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Smart Vehicle Speed and Location Tracking System Using IoT

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Abstract **-** Without vehicles, life is unimaginable and the number of automobiles has also grown quickly to meet the needs of enormous population. A smart bus speed and location tracking system has been developed in this work. IOT technology can be used to quickly locate arrival times, current bus positions, and bus routes on a map. Google Maps and the Global Positioning System are used for navigation and display services. The speed of the vehicle can be tracked based on the rotations made by the vehicle wheels and the monitored data is also passed to the server. So that the over speed indications is tracked and alerted to reduce speed of the vehicle and avoid accidents. The arduino microcontroller is used to receive data from speed monitoring unit and global positioning system and passes that information to node MCU Wi-Fi module to transfer that information to IoT cloud. The user can use IoT cloud user interface or app to track vehicle and its speed.

Index Terms: IoT, vehicle speed monitoring, data logging and cloud.

I. INTRODUCTION

In terms of innovation, the internet of Things (IoT) [1] is seen as the internet's successor. All items may exchange data and communicate via data-detecting devices thanks to the Internet of Things (IoT), a sophisticated system that links them all to the Internet. It makes it possible to precisely recognize, discover, follow, observe, and supervise. It is a system that enhances communication between people, between people and things, and between things. Systems in the Internet of Things will be connected to a lot of things. According to a current paradigm of communication, in the not too distant future, commonplace items will be equipped with microcontrollers, electronic communication devices, and reasonable convention stacks that will allow them to communicate with one another and with customers, becoming a vital part of the Internet. Everyone relies heavily on vehicles and the road transportation network to get around in this densely populated mechanical world. Since the dawn of time, transportation has been an integral part of human development. The number of vehicles on the road increases in tandem with the population. When it comes to public transit, time and patience are crucial. In other words, many individuals who utilize public transit buses have wasted time because they have to wait at bus stops. Millions of students must travel from home to college and vice versa every day.

This article describes an intelligent vehicle tracking and
speed monitoring system based on the Internet of Things. Our newly generated technology allows for the Internet-based reporting of vehicle location information. It enables anybody to instantaneously check the speed and location of vehicle on the internet, hence reducing arrival and departure times. Using various sensors, the system monitors the location as well as speed and delivers real-time information. No devices are mentioned in a report that advises monitoring two tracking indicators. Creating a system that can calculate the speed of vehicle using ir sensor using interrupt method and location tracking using the GPS system is proposed. This system is able to achieve its objectives by utilising technologies such as the Internet of Things (IOT) and the Cloud. The core concept of the "internet of things" is that every device should be connected to the internet and any other relevant gadgets. The data generated by Internet of Things devices may be readily uploaded to the cloud and subsequently delivered across the internet to end

users. Vehicle monitoring is an essential use of the notion behind the Internet of Things. This entails sensing and collecting a information from vehicle and utilising it for triggering alerts and interacting with users through user interface.

II. LITERATURE

Previous studies have demonstrated that various wireless technologies, including RFID, IR, GPS, Bluetooth, and Wi-Fi, manage and monitor smart public transportation systems. This is done by merging information technology, cutting-edge methodologies, and smart sensing systems. A smart bus transportation system is developed and introduced by Parmeshwar et al. (2017) [1] using GSM, GPS, and Arduino. Passengers waiting for the next bus receive a notification from GSM and GPS. In this system, passengers were automatically counted. Using Wi-Fi and a smartphone application for real-time bus tracking, Kiran et al. (2017) [2] developed a smart bus tracking system. The programmer sends data to the cloud using the address of the bus terminal, where it is then retrieved and displayed to the user via a mobile app. The tracking system includes installing GPS, RTC, and Arduino UNO in a bus as well as an Android App that can be used to follow buses and determine the distances between stations along their routes [4].There is no mechanism that provides users with information on the location and speed of the bus.

III. HARDWARE

This section provides a description of the model's intended layout and design. The next section provides an in-depth look at the model and all of its constituent parts.

A. Block diagram of proposed weather station

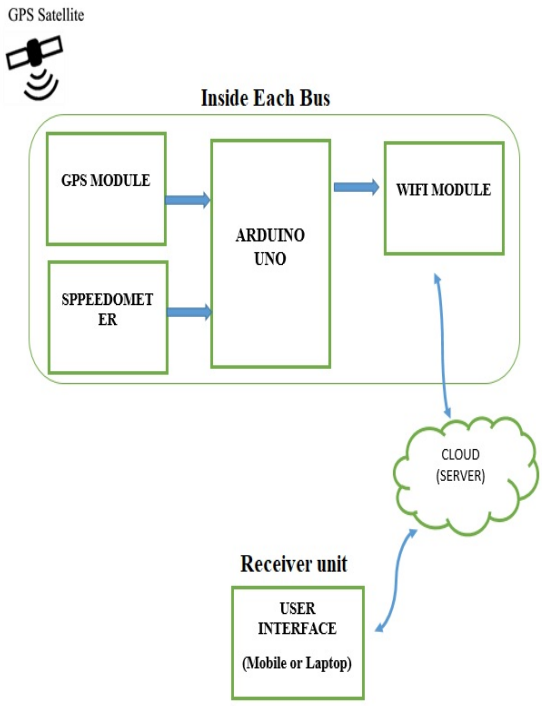

Fig.1. Block Diagram of weather station

B. Arduino UNO-328

Arduino, the organization, is responsible for developing the microcontroller that is housed on the board known as the Arduino Uno. The Atmega328 from AVR serves as the primary inspiration for this open-source microcontroller platform for electrical projects. The most up-to-date version of the Arduino Uno board features a USB connector, in addition to six analogue input pins and 14 digital I/O ports. These ports provide users the opportunity to connect the board to a variety of different electrical circuits. Out of a total of 14, PWM output may be obtained from six of the I/O ports. It enables the designers to handle and monitor in real time any electrical equipment that is situated in an external environment. This board has all of the components necessary to run the controller, and it can be immediately connected to a computer by means of a USB cable. In addition to this, it possesses all of the capabilities that are essential for the controller to operate properly. When transmitting code to the controller from the computer, the IDE software, which was built exclusively for the purpose of programming Arduino, is utilized. This software was developed specifically for the purpose of programming Arduino. Languages such as C and C++ are utilized in the development process to write the IDE's code. The circuit board may take its power not just from a USB port, but also from a battery or an AC-to-DC converter if any of those options are used. The version that is regarded as being the most official is the Arduino Uno. It has an Atmega328 8-bit AVR Atmel CPU and 32KB of RAM already installed in it.

C. GPS Module

Fig.2. GPS module

This is a whole GPS module built around the NEO-6M.This gadget uses cutting-edge technology to offer the most precise position data possible, and it includes a larger built-in 25 x 25mm active GPS antenna with a UART TTL connection. A battery is also included to assist you in obtaining a GPS lock faster. This is a GPS module that has been modified for use with the arduino mega v2.This GPS module gives the most precise location data available, allowing for better performance. The serial TTL output of the GPS module contains four pins: TX, RX, VCC, and GND.

D. Speed sensing Module

Fig3. IR sensor as speed sensor

The IR sensor module is made up of an IR transmitter and receiver that may function as a digital tachometer to measure the speed of any rotating object. The ir sensor triggers the number of rotations made by the wheel and that information is passed to the microcontroller board. Based on the interrupt generated by trigger the interrupt service routine is used to calculate the number of rotations made by the wheel.

E. Node MCU

Fig.4. Node MCU

An embedded WiFi module is a component of the Node MCU WiFi microcontroller unit. The arduino microcontroller serves as the board's base, and it includes an ESP8266 WiFi Module. The ESP8266 WiFi Module is a self-contained system-on-a-chip (SoC) that includes an integrated TCP/IP protocol stack and can connect to your WiFi network (or acting as an access point itself). One of the most essential characteristics of the Uno WiFi board is its support for over-the-air (OTA) programming. This might be used to send Arduino sketches or WiFi firmware.

F. Arduino IDE

Fig.5. ARDUINO SOFTWARE

The Arduino Integrated Development Environment (IDE), sometimes known as the Arduino Software (IDE), has a code editor, a message area, a text terminal, a toolbar with basic action buttons, and a menu system. It connects with the Arduino hardware and uploads programmes to it.

IV. WORKING

We presented a new approach that addresses the shortcomings of the current public transit system. The proposed system handles all data such as the present position of the bus, its administration, and its timetable. Our suggested system can do real-time tracking as well as bus speed, and this information is then sent to distant users that wish to know real-time bus information. Certain technologies, such as GPS (Global Positioning System) and Google Maps, are employed in development. Our solution provides a web-based application that displays the real-time position of the bus on Google Maps as well as the speed of the bus to a distant user.

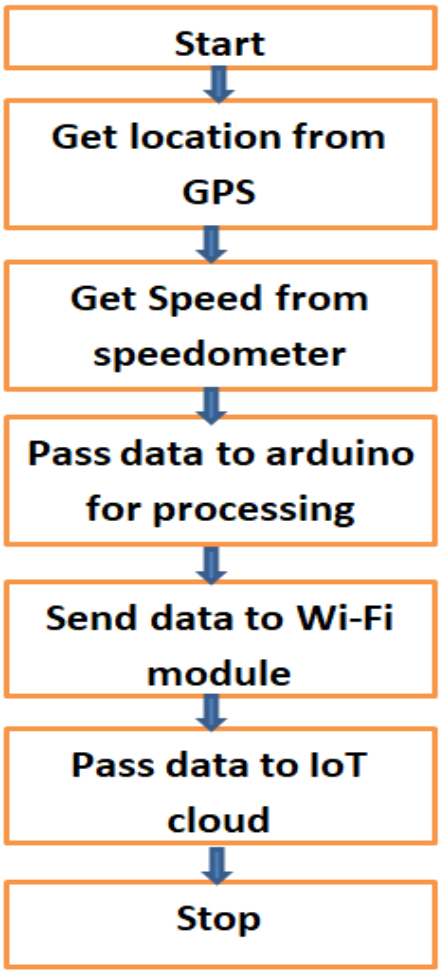

Fig.6. Proposed flow diagram

V. RESULTS

Here's an IoT-based vehicle location and speed monitoring system that can be viewed remotely when connected to the internet through the IoT cloud app. Our project incorporates an Arduino UNO, WIFI module, GPS module and IR sensor. First, sensors were connected to the Arduino Uno and to Wi-Fi module. The sensors communicated data effectively.

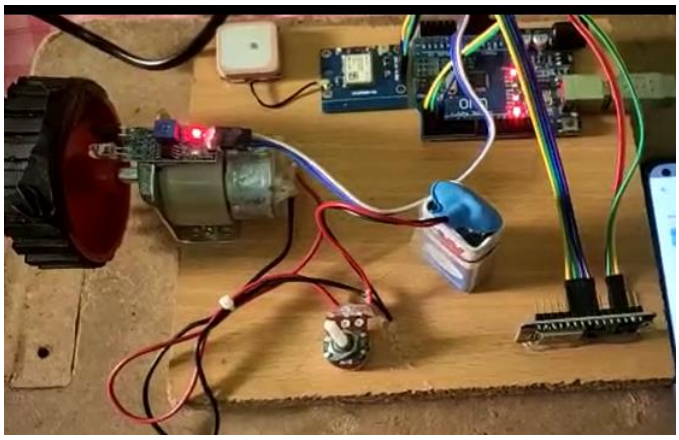

Fig. 7. Figure showing the proposed system

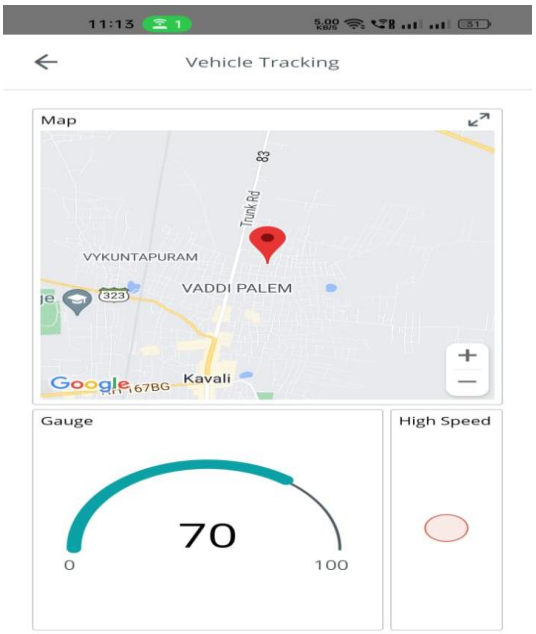

Fig.8. Figure showing the location and speed data sent to server

VI. ADVANTAGES

- Smart way of tracking vehicles
- Providing information to passengers and riders is through IOT
- Providing comfort and convenience in the journey

VII .APPLICATIONS

- Traffic management
- Vehicle tracking
- Vehicle to vehicle communication

VI. CONCLUSION

It is concluded that the VEHICLE TRACKING and SPEED MONITORING SYSTEM USING IoT was a success.

This system is made up of an Arduino-Uno board, a GPS module, an infrared module, and a Google Maps application. It is both user-friendly and cost-effective. It is also possible to infer that the following project objectives were fulfilled successfully:

- A vehicle tracking system that has been built can be utilized by a smartphone, especially an embedded device.
- Created and implemented a low-cost, high-efficiency vehicle tracking system.
- Created a user-friendly monitoring system specifically use with college students and public.

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