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LIVE LOCATION TRACKING OF A VEHICLE ON GOOGLE MAPS USING IOT AND POWERED BY SOLAR

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Abstract - *This paper presents the live location tracking of a vehicle such as Ambulance, college buses, RTC buses, etc on google maps. It is as well used in public transportation as people face a lot of inconvenience of road congestion and associated issues of commuters, so people face difficulties in their journey due to lack of information about the live location of the vehicle. This may lead to many problems. So, to overcome this, we have developed this tracking system and it can be installed in any vehicle as well as in RTC buses with Government support. The idea of this tracking system is to know the movement of a vehicle from any location at any time by using IoT (Internet of Things). The vehicle carries a Global Positioning System (GPS) device with Solar power to track their positions on Google Maps by using Node MCU ESP8266 Microcontroller connected to the Local network. URL is used to display the vehicle on the map in the Smartphone. GPS module provides geographic coordinates at regular time intervals. Then we can generate a link of GPS location for all the Vehicles and shared it with the users. Finally, Google map displays the live location when the user accesses the generated link. Thus, the user will be able to monitor the live location of the vehicle using the cell phone. The user can get the flexibility of planning their travel using this Tracking system. The proposed system is user-friendly and ensures safety and surveillance at a low maintenance cost.*

Key Words: *MICRO CONTROLLER, GPS, SOLAR, HEROKU CLOUD, LEAFLET MAPS, WIFI MODULE, etc*

1.INTRODUCTION

This paper demonstrates the Vehicle tracking system to find the location of a vehicle using GPS and such technology has become very prominent. To implement a vehicle tracking system that can display the location on Google map, the GPS, Wi-Fi modules controlled by Node MCU must be placed in the vehicle, and power is supplied to the kit by a solar panel. The position of the vehicle will be updated every 1 second as it is moving. This Tracking system helps in continuously check the live location of that vehicle where it is installed. And even the past travel of that vehicle can also view. This technology is popularly called real-time GPS vehicle Tracking Systems which created many wonders in the security of the vehicle. The system can be installed in any vehicle where it cannot be seen by anyone. This information is available to authorized users of the system via a website over the internet.

1.1 BLOCK DIAGRAM

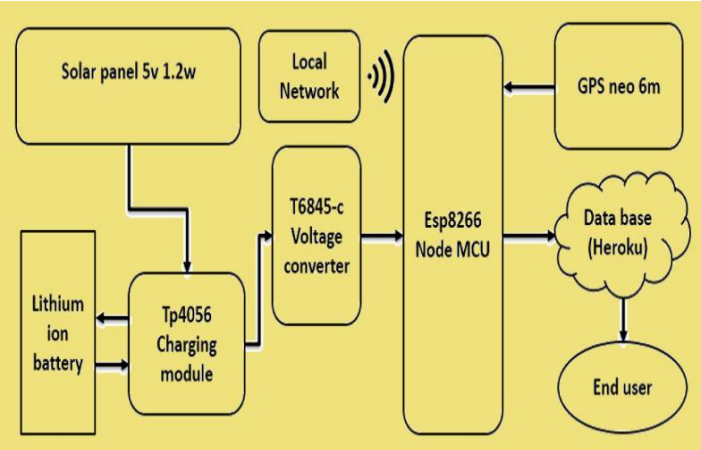

Fig -1: Block Diagram

2. HARDWARE COMPONENTS

2.1 Node MCU ESP8266

The Node MCU Wi-Fi module is a one-way microcontroller. It has a Wi-Fi platform used to create projects with Wi-Fi and IoT applications. It has built-in USB serial chip to upload codes, a 3.3V regulator, and a logic level converter circuit so you can quickly download codes and connect your circuits. This module contains an ESMB-12E chip with 4MB flash memory. The ESP8266 Node MCU module is used for low-cost projects using a Wi-Fi network. The module comes up first with the Node MCU firmware, so you just need to install the USB driver. Node MCU is an open-source development tool. This microcontroller module can be easily configured using Arduino IDE software. Four pinouts of Node MCU are used to connect to the GPS module. The pins are VCC 3.3V, GND, D1, and D2.

2.2 GPS module NEO-6M

GPS represents the Global Positioning System and can be used to determine location, time, and speed. It comes with an external antenna and the module has four anchors: VCC, RX, TX, and GND. The module communicates with Arduino via serial communication using TX and RX pins.

2.3 Solar panel

Solar panels are used to absorb solar radiation and convert it into electricity or heat. A solar panel is a collection of solar cells (or photovoltaic), which can be used to generate electricity with the effect of photovoltaic. It is used to power the battery

2.4 Lithium-ion battery

Lithium-ion batteries that generate electrical energy by converting chemical energy via redox reaction on the active materials, i.e., the negative (anode) and positive electrode (cathode), in one or more electrically connected electrochemical cells. Here we use the 3.7v, 2200mah rechargeable lithium-ion battery shown in the circuit diagram.

2.5 TP-4056 Charging module

The TP-4056 charging module is used for charging rechargeable lithium-ion batteries. In addition to safely charging a lithium battery, the module also provides the necessary protection from Overcharge and Over-discharge. It has two input pins (positive and negative) and four output pins in those two pins (OUT+ and OUT-) are to charge the battery and the other two pins (B+ and B-) are connected to the boost converter.

2.6 T6845-c Boost converter

The Boost converter is used to step up the voltage from 3v to 5v because the Lithium battery is only providing 3.7 volts, but we need 5v to charge the Node MCU ESP8266 without any interruption.

3. SOFTWARE REQUIREMENTS

3.1 Arduino IDE

Arduino IDE is a cross-sectional application written in Java and is based on the IDE language of the programming language and Wiring project. It is designed to introduce programs to artists and other young people who are unfamiliar with software development. It is possible to integrate and upload programs to the board with a single click. There is usually no need to plan to create files or run applications on the command line interface. Arduino IDE comes with a C / C ++ library called "Wiring", which makes many standard installation/removal tasks much easier. Arduino programs are listed in C / C ++.

3.2 Heroku Cloud Database

Heroku is a platform as a service platform. Heroku is so easy to use that it is a superior decision in many development projects. With a special focus on supporting customer-focused apps, it enables app development and deployment. Since Heroku's platform handles Hardware and servers, businesses using Heroku can focus on making their systems more efficient.

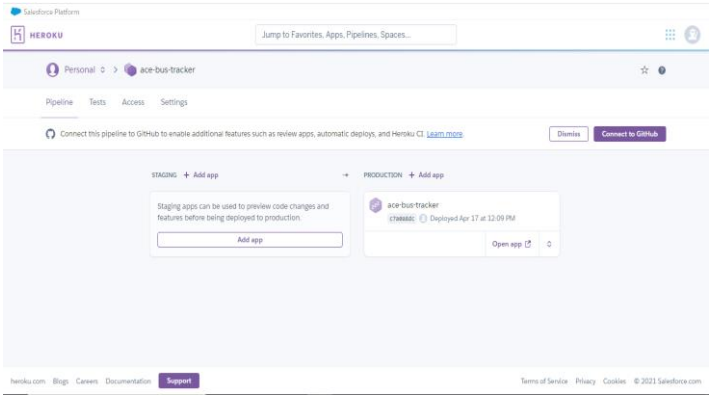

Fig-2: Heroku Cloud Storage

3.3 Leaflet Google Map

This Leaflet is an open JavaScript library for creating interactive web maps. The track was first published in 2011. It is light, extremely light, and flexible. For these reasons, Leaflet is probably the most open-source library currently open. As Leaflet's homepage puts it, the straightforward process behind this library is simple.

4. CIRCUIT DIAGRAM

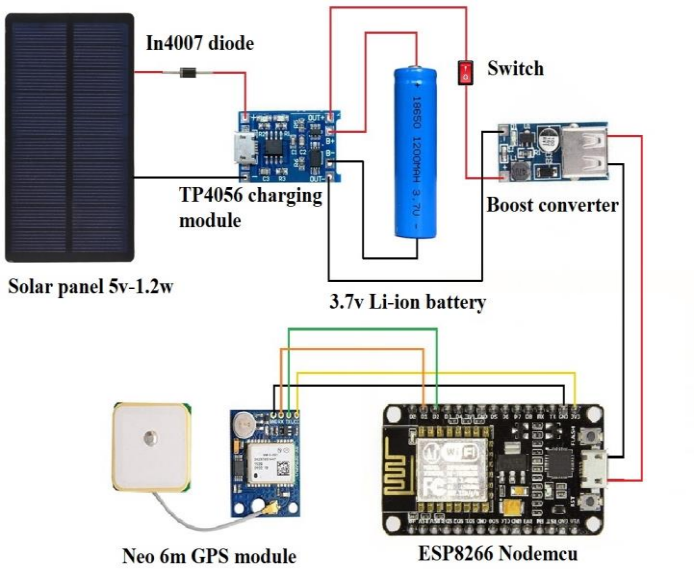

Fig-3: Circuit Diagram of System Design

In Node MCU, D1 and D2 were connected to the Tx and Rx of the GPS module. D1 received the signal from the GPS while D2 transmitted the signal to the Node MCU. GND(2) and Vin(5v) is connected to the voltage converter further connected to the battery via a charger module charged by the Solar panel. This combination of circuits produced a stable signal with precise latitude and longitude.

5. WORKING

The system involved both software and hardware components. The system hardware was ESP8266 Node MCU, GPS module, and Wi-Fi receiver. The software implemented is an IoT cloud used by the controller to monitor the vehicle's location using Geo-fencing power. The IoT cloud also provides a platform for the administrator to access information and store data on this platform. The data collected by GPS is transmitted to this platform via the Node MCU signal from GPS. The Node MCU then sent a signal to the "Heroku cloud" comprising a latitude and longitude format with "Heroku Unique ID" encoded in the source code.

Data was continuously extracted from the Neo 6M GPS Module, which was connected to the ESP8266 Node MCU. Heroku provided a map widget to view the site linked to the Google Maps page. The Heroku platform has shown the width and height of the device. After that, getting performance on Leaflet Google Maps by drawing the local boundaries of the area monitor the vehicle. Usually, a manager or engineer can define a geo-fence area limit. Therefore, in this case, the vehicle was determined to be somewhere in the geofence.

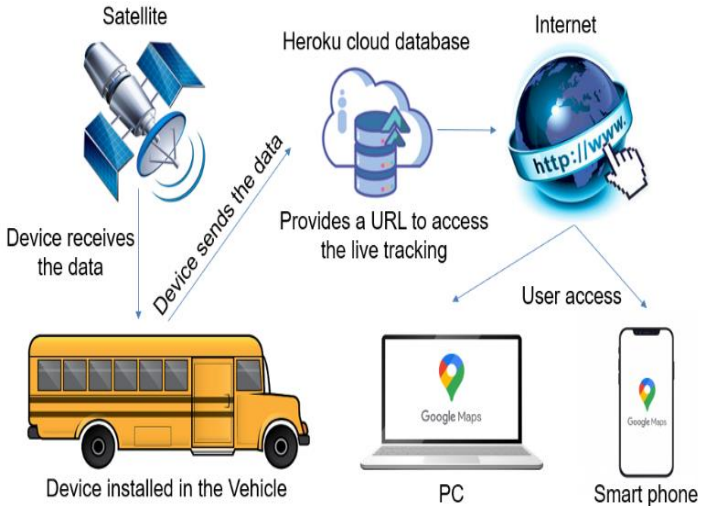

Fig-4: Concept of Tracking system

6. FLOWCHART

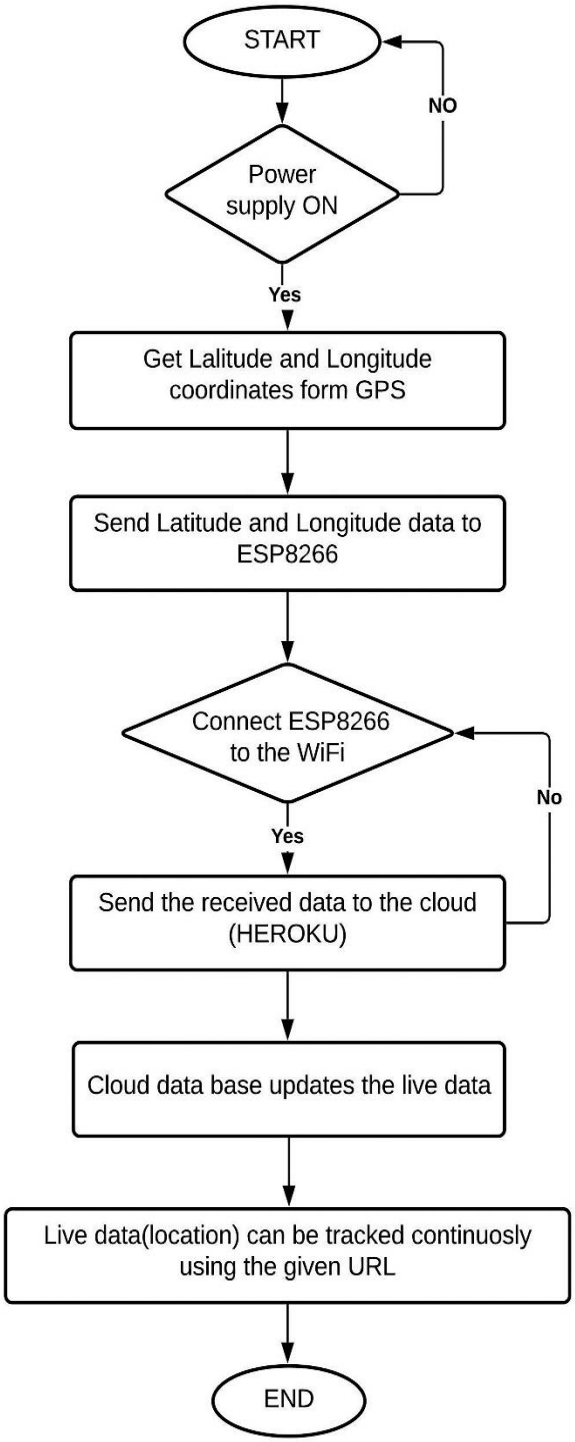

Fig-5: Algorithm

7. RESULT

This paper schemes about "Live location tracking of a vehicle on google maps using IoT and powered by Solar" equipment, it is very supportive as we can track our vehicle on mobile anywhere at any time. The hardware implementation of this project is shown in the below figures.

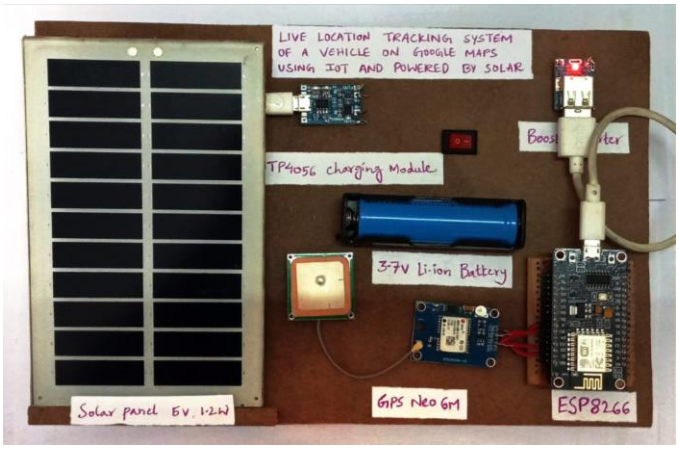

Fig-6: Device in ON condition

7.1: Output:

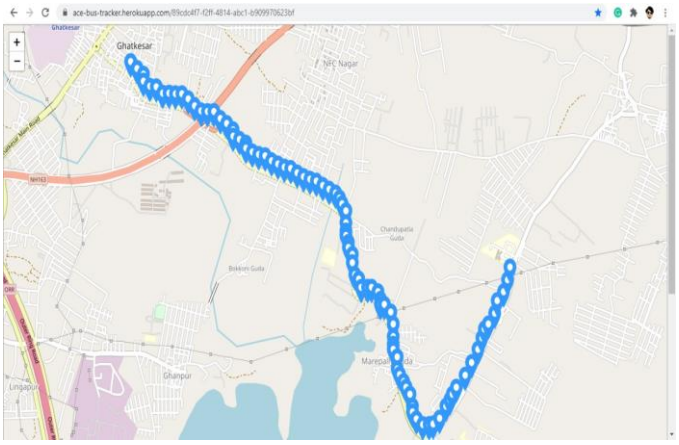

Fig-7: Ghatkesar to ACE Engineering College

Fig.7 and Fig.8 are Screenshots taken from the laptop and mobile phone when the device is turned ON and placed in a vehicle. The blue location pickers indicate the live location of the vehicle.

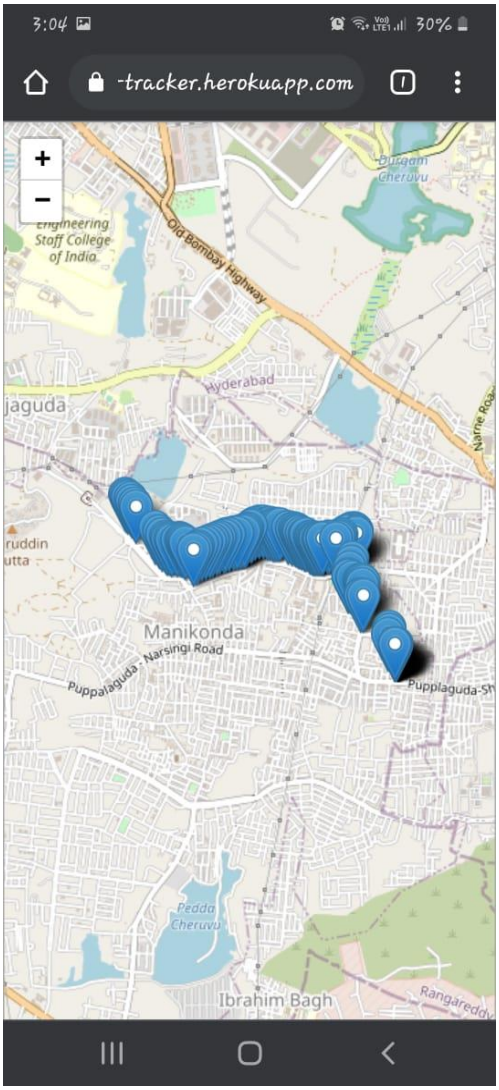

Fig-8: Live location tracking from mobile

8. FUTURE SCOPE

This device can be installed in any vehicle. Therefore, we can view its live location such as ambulances, college buses, or public transportation to improve public safety. This device can be made much easier and can count, monitor the vehicles easily. The accuracy can be increased to 3m by changing the GPS module in the future. With the help of deep vibration sensors, we can detect danger. whenever a vehicle unpredictably causes an accident on the road. With the help of a vibrating sensor, we can detect the danger and we can send the location to the vehicle owner, the nearest hospital, and the nearest police station. In the future, this system can be advanced to find the stolen vehicles too.

9. CONCLUSION

This paper ventures a flexible, customized, and accurate vehicle tracking system. To show the status of the vehicle on Google maps, Leaflet software is implemented. The ESP8266 Node MCU is the heart of the system that is connected to the Local network and GPS provides location data. Whenever GPS receives new data, it is updated in the database so that the location on the Google map is updated. This real-time vehicle tracking system is designed to keep the state of our India in mind as the number of vehicles increases rapidly day by day. The device provides accurate real-time information that enables the user to track the vehicle. There may be various other applications that can be built on top of our existing platform. Consequently, the designed system is in such a way that the development of this system is much easier which makes it open to future needs without the necessity to rebuild everything from scratch, which makes this system more efficient. The reliability of our program is tested through the various sector trials.

REFERENCES

[1] M. Rishabh Sai Madhur, K. Sreenivasa Priyatham, K. Charan Raj, K. Bipin Nandan, "Smart Bus Tracking and Management System", Iconic research and engineering journals (IREJ), ISSN NO:2456-8880, Volume 1 issue 8|Feb 2018.

[2] K.S.N.V. Someswara Rao, P. Viswa Teja, K. Bhargavi, M. Anusha, S. Vasu Dilip, K. Lova Ganga Mani," GPS based Vehicle tracking system using WIFI module", International Journal of Management, Technology and Engineering (IJMTE), ISSN NO: 2249-7455, Volume 9 issue 1|Jan 2019.

[3] A. H. Abbas, Mohammed I, Habelalmateen, Syukran Jurdi, L. Audah, and N. A. M. Alduais, "GPS based location monitoring system with geo-fencing capabilities", cite as: AIP Conference Proceedings 2173, 020014 (2019); https://doi.org/10.1063/1.5133929, Published Online: 11 November 2019.

[4] Ashutosh Upadhaya, Samir Bothra, Rashmi Singh, Shivanshu Gupta, "Tracking system using GSM, GPS & ARM7".

[5] Htun Naing Htwe, Zar Zar Mon, Aye Mya Mya Aung, "Design and Implementation of IOT Based Vehicle Tracking System", International Journal of Science, Engineering and Technology Research (IJSETR) Volume 8, Issue 8, August 2019, ISSN: 2278 -7798.

[6] Argha Ghosh, Alagappa University, "Vehicle Tracking System using Internet of Things", Thesis · May 2018 DOI: 10.13140/RG.2.2.12437.96482.

[7] G. Yang, K. Xu, and V. O. K. Li, "Hybrid-Cargo-Level Track-Systems for Logistics", in 2010 IEEE 71st Vehicular-Technology Conference, 2010, pp. 1–5.

[8] G. Cardone, A. Cirri, A. Corradi, L. Foschini, R. Ianniello, and R. Montanari, "Crowdsen at Urban- Area for Cityi - scale Mass Gather Managements: Geofencing and Activity Recognitions", IEEE Sens, J., vol. 14, no. 12, pp. 4185–4195, Dec. 2014.

[9] "Live GPS Vehicle Tracking System," YouTube, November,2007, https://www.youtube.com/watch?v=t6FrVBol9cU.

[10] The forum of the ESP8266 module, http://www.esp8266.com/viewtopic?F=5&t=4326.

BIOGRAPHIS

Dr.S.Mani kuchibhatla, Associate Professor EEE department, ACE Engineering College, India, received her B.Tech. from JNTU Kakinada, MTech. in Power Systems Engineering from NIT Warangal in 2008 and received her Ph.D. in Power systems for Enhancement of Power Quality from JNTU Kakinada in 2021. She has 15+ years of Teaching Experience. She is a Life member of Indian Society of Technical Education (ISTE) and also Life member of Indian Institute of Electronics & Tele-Communications (IETE). Her areas of interests are Power Quality Improvement, FACTS, PLC &SCADA.

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