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# Self Driven Autonomous Vehicle Technology Using Artificial Intelligent

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**ABSTRACT:** An autonomous car navigation system based on Global Positioning System (GPS) is a new and promising technology, which uses real time geographical data received from several GPS satellites to calculate longitude, latitude, speed and course to help navigate a car. The goal of the project is to make an auto-navigational GPS model for driverless car that can route through known or pre-programmed co-ordinates autonomously without any control by human. It is designed to demonstrate the feasibility of using a low-cost strap-down inertial measurement unit (IMU) to navigate between intermittent GPS fixes. The present hardware consists of a GPS receiver, IMU, compass and a data processing computer. This research paper demonstrates a prototype development of autonomous car to enable the aerial vehicle accomplish the required autonomy and maintain satisfactory automated driving operation. Design objectives include simplicity, robustness, versatility and improved operational utility. The driverless car features an advanced, highly autonomous drive control system with an anti-drift from its course algorithms. The discovery of interacting hardware and software had led to breakthrough improvements in the efficiency of maintaining planned route on the track.

**KEYWORDS:** Autonomous, GIS, Sensors, LIDAR, BLDC motor, Environmental mapping, Machine Learning.

## I. INTRODUCTION

Autonomous vehicle navigation gains increasing importance in various growing application areas. In this project we described a system which navigates the vehicle autonomously to its destination and this project also improves the efficiency in navigation. These systems not only rely on GPS, to improve the efficiency it uses location information from inertial sensors also.

An autonomous vehicle, also known as a driverless vehicle, self-driving vehicle is an vehicle capable of fulfilling the human transportation capabilities of a traditional vehicle. As an autonomous vehicle, it is capable of sensing its environment and navigating without human input. This system takes the current position as source and gets the destination point from user. User has to specify the destination in the map. System finds the shortest path to the destination and extracts the lat, long coordinates from the graph & sends to the vehicle. Vehicle follows the coordinate using GPS and compass. If GPS signal not received, inertial navigation system is used to obtain current coordinate. Navigate in its environment is one of the most important capabilities. In general, the navigation task can be defined as the combination of three basic competences: localization, path planning and vehicle control. Path planning defines the computation of an adequate sequence of motion commands to reach the desired destination from the current robot position. Due to its planning component, path planning is typically done before motion. The potential application areas of the autonomous navigation of vehicle include automatic driving, guidance for the blind and disabled, exploration of Dangerous regions, transporting objects in factory or office environments, collecting geographical information in unknown terrains like unmanned exploration of a new planetary surface, etc.

Auto-navigational GPS model that can route through known or pre-programmed co-ordinates autonomously without any control by human. It is designed to demonstrate the feasibility of using a low-cost strap-down inertial measurement unit (IMU). An autonomous car navigation system based on Accurate Global Positioning System (Ac-GPS) is a new and promising technology, which uses real time geographical data received from several GPS satellites to calculate longitude, latitude, speed and course to help navigate a car.



The approach of GPS based autonomous navigation utilizes a GPS receiver that receives signals from a constellation of GPS satellites. The receiver then computes its position on the earth surface and a navigation algorithm will compute other parameters such as direction and distances in order to aid autonomous navigation.

## II. OBJECTIVES

- The main objective of this project is to design and implement a real-time autonomous navigation system for intelligent driverless vehicles by integrating a real-time global position system.
- Continuous real-time navigation data is required to provide this autonomous vehicle with high-rate data for following a pre-computed path.
- The goal of the project is to make an Automated driven, Less power consumption, Auto charging { Solar / Electric power}, Auto parking and Pollution free vehicle.

## EXPECTED OUTCOMES

- Ac-GPS feature gives its cars the ability to drive autonomously in some situations.
- While driving with Ac-GPS activated, an autonomous vehicle can regulate its speed, change lanes, and park without driver assistance.
- Autonomous driving that could be activated when the necessary software, hardware and road regulations come into place.
- The new hardware suite enables the latest iteration of the driving system, which is called Enhanced Autopilot.
- The system doesn't just work on straightaway, though. It can also handle turns and roads with complicated shapes.
- The complete self-driving system will use Ac-GPS technology to find the optimal route to its given destination.

## III. BACKGROUND

Motorized transportation has changed the way we live. Autonomous vehicles are about to do so once more. This evolution of our transport - from horses and carriages, to cars, to driverless vehicles, - has been driven by both technical innovation and socio economic factors. In this paper we focus on the technological aspect. Looking at the state of autonomous vehicles at the start of the 2020s we can see that impressive milestones have been achieved, such as companies like Waymo, Aptiv, and Yandex offering autonomous taxis in dedicated areas since mid-2018. At the same time, technology developers have run into unforeseen challenges. Some industry leaders and experts have scaled back their expectations, and others have spoken out against optimistic beliefs and predictions.<sup>[2,3]</sup> Gartner, a global research and advisory firm, weighs in by now placing 'autonomous vehicles' in the Trough of Disillusionment of their yearly Hype Cycle.<sup>[4]</sup>

The engineering community is less affected by media hype: Over 22% of the engineers visiting the Wevolver platform do so to gain more knowledge on autonomous vehicle technology.<sup>[5]</sup> Despite how much topics like market size and startup valuations have been covered globally by the media, many engineers have expressed to our team at Wevolver that comprehensive knowledge to grasp the current technical possibilities is still lacking. Therefore, this paper's purpose is to enable you to be up to date and understand autonomous vehicles from a technical viewpoint. We have compiled and centralized the information you need to understand what technologies are needed to develop autonomous vehicles. We will elaborate on the engineering considerations that have been and will be made for the implementation of these technologies, and we'll discuss the current state of the art in the industry.

This paper's approach is to describe technologies at a high level, to offer the baseline knowledge you need to acquire, and to use lots of references to help you dive deeper whenever needed. Most of the examples in the paper will come from cars. However, individual personal transportation is not the only area in which Autonomous Vehicles (AVs) will be deployed and in which they will have a significant impact. Other areas include public transportation, delivery & cargo and specialty vehicles for farming and mining. All of these come with their own environment and specific usage requirements that are shaping AV technology. At the same time, all of the technologies described in this paper form the ingredients for autonomy, and thus will be needed in various applications.



**Even as India goes green, lack of uniform standards for setting up charging stations is holding back companies. Alnoor Peermohamed reports.**

India's bullish plans to switch over completely to electric mobility by 2030 might have caught the eye of Tesla Motors CEO Elon Musk, but there are several issues that require the government's intervention if this pipe dream needs to turn into reality. Retail sales of electric vehicles in India is almost negligible today, despite both the Centre and some state governments subsidizing the cost of these vehicles. Delhi, for instance, offers ₹1.5 lakh additional subsidy over the Union government's FAME benefit, yet adoption in the city by consumers remains low. The high cost of electric vehicles isn't the only thing hindering their sales. The infrastructure needed for charging these vehicles is inadequate, none of the large original equipment makers are currently present in the space save for Mahindra & Mahindra. In the two-wheeler market, customers do have a few options, but the products are mostly substandard.

"A flat subsidy incentivizes low-spec vehicle manufacturing disproportionately, since it makes the end-customer price for low-spec products very attractive. In a category that doesn't have high awareness and understanding amongst consumers, it creates the impression that electric vehicles are low end and compromise products," says Tarun Mehta, co-founder and CEO of Ather Energy. While the government has been offering subsidies on electric vehicles from April 2015, it still has not introduced a standard for charging infrastructure. Work to define these standards, or Bharat Charging Standards as they have come to be known, is still on, with the government actively asking for the participation of the industry in defining them. The reason it is important for charging standards to be set in stone is that all players -- original equipment makers, charging station providers -- will then be able to build on it and crystallise their plans. Right now, the lack of any standards is holding back companies from making large investments in the space. They fear the infrastructure they set up right now might become redundant once the standards are introduced. Unlike a traditional electrostatic sensor, the Charge Sensor can make quantitative measurements. Numerical measurements improve many electrostatics experiments, such as charging by induction, charging by friction, and charging by contact.

The sensor can also be used to measure charge polarity. An extremely high-impedance voltage sensor with a 0.01µF input capacitor makes these measurements possible. The sensor has three operating ranges and a zeroing switch to discharge the input capacitor.

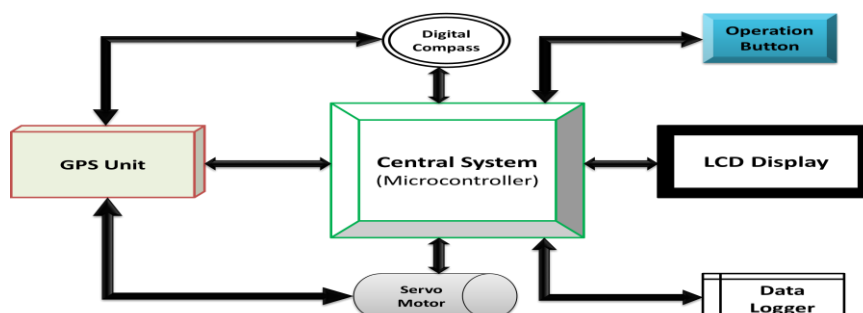
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**IV. METHODOLOGY**

**SYSTEM BLOCK DIAGRAM**





**BATTERY**

**LiFePO4:**The **LiFePO4** batteries have more constant discharge voltage and are considered to **offer better safety** than other Lithium-based batteries. Other advantages of the Lithium-based rechargeable batteries include the ability of a much faster recharge and higher discharge rates than other chemistries. LiFePO4 life expectancy is approximately 5-7 years.

**SOLAR PANEL**

**Comparison table:**

	Monocrystalline	Polycrystalline	Amorphous	CdTe	CIS/CIGS
Best research cell efficiency	25.0%	20.4%	13.4%	18.7%	20.4%
Area required for 1 kWp	6-9 m <sup>2</sup>	8-9 m <sup>2</sup>	13-20 m <sup>2</sup>	11-13 m <sup>2</sup>	9-11 m <sup>2</sup>
Typical length of warranty	25 years	25 years	10-25 years		
Lowest price	50 ₹/W	40 ₹/W	45 ₹/W		

**Electric Charging**

**120 volts:** This is the slowest type of charging, although for plug-in hybrids with smaller battery packs it may be enough to recharge in a few hours to overnight. The charging cord will test the circuit when you plug it in, to ensure that it's properly grounded and the current is strong enough to power the charger.

**Brushless DC Motor**

To make the operation more reliable, more efficient and less noisy the recent trend has been to use brushless D.C (BLDC) motors. They are also lighter compared to brushed motors with the same power output. Diameter ranges from 13 mm to 30 mm. Brushless DC slotted motor diameter and length are specified in inches. Brushless DC slot less motor diameter is specified in millimeters.

**Why BLDC motors?**

The brushes in conventional D.C motors wear out over the time and may cause sparking. As a result, the conventional D.C motors require occasional maintenance. Controlling the brush sparking in them is also a difficult affair. For this reason, the BLDC motors are used in most of the modern devices. Efficiency of a BLDC motor is typically around 85-90%, whereas the conventional brushed motors are only 75-80% efficient. BLDC motors are also suitable for high speed applications (10000 rpm or above).

**Rear and Front Wheel Drive**

**This vehicle is integrated with 4 brushless motors for each wheel.**

**Both front and rear wheels can steer to reduce the burden of reverse drive and parking.**

**GPS**

The GPS system does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. This system takes the current position as source and gets the destination point from user. System finds the shortest path to the destination and extracts the last, long coordinates from the graph & sends to the vehicle. Vehicle follows the coordinate using GPS and compass. If GPS signal not received, inertial navigation system is used to obtain current coordinate. The GPS costs you very low in comparison other navigation systems. The most attractive feature of this system is its 100% coverage on the planet.

**GPS Accuracy:**

The accuracy of a position determined with GPS depends on the type of receiver. Most consumer GPS units have an accuracy of about +/-10m. GPS is extremely easy to navigate as it tells you to the direction for each turns you take or you must take to reach to your destination.



### **LiDARs**

It's highly effective at creating a three-dimensional map of an environment, whether man-made, natural or in-between, and updating that 3D picture several times a second. Human vision performs the same function, but achieves it in a different way - your brain calculating the difference between your left eye and right eye to understand the distance and relationship between you and those objects in 3D space.

This approach will provide a holistic perceptual mapping of a vehicle's surroundings, and ensure system redundancy, reducing the occurrence of erroneous readings. Depending on the requirements, various combinations of LiDARs. Moving forward, LiDARs may become the cornerstone for the successful development and commercialization of higher-level autonomous driving functions.

### **SENSORS**

#### **Automated Braking System**

##### **What is an Automatic Braking System?**

Automatic braking technologies combine sensors and brake controls to help prevent high-speed collisions. Some automatic braking systems can prevent collisions altogether, but most of them are designed to simply reduce the speed of a vehicle before it hits something. Since high-speed crashes are more likely to be fatal than low-speed collisions, automatic braking systems can save lives and reduce the amount of property damage that occurs during an accident. The primary use of automatic brakes is in pre-crash and collision avoidance systems. These systems are typically capable of warning the passenger of an impending collision, tightening seat belts, and taking other actions that can help prevent an accident or reduce the damage that occurs during a collision.

#### **Charging Sensors**

Electrical charge sensors measure the electric charge contained in subatomic particles to determine the charge's electromagnetic interactions. The electrons have a -1 charge. The protons have an opposite charge of +1. In electrical circuits, these charges are detected by electrical charge sensors. For example, an electrical relay consists of two circuits: an energizing circuit and a contact circuit. These circuits are common to different electrical relays such as a latching relay, electromechanical relay, contact relay, and timing relay.

### **REFERENCES**

1. Source:<http://www.rediff.com/business/report/the-speed-bumps-for-indias-electric-cars/20170801.htm>



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