# DEVELOPMENT OF PICK AND PLACE ROBOT

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**Abstract -** In this paper work, we analyze the numerous ways and techniques for design and development of pick and place robot using remote or wireless device RF (Radio Frequency) Transmitter. The robot consists of various electronic circuit device which operate as input given by its operator. Here the device RF Receiver collect the signal from given IDE (Integrated Development Environment) decoder and instructor in order to perform its function properly here an algorithm is used to define the claw or gripper operation, motion and direction of the peak and place robot. The robot first provide a signal to its operator, once it's started,then operator use a device and forward the robot towards the object.After that the robotic claw of robot is controlled with the help of wireless RF transmitter once it reach near the object now the operator give the command to robot and hence robot will catch and again pass a signal for further step here the robot is ready for picking and placing that object by the help of its operator command or device using these phenomena heavy weight in the industry or toxic chemicals are easily picked.

**Key words:** Pick and place Robot, Chassis, Wheels, Rf Receiver Module, Rf Transmitter Module, Motor Driver L293D & l298N, Arduino Uno, Robotic Claw Or Gripper.

## INTRODUCTION

Industrial sector is facing various challenges and dangerous situation including shifting of heavy machines and toxic chemicals and labour shortage this sector have to meet the customers demand they need to manufacture the huge amount of product which may be heavy vehicles, toxic pesticides and many more things. In this paper we present a novel approach perform to load and unload work faster which help to shift in each corner of the world easily without damage and also it save the human from working in hazardous environment.Other many countries have developed various types of robots like university of Auckland, New Zealand has developed a multipurpose orchard robot to deliver pollination and harvesting services. we prepare a remote based pick and place robot to overcome for the industrial heavy equipment and parts shifting and saving time, labour cost .A pick and place device can obtain the input from the user or remote these inputs signal is hosted by RF transmitter module and send it to the RF receiver module and hence this way the peak and place robot can be operated in various industries the main concept this paper deals with movable vehicle which consists of a pick and place robot which can run forward ,backward and can turn around 360 degree in its operating place.

Fig. 1: Complete experimental setup

## OBJECTIVE OF THE PROJECT:

In Nepal the economy is mainly dependent on agriculture, fuel ,construction materials and also the main power is not available for industrial growth. In this situation peak and place robot can assist the need of nation economy and also help people to work in the chemical industries basically for those company which produce the pesticide for farmers also it beneficial for construction work where the bricks, rod and cement are easily transformed desirable place.

## SCOPE OF THE PROJECT:

The scope of this work involves RF signal transmitter and RF signal receiver are the compatible with the pick and place robot gripper or claw. The assembly program is used to develop the work function of the robotic claw. And we considered that while figuring the interface issue for the robotic pick and place claw with the help of RF transmitter and RF receiver controller. The similar project idea can be extended to make very different robot with the upgraded functionality in the robot.

## APPROACH:

Our team successfully able to perform crystal clear study work of pick and place robot and RF transmitter and RF receiver .we tested the peak and place robot with the various loads. we also learn and practice with the controller and receiver like RF signal using assembly language and converting assembly language to the codes with the help of Arduino UNO.

## ROBOTICS:

The Isaac Asimov was the pioneer of robotic words the robot consists of electrical and mechanical engineering works as well as controlled computing theory in robotic program. As per robot institute of America,"robot is a reprogram-able,multifunctional, manipulator designed to move material,parts,tool or specialized device through variable programmed motion of the 4 performance of the various task in robotic research group".

## Arduino UNO:


Fig. 2: Arduino uno

The arduino uno board has 14 digital input pins that also can be usable for output pins, and six analog input pins for the connections with the help of jumper wires, an usb connecting port for data or code, a 16 MHZ quartz crystal, a power jack port for power or current supply, an ICSP (in-circuit serial programming) header, and a reset button. the digital pins can be used for both input and output, and those can be configured as either a digital input or a digital output. the analog pins are used to read analog signals, such as sensors, and convert them to digital values.the arduino uno board is widely used in a variety of applications, including robotics, automation, home automation, and internet of things (i o t) projects. it is also popular in educational settings, where it is used to teach programming and electronics to students of all ages in easy way.

## Motor Driver L298N:

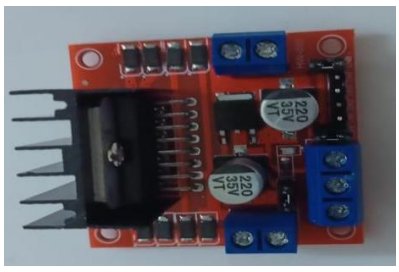


Fig. 3: L298N

The motor driver (L298N) is a popular dual H-bridge (half-bridge) motor driver IC (Integrated Circuit) that can control the speed and direction of two DC (direct current) motors/single stepper motor. It is commonly used in robotics

and other applications that require precise motor control.The L298N operates from a wide range of voltages (up to 46V) and can deliver up to 2A per channel (with proper heat sinking). It consist of four input pins that is denoted by (IN1, IN2, IN3, IN4) which can control the direction efficiently of each motors, and two PWM input pins ENA (enable A) and ENB (enable B) that can control the speed of each motors easily. To use the L298N, you will need to connect it to a micro-controller or other control circuitry that can generate the appropriate signals for the input pins. The motor power supply should be connected to the L298N's external power supply input (Vs), while the control circuitry should be connected to the logic power supply input (Vss). The motor outputs (OUT1, OUT2, OUT3, OUT4) should be connected to the motor terminals.

**Motor Driver L293D:**


Fig. 4: L293D

The l293d is a popular motor driver IC (integrated circuit) that allows control of two dc motors in both directions (forward and reverse) using a micro-controller. it has four input pins for controlling the motor direction and speed and four output pins for driving the motor coils. the l293d also has built-in diodes for protecting the motor and driver from voltage spikes generated by the motor's inductance. the IC is commonly used in various applications such as robotics, toy cars, and industrial automation. its simplicity and low cost make it a popular choice among hobbyists and engineers.

**Robotic Claws/Gripper:**

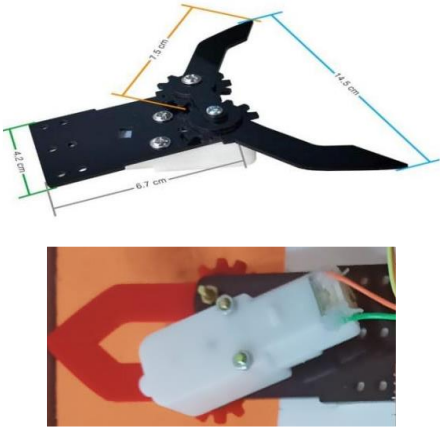


Fig. 5: Gripper

Basically our model grip or claws was built by fiber as prototype which close and disclose by the help of its operator. Its length was 6.7 cm and its expanded up to 4.5 cm and its width was 4.6 cm while the thickness was up to 2mm and also it capable of to hold the weight of 200g as prototype.

**Fr Transmitter And Rf Receiver:**

Fig. 6: FR receiver module

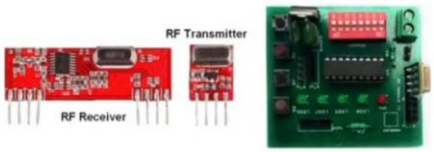


Fig. 7: RF transmitter module

**RF Transmitter Module:**RF transmitter modules are commonly used in various applications, such as wireless remote controls, wireless alarm systems, and wireless data transmission systems. They can transmit signals over short distances (a few meters) to long distances (several kilometers), depending on the power of the transmitter and the frequency used.

**RF Receiver Module:**An RF (Radio Frequency) receiver module is an electronic component that receives signals wirelessly transmitted by an RF transmitter. It is commonly used in remote control systems, wireless communication systems, and other applications that require wireless communication.

The number of coils and teeth on the motor's rotor and stator. As we know the Stepper motors are widely used in various applications around the world that require accurate control of position and speed, such as robotics, CNC machines, and 3D printers. They are also commonly used in industrial automation and automotive applications.

**Bo Motor:**

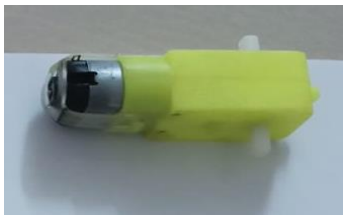

Fig. 8: BO Motor

A BO (battery operated) motor is an electro-mechanical device which helps to generate rotational movement that converts electrical energy into mechanical energy. It consists of a rotating armature (rotor) and a stationary set of coils (stator) that produce a magnetic field. Brushes and a commutator are used to transfer electrical power to the armature, causing it to rotate. BO motors are widely used in various applications, including toys, robotics, and automotive systems, due to their simplicity, reliability, and cost-effectiveness of the product.

**CONTROL CIRCUIT DIAGRAM:**

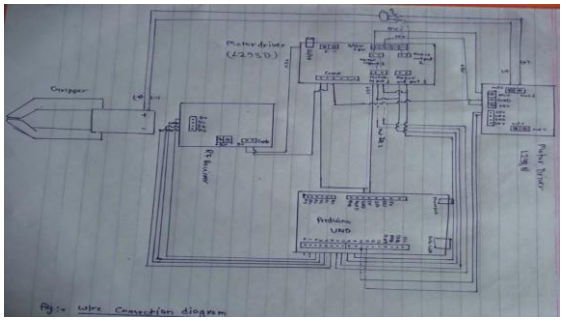

Fig. 9: Circuit Diagram

Our system has the following control panel as it can be seen that operating gripper, Arduino and motor driver L298N act as the driver and the main function for the given robot. Here the Arduino UNO brain of the pick and place robot.when power is supplied between(+ 3 Volt to 12 Volt) the Arduino Uno start the program code and after that the RF transmitter generate the signal to the device or its controller or hence once the signal is received by the remote then again the remote send the signal to its RF signal receiver finally the received signal is converted by Arduino Uno to the machine language and operation is executed.

**MECHANICAL STRUCTURE:**

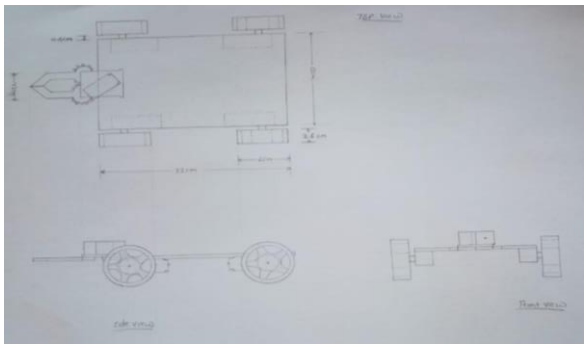

Fig. 10: 2D Drawing Of Mechanical Structure

While assembling, our robot had two jaws (claw) which operated by the help of one stepper motor and gear the pick and place robot structure is in the 3 dimensional. A typical prototype has been shown in the figure that we have assembled in our workshop there is stepper motor in base of the gripper which help claws to the close and disclose for holding or catching the object. Here the pick and place robot consist of four wheel so we and move it any where in our work place easily also it can be rotate up-to 360 degree.

**METHODOLOGY:**

The method which we used for designing and construction of robotic claw or gripper are based on the operational characteristics and features of Arduino uno, stepper motors, electronic circuit diagram and the programming part by using IDE (Integrated Development Environment) software in Arduino uno micro-controller.

Here is the block diagram of our experimental working model with all connections as shown in figure:

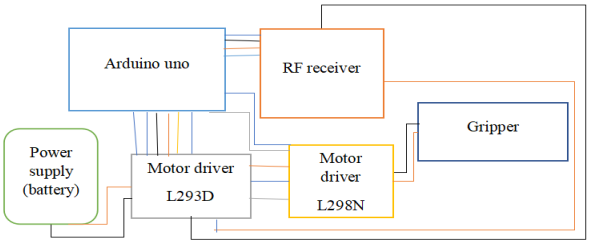


Fig. 11: Block Diagram

When the power is supplied (9 to 12) volts using power adapter or battery. We can operate It's power is applied to the motor driver (L293D) with the help of battery source and also using adapter of the +9 to +12 Volt of the 2.5 ampere current. From motor driver the power is provided to the other components like, Arduino uno, here we know RF receiver, motor driver (L298N) and gripper from the motor driver (L293D) the power of 5 Volt is given to the original we know RF receiver is the also connected to the motor driver (L293D) to the next power source of the 5 Volt to the operator for the motor driver (L298N) power is given by the motor driver (L293D) of the +12 Volt and +5 Volt with the connection of ground or negative pin the gripper is connected to the motor driver L298N 4 operating it's gripper and various loads are picked in this way.

## CONTROL SYSTEM:

There are two more buttons , one is on the Arduino uno board for reset. And one is on the motor driver (L293D), which is used for the power distribution and power cut to other components directly (Start\Stop).

### Motor Driver L293D:

- ✓ " On" button active the system while "off" button make it in sleep mode (Start\Stop).

### RF Transmitter (robot operator):

The first right side button of RF Transmitter is used for the move robot forward.

- ✓ The second button from right side is used for move backward.
- ✓ The third button is used for take turn right side.
- ✓ The last button is used for take turn left side.
- ✓ The combination of two middle buttons together is used for opening the claws/grippers/jaws.
- ✓ And the combination of two outside buttons together is used for closing the claws/grippers/jaws.

## RESULT:

Our team were successfully completed the functionally defined a working sample of robot (pick and place robot) which is capable of rotate 360 and also pick and place objects, equipment,can work in hazardous environment with the help of wireless device. Here the Arduino UNO play the main role for robot processing the signal and also converting the code at the same time.

There are four buttons in RF transmitter which assist it to operator or to control the pick and place robot.

## CONCLUSION:

In this paper work we deal with the robotic arm with the numerous type of input and output signal receiver and generator.Our method was store the program in the Arduino uno in order to work properly.We compared this robot with human our robotic arm was much efficient and stronger than human and also it helps human from working in harmful environment what is more we also found that it can lift up to heavy load without wasting any time also it saves the labour cost it also capable to work under the harsh condition like,shifting newly produce flame which are just come out from the furnace and many more kind of work from far distance with the help its remote or device.

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