Realization of Self driving Car with Collision Avoidance

R. Nickson Rajapaul[1], A. Mahibalan[2], S. Naveenkumar[3], M. Muthukumar[4], Ragimol. M. G[5]

[1,2,3,4] BE Mechatronics Engineering, Department of Mechatronics Engineering, Nehru Institute of Engineering and Technology
[5] Assistant Professor, Department of Mechatronics Engineering, Nehru Institute of Engineering and Technology

ABSTRACT

There are many driver assistance systems which can make driving safer and comfortable. Moving one step further we can change the driving process to fully autonomous, so that the time utilization and can be done in a magnificient manner. That is the system doesn't need human interface in driving and people can occupy their time by doing other things while on road. We aim to implement such a fully automated driving system. for the movement of the car, two DC motors are chosen and the motor gives the forward and reverse motion to the car. For the controlling purpose the Arduino developer model PROTON and the main controller chip of At Mega 8L is utilized in this . We have chosen the sensors for observing the surroundings and the environment. The Ultrasonic sensors for measuring the minimum difference between the car and the nearest object. By completion we obtained82% of efficiency

Keywords: Ir Txr, Ultrasonic Sensor, Dc Motors, Keil Software

1. INTRODUCTION

For the past hundred years, innovation within the automotive sector has brought major technological advances, leading to safer, cleaner, and more affordable vehicles. But for the most part, since Henry Ford introduced the moving assembly line, the changes have been incremental, evolutionary. Now, in the early decades of the 21st century, the industry appears to be on the cusp of revolutionary change with potential to dramatically reshape not just the competitive landscape but also the way we interact with vehicles and, indeed, the future design of our roads and cities.

The revolution, when it comes, will be engendered by the advent of autonomous or "self-driving" vehicles and the timing may be sooner than we think. KPMG LLP and the Center for Automotive Research (CAR) joined forces in developing this white paper to examine the forces of change, the current and emerging technologies, the path to bring these innovations to market, the likelihood that they will achieve wide adoption from consumers, and their potential impact on the automotive ecosystem. Research included interviews with more than 25 thought leaders, automotive and high-tech executives, and government officials as well as analysis of industry trends. This white paper presents our findings, with an emphasis on the convergence of sensor-based and communication-based vehicle technologies and its implications.

2. EXISTING SYSTEM

2.1 Google's Self Driving Car

Google self-driving car is any in a range of autonomous cars, developed by Google X as part of its project to develop technology for mainly electric cars. The software installed in Google's cars is called Google Chauffeur. Lettering on the side of each car identifies it as a "self-driving car". The project team has equipped a number of different types of cars with the self-driving equipment, including the Toyota Prius, Audi TT, and Lexus RX450h, Google has also developed their own custom vehicle, which is assembled by Roush Enterprises and uses equipment from Bosch, ZF Lenksysteme, LG, and Continental. Google's robotic cars have about $150,000 in equipment including a $70,000 LIDAR system. The range finder mounted on the top is a Velodyne 64-beam laser. This laser allows the vehicle to generate a detailed 3D map of its environment. The car then takes these generated maps and combines them with high-resolution maps of the world, producing different types of data models that allow it to drive itself.

The advent of driverless and automated vehicle technologies offers enormous opportunities. It will make driving easier, improve road safety, reduce emissions, and ease congestion. It will also enable drivers to choose to do other things than driving during the journey. Ultimately access to fully automated vehicles will also improve mobility for those unable or unwilling to take the wheel, enhancing their quality of life. As a result driverless vehicles could provide significant economic, environmental and social benefits.

Fig: 2.1Google Self driving car

2.2 Delfi Selfdriving Car

In 1903 delfi comes to creating a first driving car to cross the country at 1903 it is very difficult to cross the country by using a car but they had an idea to use autonomous car to travel a longest distance . The team of delfi engineers crossed 3400 miles, New Yorkcity to San Francisco. The 99% of delfi car was derived by autonomous mode. The delfi used an audi Q5 SUV car with some modification(cameras, radars and leaser scanners). Cost of the car is more then $500,000 because of they using 6 lidar sensors for measure the distance and using 6 radar sensors for bad weather and they using multiple high pixcal camera to watch the road and to senses the opposite vehicle.

3 PROPOSED SYSTEM

We are proposing an autonomous system for a car .The paper is based on fully automated car. So that we are chosen the sensors for observing the surroundings and the environment. The Ultrasonic sensors for measuring the minimum difference between the car and the nearest object and it was placed on the front of the car and IR proximity sensors are used to sense the nearest appearance of the object towards the car. In our project we are using two IR Proximity sensor, one is placed in a right side of the car and another one placed in a left side of the car which is used to sence the object in sides (right and left) of the car. IR proximity sensor having a transmitter and a receiver. the transmitter trans mite the infrared signal that will be reflected by an object, that is received by the receiver of the IR proximity sensor

3.1Block Diagram

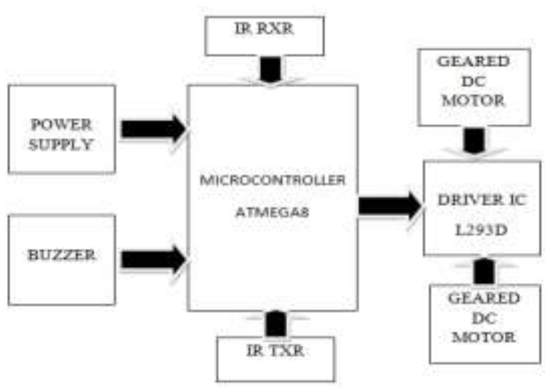


Fig 3.1: Block diagram of our car model

3.2 Ir Txr

The NIST Thermal-infrared Transfer Radiometer (TXR) is used for measuring the radiance temperature in the thermal-infrared spectral region of extended-area blackbody sources, over the range of about 190 K to 350 K, either in vacuum chambers or ambient condition laboratories. The TXR is a portable radiometer with two channels, one at 5 µm and the other at 10 µm. It uses a photovoltaic In Sb detector for the 5-µm channel, and a photovoltaic mercury cadmium telluride (MCT) detector for the 10-µm channel. The detectors, filters, and reflective optics are built into a liquid-nitrogen cryostat, and the entire radiometer is vacuum/cryogenic compatible and designed to be deployed inside of the

3.3 Ultrasonic Sensor

Ultrasonic transducers are transducer that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called **ultrasound transceivers**; many **ultrasound sensors** besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and son a system, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Active ultrasonic sensors generate high-frequency sound waves and evaluate thee cho which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions, convert it to an electrical signal, and report it to a computer.

3.4 Avoidance Sensor

This sensor module have great adaptive capability of the ambient light, having a pair of infrared transmitter and the receiver tube, the infrared emitting tube to emit a certain frequency, encounters an obstacle detection direction (reflecting surface), infrared reflected back to the receiver tube receiving, after a comparator circuit processing, the green LED lights up, while the signal output will output digital signal (a low-level signal), through the potentiometer knob to adjust the detection distance, the effective distance range 2 ~ 80cm working voltage of 3.3V-5V. The detection range of the sensor can be adjusted by the potentiometer, with little interference, easy to assemble, easy to use features, can be widely used robot obstacle avoidance, obstacle avoidance car assembly line count and black-and-white line tracking and many other occasions.

3.5 Motor Drive

Motor drives for compact and amateur cameras wind slowly—shot-to-shot intervals of approximately a second are commonplace. Professional grade cameras are faster, with speeds up to 10 frames per second (fps). The first 35 mm SLR to achieve such a shooting speed was Nikon's High Speed Motor Drive camera, first developed for the 1971 Chicago Photo Expo with 7 fps. To enable this speed and allow the photographer to more easily track the moving subject, this camera used a fixed, semi-transparent pellicle mirror instead of a moving mirror. Today, the fastest professional models from Canon and Nikon achieve approximately 10 frames per second with a moving mirror. In the digital camera era, some users continue to refer to continuous shooting modes as "motor drive.

4. EXPERIMENTAL SETUP

4.1 Working Mode

IR sensor are used to detect the obstacles in shortest distance when a IR sensor detect the obstacle in right side the vehicle will turn left side according to the left side IR sensor and program the function of left side IR sensor is similer to the right side sensor

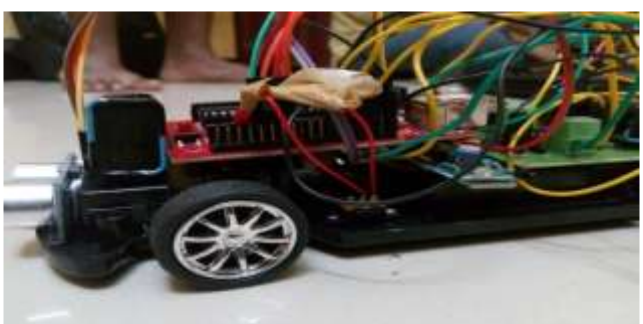


Fig 4.1 TR TXR from our mode

A ultrasonic sensor used to detect the obstacles present in the long distance(less then 5 meter).The ultrasonic sensor transmitting a ultrasonic wave that was reflected by the objects that is received by the receiver of ultrasonic sensor. We can measure the distance of the objects and size of the objects by using reflected ultrasonic wave based on the ultrasonic sensors signal the vehicle speed will controlled

Fig4.2 ultrasonic sensor from our model

We utilized the keil software for simulation.

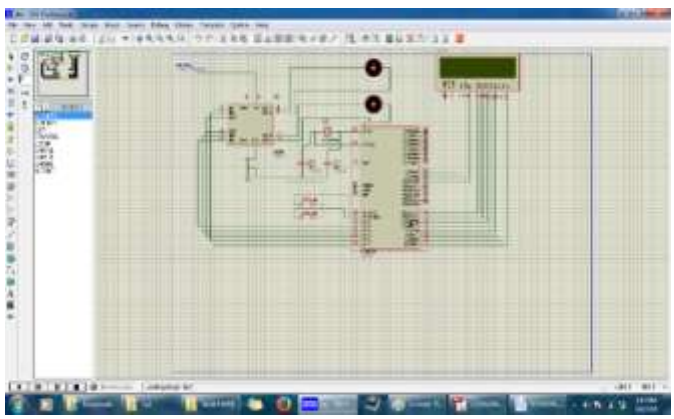
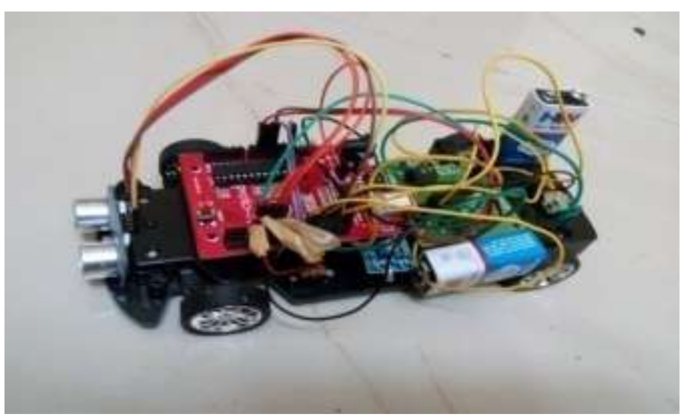


Fig4.3Circuit diagram simulated in the Keil software

Complete Setup of Our Model



CONCLUSION

With the heights of the technology autonomous car is no more a myth. It's a reality! We would like to present that there must be further developments in this technology to make autonomous car more common all over the world. This can be happened by making the autonomous easy to operate for the user and the designers should concentrate more in producing autonomous cars, which should not cost a lot, they should in the vicinity of customers' budget. With this type of vehicles there will be great advantages in the coming feature. Due to speed control technique, accident free driving is possible and fuel savage is also made possible by the technique, which will make the car to travel through shortest path

REFERENCE

[1]. D. Veneziano, "Accuracy Evaluation of LIDAR-Derived Terrain Data for Highway Location," presented at the 2002 Transportation Scholars Conference, Iowa State University, 2002.
[2]. Tom‟s Hardware, "CPU Charts 2007," December 2007, http://www.tomshardware.com.
[3]. R. Elias,"Sparse view stereo matching, Pattern Recognition Letters 28," 13 Oct. 2007.
[4]. E. Rosten, "FAST Corner Detection," October 2006, http://mi.eng.cam.ac.
[5]. U.A. Dauderstad, P.M. Sarro and S. Middelhoek, "Temperature dependence and drift of a thermal accelerometer," Solid State Sensors and Actuators, 1997.
[6]. Smithsonian National Air and Space Museum, "How does GPS work?" 1998, http://www.nasm.si.edu.
[7]. Google self-driving car,From Wikipedia, the free encyclopedia.