e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:06/June-2022 Impact Factor- 6.752 www.irjmets.com

IOT BASED BUS LOCATION TRACKING SYSTEM

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ABSTRACT

In the busy metropolitan cities like Mumbai, Delhi, Hyderabad, students don't have time to invest in waiting for transport. Waiting time for transport in such crowded cities leads to less productivity on a whole. Students face this problem in their daily life where they have no idea about the current status of their transport. So the proposed solution is an android based application that will help the user to check out the current location of the bus and also will help the user to know how much time the bus will take to reach the current location of the user. The system will use GPS along with NodeMCU as the basis for the application and basic android application will be interfacing with the updated database to provide the real-time data to the user, hence enhancing the user-experience.

Keywords: Android, NodeMCU, GPS Module, OLED, Latitude, Longitude.

I. INTRODUCTION

Vehicle tracking systems were first used in the shipping industry because people wanted to know where each vehicle was at any given time. Nowadays, however, as technology advances rapidly, automated vehicle tracking systems are used in a variety of ways to track and display vehicle locations in real time. However, the bus service has a very poor transportation system today. Bus users do not know the exact time of arrival of the bus, but only know the estimated scheduled arrival time. The bus service does not have a proper tracking system for all bus stops and real-time arrival at all bus stops. These problems occur because the current bus service system does not use real-time tracking technology to track every bus on the road and the lack of a platform to update the latest bus traffic information for bus users. With a real-time bus tracking system, bus location data is connected in real time and transferred to a central server to process and extract transport information. So the proposed solution is an android based application along with IoT based Location sharing circuit which consists a NodeMCU and GPS module, that will help the user to check out the current location of the bus and also will help the user to know how much time the bus will take to reach the current location of the user. The circuit starts sharing the location using GPS module to the database with the help of NodeMCU in quick intervals. The system will use GPS as the basis for the application and basic android application will be interfacing with the updated database to provide the real-time data to the user, hence enhancing the user-experience.

II. LITERATURE REVIEW

There are many vehicle tracking systems being developed in the developed and developing countries. These embedded systems with their array of hardware modules have been included into lots of public and private vehicles in the urban area. A system for tracking and knowing the location of inter-city buses in urban areas was developed in Ghana by the University of Ghana. GPS and GSM/GPRS system was used in the tracking system which sends SMS alerts about the vehicle location and also provides real time tracking through web application. To maintain the tracking data external database server was used which again increased the cost of the tracking system. The system also provided many other enhancements like theft alert etc. Tracking systems were first developed for the shipping industry to track cargo. First devices developed were passive. To obtain automatic and real time tracking active devices are to be used. Muruganandham and P.R.Mukesh proposed a system that uses GSM/GPRS modem and GPS system to provide real time tracking over the internet by TCP/IP connection through Java applications developed specifically for it. External databases are used to maintain the

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tracking details. The Bangalore vehicle tracking and control systems at Bangalore and ongoing projects at Koyambedu, Chennai provides real time solutions to public vehicles.

III. METHODOLOGY

When POWER SUPPLY is given to NodeMCU, GPS module gets activated. Wi-Fi and Firebase connects to NodeMCU. Using Push button user can select the route to which the tracking needs to be done. By turning on the status switch, the location sharing is enabled. GPS module continuously searches for Satellites. Once it finds any satellite it start sending the current location details through NMEA code to NodeMCU. NodeMCU extracts current latitude and longitude from NMEA code and shares to Firebase Realtime Database. Firebase Database gets updated for every 5 seconds. In Android application the location gets plotted in google map.

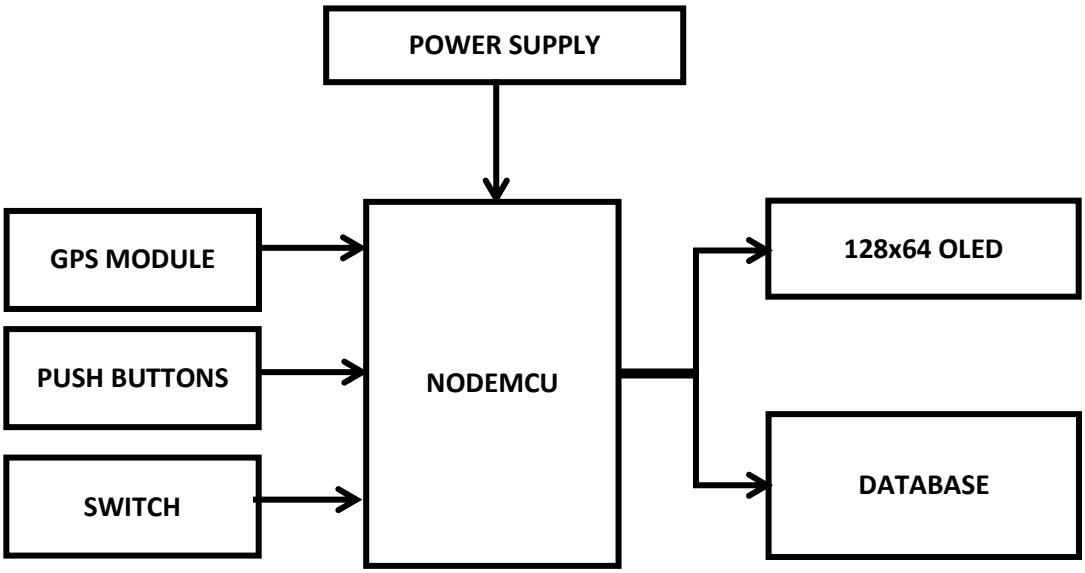

Figure 1: Block Diagram Of Iot Based Bus Location Tracking System

IV. THE HARDWARE

NODEMCU

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. NodeMCU can be powered using a Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

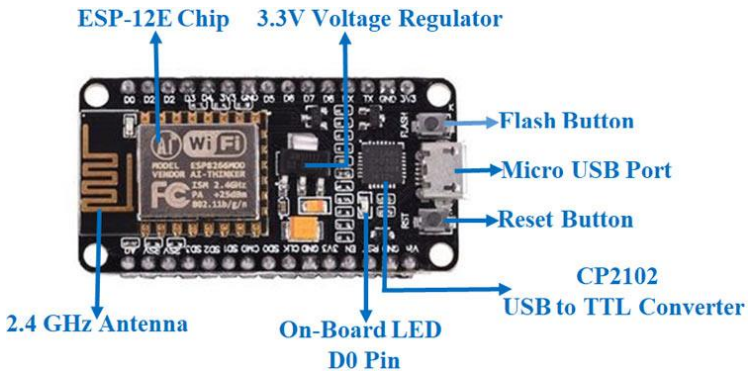

Figure 2: NODEMCU

GGPS MODULE

The NEO-6M is a GPS (Global Positioning System) module and is used for navigation. The module simply checks its location on earth and provides output data which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. These flexible and

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cost effective receivers offer numerous connectivity options in a miniature (16 x 12.2 x 2.4 mm) package. The compact architecture, power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints. Its Innovative design gives NEO-6MV2 excellent navigation performance even in the most challenging environments.

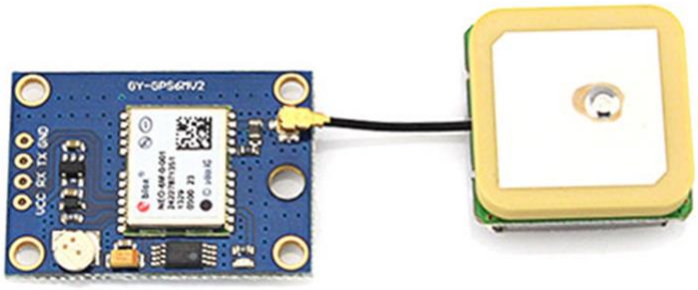

Figure 3: GPS MODULE

OLED

This OLED (organic light-emitting diode) display unit is based on SSD1306 can self-illuminate, with high resolution of 128∗64 and Viewing angle greater than 160 degree. It is supported by many control chips: Fully compatible with Arduino, 8051 Series, MSP430 Series, STM32 / 2, CSR IC, etc. Ultra-low power consumption with full screen lit 0.08W and wide voltage range of 3V ~ 5V DC. I2C/IIC/Two Wire Interface need 2 IO only for communication.

Regardless of the size of the OLED module, the SSD1306 driver has a built-in 1KB Graphic Display Data RAM (GDDRAM) for the screen which holds the bit pattern to be displayed. This 1K memory area is organized in 8 pages (from 0 to 7). Each page contains 128 columns/segments (block 0 to 127). And each column can store 8 bits of data (from 0 to 7).

Figure 4: OLED DISPLAY

PUSH BUTTON

Push Buttons are normally-open tactile switches. Push buttons allow us to power the circuit or make any particular connection only when we press the button. Simply, it makes the circuit connected when pressed and breaks when released. A push button is also used for triggering of the SCR by gate terminal. These are the most common buttons which we see in our daily life electronic equipment's.

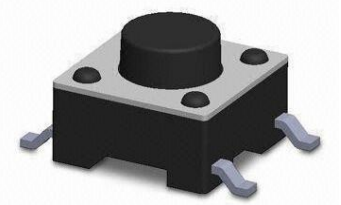

Figure 5: PUSH BUTTON

SWITCH

A switch is a piece of a physical circuitry component that governs the signal flow. Having a switch or toggle switch allows a connection to be opened or closed. When opened, the switch allows a signal or power to flow through the connection. When closed, the switch stops the flow and breaks the circuit connection.

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Figure 6: SWITCH

V. SOFTWARE

ARDUINO IDE SOFTWARE

It's free software that allows us to develop and upload code to Arduino devices. This software can be run on many operating systems or platforms such as windows, Linux, and Mac OS. C and C++ have supported programming languages. This software combines standard inventor tools into a single user interface for creating apps for several operating systems. It is very similar to C Language and it is based on a hardware programming language named processing. An Arduino IDE is required for uploading the sketch on the board.

ANDROID STUDIO SOFTWARE

Android Studio is the official IDE (Integrated Development Environment) for Android app development and it is based on JetBrains' IntelliJ IDEA software. Android Studio provides many excellent features that enhance productivity when building Android apps, such as:

- A blended environment where one can develop for all Android devices
- Apply Changes to push code and resource changes to the running app without restarting the app
- A flexible Gradle-based build system
- A fast and feature-rich emulator
- GitHub and Code template integration to assist you to develop common app features and import sample code
- Extensive testing tools and frameworks
- C++ and NDK support
- Built-in support for Google Cloud Platform, making it easy to integrate Google Cloud Messaging and App Engine, and many more.

FIREBASE CLOUD

Firebase is a Backend-as-a-Service (Baas). It provides developers with a variety of tools and services to help them develop quality apps, grow their user base, and earn profit. It is built on Google's infrastructure. Google Firebase is Google-backed application development software that enables developers to develop iOS, Android and Web apps. Firebase provides tools for tracking analytics, reporting and fixing app crashes, creating marketing and product experiment

VI. RESULTS AND DISCUSSION

DEVICE:

The pictures below are to represent the result of this work. In this model, the device shares the current location of GPS module to database and OLED.

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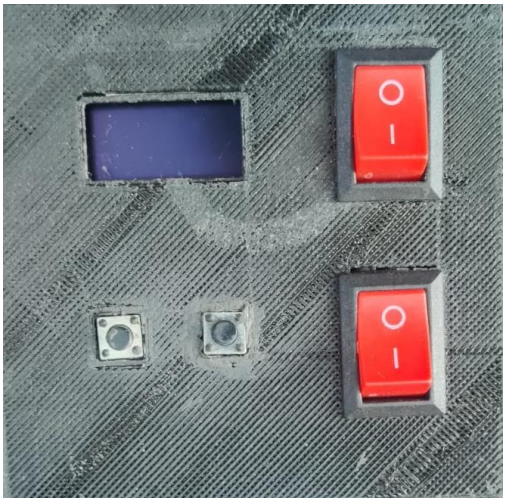


Circuit off state

Circuit on state

Wi-Fi connected

Selecting route

Getting ready to share

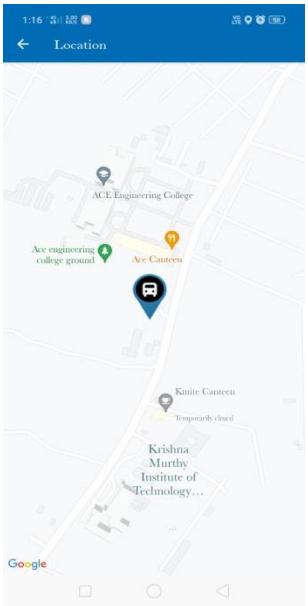
Searching for satellite

Figure 7: DEVICE

ANDROID APPPLICATION:

Routes list

Location route activated



Location point

Figure 8: ANDROID APPLICATION

The pictures above are the screenshots of android application which is developed using ANDROID STUDIO. In the first picture all routes are in off state which means not even one device is activated. In the second picture the route named LOCATION is activated so it is denoted with green color, remaining all are in deactivate state so they all are in red color.

VII. CONCLUSION

Vehicle tracking system makes better fleet management and which in turn brings large profits. Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking

both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living. Main motto of the project is to incorporate different types of sensors so that they help in decrease the chances of losing life in such accident which we can't stop from occurring.

ACKNOWLEDGEMENTS

We would like to thank our guide Mr. B. Srinivasa rao sir for his continuous support and guidance. Because of his guidance, we completed our project successfully. We are extremely grateful to Dr. P. Satish Kumar, Head of the Department of Electronics and Communication Engineering, Ace Engineering College for his support and encouragement.

VIII. REFERENCES

[1] Eddie Chi-Wah Lau "Simple Bus Tracking System", Journal of Advanced Computer Science and Technology Research, vol.3, no.1, 2013.

[2] Khondker Shajadul Hasan, Mashiur Rahman, Abul L. Haque, M Abdur Rahman, Tanzil Rahman, and M Mahbubur Rasheed,"Cost Effective GPS-GPRS Based Object Tracking System," Proceedings of the International MultiConference of Engineers and Computer Scientists 2009 (IMECS 2009), March 2009, Hong Kong, vol. 1.

[3] MZ Parvez, KZ Ahmed, QR Mahfuz, MS Rahman, "A theoretical model of GSM network based vehicle tracking system," 2010 International Conference on Electrical and Computer Engineering (ICECE), Dec. 2010, pp. 594-597.

[4] P.Chaiprapa, S.Kiattisin, and A.Leelasantitham, "A Real-Time GPS Vehicle Tracking System Displayed on a Google-Map-Based Website," University of the Thai Chamber of Commerce Journal, 2011.

[5] P.Zhou, Y.Zheng, and M.Li, "How Long to Wait? Predicting Bus Arrival Time with Mobile Phone Based Participatory Sensing" Transactions S.A.E.Yosif, M.M.Abdelwahab, M.A.E.ALagab, and F.Muhammad, "Design of Bus Tracking and Fuel Monitoring System,"In Proc. of International Conference on Communication, Control, Computing and Electronics Engineering (ICCCCEE), IEEE, Khartoum, Sudan, 16-18 January 2017.

[6] Kumbhar, Meghana Survase, Pratibha Mastud, Avdhut Salunke, "Real Time Web Based Bus Tracking System," International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 02, Feb2016.

[7] Sharmin Akter, Thouhedul Islam, Rashidah F.Olanrewaju, Ajayi Adeniyi, "A Cloud-Based Bus Tracking System based on Internet of Things Technology," 7th International Conference on Mechatronics, 2019.

[8] Priyanka V. Narkhede, Radhika V. Mahalle, Priya A. Lokhande, Reetu M. Mundane, Dhiraj M. Londe, "Bus Tracking System based on Location-Aware Services," International Journal of Emerging Technologies in Engineering Research, Volume 6, Issue 3, March 2018.

[9] Benjamin Y.O. Low, Samsul Haimi Dahlan, Mohd Helmy Abd Wahab, "Real-time Bus Location and Arrival Information system," IEEE Conference on Wireless Sensors (ICWiSe), 2016.