

ROBOGAMES 2018

EVENT NAME: - MANOEUVRE

DATE: -

TEAM INFO

Team name: -Robo Enfield

Team leader's name: -Ali Nazar

Contact details of team leader: -Room no. G-46, Vrindavan, BIET Jhansi-284128.
Mob-8004193161

Number of members in the team (max 5):

MEMBERS INFO: -

<u>S No</u>	<u>NAME</u>	<u>EMAIL ID</u>	<u>PHONE NO.</u>
<u>1</u>	Ali Nazar	aliali36607@gmil.com	8004193161
<u>2</u>	Mayank Kumar Singh	mayankkvs00@gmail.com	6393056961
<u>3</u>	Saubhagya Shukla	saubhagyashukla1997@gmail.com	8755435157
<u>4</u>	Poonam Kumari	Poonamkri874@gmail.com	8853461752
<u>5</u>	Aanchal Sharma	aanchalsharma012345@gmail.com	7007678171

IMPORTANT NOTES AND GUIDELINES: -

Filling of this form should be taken **seriously** as the selections would be based on the evaluation of this form.

All the Information and facts provided by you must be **correct**.

Any information and content which are taken from elsewhere must be given proper reference.

Your content should be Brief and addition of unnecessary content should be avoided.

Images should be used wherever you feel appropriate in a sense that it gives a better vision of your content.

You can attach CAD diagrams, Electronic simulations provide links etc., related to your robot.

Any form of plagiarism shall lead to disqualification.

Attach the list of components used.

ABSTRACT SHOULD BE MAILED TO _____ : -
robogames@techkriti.org

SUBJECT OF MAIL SHOULD BE _____ : -
"Robogames: <Team Name> Event Name".

Try sending a single abstract. In-case of multiple abstracts the latest shall be considered

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FOR ANY QUERIES CONTACT:

Trishank

Mukesh

Mrinaal

Dhirendra

8989176212

7054151340

7388785212

8949936762

INTRODUCTION:-

For many people robot is a machine that imitates a human—like the androids in Star Wars, Terminator and Star Trek: The Next Generation. However much these robots capture our imagination, such robots still only inhabit Science Fiction. People still haven't been able to give a robot enough 'common sense' to reliably interact with a dynamic world.

The type of robots that we will encounter most frequently are robots that do work that is too exciting . Most of the robots in the world are of this type. They can be found in auto, medical, manufacturing and space industries. In fact, there are over a million of these type of robots working for us today.

Well robot is a system that contains sensors, control systems, manipulators, power supplies and software all working together to perform a task. Designing, building, programming and testing robots is a combination of physics, mechanical engineering, electrical engineering, structural engineering, mathematics and computing. A study of robotics means that students are actively engaged with all of these disciplines in a deeply problem-posing problem-solving environment.

Mankind has always strived to give life like qualities to its artifacts in an attempt to find substitutes for himself to carry out his orders and also to work in a hostile environment. The popular concept of a robot is of a machine that looks and works like a human being.

Now a days industry is moving from current state of automation to robotization to increase productivity and to deliver uniform quantity.

one type of commonly used robot is PICK AND PLACE ROBOT .A pick and place robot is a robot that can be programmed to pick an object up and place it somewhere.the main idea is to develop a application which can reach places where human can not reach like *space, hidden places, small tunnels. This robot runs on human guidance.*

Robot is controlled by four DPDT (Double Pole Double throw) switches.

They are especially practical in places such as assembly lines ,where respective and difficult task need to be performed with accuracy.

This can lead to an increase in production rate, especially in industries where production is time sensitive.

They can produce more product in less time that a human can.

CONSTRUCTION: -

Robot divided in to three parts -

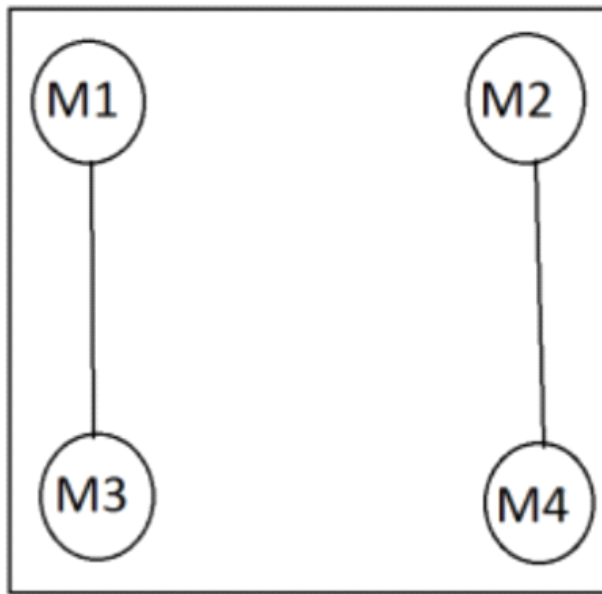
1-Moving base

2-Gripper

3-Remote

MOVING BASE

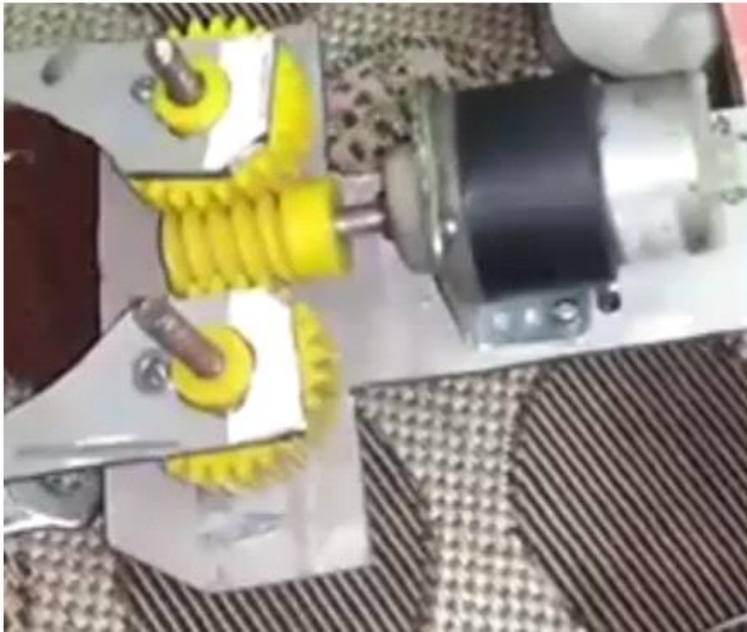
The function of moving base is to move robot from one place to another place .Moving base consist of four motors of 200 rpm clamped with the help of clamper in each corner side then tyres are fitted in four motors of moving base.



In this fig M1 ,M2,M3 and M4 are four motors of moving base in which M1 and M3 are connected to each other such that direction of rotation of tyres of motor M1 and M3 are same ,also M2 and M4 are connected so that directions of rotation of M2 and M4 are same .The reason behind connecting M1 , M3 and M2, M4 is to move the base in right and left direction ,when we give electric supply to M1,M3 and M2, M4 does not have any electric supply supply then bot move in right direction and whenwe give supply toM2,M4 and M1,M3 does not have any electric supply then base move in left direction.

GRIPPER

Gripper is used to hold the object and mechanism used in the gripper is worm and worm wheel.



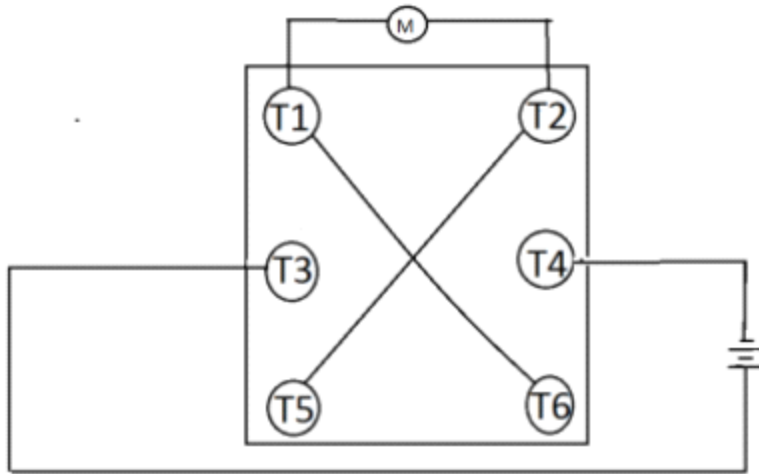
Worm and worm wheel mechanism consist of one cylindrical gear and two circular gear in which circular gears fitted between one cylindrical gear or worm wheel in such a way that when cylindrical gear move

then circular gear also move ,here power transfer takes place from one cylindrical gear to other two circular gear. Then cylindrical gear is connected to 200 rpm motor .This mechanism is attached to

moving base with the help of two pieces of wood .these two pieces of wood is connected to another circular gear and this gear is also connected to worm wheel ,this worm wheel is connected to another 200 rpm motor ,this motor lift up or lift down the gripper .

REMOTE

Remote is used to control the robot .In this four DPDT switches fit in the pcb .DPDT stands for double pole double throw switch .



DPDT consist of six terminals which assign in the fig by T1,T2,T3,T4,T5 and T6. Before using these switches in motor we short T1,T6 and T2,T5 then terminals T3 and T4 is connected to battery and T1and T2 is connected to motor .We use six motors in whole robot four in moving base which need two DPDT switch for controlling ,one is used to lift the gripper and remaining motor used in gripper which is used to open and close the mouth of gripper.

WORKING PRINCIPLE: -

The various factors to be considered while designing of pick and place robots are been discussed as follows.

ARMS

The basic function of of a pick and place robot is done by its joints. joints are analogous to human joints and are used to join the two consecutive rigid bodies in the robot. the can be rotatary joint or linear joint

The robotic arm's working principle is based on the joint variables i.e total number of joints that are allowed to rotate or translate. The number of independent joint variable can be used to determine the number of degree of freedom. The term **degrees of freedom** are set of independent displacement that

specifies completely the displaced or deformed position of body. In simplest way it describe the number of ways a robot can move. Therefore to control the motion of the arm, we have to just manipulate the degree of freedom.

Since in the base a 200 r.p.m dc geared motor is attached. This motor is further attached to a circular gear. Therefore, when the motor rotates either clockwise or anticlockwise, it also compels the gear to rotate in the similar fashion of the motor. Thus this whole mechanism results in the motion of the whole arm.

The working of the ARM and the WRIST segment were based on gear mechanism. Thus one 200 r.p.m dc geared motor and a circular gear was used to control the motion of the arm.

The working of GRIPPER was simply based on gear mechanism. In this mechanism a cylindrical gear was inserted between two circular gears. Each circular gear was attached to a jaw of the gripper. On the other hand the cylindrical gear was connected to a 200 r.p.m dc motor. Therefore, whenever the cylindrical gear rotates the circular gears were also rotated, thus resulting in the opening and closing of the jaws.

CONTROLLING SYSTEM:

The controlling system of pick and place robot is based on DPDT swiches which working is as follow:-

DPDT switch consists of 6 terminals. let us name them A,B,C,D,E,F to understand the working principle.

1. DPDT TO MOTOR CONNECTION :

The point 'A' is connected to point 'F' so you can solder a wire between point 'A' and 'F' .A motor is connected to DPDT switch between points 'A' and 'B' and power supply is connected between points 'C' and 'D' .Similarly points 'B' and 'E' are connected .As shown in above figure.

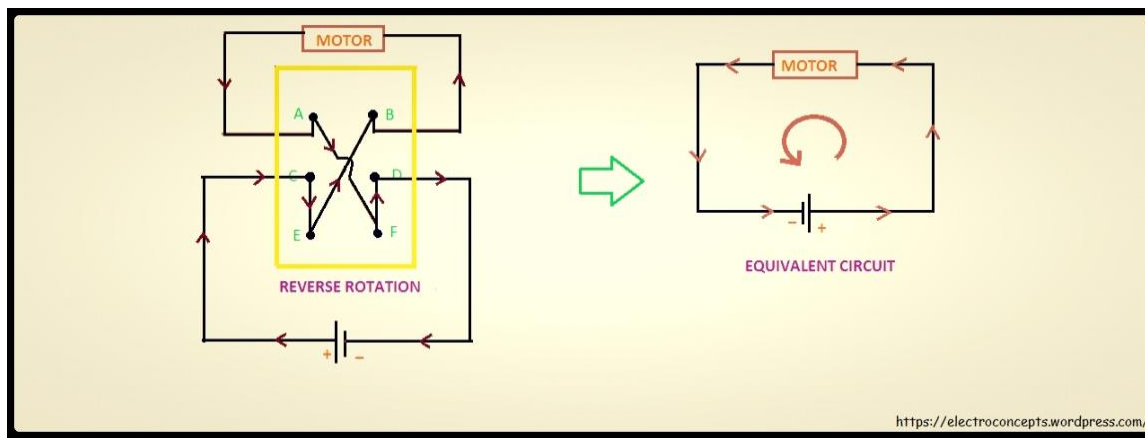
2. FORWARD ROTATION :

When the switch is pushed in forward direction the point 'A' is connected to point 'C' and also point 'B' is connected to point 'D' . Thus the motor moves in forward direction because now the battery is connected in forward connection to the motor.The equivalent circuit is provided in above fig.

3. REVERSE ROTATION :

When the switch is pushed in reverse direction the point 'C' is connected to point 'E' and also point 'D' is connected to point 'F'. Thus the motor moves in reverse direction because now the battery is connected in reverse connection to the motor.

Thus you can move your motor in clockwise or anti-clockwise direction using a DPDT (Double Pole Double Throw switch)



MOVING BASE (CHASSI):

The mobility of the robot is controlled by installing four wheels in the wooden base. Each wheel is connected to a 200 r.p.m dc motor. These motors are also controlled through a set of DPDT switches thus controlling the forward, backward, left and right direction of motion of the robot.

When we need to turn the robot then two tyres which are connected to each other move in same direction and other two tyres are not rotating due to which it take turn in left and right direction, if we need to take the turn in backward direction then by pressing the joystick switch in opposite direction it moves backward the reason behind moving in backward direction is change in polarity, dpdt switch change the polarity

REFERENCES: -

The following links has helped us a lot in understanding the basic feature of a robotic arm:-

https://en.m.wikipedia.org/wiki/Robotic_arm

<http://www.instructables.com/id/DIY-robot-arm-/>

But most of the help that we got was from our seniors.