

# Solar based Piedrive using GSM Technology

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*Abstract*— a vehicle that travels from point A to point B without any human input for a particular duration of time is classified as an autonomous vehicle. Such vehicles employ sensory, control and navigation technologies that respond to the environment accordingly, thereby eliminating the need for human interference. Autonomous vehicular technology aims to bring about a paradigm shift in transportation. For making these vehicles autonomous one need to develop various kinds of driving assistive systems. Driver assistance systems are developed to automate and enhance vehicle safety and better driving. Moreover, the renewable energy is vital for today's world as in near future the non-renewable sources that we are using are going to get exhausted. The idea of making a solar based vehicle along with assistive system, is a step in saving the non-renewable sources of energy as well as basis for future driverless vehicles. This paper will give an overview of a prototype car based on solar energy provided with driving assistive system.

**Key words:** Autonomous, Assistive, Self-Driving, Vehicle Safety, Renewable Energy

## I. INTRODUCTION

With increasing vehicles day by day traffic is getting denser. Long duration of driving, traffic jams for hours results into Human errors, which are the biggest contributing element to road accidents. Drivers distracted by their phones, drinking and driving, lack of skill, and road rage to name a few prevalent accidents-inducing errors been found in such accidental cases. In order to automate systems for safety and better driving, the driving assistive systems need to be developed and implemented. The safety features are designed to avoid collisions and accidents by offering technologies that alert the driver to potential problems. The data transmission, communication and control are basically accomplished using GSM and GPS technology. Since vehicle navigation and tracking is one of the most important factors in the context of navigation which is mostly used by many drivers, the GSM based piedrive will provide vehicle control and remote vehicle tracking. This prototype of vehicle will be controlled by using a mobile phone, using two different modes of operation. In one mode, we are simply using text base method to move our prototype using GSM interface and in second mode we will make it run with the help of android based app named blynk through wi-fi connectivity.

## II. LITERATURE SURVEY

Rinkukumar.et.al[1] In his paper author explained about various existing driving assistive systems. His work includes how these assistive systems can automate the vehicles in order to transform into autonomous vehicle. In his work

author researches on how effectively and efficiently various assistive systems can be used. By analyzing existing systems it is important to opt for advanced driving assistive systems for vision of fully autonomous vehicles. Modules like GSM and GPS can enhance the driving to a great level by observing surrounding conditions of vehicles properly.

B. Nivetha.et.al[2] In her paper author proposed driver drowsiness is the major issue behind accidents. To solve this issue many techniques are used. A new car safety system that anticipates what the driver is about to do a few seconds before it happens, to prevent those behind the wheel from committing mistakes. By observing the driver's body language and considering that in context of what happening on the road, a computer algorithm can determine the probability that the driver will turn or change lanes. The drowsiness detection fatigue is involves sequence of images of a face. The fatigue monitoring can be starts with extracting visual parameters. This can be done via a computer vision system. In the purposed work, author purpose a real time robust methods for eye tracking under variable lighting conditions and facial orientations. The tracking is based on the eye appearance. Visual information is acquired using a specially designed solution combining a CCD video camera with an IR illumination system. The system is fully automatic and detects eye position and eye closure and recovers the gaze of eyes. Experimental results using real images demonstrate the accuracy and robustness of the proposed solution.

Mashood Mukhtar.et.al[3] In his work author has presented a vehicle tracking system that employs a GPS module and a GSM modem to find the location of a vehicle and offers a range of control features. To complete the design successfully, a GPS unit, two relays, a GSM Modem and two MCU units are used. There are five features introduced in the project. The aim of this project is to remotely track a vehicle's location, remotely switch ON and OFF the vehicle's ignition system and remotely lock and unlock the doors of the vehicle. An SMS message is sent to the tracking system and the system responds to the users request by performing appropriate actions. Short text messages are assigned to each of these features. The design of the tracking system is divided into three parts; basic design, intermediate design and an advance Design. The basic design of the vehicle tracking system consists of a GSM module, a GPS module, a MCU (ATMEL), a Relay circuit and a LCD. The user sends SMS and the system responds to the user's request by providing the coordinates of a location in accordance to the requirements of mobile phone users through the GPRS network.

## III. CIRCUIT DIAGRAM

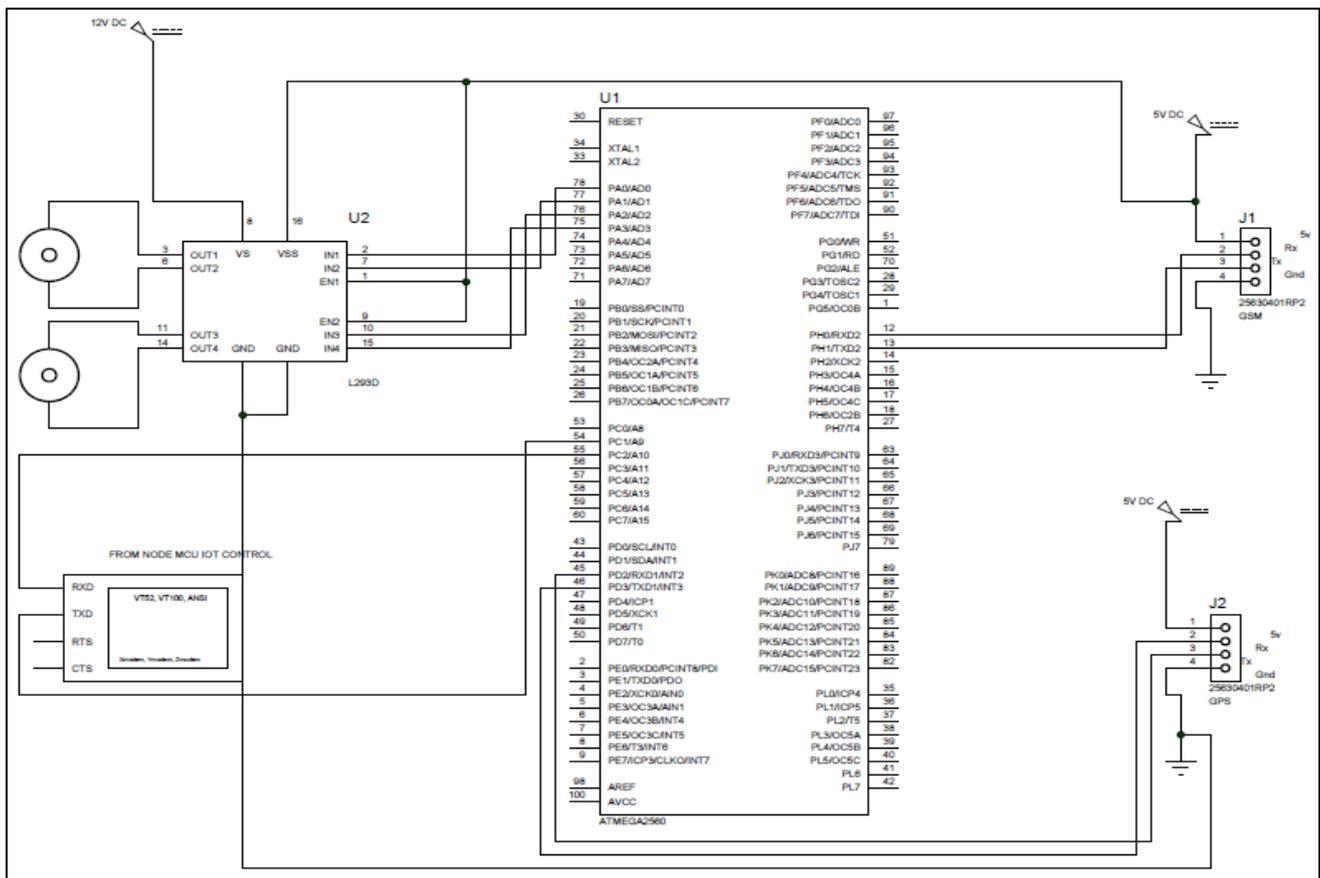


Fig. 1: Circuit diagram of Piedrive

#### IV. PROBLEM IDENTIFICATION

With rapid increase in number of vehicles on road, number of road accidents has been increased in decade or so. Every 30 seconds, someone dies in a traffic accident, adding up to well over 1 million deaths each year. Automobile accidents are the leading cause of death for people between the ages of 3 and 34. Moreover, human error is the cause of over 90% of automobile accidents. In addition, the inefficiencies related with the automobile usage is staggering. Long distance travel makes the driving hard. Most automobiles sit unused more than 95% of their lifespan, and a freeway operating at maximum efficiency has automobiles on only 5% of its surface. In congested urban areas, 40% of all gasoline used is spent when cars circle to look for parking spaces. Furthermore, in some U.S. cities, parking lots comprise more than a third of the land, becoming the single salient landscape feature of our built environment. Data from the Department of Transportation also evokes concerns about quality of life. It estimates that people spend an average of 52 minutes of each working day commuting. The opportunity cost of this time is high, whether it is measured in lost productivity, the inability to spend more time with friends and family, or increased stress. Autonomous vehicles could alleviate or completely solve these serious problems.

#### V. DESIGN AND IMPLEMENTATION

The circuit diagram of proposed model has been shown in the figure 1. This model includes DC motors, motor driving IC's, a microcontroller, GSM, GPS and node MCU modules and solar based power supply as the main components. The project is intended to work in two different modes. One mode

will be comprised of the SMS based method to move the prototype while other mode consists of moving it with the help of android based app over internet connectivity. Likewise keeping in mind the design process has been developed. The assistive system at initial level can consists of system we are going to use in our project. One is GSM & GPS mode and other is IOT mode. The GSM modem which is fixed at the robotic prototype will receives the messages sent by the mobile and gives the instructions to the microcontroller to control the its directions. GPS will help in location tracking and node MCU will make it run over internet through Wi-Fi connectivity. In this project, we interface Atmega2560 microcontroller with GSM SIM 900A, GPS and node MCU. The protocol used for the communication between controller and GSM modem is UART (Universal Asynchronous Receiver-Transmitter) and with node MCU it is MQTT (message queuing telemetry transport). This system continuously checks for messages to take the decision for controlling the robot by driving motors in predefined directions through motor driver IC's.

#### VI. RESULT

In both operating modes, the prototype worked well ie. moved in predefined directions as per the through android based app increased its range. The GPS system continuously monitors the location and give instant notification of collision along with location co-ordinates to user. Overall it helped in vehicle remote control and tracking by just a simple touch to mobile, proving to be a better assistive system at initial level. Use of solar energy for power up the prototype is another feature of our project.

## VII. FUTURE SCOPE

This system can be made more advanced by using various kinds of sensors. It can be developed to serve as an unman transporter where the device takes the load to the destination without the need of the user. It can also be used in the war field for the transportation of Ammunition from one place to another. The user only has to feed the coordinates of the plane of destination and gets free to other work. It can also be used for automatic valet parking.

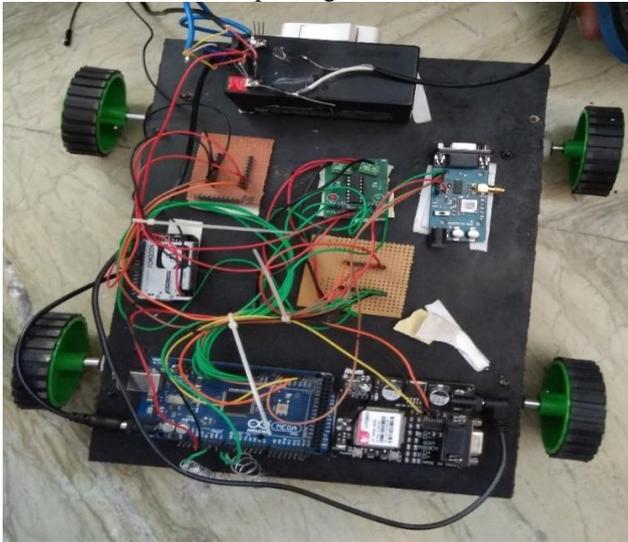


Fig. 2: Hardware pic

## VIII. CONCLUSION

Driving assistive system need to be implemented in more and more vehicles. These technologies will not only save time and money but also provide rapid boost to autonomous vehicle. It will enhance the driving quality and help in reducing the driver's effort to a great level. Thus, for now, it can be said that it is the most adaptive, user friendly, interactive driving assistive system to be installed in prototype, just to make them automated.

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