

# Servo Robot Experiment

---

## Summary of the Work Schedule

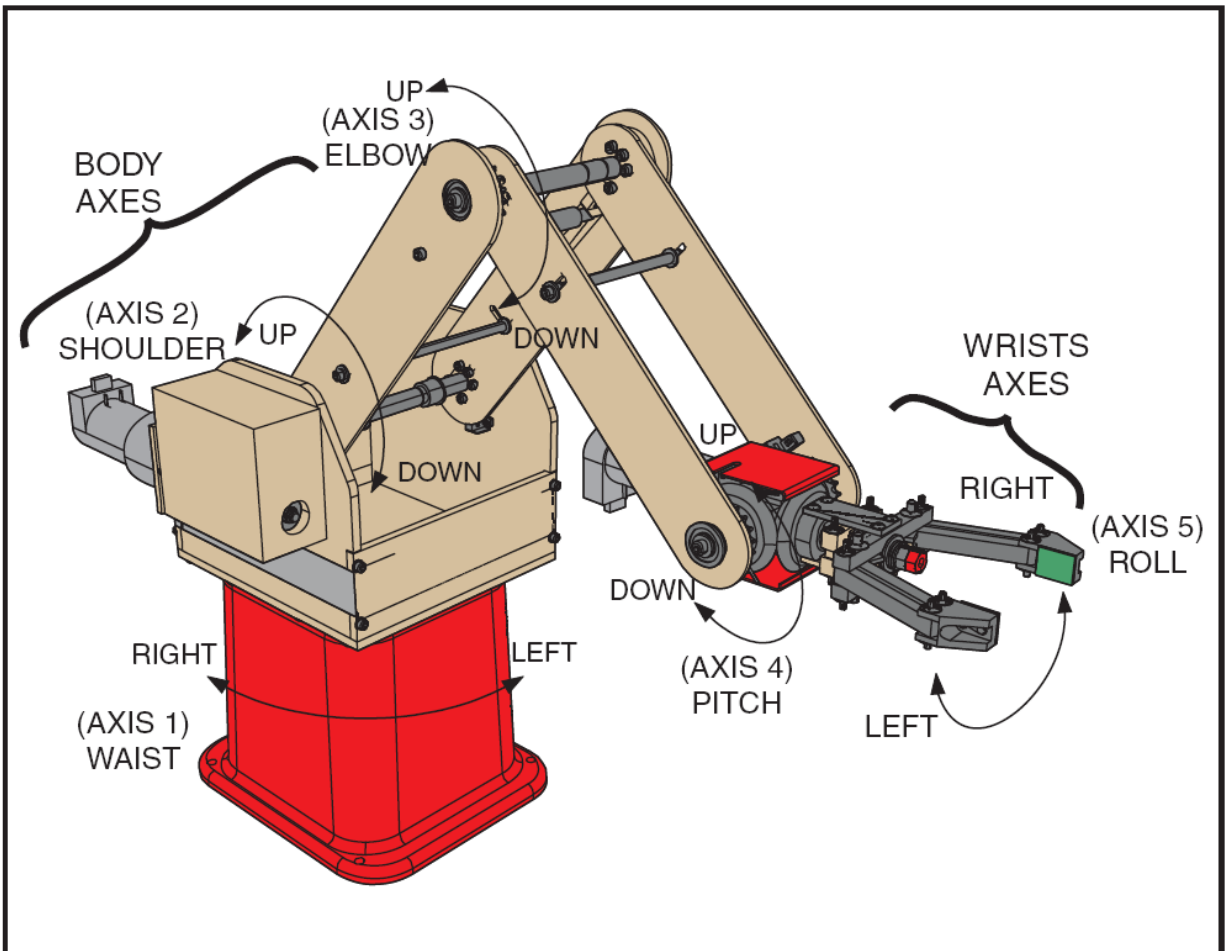
### *Week 1*

1. Make yourself familiar with the robot's components for different degrees of freedom and usage of the virtual Peegasus RSS software for executing the basic actions.
2. Conduct experiments with the actual robot to experience its basic motions using the teach pendant.

### *Week 2*

3. Learn how to teach the robot different points of motion.
4. Plan a path for picking and placing an object by avoiding obstructions in the way. In the current lab set up, create the obstructions as well as initial and target points.
5. Teach that path to the robot.
6. Write a short program for executing the planned path. The path must have a well-defined avoidance point, Hover point, and approach point before grasping and releasing the object.
7. Execute the program and demonstrate it to Instructor.
8. Take printout of programs and the coordinates of different points and submit the report.

The purpose of this experiment is to learn about the different components of robot and gain hands-on experience on Pegasus Servo Robot system. This experiments will also demonstrate programming features on the robot. Figure 1 shows the schematic diagram of a Pegasus servo Robot and is marked with different axes and their degrees of freedom.

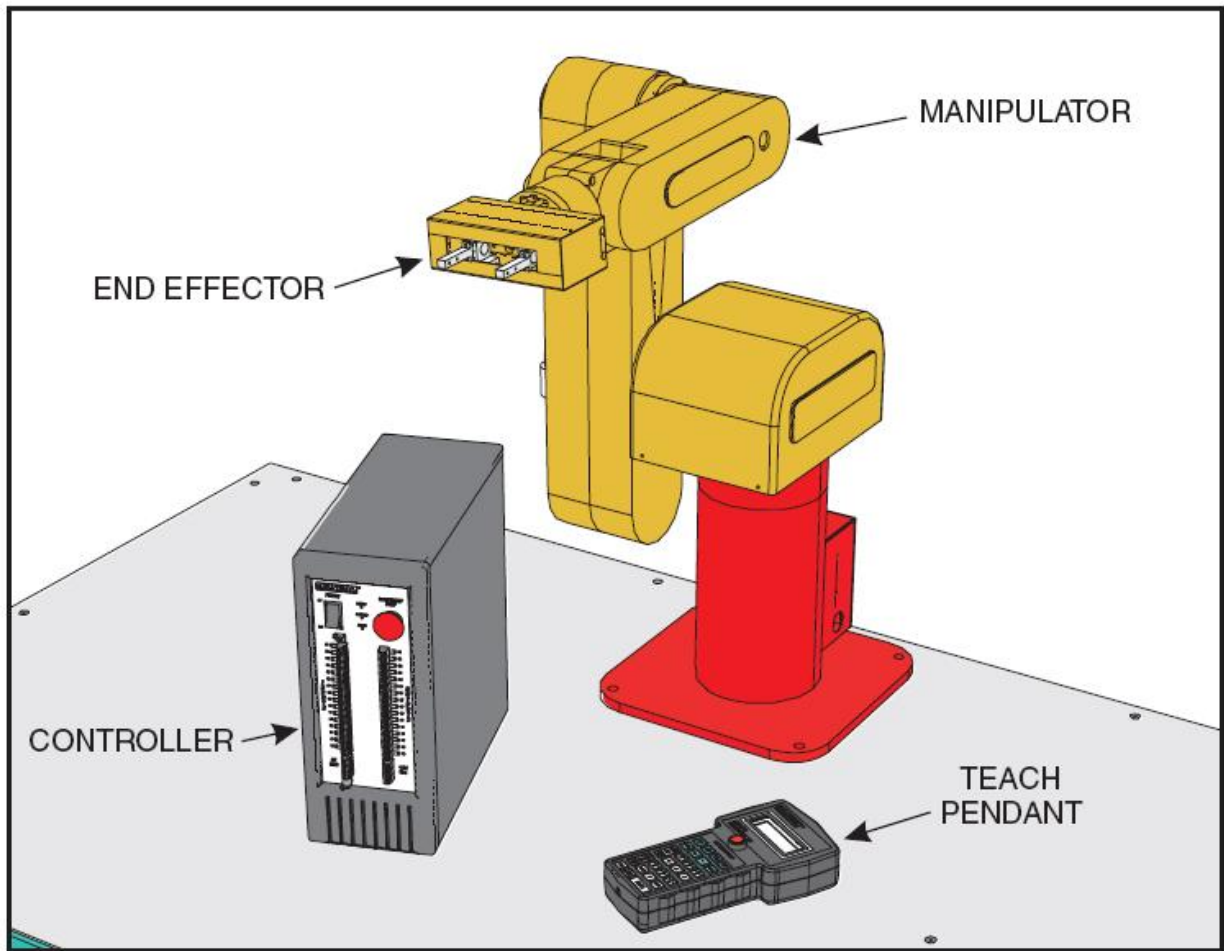


**Figure 1:** Axis of movement of Pegasus Servo Robot

The robot has five axes of rotation as shown in Figure 1. The arms are free to rotate about the respective axis to which it is attached to. So there are five degree of freedom, the sixth motion is Grab and release motion which is performed by the end effector. All five possible movements can be controlled using the interface software called pegasus control software loaded on the computer. The robot can be programmed using a set of instruction to complete a certain task within its range of movement. Before manipulating motion of the machine let me briefly educate you about Robot.

The robot has five basic components :

1. Manipulator
2. End Effector (Hand)
3. Controller
4. Drives
5. Teach Pendant



**Figure 2:** Axis Five Basic Component of Robot

Identify each element of robot. You will be mainly using Teach pendant for moving the robot from one point to different point. Teach pendant is a handheld device that allows robot operator to perform certain tasks on the robot.

## Experiment:

The robot control software is facilitated with RSS interface software where you can move a virtual robot on screen using the same command that you will be using to move actual robot. This step is necessary to get some experience of robot commands before handling the actual robot.

### Part 1.

1. Start the Pegasus Control software and enable the pegasus RSS interface.

(Select Robot from Menu and then select interface w/simulation software in the drop down menu.

2. Go to page no 32 in Manual 1 and learn how to jog a robot using virtual teach pendant. Move all 5 axis one by one and identify its concerned axis of rotation.
3. Learn to use emergency stop (red round) button in case some unexpected motion of Robot.
4. Change speed of robot using the jog speed button on teach pendant.
5. Learn Homing operation of Robot. Remember before running any program homing operation is necessary. Homing action brings robot in a predefined position. Go to page 58 of Manual 1 and follow the steps 1 to 5 to home the robot.
6. Now learn how to operate robot gripper using instructions on page 67 of manual 1.

### Part 2.

Once you are done with these above steps you are ready to move to the actual robot setup. Do the following actions to start the robot.

1. Press the power button on the control and start robot control software on the system.  
Remember in case of any unexpected or violent movement of robot immediately press either emergency stop (red round button) on the controller or on the teach pendant.
2. Before doing any operation Home the robot. Perform instructions given in manual 2 on page 8 to move the robot from one point to other point. The instructions are given for virtual robot .  
But you perform the given steps on the actual robot.
3. Learn to teach the different point to the robot. And save the points.
4. Now you are experienced with the basic robot motions. It's time to move to segment two to learn basic programming commands given in segment 2 of the second manual.  
There are four main commands used to program the robot.  
Pmove Point\_1 : It moves the robot to the point\_1 from its current position.  
Grasp : It is used to grab some object by robot's end effector.  
Release: it is used to release the object from the robot's end effector.  
Delay : it is used to delay or give some pause between two consecutive commands written in the program.

### Part 3.

In this part you have to write a program to grab a object and place it to the desired position avoinding obstructions .

Steps:

1. First of all fix the position from where robot will pick the object. fix the target point where robot will place the object.
2. Place some arbitrary obstruction in between the pick up point and target point.
3. Now using teach pendant perform the pick and place operation avoinding the obstructions in the way. Once you are sure of the path robot should take for the pick and place operation. Teach different points in the path trajectory to robot.
4. Write a program to perform the pick and place operation using the points taught to the robot in step 3.
5. Show the program to instructor and demonstrate by running it.
6. Save the program with the corodinales of all the points used in the program. Take print out and submit it.

Before leaving home the robot. Then close the robot control software and the switch off the power button located on the controller.