

# **MINI PROJECT – I**

**(2020-21)**



## **SYNOPSIS**

### **IOT ENABLED ROBOTIC CAR**

**Submitted By:**

**Tej Pratap Singh(171500358)**

**Satyam Singh(171500296)**

**Branch/Sec: B.tech (Computer Science) -III<sup>rd</sup>Year-I**

**Submitted To :**

**Mr. Amir Khan**

## INTRODUCTION

Internet of Things (IOT) is a new revolution of the Internet. It enable to connect remote and mobile things or machines or assets through the use of wireless communications and low-cost sensors, computing and storage devices.

This project shows how to use Internet of Things (IOT) for controlling Robotic car remotely (anywhere), provided that your robot is connected to the Internet.

Robots can be controlled wirelessly by various means like Bluetooth, Wifi, etc. We will make a **WI-FI controlled Robot Car using NodeMCU** which can be controlled wirelessly by using internet browser.

In the present day, technology has so improved that an Unmanned Aerial Vehicle (UAV) also called as Drone can be controlled from a distance ranging from 2km to 20,000km. The Mars Rover, which was sent to Mars to explore various features of the planet is an autonomous robot which is programmed such that it performs the desired task as it is intended to do. There are many such systems which are controlled either by Radio Frequency transmission or by creating intelligence. Robots are called Non-autonomous robots. These robots have the programming logic to do the desired task but the decision power lies in the hand of controller (human) handling the robot. Here the interface can be made using two methods:

**A. Wired** –The connection between controller and robot is maintained using wired interface. This interfaces can be serial or parallel but the technology is transmission of signal, which is sent in the form of specific pattern to the robot to carry out the specific task, these patterns with the help of a microcontroller governing its motion.

**B. Wireless** –Here the connection between controller and robot is achieved by wireless interface such as:

- >Bluetooth
- >Wi-Fi

Arduino is designed as 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

## **EXISTING SYSTEM**

Existing System Existing system is implemented using the Arduino uno board. In this project user can controller the devices from the switching system remotely. Existing system contain the two sections one is transmitter section another is receiver section. Transmitter section contain the keypad enable Arduino system and receiver section contain the robot with Arduino board. Arduino device is connected with the RF module for transmission of the information between the transmitting Arduino system and receiving robot section for wireless communication. Power supply section is providing the power to the Arduino board as well as all the electronic circuit of the receiver section for operate the all device properly. For wireless communication system uses the UART protocol. This project is used to control the robot navigation through the remotely using the keypad mobile using RF module.

Now a day the advancement in technology various new designed smart makes use of Wi-Fi robot for various applications. Mostly wi-fi network was using home security purpose. The various applications are done by robot car like doing different works on the command ex- switching on the lights when the robot is given the command by the Wi-Fi enabled device.

Working of the Wi-Fi controlled robot is very easy, we just need to Drag or Slide the joystick in the direction, where we want to move the Robot. If we want to move the Robot in Forward direction then we need to Drag the Joystick 'circle' in Forward direction. Like we can move the Robot in Left, Right and Backward direction by Dragging the Joystick in respective direction.

Now as soon as we release the Joystick, it will come back to centre and Robot. Blynk App sends values from Two Axis Joystick to Arduino through Wi-Fi medium. Arduino receive the values, compare them with predefined values and move the robot accordingly in that direction

## **FUNCTIONAL SPECIFICATION**

### **Hardware Requirement: -**

- a) ESP8266 (Node MCU)
- b) L298N Motor Drive Module
- c) Arduino UNO
- d) Robot Chassis
- e) 5-4 \* 5V Geared Motor
- f) Connecting Wires
- g) Power Supply (or battery)
- h) Ultra-Sonic sensor
- i) Camera
- j) Bread Board
- k) Wheels

#### **a) NodeMCU: -**

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Expressive 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 project, and built on the Expressive NonOS SDK for ESP8266. It uses many open source project.

#### **b) Arduino UNO: -**

Arduino Uno is a microcontroller board based on the ATmega328P It has 14 digital input/output pins 6 analog inputs, a 16 MHz quartz crystal, a USB Connection, power jack, an ICSP header and a reset button.

#### **c) L298N Motor driver module**

This dual bidirectional motor driver is based on the very popular L298 Dual H-Bridge Motor Driver IC. This module will allow you to easily and independently control two motors of up to 2A each in both directions.

#### **d) Ultra-Sonic Sensor:-**

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound.

## Software Requirement: -

### 1. Arduino IDE: -

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

### 2. Embedded C Language: -

**Embedded C** is a set of *language* extensions for the **C programming language** by the **C** Standards Committee to address commonality issues that exist between **C** extensions for different embedded system.

### 3. HTML: -

HTML (Hypertext Markup Language) is the code that is used to structure a web page and its content. It is used for making a interface of control car by website.

### 4. Android Studio: -

Android Studio provides a unified environment where you can build apps for Android phones, tablets, Android Wear, Android TV, and Android Auto. Structured code modules allow you to divide your project into units of functionality that you can independently build, test, and debug. It is used for making a interface of control car by an android application.

## **USE OF THE PROJECT**

Robot car controlled by Wi-Fi will make our work much more easier as we can make the robot do any work we need by just a single movement on our mobile phone on computer. In near future we can see such designs getting too common and being used extensively for household purposes.

Remote control vehicles are used in law enforcement and military engagements. Remote controlled vehicles are used by many police department bomb-squads to defuse or detonate explosives.

We use Robot car at parking service to give direction to vehicle where parking space is free to park car and also check negative or danger activity in parking zone.

Robot car is used for force for spying activity. The majority y robots are tele-operated and not equipped with weapons; they are used for reconnaissance, surveillance, sniper detection, neutralizing explosive devices, etc. Current robots that are equipped with weapons are tele-operated so they are not capable of taking lives autonomously.

This robot car can also be used to push the objects from one place to another. This project will be enhanced with better Wi-Fi which would enable long distance communication. A robot is a machine designed to execute one or more tasks repeatedly, with speed and precision.

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.

## **WORKING**

**1 - Sending command** -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.

**2 - Checks for command validation-** On successful decoding the dedicated event handlers take care of the rest of the task. But on unsuccessful decoding the client is requested to generate any command from the set of valid commands. This request is in actual a message displayed on the user interface of the application.

**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 at 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 Queue.

**4 - Processor (Mobile) collects the command and passes to the Arduino-** There are basically four modes of command signals that the Arduino receives from the processor. These are:

A- Move according to the command signals sent by the user,

B-pick and drop any object,

C-To send GPS sensor values acquired from the GPS,

D-To send the data received from the obstacle detector.

**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.

**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.

## **FUTURE SCOPE**

In this project 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, module is used for wireless medium. Including object detection method is one of the main future works that needs to be implemented.

From manufacturing units to experimental robotics for medical, military and automotive industries, the future of robotics engineering finds tremendous opportunities for its budding professionals. ... Robotic science has a tremendous scope as a career option as robots play an important role in the industrial sector

## **Conclusion**

Research groups are modifying the previously designed robots for new purposes and different aspects. We started our work from zero. However, our collaboration, hardworking, skills, and ambition gave us the power of doing best work. Our best understanding and combine searches on parallel fields helped us to accomplish our work correctly. Now we can say that we can do more efficient work and can perform more difficult task easier. Our idea is mainly for army use. The army is doing researches on this type of ideas and doing their lab works to build a capable working robot. It will replace the humans and will save many lives in critical situations. We are very hopeful with our idea that it will bring a significant change in our technical field and our minds



***THANK YOU***