IoT Based Robotic Vehicle

Shreya Gund[1], Prof. N. V. Bhosale[2]
[1] Dept of Electronics and Telecommunication Engineering
[2]Professor, Dept of Electronics and Telecommunication Engineering
[1, 2] TPCT'S College of Engineering, Osmanabad, Maharashtra, India

Abstract- *In this paper, we presents compact portable robot with Arduino NodeMCU as central driving functional unit with novel features of wireless control using Wi-Fi module with the activation and deactivation of obstacle detection in the path of the robot .The main contribution of the paper is that it leverages the efficiency of robot's motion controlling system.*

These innovative technologies have potentials to build a board less communication society a symbolic society between humans and robots. The GPS system is incorporated, hence the client can trace the car. Commands and data are stored in cloud services which delivers to device when it is ready to receive. The system has IR obstacle sensors for avoiding obstacles coming in its path. We present the architecture and design of Arduino communication and how to control the car by means of commands and application

Keywords- Arduino Node MCU, Motor driver, IR obstacle sensors, motor driver and motors.

I. INTRODUCTION

Arduino is designed as an open-source electronics prototyping platform providing schematics and flexible development kits for enthusiastic users who intend to produce interactive objects or environments. Arduino can be used to sense surroundings by utilizing various transducers to read and interpret inputs in order to make responses for example through the controlling of motors or transferring of data. In today's world there is a significant development in the field of robotic control. Mobile robotic vehicles are light, small and portable enough to be carried by an individual [5]. Our design serves as a solution to demonstrate how the control of the dc geared motors in coordination of the signals obtained from Wi-Fi module in conjunction of Arduino is used to achieve high degree of precise path control from the user side to achieve standard operations like moving at a particular target location, collecting data and avoiding any obstacle to prevent collision .In existing literature many works have been done on the implementation and analysis of the robotics for various aspects like disaster management, working in nuclear areas, photography and military application. Cloud robotics uses computing resources to enable great memory, computational power and collective learning for robotics applications. When computational or storage demands exceed the on-board capacity of a robot, they are offloaded to the cloud, here the massive resources of a data center can supplement the limited local resources of robots .Cloud robotics also represents a significant advance for robot learning. The collision and detection protocol has been incorporated and well executed by using infrared sensors which prevents collision and sends the signal to the user mobile of obstacle detection. The robot direction can be changed by using the buttons available in the application .The robot is equipped with a pick and drop arm which can pick and drop up to 60 grams of weight. Our user end equipment mobile is equipped with an application control the path of the robotic car achieve its target location avoiding obstacles.

II. LITERATURE SURVEY

Shreya Gund1, Prof. R P. Shelkikar2 [1] proposed the A Survey on Iot Based Motion Control System of a Robotic Vehicle.In this system an efficient control system of a robotic car is incorporated with IoT. The cloud service helps the system to reduce memory load. Stored messages are automatically removed after a certain amount of time. The performance results prove that if the incorporation is efficient. The wireless range is too small. It can be efficient if GPRS, Zigbee module is used for wireless medium. Including object detection method is one of the main future works that needs to be implemented.

D. Kalaiarasi1, Pavithra .S2, Pratheeba .S3, Priyaadharshini .R.L4 proposed the system of IoT BASED MOTION CONTROL SYSTEM OF A ROBOTIC CAR.In this paper an efficient control system of a robotic car is incorporated with IoT. The cloud service helps the system to reduce memory load. Stored messages are automatically removed after a certain amount of time. The performance results prove that if the incorporation is efficient. The wireless range is too small. It can be efficient if GPRS, Zigbee module is used for wireless medium. Including object detection method is one of the main future works that needs to be implemented.

This paper thinks about the clever flight observing programming robot under the Internet of Things IOT Based Remote Access Human Control Robot Using MEMS Sensor by Abhishek Deendayal Patil [3], HusbanImtiyaz Kadiri, Ajinkya Shriram Joshi This paper proposed four different signals to operate the robot, forward, reverse, left and right. These commands are given by the user using the MEMS sensor. The MEMS Sensor will be set to the hand. At whatever point the hand moves toward some path, the mechanical development of the hand will be perceived by MEMS. MEMS interpret this mechanical hand development into proportional electrical flags and send it to the Raspberry Pi. The Raspberry Pi at the transmitter side sends control signs to the recipient side through IOT (Internet of Things). The controller (ARM7) at the beneficiary zone gets these signs and provides guidance to the robot through IOT i.e. through cloud. Design and Construction of Microcontroller Based Wireless Remote Controlled Industrial Electrical

Appliances Using ZigBee Technology by Lu Mai, Min Zaw Oo This paper proposed microcontroller based remote controlled for electric frameworks parameters like voltage and current utilizing ZigBee innovation. PIC16F877A controller is utilized as a part of an overwhelming way since it is rich in peripherals and henceforth numerous gadgets can be interfaced quiet, it is likewise exceptionally shabby and can be effectively gathered and customized. The Pic controller controls the gadgets and sends the sensor esteems to the PC by means of ZigBee module. In spite of the fact that Bluetooth is superior to anything ZigBee for transmission rate, ZigBee has bring down power utilization.

III. SYSTEMCONFIGURATION

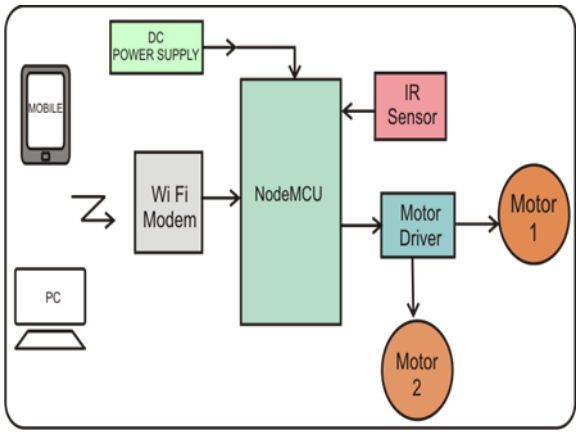

Fig.1: System Configuration

The mode of sending command to the car is by manually clicking buttons visible in the user interface which is the android application developed in the android studio with buttons controlling movements like move forward and backward, turn right and left, stop, pick and drop This request is in actual a message displayed on the user interface of the IDE so that it would be relatively easy to change the IDE to support alternate tool chains to allow Arduino C/C++ to be compiled for these new processors. Application. 3.3 Stores commands in a cloud service Queue provides a well-defined and flexible service to this system. As both car information and commands are needed to be transferred at the desired places or devices and the same time, so two queues were used-one for data and another for command.

The Arduino in the car listens to the Command Queue and it sends data to the Data Queue. On the other hand the android application in the controller end listens to the Data Queue and it sends command to the Command These are: 1. Move according to the command signals sent by the user, 2.pick and drop any object, 3.To send GPS sensor values acquired from the GPS, 4.To send the data received from the obstacle detector. 3.5 Arduino takes action according to the command Based on the command received Arduino takes appropriate action. For example: acquiring GPS sensor value, acquiring obstacle sensor reading and changing the car's direction of motion or state. The GPS sensor continuously pings for getting the actual location of the car. Arduino also pings the IR obstacle sensor for distance of obstacle before the car. Based on the commands, Arduino changes the direction and speed of the motors using the motor controllers. 3.6 Updates GPS position of the car Whenever the Robotic Car is commanded to change its position, Arduino polls the GPS sensor to get the updated GPS position and then when it is commanded to send the GPS position then this location is sent to the Data queue of the cloud service bus. This data is later received by the android application which updates the UI accordingly. 3.7 Surveillance camera provides visual track of the robotic vehicle the robotic car here is equipped with a surveillance camera which enables the user to be aware of the motion of the car and the environment in which the car is being operated. Left motors Right motors outcome Forward Forward Forward Forward Static Left Static Forward Right Backward Backward Backward.

3.1 NodeMCU

It is an open source IoT platform. It includes firmware which runs on the ESP8266Wi-FiSoCfromEspressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espress if Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS.

Fig.2: Node MCU

As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino

3.2 IRSENSOR

Fig.3: IR Sensor

An infrared sensor emits and/or detects infrared radiation to sense its surroundings. The basic concept of an Infrared Sensor which is used as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

3.3 MOTORDRIVER

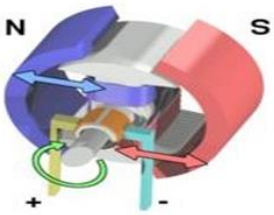

Fig.4: Motor Driver

Motor drivers acts as an interface between the motors and the control circuits. Motor require high amount of current whereas the controller circuit works on low current signals. So the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.

3.4 VISUAL TRACK OF ROBOTIC VEHICLE

The robotic vehicle is being operated by following instructions.

Table 1: Different Steering Method

Left motors	Right motors	Outcome
Forward	Forward	Forward
Forward	Static	Left
Static	Forward	Right
Backward	Backward	Backward

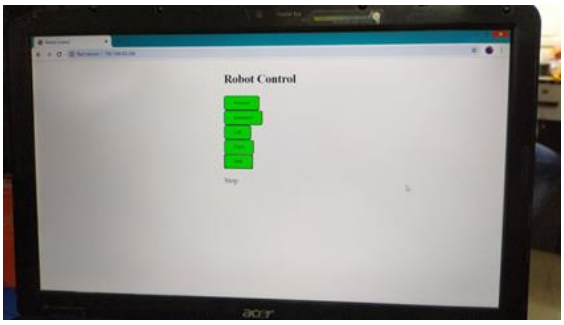

Fig.5: Screenshot of webpage application user interface

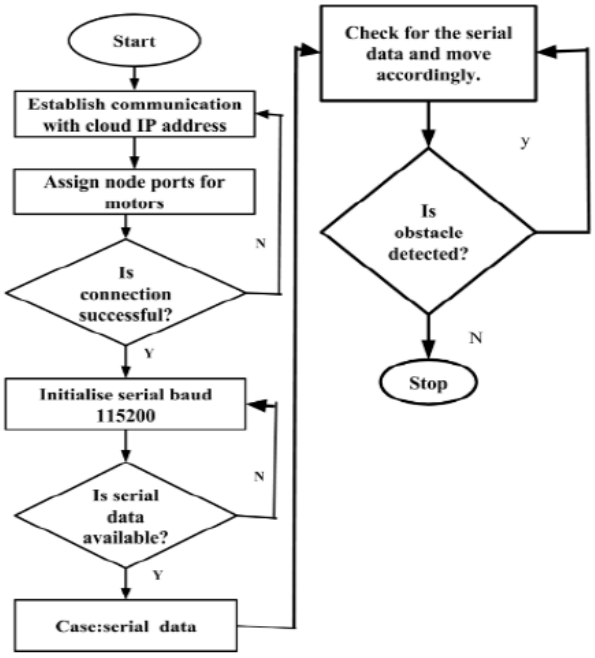

Fig.6: Workflow

IV. RESULT

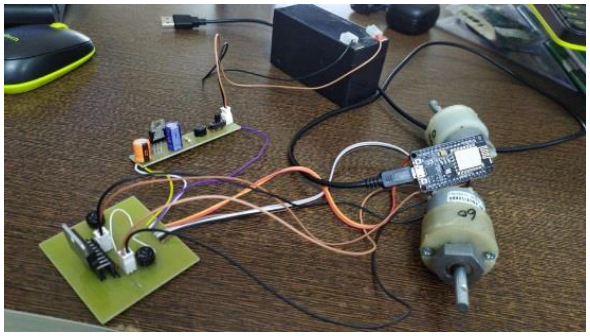

Fig.7: Snapshot of project implementation

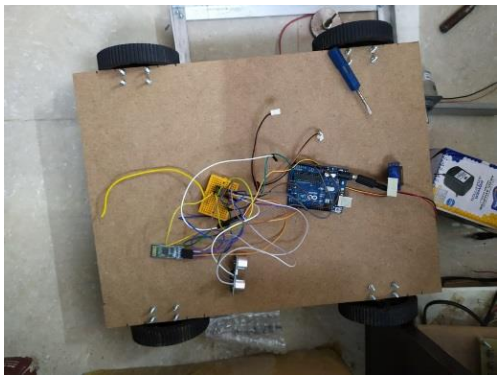

Fig.8: Snapshot of project implementation

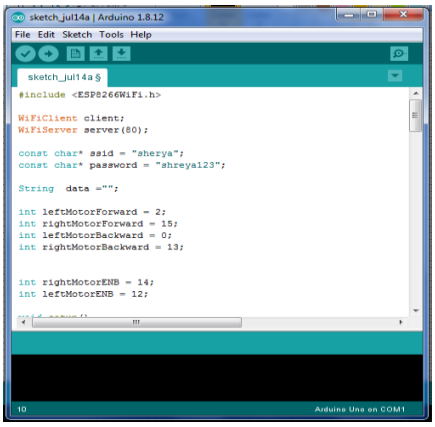

Fig.9: Screenshot of Arduino software compile the code

V. CONCLUSION AND FUTURESCOPE

In this paper an efficient control system of a robotic car is incorporated with IoT. The cloud service helps the system to reduce memory load. Stored messages are automatically removed after a certain amount of time. The performance results prove that if the incorporation is efficient. The wireless range is too small. It can be efficient if GPRS, Zigbee module is used for wireless medium. Including object detection method is one of the main future works that needs to be implemented.

REFERENCES

[1] Shreya Gund1, Prof. R P. Shelkikar2," A Survey on Iot Based Motion Control System of A Robotic Vehicle", ijsart, Volume 5 Issue 11 , pp. 121-123, NOVEMBER 2019.

[2] D. Kalaiarasi1, Pavithra .S2, Pratheeba .S3, Priyaadharshini .R.L4,"IoT BASED MOTION CONTROL SYSTEM OF A ROBOTIC CAR", International Research Journal of Engineering and Technology (IRJET), Volume: 05, pp. 3073-3076, Mar-2018.

[3] Abhishek Deendayal Patil, Husban Imtiyaz Kadiri, Atul B Wani,"IOT Based Remote Access Human Control Robot Using MEMS Sensor", 2016.

[4] Zhao Wang, Eng Gee Lim, Weiwei Wang, Mark Leach, Ka Lok Man "Design of An Arduino-based Smart Car" Xi'an Jiaotong-Liverpool University, Suzhou, China.

[5] Supantha Mandal, Suraj Kumar Saw, Shilpi Maji,Vivek Das,Sravanth kumar Ramakuri , Sanjay kumar" Low Cost Arduino WIFI Wifi integrated path following with wireless GUI remote control", Birla institute of Technology Mesra ranchi Jharkhand India.

[6] A. Abdullah, O. Sidek, N. A. Amran, U. N. Za'bah, F. Nikmat, H. Jafar and M. A. Hadi, "Development of Wireless Sensor Network for Monitoring," 2012, International Conference on Advanced Computer Science and Information Systems.

[7] A. R. Krishna, G. S. Bala, A. Sastry, B. B. Sarma and G. S. Alia, "Design And Implementation Of A Robotic Arm Based On Haptic Technology," International Journal of Engineering Research and Applications (IJERA), vol. 2, no. 3, pp. 3098- 3103, 2012.

[8] "How to Change the Direction of Rotation of a DC Motor? | Study Electrical | Online Electrical Engineering StudySite. " [Online]. Available: http://www.studyelectrical.com/2015/07/how-to-change direction-of-dc-motor.html.

[9] "Arduino UltraSonic Range Finder: The best interfacing tutorial!"[Online].Available:http://diyhacking.com/arduino-ultrasonic-range finder/.

[10] J. Sobota, R. Psl, P. Balda, and M. Schlegel, "Raspberry pi and arduino boards in control education," IFAC Proc. Vol., vol. 10, no.PART 1, pp. 7–12, 2013.