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GPS Live Tracking of Buses and Fuel Monitoring System using Arduino

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Abstract: ***Public transport has become a part of life. Most people reach from homes to workplace or school using public transportation. People can lose time in transportation because of unwanted waiting. This paper discusses the concept of developing a bus tracking and monitoring the fuel and speed system to provide a facility for the management requirements by the administrator. In the fastest world, everyone is in hurry with their works, so sometimes they don't reach their destination within a particular time. In this case, waiting for buses/transport is not reliable. People who rely on the public transport their major concern is to know the real-time location of the bus for which they are waiting for and the time it will take to reach their bus stop. This information helps people in making better traveling decisions and then plans their journey from their home. The fuel monitoring system is the major issue for the transport companies. In today's world, the actual record of fuel filled and fuel consumption in vehicles is not maintained. It results in a financial loss. The web application designed by using Arduino GSM/GPS and map suit ASP, MVC which provides the exact arrival time in additional to graphically showing the bus on Google map. The server-side application will maintain the database to maintain data ns client application will fetch this data when the user needs this app services by browsing map. The embedded control system can achieve many tasks of the effective fleet management, such as fuel monitoring, vehicle tracking. Using GPS vehicle tracking technology and viewing interactive maps enable us to see where it was losing money, time and wasting fuel.***

Keywords: Fleet management, Arduino, GPS, GSM, Tracking, Fuel, Database

I. INTRODUCTION

In the way, people move around their communities' public transportation systems is the main problem which plays an increasingly important role. It is a very cost-effective mode of transport and by using public transport avoids pollution and traffic. Due to the cause of heavy traffic and roadwork etc., most of the buses are delayed in time. At the bus terminals, people have to wait for a long time without even knowing when the bus will arrive. Anybody who wants to use the public transportation system, can't find the time of arrival of the particular bus at the particular destination even at their homes and plan their departure from home accordingly. But due to unexpected delays in traffic congestion, the bus arrival time cannot be guaranteed. Presently most of the motor vehicles display the amount of fuel in the fuel tank with the help of some of the other kind of indication showing the E (empty), H (half) and F(full) indicators. The manufacturer provides the specification that E, H and F bar maps corresponding to the liters of fuel approximately. In daily life, we might have experienced the problem of improper measurements of the fuel level in the tank with the existing system. Today in this digitized world if the analog fuel indicators in the vehicles are replaced by the digital system then it will help us to know the exact amount of fuel present in the tank. In this phase Fuel level detection measures the fuel level from the gauge, we can locate the vehicle by using the Global Position System (GPS). By using Arduino we will collect the data from fuel sensor, GPS and speed sensor send it to the server at the base station using GSM. A website is developed using ASP.MVC web edition, Visual a Studio2013 with embedded Google Map to retrieve and display on track details.

II. RELATED WORK

Proposed live tracking of buses using real-time web-based applications. Different technologies like GPS (Global Positioning System), Google maps and GPRS (General Packet Radio Service) GSM (Global services for mobile)are used for development purpose. Manini Kumbhar1, Meghana Survase [1]

proposed, Design of exact timings of bus transportation system using GSM. The quality of the bus service is improved and the passenger also able to get the information about the current bus. Madhu Kumar, K. Rajashekhar, et al [2]

Shruti Kotadiaa [3]: presents a design depending on the using RFID stickers which installed on every bus, these stickers are installed for identification at bus terminals. Every bus has the unique ID. These IDs are used for identifying the buses. Shruti Kotadiaa [3]

proposed a design depend on the embedded system which is a single board system having GPS and GSM modems and ARM processor to track vehicle. This system has large capacity Vehicle tracking system resulted in improving overall productivity with better fleet management that in turn effects better return on your investment, low operation cost, strong expansibility. Abid Khan [4] Propose a City Bus location and route navigation system using smartphones by using ICT (Information and Communication Technology). Ravi, Rohitaksha [5]

All previous studies mentioned above talked about Vehicle tracking, but each of them have drawbacks, for example, the RFID technology need another device at the bus stop in addition of the short rang The passengers cannot get the exact location of the bus, they will only be notified when the buses are nearing the user, and another system not track the location on the map. This paper based on the GPS and GSM to design simple, accurate, less used of a complex circuit, power consumption and costless bus tracking and fuel monitoring system used Arduino and map suit, Asp. MVC technologies.

III. METHODOLOGY

The architecture of bus tracking system is shown in below fig. By depending on the user source and destination it provides the bus arrival time. This device consists of Arduino, GPS, GSM, fuel sensor and speed sensor. It provides the outcomes from the interaction between the system devices, which are on the bus, web application and desktop application.GPS works as a transmitter, which receives the correspondent information from the satellite and sends it to Arduino, where the fuel level and speed calculated by using the fuel sensor and speed sensor, and all this information sent to the Arduino, which collect all this data and send it to the server through the GSM.

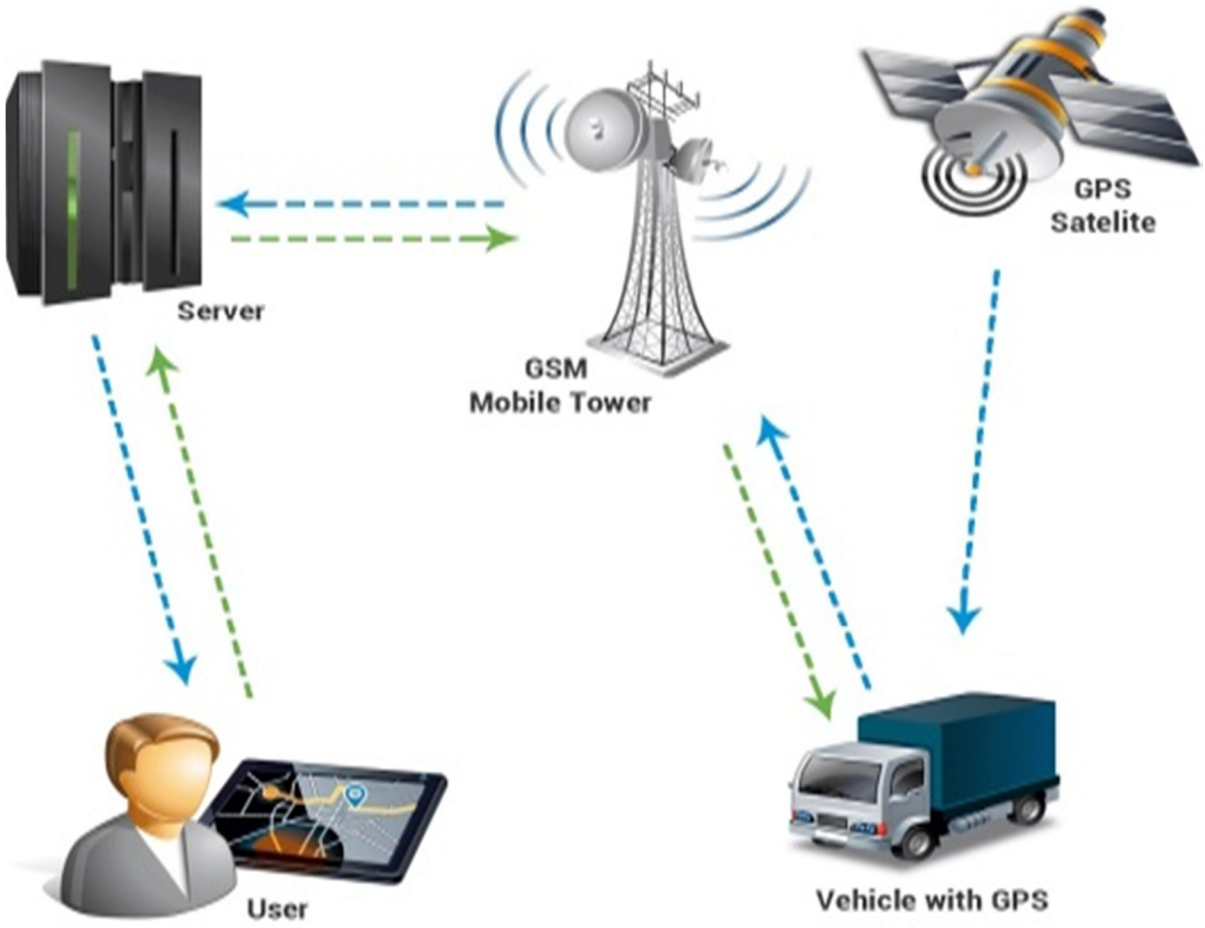

Fig. 1 System Architecture

The central server (pc) receives the information from the device, which is on the bus. This information consists of about speed, the location of the bus and its fuel level. The total relevant information is stored in the database. The stored data is view by using desktop or web applications. The database consists all the information about buses id, driver name, routes, stations, fuel.

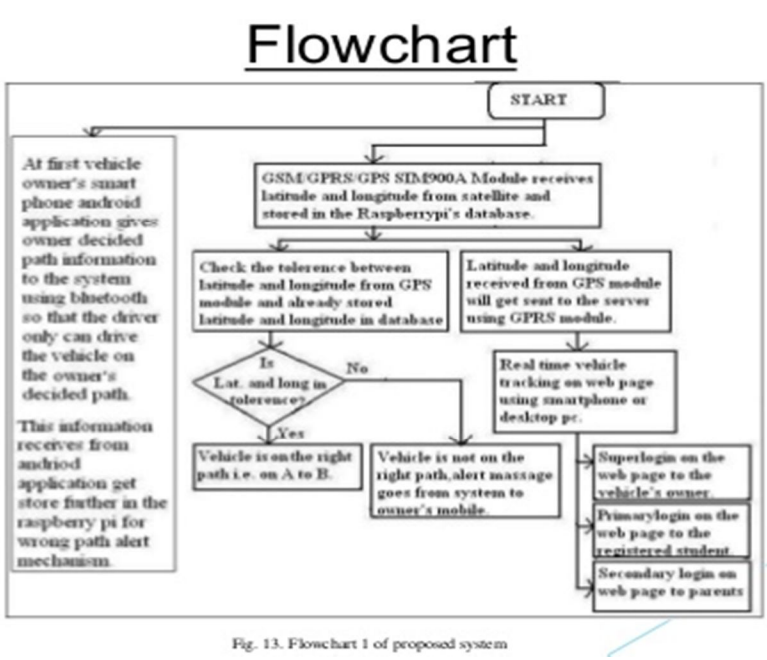

Fig. 13. Flowchart 1 of proposed system

Fig. 2 Flowchart for proposed System

After uploading the information into severs, through the internet we can access the information by using the computer. The website is designed by the ASP.MVC and visual studio2013 with embedded of Google map. Through this website, user can know the current live update of the buses.

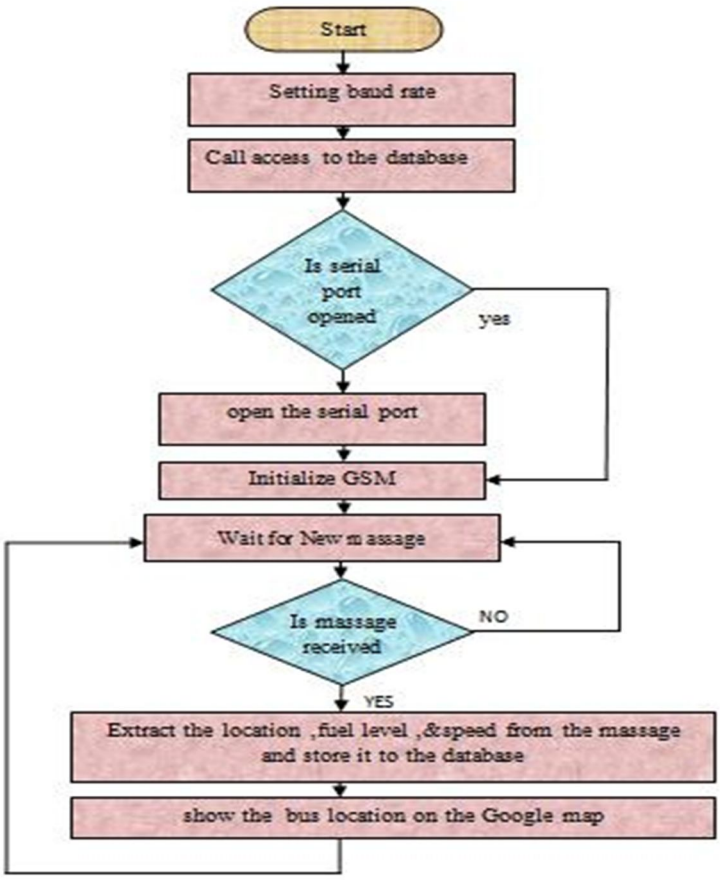

Fig. 3 Flowchart for the working process

The components and programs are:

A. GPS TECHNOLOGY

The Global Positioning System (GPS) is a worldwide radio-navigation system formed from the constellation of 24 satellite and their ground stations. It was developed by U.S Department of Defense. Today there are also many civil users of GPS across the whole world. The civil users are allowed to use the standard positioning service without any kind of charge or restrictions. Global positioning system tracking is a method of working out exactly where something is. A GPS tracking system, for example, may be placed in a vehicle, on a cell phone, or on special devices, which can either be fixed or portable unit. GPS works on by providing information on exact location. It can also track the movement of a vehicle or a person. GPS provides special satellite signals, which are processed by a receiver. These GPS receivers not only track the exact location but can also compute velocity and time. The positions can even be computed in three-dimensional views with the help of four GPS satellite signals. The Space Segment of the Global Positioning System consists of 27 Earth-orbiting GPS satellites. There are 24 operational and 3 extra (in case one fails) satellites that move around the Earth every 12 hours and send radio signals from space that are received by the GPS receiver.

Fig. 4 GPS Module

B. GSM Module

GSM module is used to establish communication between a computer and a GSM system. Global system for mobile communication is an architecture used for mobile communication in most countries. It requires a SIM card just like mobile phones to activate communication network.

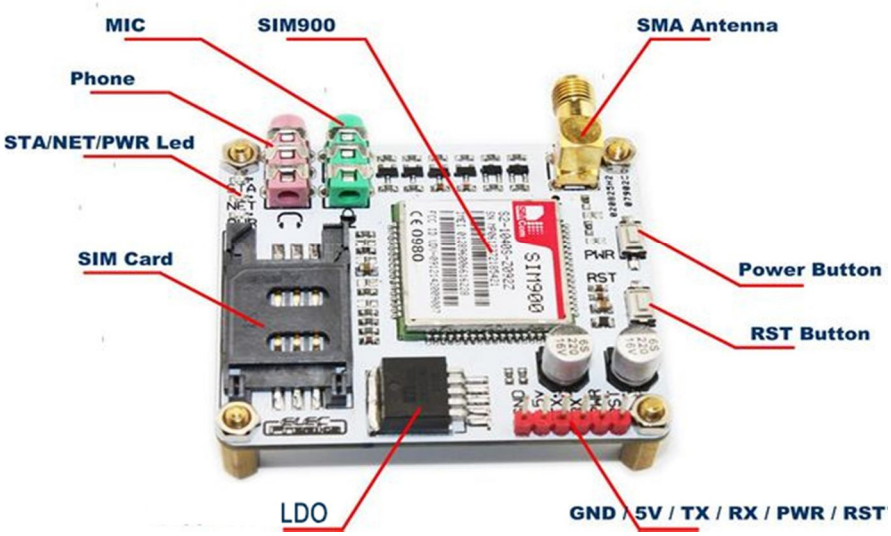

Fig5: GSM Module

C. Arduino Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button

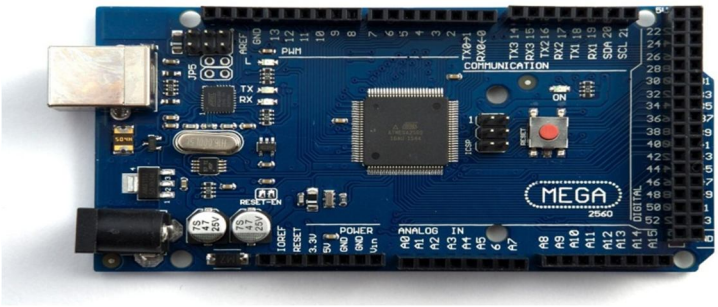

Fig. 6 Arduino mega 2560

D. ASP. Net MVC

ASP.NET MVC gives you a powerful, patterns-based way to build dynamic websites that enables a clean separation of concerns and that gives you full control over markup for agile development. The Model view controller architectural pattern separates an application into three main components: the model, the view, and the controller. The ASP.NET MVC framework provides an alternative to the ASP.NE T web forms pattern for creating web applications. The ASP.NET MVC framework is a lightweight, highly testable presentation framework that is integrated with existing ASP.NET.

E. Analyses Fuel Efficiency

With AVL View fuel monitoring system, wasted fuel will be a thing of the past. You can monitor, analyze fuel refilling and consumption even without using additional accessories like fuel sensor rods. Those who use spreadsheet would find this feature handy. You may upload fuel refill data on a spreadsheet directly to the platform. Once uploaded, fuel logs are created and the fuel expenses are e-logged.

1) Fuel efficiency reports for detailed analysis on fuel consumption.
2) Monthly fuel consumption report.
3) Fuel log & Cost/km reports.

F. Real-Time Fuel Level Monitoring

One of the many reasons why a fleet owner implements vehicle tracking system for his/her long route truck is to regain control over the losses incurred on road. And so as a first step, he/she should focus on reducing fuel wastage and catch en route fuel theft attempts.

Unmonitored vehicles are left vulnerable to fuel theft, and the surveillance of fuel tank level becomes critical to catching thieves in their act. Subscribe to AVL View *fuel monitoring system* with vehicle tracking, you won't be disappointed.

1) Digital fuel sensors designed for trucks.
2) Multi level calibration procedure ensuring up to 98%* accuracy.

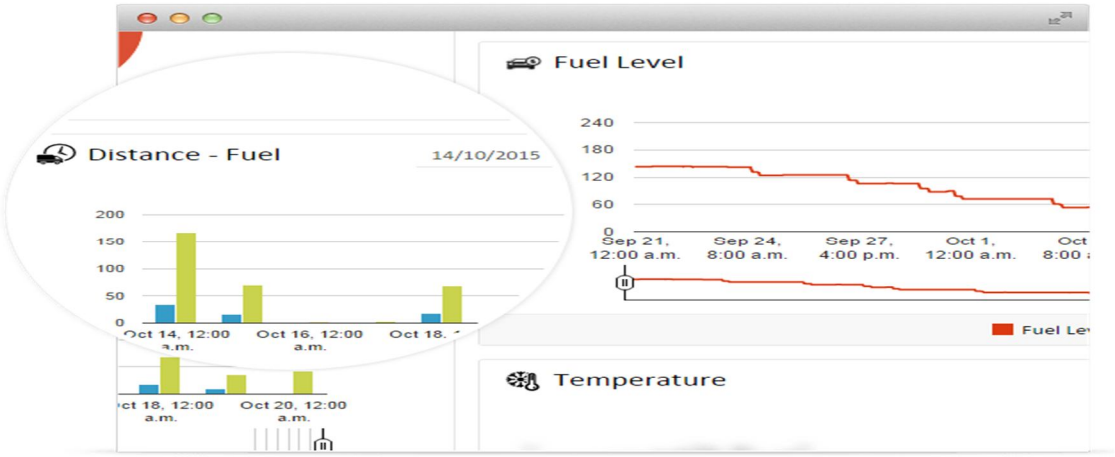

Fig. 7 Real-time Fuel level

IV. RESULTS AND DISCUSSIONS

The device which is in the buses sends a message to the server every 5 seconds using GSM module through the GPRS network. After receiving the message the central server executes the program.

First, all the devices in the buses send a frame to the central station every 5 seconds through GPRS network using the GSM module. In the central station when the designed program is executed, the main Form in the desktop application is displayed to perform the following:

A. Setting the baud rate and the com of the GSM that connect with the central computer to open the connection with the bus

B. When the connection establishes the GSM receive the information from the buses and send it to the desktop application to store it in the database .this process occurs in the background.

C. In figure_6 in the Setting section in the right side, if you press any button that Labels with a Buses, Drivers, Stations or Routs, the sub-screen will appear as shown in the figures from 8 to 11, throw it the administrator can add or remove abuses, station, and route or driver information from the database.

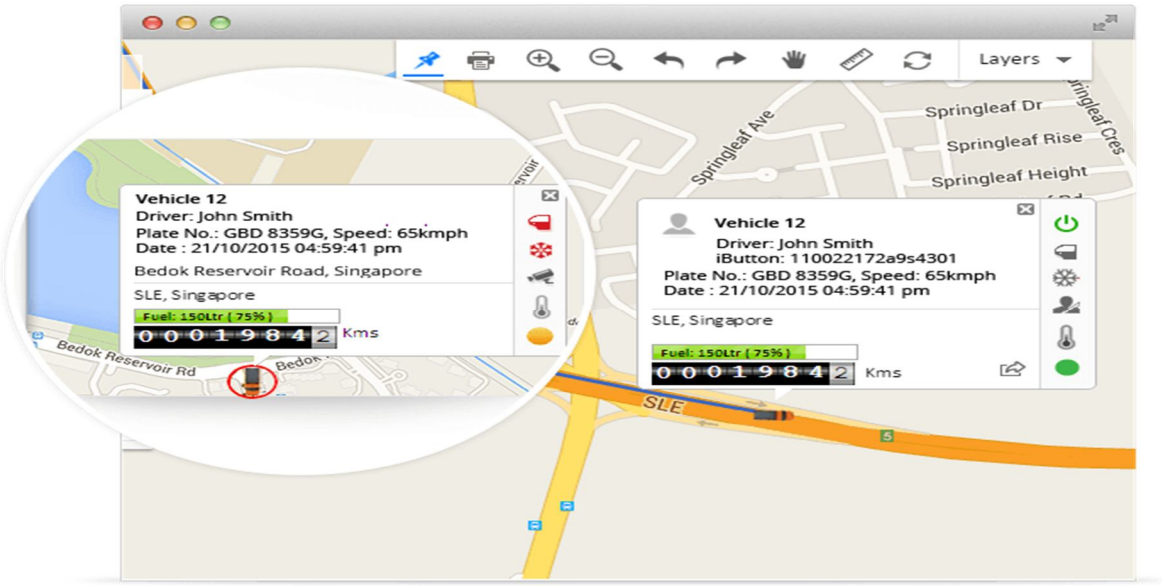

Fig. 8 Desktop Application

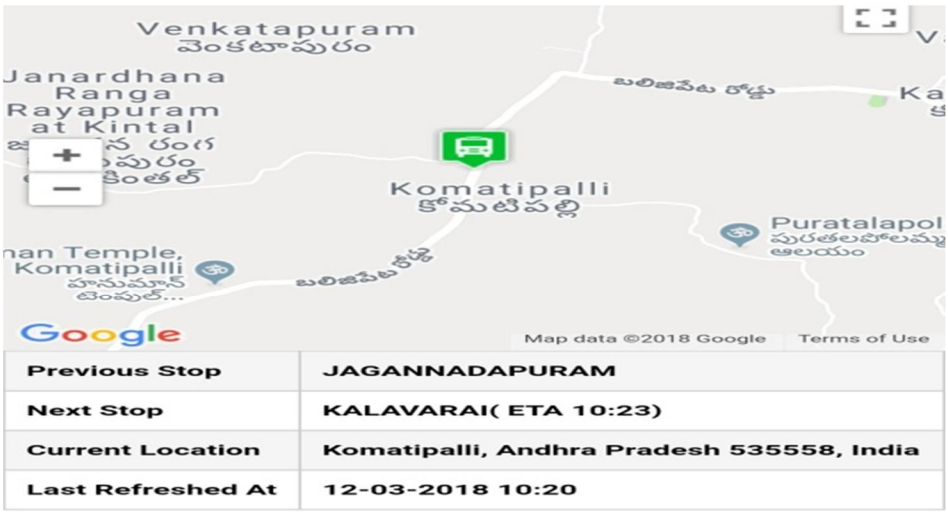

Fig. 9 Live location of Bus

SERVICE NUMBER	CK01
DEPOT NAME	SALURU
FROM	BOBBILI
TO	BALIJIPETA/CHILAKALAPALLI
BUS TYPE	Telugu Velugu
JOURNEY DATE	12-03-2018
SCHEDULED START	10:00
SCHEDULED END	10:45
VEHICLE NUMBER	AP 35 Y 4488
DRIVER NAME	P.H.Basha
DRIVER CONTACT	9494592005
DATA REFRESHED AT	12-03-2018 10:13
STATUS	Running

Fig. 10 Details of current bus

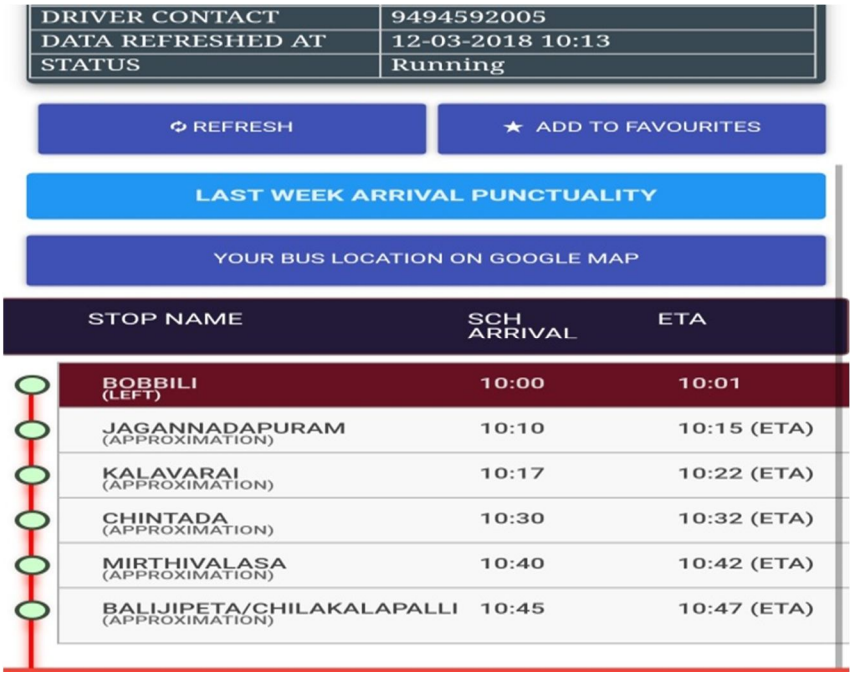

Fig. 11 Bus status

Fig 12: Location on Google Map

V. CONCLUSION

Vehicle tracking system resulted in improving overall productivity with better fleet management that in turn offers the better return on your investments. This paper attempts the smart design of tracking and monitoring of the buses, which helps the people and the companies to locate the current status of the bus service. This paper is a growing application in the transportation field. Many new features are being added to enhance the monitoring and tracking operations using recent technologies.

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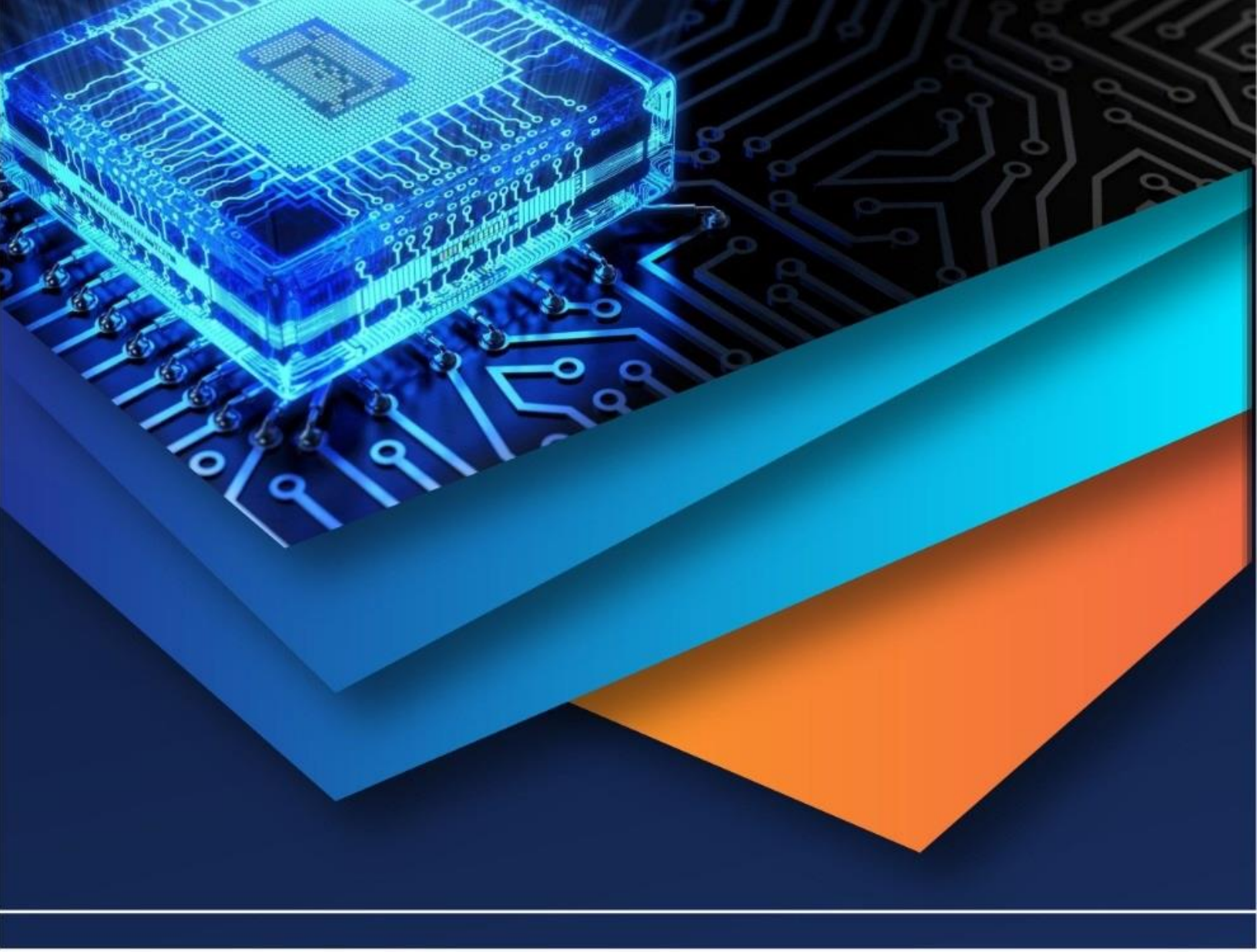

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