WIRELESS GESTURE CONTROLLED VEHICLE

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ABSTRACT

With the advent of 21st century, we have seen major advancements in the technological fields ranging from high tech drones used by military organizations and driverless/self driving car designed by Google. The idea proposed in this paper is about a wireless gesture controlled car which can be easily controlled by the user with just his/her hand gestures. The car is equipped with radar which can detect turns and gradient of the road and notify the user about the same to avoid any kind of mishap. The various modules in the project are:

***Transmitter* –** Used to transmit the gesture from the user to the receiver located on the chassis of the vehicle.

Receiver – Used to receive the signals and convert them to mechanical energy using the geared DC motors.

Programmer – This module is used to load the programs onto the receiver, micro-controller and the transmitter.

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Keyword: - *CVAVR, Proteus, ATmega16*

1. INTRODUCTION

A vehicle is something in which an object can be loaded to travel from one point to another. A vehicle is also something which limits the human efforts and helps maneuver basic controlling. Drones and auto-pilots used in airplanes are a decent example of how human-computer interaction needs to be monitored in order to avail simple functioning of the complex machines. Similarly, a simple vehicle (car, in this project) must be controlled by the human being by being physically present in the vehicle.

Mishaps are something that is very common in the transportation world and loss of capital, goods and human life is something that is too precious to lose. We hereby, present to you this project where the same vehicle can be controlled by a human being of any capacity using only the hand gestures and no extra effort. The gestures will be easily converted in the directions and thrust used by the motors to move the vehicle in the user-defined direction and at user-defined speed.

1.1 Objective

The main objective of this idea is to make sure that safety is the foremost concern for every human being and it must be maintained every time. This vehicle and the idea proposed not only provides the safety to the user, but also makes sure that comparatively, less human effort is needed to do a task where physical presence was necessary. The idea and the module used make the vehicle user-friendly and highly affordable.

1.2 Organization of the report

The report is divided into 4 parts and each part deals with the different aspects of the system.

- **(i)** **Design:** This part talks about the existing system, how they are designed and the issues associated with them. Furthermore, it describes the features of the system proposed and the requirements for operating it.
- **(ii)** **Module Description:** This part describes each module implemented in the system, i.e., how the data is processed in each and what are the steps involved from the user's point of view.
- **(iii)** **Implementation:** This part deals with an overview of the platform for which the system is developed for. It also talks about the parameters needed for running the system and provides a sample of code used, along with screenshots of the output.
- **(iv)** **Conclusion:** This part concludes the report and discusses the possible enhancement that can be implemented in the future improve the quality.

1.3 Challenges Overcome

The user is verified by the unique code of the connection and thus any random user cannot operate the vehicle. A voice controlled password has been installed in the module that converts the voice into text and checks whether the password matches to the text or not. This ensures privileged access to the vehicle by only the authorized users..

2. LITERATURE REVIEW

This specific project is not only the most easy topic but also rarely used. For instance there exist more than 3 Self Driving Cars (including the Tesla) and only 3 till now have managed to climb the cliff. With the market not so open, entering into this was indeed difficult and the greatest risk. As said by Elon Musk, “Simplicity is the mother of complex projects”, this is what we have done here. With every review, every guidance and every help, we crossed the steeping stones to what was another brain child project, Wireless Gesture Controlled Car. The vehicle, the modules in itself is enough to explain the need for this kind of innovation in market. The vehicle stands for itself with its unique idea and safety concerns. It is indeed very important to take care of ourselves, no one can ever predict when a mishap happens or when an electrical component fails. Accidents are subject to life pertaining risk and that’s the reason this idea was born. During the whole review process of this idea, we referred this as not a vehicle, but just an idea or a proposal. The only reason for this was that it is not published and one of the goals of this project is yet to be accomplished. The others goals are not profit, but safety and reliability. The stepping stones to the final commencement of the project are just debugging and prototype design which have been successfully done. To achieve greater safety, the radar system needs to be installed which has been proposed in the future enhancement phase. One of the reasons for the generation and metamorphosis of this idea is the growing number of accidents and the amount of lives lost and the capitals and goods wasted. This idea will not only aim at profitability for the business domain users, but also safety of the loved ones who use this project.

2.1 Existing System

The existing ideas are self driving car by Google and the auto-drive feature used by Tesla in the Model X and other models of their cars. The cost of the system used in market is comparatively much higher than our idea owing to the fact that lot of GPS tracking needs to be done and maps have to be loaded in the User Interface to make sure that the car is driving it properly. What the systems don’t have is the dead man’s switch, a concept used in a project which has been described in the proposed system.

2.2 Proposed System

Many cars and projects are launched with the self driving technology and numerous numbers of ideas are there in the market. The proposed system has the features and implementation as follows:

i) Low cost
ii) Platform independent (Same technology can be used in any vehicle),
iii) Secure voice controlled user access,
iv) Simple Design,

iv) Safety

The gestures are sent to the receiver using a transmitter that is held by the user which is attached to the glove that the user can wear. The receiver is fixed on the chassis of the main controller which is in-turn attached to the geared DC motors. The receiver receives the signals and passes them to ATmega16 micro-controller used to convert the motions to electrical signals passed to the motors. The motors will run on the speed determined by the gesture done by the user that has been converted into electrical signals by ATmega16 micro-controller. The simulation of the whole idea was done on Proteus and the code was compiled in CVAVR. The gestures and converted simultaneously as the vehicle is moving.

2.3 Module

- **Stepper Motors:** A stepper motor is a brushless, synchronous electric motor that converts digital pulses into mechanical shaft rotation. Every revolution of the stepper motor is divided into a discrete number of steps, in many cases 200 steps, and the motor must be sent a separate pulse for each step. The stepper motor can only take one step at a time and each step is the same size. Since each pulse causes the motor to rotate a precise angle, typically 1.8°, the motor's position can be controlled without any feedback mechanism.

- **Accelerometers**: Accelerometers provide a means of measuring acceleration along an axis, also known as force. They are susceptible to position noise which can be avoided by incorporating filtering on their digital or PWM output lines. Accelerometers are commonly found in airbag and braking control systems of vehicles. Their main purpose is to measure changes in speed. It is classed as an analogue device as the voltage varies with respect to the rate of change.

- **Wheels:** The wheels provide traction and locomotion for the robot as well as support for the robot chassis. The diameter of the wheel should be chosen to best reflect the torque requirements of the machine. It is used to impact on traction and the smoothness of the motion experienced by the inertial sensors and sensitive components onboard. The number of wheels to be used in a design should depend on requirements of the capabilities.

2.4 Work Flow:

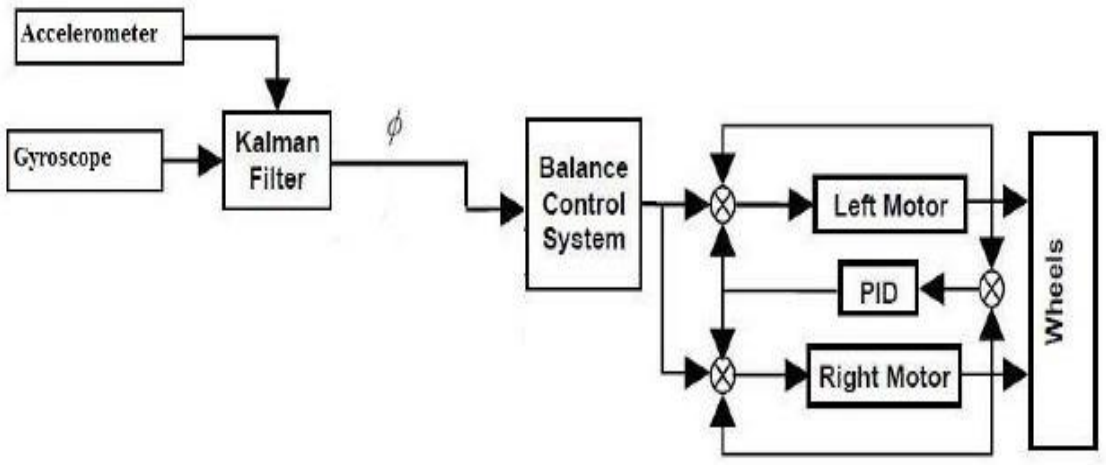

Figure - 1: Work Flow

2.5 Flow Chart:

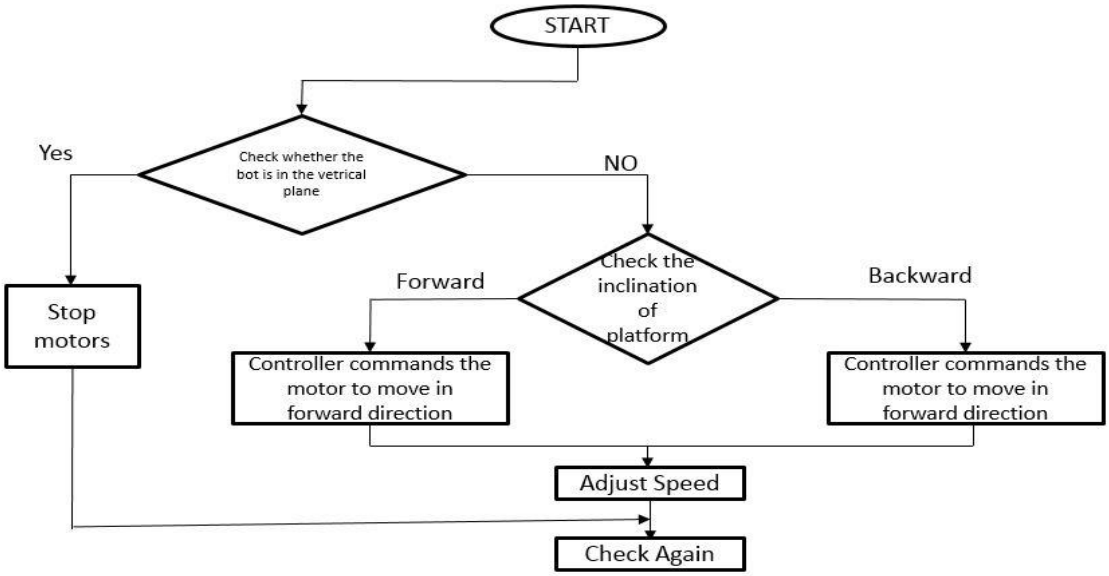

Figure - 2: Flow Chart

2.6 System Architecture:

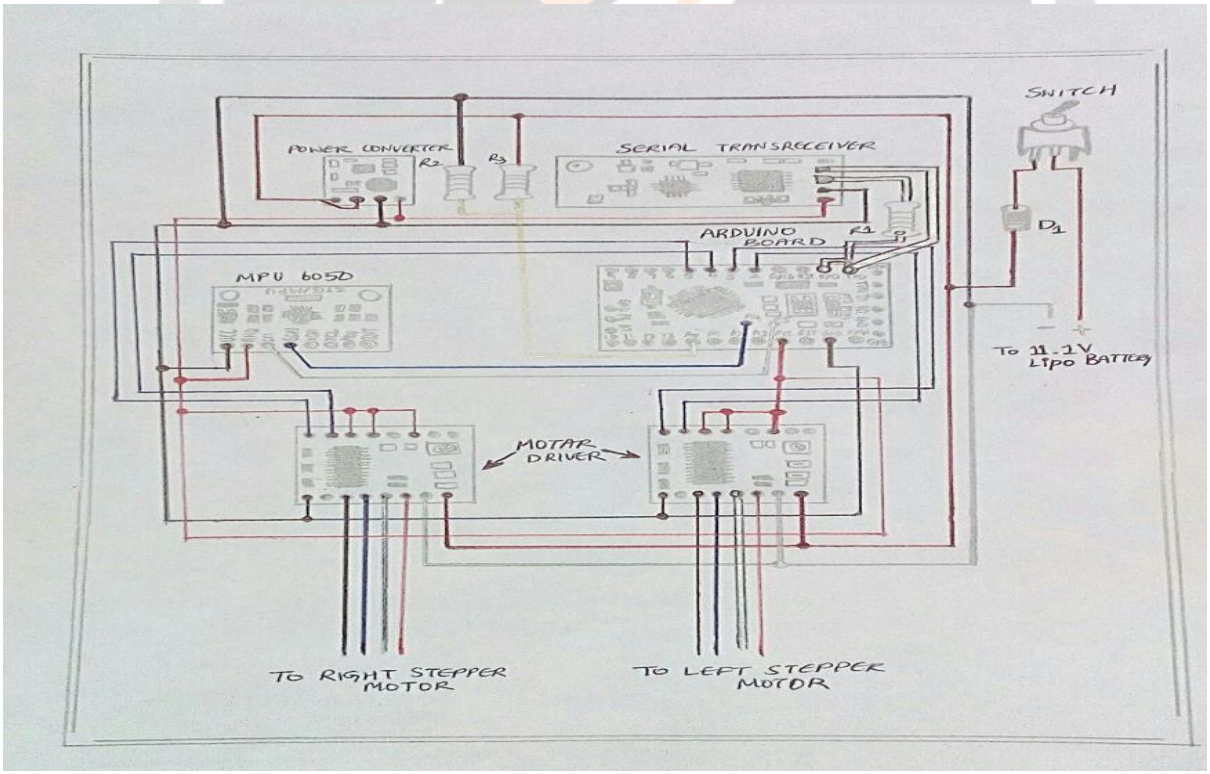

Figure - 3: System Architecture

2.7 Future Enhancements

- The data about the gradient and turns and obstacles will be provided to the user through an in-built radar system.
- The same technology would be used to test drones.
- Biometric scan and security system will be included in the system other than the voice controlled password protection offered.
- Live video coverage of the vehicle and the route to implement this idea when the vehicle is to be operated in no line of sight situation.
- Dead man switch to make sure that user is active and safe when controlling the vehicle.

2.8 Features of the Vehicle

There are many great features but some of the features are worth mentioning:

- User will be able to control the vehicle when he is not physically present there.
- Speed control implemented in the system.
- The vehicle will automatically stop when obstacle sensed by the sensors in the front of the vehicle.
- Sensors attached on each side of the vehicle enhancing collision avoidance.

3. CONCLUSION

- In this given time, self driving vehicle are too many. But due to high cost, they are hardly used.
- The low cost and high reliability makes this idea implementable.
- A user-friendly and safe vehicle saves the cost of goods and lives of the human beings involved in the mishaps.

4. ACKNOWLEDGEMENT

We, Aditya Bhat and Vignesh Kannan have dedicated our time, heart and efforts for this project. Still, it would be unfair not to mention a few names as without their constant support and backing, this would not have been what it is now. Therefore I would like to extend my sincere gratitude to all of them.

First of all I would like to thank our Guide of project Mr. R. Veeramani for his sincere attention, guidance and impeccable abilities and also our HOD Dr.T.K Thivakaran for providing valuable insight and expertise.

In the end we thank SRM University, Ramapuram campus for providing the freedom and resources to pursue the project we wanted to.

5. REFERENCES

[1] IMPLEMENTATION OF WHEELED SELF BALANCING PLATFORM B.S.B. VAMSI KRISHNA, P. MALLIKARJUNA RAO. PG student, Dept. of Electrical engineering, A.U. College of engineering, A.P, India, bsbvk2594@gmail.com Professor, Dept. of Electrical engineering, A.U. college of Engineering, A.P, India, Volume: 03 Issue: 10 | Oct-2016, e-ISSN: 2395 -0056, www.irjet.net

[2] Mrs..LEKSHMY. S1, ALEESHA GEORGE2, ATHIRA C. V3, Department of ECE, Vimal Jyothi Engineering College, Chemerin, Kannur, SELF BALANCING ROBOT, Volume2, Issue 12, December-2015, pp.1091-1095 ISSN (O): 2349-7084 http://www.ijcert.org/V2I1249.pdf

[3] Wireless-Wheeled Self-Balancing Robot, HELLMAN, HANNA SUNNERMAN, HENRIK, Supervisor: Martin Eden Grameen Examiner: Martin Edin Grimheden Approved: 2015-05-20, TRITA MMK 2015:8 MDAB061

[4] Brisilla R.M, Sankaranarayan V. "Nonlinear control of mobile inverted pendulum", Robotics and Autonomous Systems Elsevier,Volume 70, August 2015, Pages 145-155

[5] Yulee Gong, Xiao Wu, Huijaio Ma, "Research on Control Stratergy of Two-Wheeled Self-Balancing Robot", International Conference on Computer Science and Mechanical Automation, 2015