Project Write-Up / Synopsis

1.	**Project Reference No.: 46S_BE_0277**
2.	**Title of the Project: BUS TRACKING AND TRANSPORTATION MANAGEMENT IN RURAL AREA**
3.	**Name of the College: JAIN COLLEGE OF ENGINEERING & TECHNOLOGY, HUBBALLI**
4.	**Name of the Department: ELECTRONICS AND COMMUNICATION ENGINEERING**
5.	**Theme (as per KSCST poster): Low-Cost Modify Transport System for Village/Rural/Disabled Community**
6.	**Name of project guide:** **Name: Mr. Mahesh Hiremath.** **Asst. Professor, ECE dept. JCET, Hubballi** **Email id: mahesh.ph024@gmail.com** **Contact No.: 8123176001**
7.	**Name of Team Members (Strictly not more than four students in a batch):** *(Type names in Capital Letters as provided in your college)* (Please paste the latest passport size photograph adjacent to your respective names) **Name: FAYAZAHMED SAYED** **USN No.:2JH20EC404** **Email id: fayazahmedsayed18@gmail.com** **Mobile No:9900361037**  **Name: SAIKUMAR PATIL** **USN No.:2JH20EC415** **Email id: www.saikumar9611687509@gmail.com** **Mobile No.:8618549740**  **Name: SHIVASHARANAPPA SANNULI** **USN No.:2JH20EC417** **Email id: sharanusannuli7233@gmail.com** **Mobile No.:9482201922**  **Name: SHREEPAD PHADNIS** **USN No.:2JH20EC418** **Email id: shreepadphadnis@gmail.com** **Mobile No.:9731780895**

8.	**Team Leader of the Project:** **Name: FAYAZAHMED SAYED** **USN No.: 2JH20EC404** **Email id: fayazahmedsayed18@gmail.com** **Mobile No.: 9900361037**
9.	**Keywords: REAL-TIME BUS TRACKING, CONVENIENT TRANSPORTATION, MAPS INDICATION, INFORMATION AND STATUS OF BUS**
10.	**Introduction/Background:** **In India, there is a need for proper bus transport system. With increase in the population, it has led to uncertain crowding at Rural bus stops. People wait for long hours and suddenly gather near stops whenever they see any bus coming by, even though it is not their destinations bus. This leads to unnecessary crowding which be solved by the use of this smart design of IOT based bus transport system. Here in our project, we aim to reduce the crowd at public places and where in people will come to know about the upcoming buses which have left the previous stop and are heading to the next stop soon. So by applying this approach a person need not to gather to see which bus is coming their way. He may sit and relax until his bus arrives from the previous stop. By using this designed system we can come to know about all the buses that are heading towards the bus stop, their destination and the time they will require to reach the stop. By using IOT a person at remote place i.e. away from stop or anywhere at home or workplace can know the information about the bus, from which stop, at what time, within how much time the bus will reach destination and much more information about it through the internet. The user will need to just open his web browser, enter the static IP address. And then the whole information related to the bus can be accessed by him. In India, until now we do not have such a smart city bus transport system where in the real time of the bus reaching the destination is known**
11.	**Objectives of the project:** **1. To give the user the exact location of the selected bus with respect to the user location.** **2. To design and implement cost effective vehicle tracking system** **3. Provide Fuel insufficient information to the user** **4. Provide information due to uncertainty in the bus arrival at stops due to temporary errors or malfunctioning**
12.	**Methodology:**

1) Work Flow.

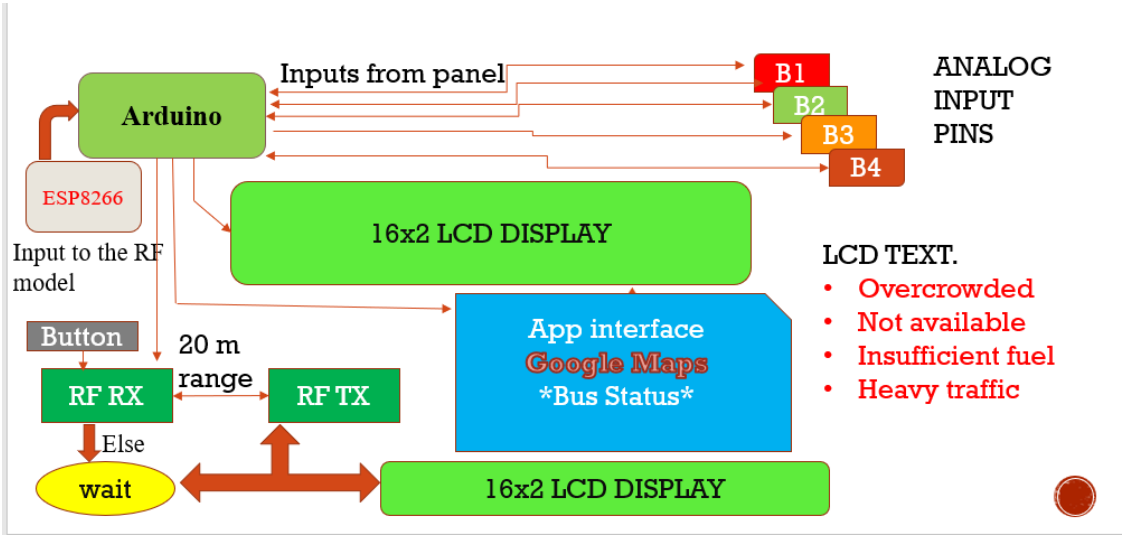

Fig 1: Work flow diagram

The following methodology was employed for implementing the Bus Tracking System:

a. Hardware Setup: Arduino Uno board was used as the microcontroller along with a GPS module for obtaining location data.

b. Software Development: Arduino IDE was used for coding and programming the Arduino board. The code was developed to read GPS data and transmit it to a server.

c. Server-Side Development: A server was set up to receive and process the GPS data from the Arduino. The server utilized appropriate APIs and databases to store and manage the data.

d. User Interface Development: A web-based or mobile application interface was developed to display the bus location information to passengers.

3. Implementation:

The Bus Tracking System was implemented in the following steps:

a. Arduino and GPS Integration: The GPS module was connected to the Arduino board, and the necessary libraries were imported to read and parse the GPS data.

b. Data Transmission: The Arduino board transmitted the GPS data to the server using appropriate communication protocols (e.g., Wi-Fi, GSM, etc.).

c. Server-Side Processing: The server received the GPS data and stored it in a database. Additional functionalities like ETA calculation and data analytics were implemented on the server side.

d. User Interface: A web or mobile application was developed to display the real-time bus location and ETA to passengers. This interface allowed users to track buses on a map and receive relevant notifications.

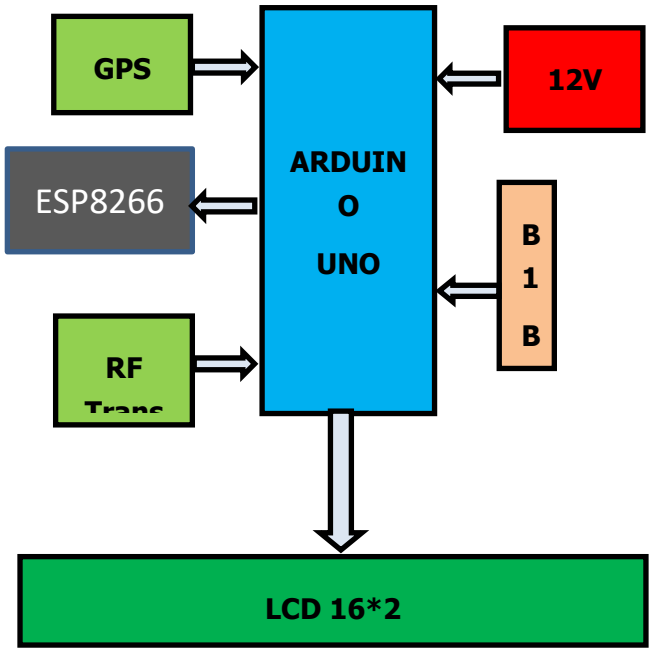

Fig 2: Block diagram of Bus unit

- **ARDIUNO board receives the input from the buttons B1 B2 B3 B4 and specified text context is display's on LCD display**
- **The Arduino board is responsible for processing the data collected by the GPS module and sending it to Esp8266 LCD Display has a 16x2 where a smart bus text is shown at beginning**
- **The ESP8266 board takes the information related to location and sends it to server**

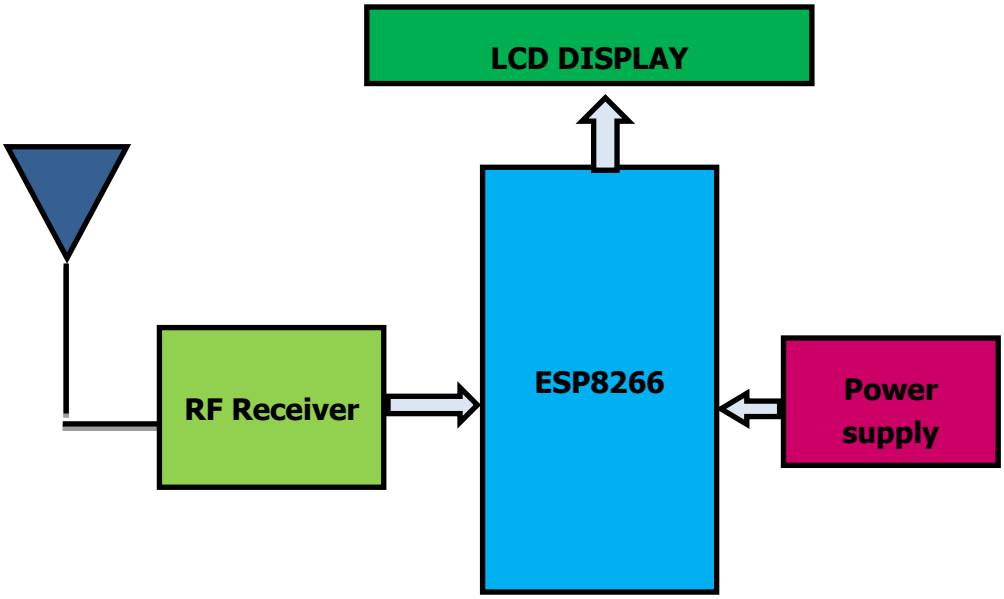

Fig 3. Bus Station Unit

- **When arrival of bus near to the Rx receiver within 20m**
- **Also, it displays the real time status/information of bus to end user's**
- **Bus station model displays bus arrival message**

Components:-

SI NO	COMPONENTS	Quantity
1	Arduino	1
2	NodeMCU	2
3	433MHz RF/TX	1
4	GPS neo6	1
5	Power Supply 12v	1
6	LCD Display	2

Pictures of Project Model and Unit

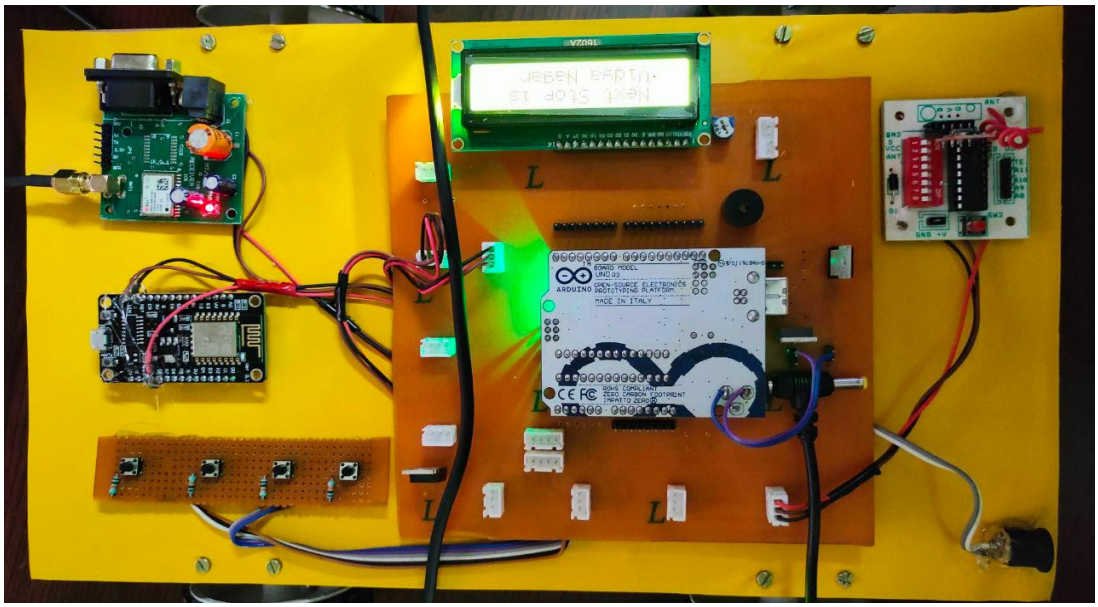

Fig. Bus Station Model

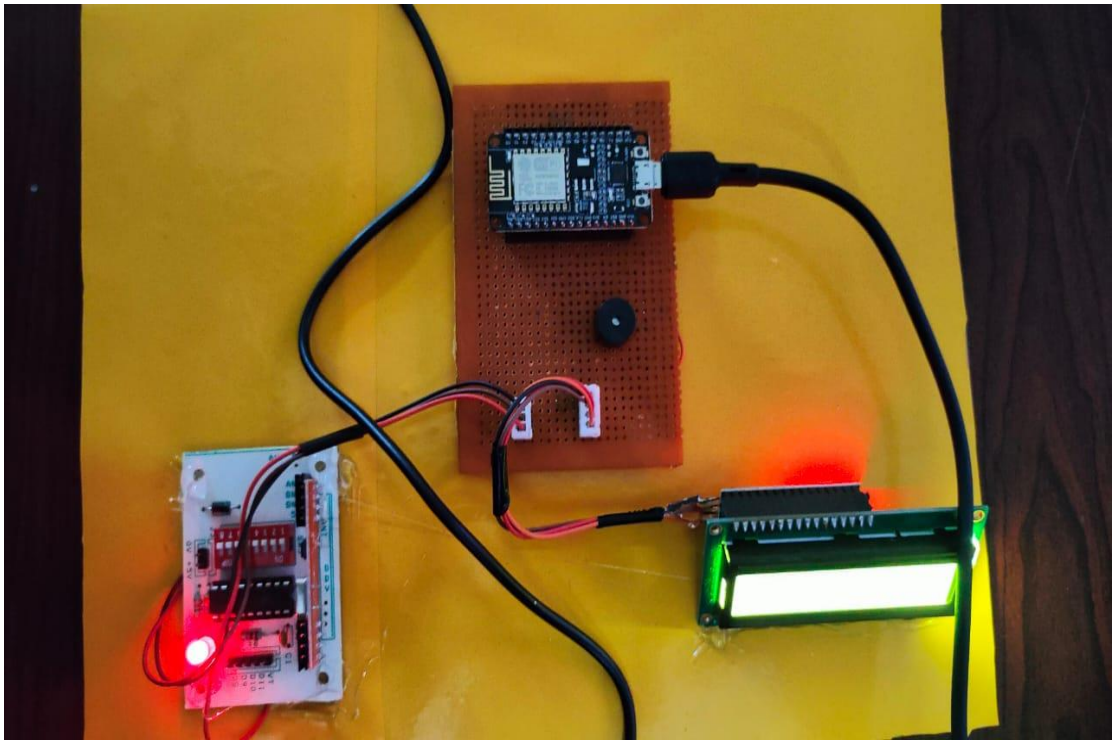

Fig. Bus Station Model

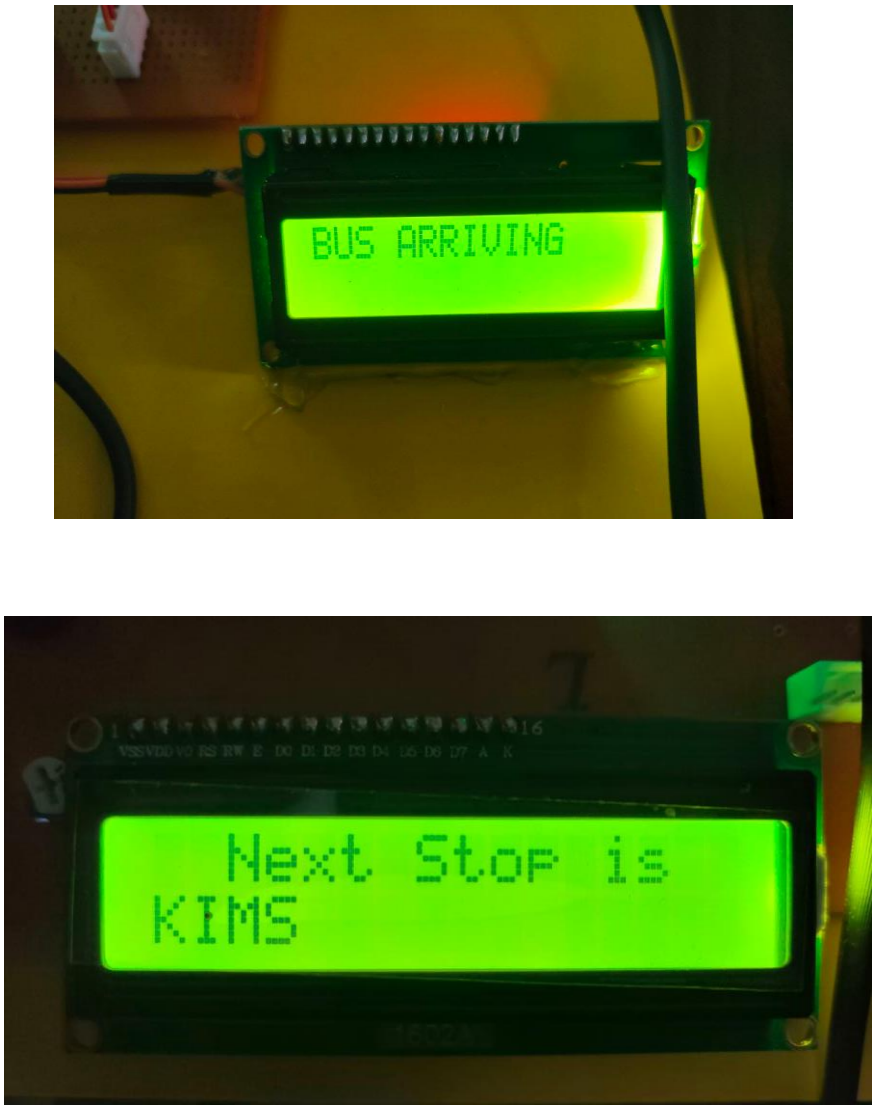

Fig. LCD Display Units

13. **Results:**

The Bus Tracking System demonstrated the following outcomes:

a. Real-time Tracking: The system successfully tracked the buses' location in real-time and provided accurate information to users.

b. Timely Updates: Passengers received timely updates regarding bus location, ETA, and any delays, reducing waiting time and improving user experience.

c. Efficient Bus Management: The system enabled operators to monitor and manage the buses effectively, optimizing route planning and resource allocation.

d. User Satisfaction: Feedback from passengers indicated a high level of satisfaction with the system's accuracy and convenience.

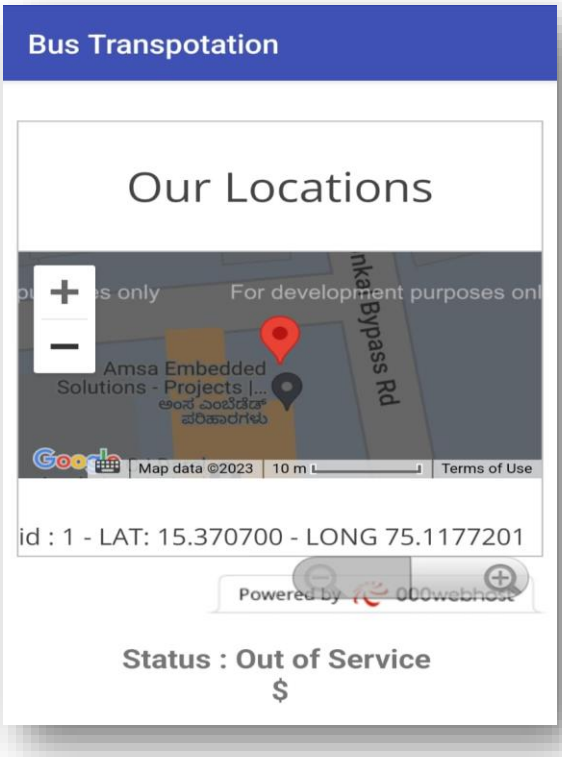

Fig. User Result of Bus Location on Maps and Status

14.	**Conclusion:** **The Bus Tracking System using Arduino and GPS proved to be a viable and effective solution for tracking and managing buses in a Rural transportation system. It provided real-time bus tracking, accurate ETA information, and enhanced operational efficiency. The project successfully achieved its objectives and demonstrated the potential for improving the bus transportation experience.**
15.	**Scope for future work:** **This study leaves a wide scope for future investigations.** **Further improvements can be made by incorporating additional features such as passenger counting, integration with ticketing systems, and integration with other smart transportation technologies.** **1. Software Development** **2. Integration With LoRawan** **3. Making it Compact Advanced feature Microcontroller boards** **4. Making it more Network friendly**

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HOD, Dept of E & C
JCET, Hubli-31.

Guide:Prof. Mahesh Hiremath
Email id: mahesh.ph024@gmail.com
Contact No.: 8123176001

HOD: Prof. PRASANNA PATANSHETTY
Email id: prasanna.shetty68@yahoo.com
Contact No.: 9844025356