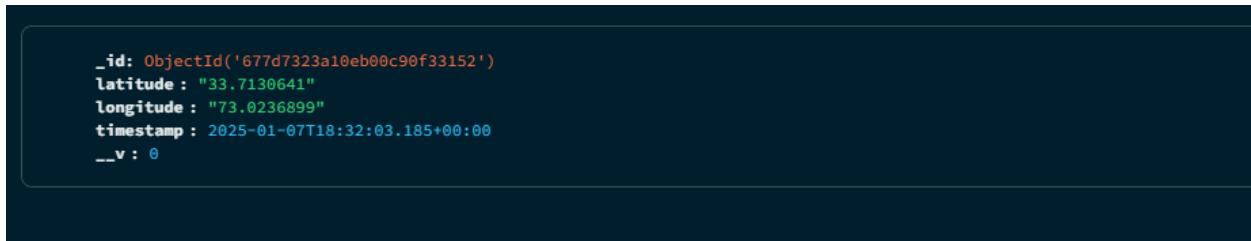


The screenshot shows the Arduino IDE interface with the Serial Monitor tab selected. The output window displays the following log:

```
IOT-Arduino IDE 2.3.4
File Edit Sketch Tools Help
NodeMCU 0.9 (ESP-12... ▾
IOTino
Output Serial Monitor x
Message: (Enter to send message to 'NodeMCU 0.9 (ESP-12 Module)' on 'COM8')
Waiting for a valid location...
WiFi connected!
IP Address: 192.168.79.166
Synchronizing time with NTP...
Time synchronized!
Waiting for a valid location...
Latitude: 33.712841, Longitude: 73.022888, Timestamp: 2025-01-08 06:50:17
Attempting to connect to the server...
Sending payload:
{"latitude": "33.712841", "longitude": "73.022888", "timestamp": "2025-01-08 06:50:17"}
HTTP Response Code: 200
Data sent successfully!
Server response:
{"message": "Location updated successfully", "location": {"_id": "677d7323a10eb00c90f33152", "latitude": "33.712841", "longitude": "73.022888", "timestamp": "2025-01-07T18:32:03.1852", "__v": 0}}
Latitude: 33.712841, Longitude: 73.022888, Timestamp: 2025-01-08 06:50:22
Attempting to connect to the server...
Sending payload:
{"latitude": "33.712841", "longitude": "73.022888", "timestamp": "2025-01-08 06:50:22"}
HTTP Response Code: 200
Data sent successfully!
Server response:
{"message": "Location updated successfully", "location": {"_id": "677d7323a10eb00c90f33152", "latitude": "33.712841", "longitude": "73.022888", "timestamp": "2025-01-07T18:32:03.1852", "__v": 0}}
Latitude: 33.712841, Longitude: 73.022888, Timestamp: 2025-01-08 06:50:24
Attempting to connect to the server...
Sending payload:
{"latitude": "33.712841", "longitude": "73.022888", "timestamp": "2025-01-08 06:50:24"}
```

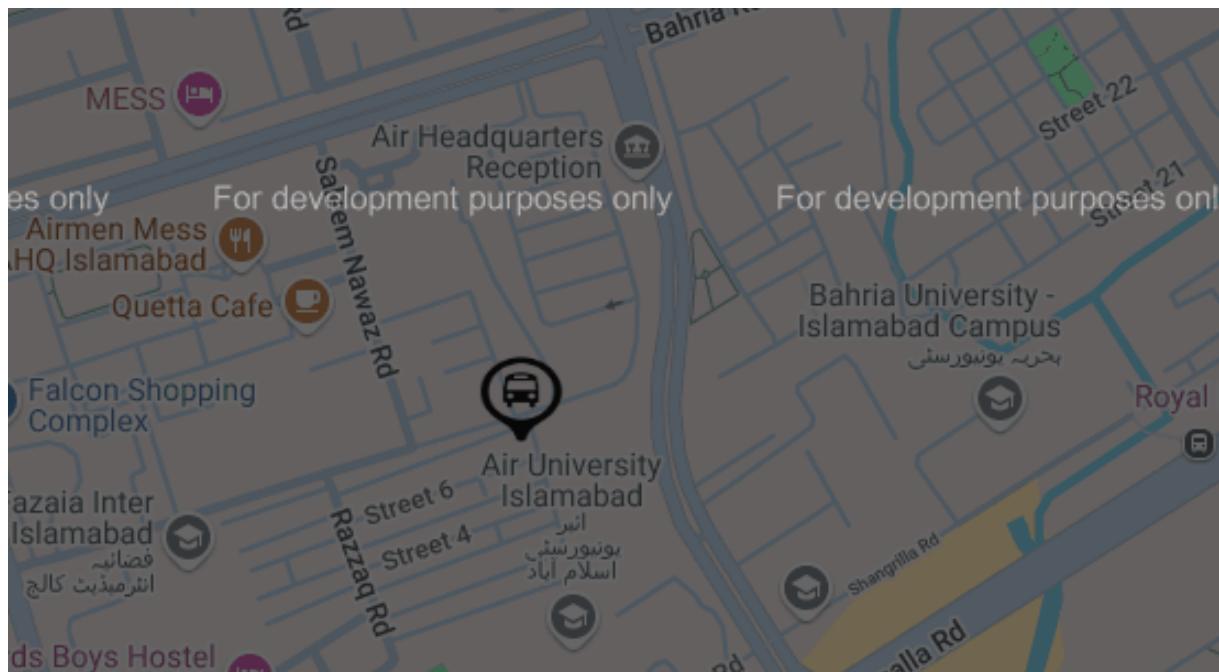
In 18, Col 1 NodeMCU 0.9 (ESP-12 Module) on COM8

Data received at Mongo DB.



```
_id: ObjectId('677d7323a10eb00c90f33152')
latitude : "33.712841"
longitude : "73.022888"
timestamp : 2025-01-07T18:32:03.185+00:00
__v : 0
```

Location fetching from Mongo and Displaying on the Website.



Hardware Prototype.

