



## AUTONOMOUS TADPOLE VEHICLE

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### ABSTRACT:

The objective of the "AUTONOMOUS TADPOLE VEHICLE" is optimization of delivery platform. The vehicle consists of Sensors and GPS network for sensing the objects and to find the location of the vehicle. Light, Sound and Ultrasonic Sensors are connected at the Arduino board which is fixed in front of the vehicle. The Arduino board is programmed with boarding and destination of the vehicle. The Arduino board is used to control the motors and the sensors which are fixed in the vehicle. In addition to GSM module is placed for sending text message to the owner if there is no movement in the vehicle for three minutes. Light sensor provides the appropriate 3D view of the surrounding and it is the primary source of the vehicle. The performance of the vehicle is monitored using GPS. Hence the performance should be better. This project is mainly focused improving the delivery and travelling platform by providing the autonomous vehicle which uses solar for energy. Development in this project will lead to a smart environment all over India.

### KEYWORDS:

### INTRODUCTION

Nowadays Electric Vehicle plays a major role in the society and at the same time Solar Vehicles also plays a major role. The electric vehicle improves the air quality in towns and cities. Solar vehicles are environmentally friendly as they generate zero emissions while driving which can help to reduce air pollution and to reduce emission of greenhouse gases.

The autonomous vehicle is used to deliver things as well as it used for travelling purpose. The autonomous vehicle is societal cost-savings. An autonomous vehicle gives better access and mode of transportation. In this busy society delivering things should become complicated for the drivers at the appropriate time. This is rectified using the driverless autonomous vehicle which runs using solar energy.

The vehicle is monitored by GPS. The autonomous vehicle contains sensor for monitoring the objects around the vehicle. The vehicle comprised of tadpole design which is cost efficiency. Compare to normal driving vehicles controlling of the autonomous vehicle is easier.

The GSM module is used to sending the text messages to the owner when there is no movement of the vehicle until three minutes. It is connected to the Arduino board which is the controlling unit of the vehicle. There is a sim card connected to the vehicle which is used for the connection between the vehicle and the GPS.

### 2. EXISTING SYSTEM

The existing vehicle is semi-Autonomous vehicle. It is used only for delivery purpose. The vehicle is charged only by a charging port. Motor is fixed at the front wheel. Pulling torque of the vehicle is high. The existing uses wireless connection for monitoring-WIFI. This vehicle requires high torque. The vehicle is monitored by human.

### 3. PROPOSED SYSTEM

This vehicle is fully autonomous. This Vehicle is used for both delivery and travelling purpose. This is Hybrid charging vehicle. This Vehicle is used in colleges, Office, Zoo, Temple and Factories etc. The Vehicle is charged with both charging port and solar. This vehicle consists of a

transparent roof. This vehicle is used for multipurpose. Motor will be connected in the back wheel. Then the starting torque of the vehicle is low. So it consumes less power. The efficiency of the vehicle is increases compared to the existing vehicle. The cost is low. The maintenance of the vehicle is low. The vehicle is not monitored by human.

#### 4. BLOCK DIAGRAM

FIG- 1 BLOCK DIAGRAM

### 5. HARDWARE SECTION

#### 5.1 SENSORS

LIDAR is used to create the 3D view of the surveyed environment. The sensor sends the laser and it bounce back to the sensor after it touches the opposite object. The sensor calculates the time of the each pulse to determine the distance of the vehicle. The repetition of the process gives the real time 3D view of the environment.

RADAR is used to detect the objects it also locate and track the objects at various distances. The working principle of the RADAR is same as the LIDAR. It transmits the electromagnetic energy towards the object and receives the echoes from the object to determine the object.

ULTRASONIC sensors are used to measure the distance of the object. It uses ultrasonic waves to measure the distance of the object. The transducer is used to send ultrasonic pulses which come back with the information of object proximity to the sensor.

SOUND sensors are used to detect the sound waves and it converts sound waves into the electrical waves. There is a microphone in the sound sensor which is used to detect sound waves.

#### 5.2 MOTORS

BLDC (Brushless DC Electric Motor) is used for its efficiency. It has permanent magnets and it does not contain brushes. Commutator is absent instead hall sensor is used to reverse the current. It is commonly used in electric vehicles and robots etc. Hall sensors are used to control the rotor speed. It gives continuous torque.

Servo motor works on PWM (pulse with modulation) principle, means its angle of rotation is controlled by the duration of applied pulse to its controlled pin. Basically servo motor made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears. Servo motors are used in robots, food services and pharmaceuticals etc.

#### 5.3 BATTERY

Rechargeable lead acid battery is used to produce electricity. The lead is dipped in the sulphuric acid for chemical reaction which in reverse charges the battery. It is widely used in UPS system and automobiles. It is cost effective and easy to manufacture.

#### ADVANTAGES

- The efficiency of the battery is high compared to the other batteries.

- It is powerful compared to other batteries.
- It is easily rechargeable and has high power output capacity.

#### 5.4 SOLAR PANEL

Solar panel is used to convert sunlight into electricity. It uses photovoltaic cell for converting sunlight into electricity. The energy is used in batteries which in turn used as an energy source of the vehicle. It is cost effective and has high efficiency. It reduces pollution and emission of green house gases.

#### 5.5 CHARGING PORT

The charging port is used to charge the battery. It is the secondary source to the vehicle which gives and stores energy for the vehicle.

#### 5.6 GLOBAL POSITIONING SYSTEM

GPS is a device used to locate the vehicle and to monitor the vehicle. It receives signal from the satellite, receives signal and find the location of the vehicle.

#### 5.7 ARDUINO BOARD

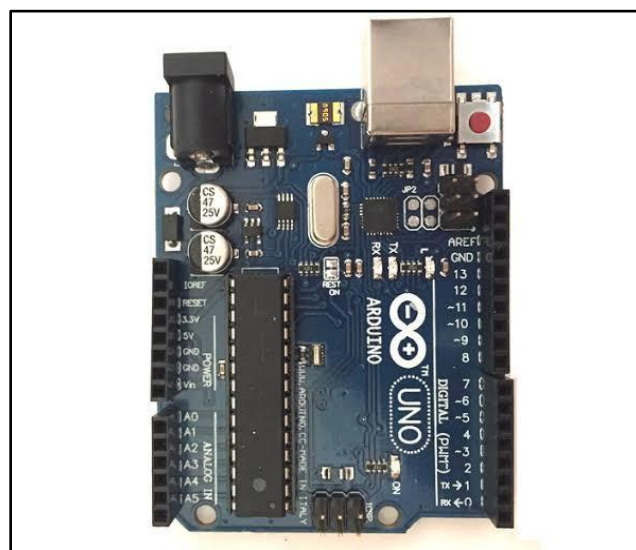
Each and every components of the vehicle is connected to the Arduino board. It is the control unit of the vehicle which controls GPS, Sensors, motors and all other components.

#### 5.8 DC-DC CONVERTER

It converts the unfiltered current from the solar into the DC current. It stores the electrical energy for converting direct current from one level to another.

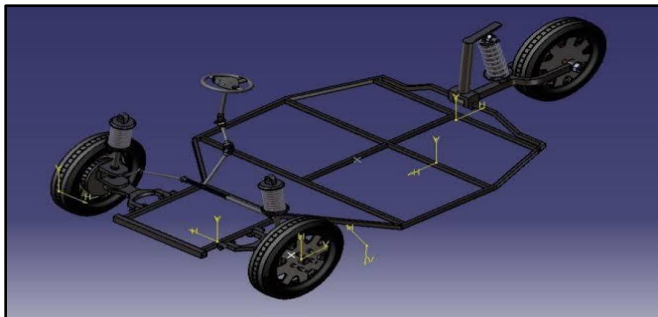
### 6. SOFTWARE REQUIREMENTS

#### ARDUINO IDE



The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It consists of 20 digital input/output pins. 6 pins are used as PWM outputs and 6 pins are used as analog inputs. Programs can be saved in to it from the Arduino computer program.

## 7. DESIGN



**FIG - 2 CHASSIS DESIGN**

### METAL USED FOR CHASSIS

Traditionally the most common material used for manufacturing the vehicle chassis has been CARBON STEEL. Steel is easy to get and the machinery required to manipulate steel is also easy. The primary reason of carbon Steel widespread use in the chassis construction industry.

### CONSTRUCTION

We Arrange a single brush less direct current motor (BLDC) for rear drive. Then we fix individual Shock absorber for each wheel. Then the direction of the vehicle is obtained by Servomotor. This Servomotor is controlled by program that we feed into the Arduino. The connection gears from the Servomotor to rod that connects the front wheels will change the direction of the wheel. Battery is the main power source that fixed at the centre of the vehicle.

### ADVANTAGES

- TADPOLE configuration has better cornering stability with both front wheels offer resistance to the cornering forces
- Having two wheels in the front is intrinsically more stable
- Production costs are lower, as there's one less wheel to produce, and you'll save on maintenance
- It has better Directional stability, increased comfort, reduced wheel slippage, better stopping power.
- Budget friendly
- Comfort and it has best endurance

- Trikes are safer than wheeled motorcycles in just about every way

### CONCLUSION

This Autonomous vehicle is very useful for future use that will be useful in situations where the delivery requires. By implementing this project, there will be an efficient and effective usage of delivery and travelling purpose. By this we improve our environment and make our city smart and become technically developed. By implementing this there is a development of delivery and travelling platforms.

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