Smart Voice Controlled Vehicle with Obstacle Detection Using IoT: A Review Paper

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Abstract **- This project assembles a voice-controlled automobile that may be controlled by voice commands which responds in accordance with the corresponding voice control. Controlling of machineries using speech was not possible earlier. This investigation will help us in executing this technology for the handicapped individuals who cannot drive the vehicle on their own. However, sound and space handling require prospective development. Simple voice commands like left, right, forward, back, stop is used to conduct the car. A Bluetooth module (HC-05) can be used to set a communication link between the car and human voice commands via Android Application. The RF transmitter of the Bluetooth may take human voice commands which are converted into encoded digital information for the benefit of an adequate range (up to 100 meters) from the car. The receiver decodes the data before feeding it into microcontroller (ATMEGA16U2) to induce DC motors via motor driver L293D for necessary work. An Arduino UNO is designed to examine voice commands and respond accordingly. Moreover, the car will have the ability to detect the barrier and informs the user to prevent the barrier by picking different route with the assistance of Ultrasonic detector. Considering this attribute for the future extent might prove a milestone in vehicle automation. Further the project can be developed using IoT technology where a user can control the car from any part of the planet.**

Index Terms **- Ultrasonic Sensors, Bluetooth module, Motor Driver, Arduino UNO, voice command.**

I.INTRODUCTION

Robotics is still an evolving technology. There are Various methods to make robots, and no one is sure which method or technology will be used 100 years from today. Robotics is evolving somewhat like the Darwinian evolutionary concept of survival of the fittest. The framework equipment includes of a control outfitted with Bluetooth communication module. It is going to be connected to the motors and other alternative components of car. When the Bluetooth program is turned on and is linked with the current system through Bluetooth, an individual will operate the vehicle by giving wireless commands from the program using the functions already programmed from the program. The automobile will move in four directions:

Forward, Backward, Right and Left. In forward Movement, all four motors will move inside the exact same movement of the motors will be in other manner. For left and right movements, either of the motors will vibrate and also to stop the motors will stop. Directions are given to the motors via the Bluetooth program of Android Smartphone from the consumer.

Within this project, we'll deliberate the best way to control robot controlled car using Bluetooth module via Bluetooth application of an android mobile. The benefit of utilizing robot-controlled car is it tend to be wont to decrease manual work. This project are often altered quite easily to incorporate a camera well which will stream the movies to the consumer over Wi-Fi utilizing Wi-Fi module. In a very straightforward and economical manner. In current situation vehicles are manually controlled and each you're done by the one which is driving the automobile. Every action like stop and start, applying brake, gear transmission, and acceleration requires human effort. But today new technologies are developed which will be integrated with the traditional vehicles to new automobile form. From the technology era, the distance between the physical and thus the digital universe is brought closer with the debut of gesture idea. For many dangerous Jobs, we favor technology instead of people. Even though these robots are being manipulated manually inside the first stages, these can now be controlled via voice and gestures. This technology of voice and gesture recognition are often defined by the interaction

between the pc and therefore the visual communication of citizenry. This constructs the communicating link between technology and mankind. The target of this work is to update the entire safety to the robot and also to simplify the controlling mechanism [1]. The voice directions are handled, utilizing a complicated mobile. The single right hand robot is created on a smaller scale control based stage and may realize its current place. The viability of the voice control conveyed over a separation is estimated via numerous assessments. Execution assessment is completed with consequences of the underlying analyses. The developments to be forecasted are potentially pertaining to the applications from ventures, medical practices and also the way, including the environmental laboratories [2]. Providing human labor is that the biggest problem everywhere the planet. With theassistance of this device, they will move during a wheelchair on their own by Just giving voice commands through Bluetooth. If any barrier is detected while moving it informs the consumer and stops. Additionally, it detects if any smoke and fire occur thanks to catastrophe, detects and informs the prescribed amount to advocate the designated help. A prototype is manufactured by integrating all the features during one module.

II.LITERATURE SURVEY

D. Chakraborty et al. [1] designed and developed a robotic car using sensors and Bluetooth technology. They had established communication between smart device and the robot. Thanks to the phone camera, they had observed the living beings. The obstacles in the opposite direction were prevented from colliding with the ultrasonic ranging sensor. Images recorded with the camera were recorded in the database and analyzed.

S. J. Lee et al. [2] designed an autonomous robotic car used Arduino Uno R3 for robot's brain. Also, Bluetooth module and the ultrasonic sensor had been used in this paper. The robot scanning the placed QR codes could move along the road in autonomous form thanks to the QR codes. It also provided voice communication with the Android device in the Text-to-speech feature. It also moved with the help of an ultrasonic sensor without hitting the objects around it. In this view, range information was collected. In order for the motion of the robot to be smooth, the deviation was minimized by the PID algorithm.

E. Amareswar et al. [3] designed a robot used for the military area. Thanks to the metal detector, the robot played an important role in the detection of explosives, and the surroundings could be viewed thanks to the camera of the used Android device. This robot system consisted of Android device, Bluetooth module, a microcontroller (Arduino Uno), DC motors, motor driver, wireless camera and metal detector.

Until now, many people have attempted in designing obstacle avoiding robots. Their works differ by selection of sensors, process of path mapping and the algorithms applied to set the operational parameters. Numerous projects have been designed in this area of interest using laser scanner, infrared sensor, GPS and multiple sensors to accomplish obstacle detection and avoidance [4,5].

Tabassum [6] has proposed the use of multiple ultrasonic sensors to have greater precision for the obstacle detection. It increased the efficiency of obstacle avoidance. The Internet of Things (IoT) is an arrangement of interrelated computing gadgets, mechanical and digital machines, objects, animals or individuals that are given one kind of an identifiers and the capacity to exchange information over a system without requiring human-to- human or human-to-PC communication. IoT is a new concept that has evolved from the convergence of wireless technologies.

Wireless communication is the transfer of information or signal between two or more points that are not connected by an electrical conductor. In IoT devices equipped with Wi-Fi allow the machine to-machine communication. Using this from of industrial machines to wearable or wireless devices, using built-in sensors to gather data and take action on that data across a network. The sensor and actuator can be setup in different place but they are working together over an internet network. Using IoT technique a vehicle tracking system (VTS) can be built. A vehicle tracking system combines the use of automatic vehicle location of individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations[7]. SV.

III.PROBLEM DEFINITION

Design and implement the smart Voice Controlled Car system with Obstacle Avoidance in smart cities where the vehicle is get traced by using Internet of Things.

IV.SYSTEM ARCHITECTURE

A car requires a standard controller which acts as a mind for it. As Arduino is platform totally free and user friendly, it's often utilized. The intelligent telephones are wont to get the input from the user. A Bluetooth module (HC-05) is used to determine a communication connection between the vehicle and individual voice commands via Android Application. The RF transmitter of this Bluetooth may take human voice orders that are converted to encoded electronic data to the advantage of a decent range (up to 100 meters) from the vehicle. The receiver decodes the data before feeding it to microcontroller (ATMEGA16U2) to induce DC motors via motor driver L293D for necessary work. An Arduino UNO is programmed to examine voice orders and react accordingly. The car must move accordingly with respect to the items which are present near the vehicle. The barriers are detected by utilizing various sensors such as directional sensors, magnetic sensors, photoelectric sensors, and ultrasonic sensors. This ultra- sonic detector is utilized to detect the barriers. The ultrasonic waves are generated by using the piezo electric crystal, where the electric signals are converted to mechanical vibrations (ultrasonic waves). The ultrasonic waves are transmitted at the transmitter end, if there is any item within the given limit; the ultrasonic waves hit the thing and get received at the receiver end of the detector. Based upon the time taken to your transmitting and receiving the space between the vehicle and the barrier is calculated. The car stops or proceed farther based upon the values that we provide. Thus, the cars increase the standard of living of the people on the planet.

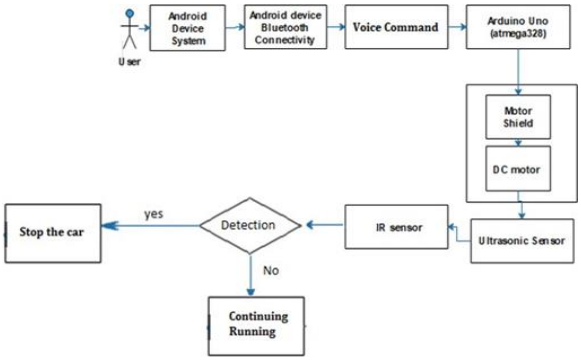

Fig. System Architecture

V.SYSTEM COMPONENTS

1. Arduino Uno

Arduino uno a microcontroller board supported the ATmega328P. It has 14 electronic input/output pins (of which 6 are frequently used as PWM outputs). In addition, it has 6 analog input signal, a 16 MHz quartz crystal, a USB connection, a power port, an ICSP header along with a reset button. It's the foremost broadly used and consumer friendly microcontroller. Simply connect it to a computer using a USB cable or power with an AC-to-DC adapter or battery to urge started.

2. Motor Driver

Motor driver might be a dual H bridge drive chip - L298N with voltage range of 5V-35V and present selection of 0-36mA. Maximum power consumption is 25W, dimensions: 43 x 43 x 26mm, weight: 26g and an integrated 5v power supply, when the driving voltage is 7v-35v.

3. Ultrasonic Sensor

HC-SR04 is your ultrasonic ranging sensor. This economical sensor supplies 2cm to 400cm of non-contact measurement performance with a ranging accuracy which will reach around 3mm. Each HC-SR04 module involves an ultrasonic transmitter, a receiver and an effect circuit. There are just four pins on the HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).

4. Servo Motor

A servo motor might be a positioner or linear actuator that allows for precise control of angular or linear position, acceleration and speed. Servo can rotate roughly 180o. It has an operating voltage of 5V and functioning rate of 0.12sec/60o with torque of 1.8 Kg-cm.

5. Bluetooth Module

Bluetooth module has a normal -80dBm sensitivity as well as +4dBm RF transmit power. It has a PIO controller, UART interface with programmable baud, integrated antenna and a foothold connector. Its auto-pairing trap is"0000" as default option plus it auto-reconnect in 30 min when disconnected Because of beyond the range of connection.

VI.CONCLUSION

There are many papers designed to address car with Arduino Uno, Raspberry pi and Android platform. However, real time obstacle detection and avoidance by using Arduino.

Uno and Android Platform of the voice-controlled car has not been studied. Thus, the voice-controlled obstacle avoiding car is successfully designed and it is concluded that voice-controlled cars are undeniably going to be a future market for many industrial applications. The purpose of this article is to alert the user to potential terrorist attacks on the military field using the application on an Android device. By taking input from the Android application, the basic movements of the car are provided. Best for handicapped people who can rely on this car as there is very less chance of accident. The car will stop instantly by slowing down once identifies an obstacle. Communication between the car and the application is made by the HC-06 Bluetooth module. The ultrasonic sensor HC- SR04 is used to prevent the car from crashing. Thanks to this sensor, the car manage to escapes the obstacles.

REFERENCES

[1] D. Chakraborty, K. Sharma, R. K. Roy, H. Singh, and T. Bezboruah, "Android application-based monitoring and controlling of movement of a remotely controlled robotic car mounted with various sensors via Bluetooth," 2016 IEEE International Conference on Advances in Electrical, Electronic and Systems Engineering (ICAEES), 2016

[2] S. J. Lee, J. Lim, G. Tewolde, and J. Kwon, "Autonomous tour guide robot by using ultrasonic range sensors and QR code recognition in an indoor environment," IEEE International Conference on Electro/Information Technology, 2014

[3] E. Amareswar, G. S. S. K. Goud, K. R. Maheshwari, E. Akhil, S. Aashraya, and T. Naveen, "Multipurpose military service robot," 2017 IEEE International Conference of Electronics, Communication, and Aerospace Technology (ICECA), 2017.

[4] Ryther CA, Madsen OB (2009). Obstacle Detection andAvoidance for Mobile Robots. Technical University of Denmark.

[5] Ahasan MA, Hossain SA, Siddiquee AU, Rahman MM (2012). Obstacles Invariant Navigation of anAutonomous Robot Based on GPS. Khulna University.

[6] Tabassum F, Lopa S, Tarek MM,Ferdosi BJ (2017).Obstacle avoiding robot. Global J. Res. Eng., 17(1). Version 1.0.

[7] Kiran Sawant, Imran Bhole, Prashant Kokane, Piraji Doiphode, Prof. Yogesh Thorat, "Accident Alert and Ve- hicle Tracking System", International Journal of Innova- tive Research in Computer and Communication Engineer- ing, Vol. 4, Issue 5, May 2016.

[8] Varshney S., Gaur, B., Farooq O., Khan Y. U. "Brain Machine Interface for wrist movement using Robotic Arm", IEEE 16th International Conference on Advanced Communication Technology, DOI: 10.1109/ICACT. 2014.6779014, 2014.

[9] Internet: Gelece˘gi yazanlar, Bluetooth ile˙Ileti¸sim,https://gelecegiyazanlar.turkcell.com .tr/konu/arduino/egitim/arduino201/bl uetooth-ile-iletisim, 20.06. 2018.

[10] Xia, Feng, Laurence T. Yang, Lizhe Wang, and Alexey Vinel. " Internet of things." International Journal of Communication Systems 25(9) (2012)