

Introduction to Robotics

Lab 1

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Task 1.2

(a)

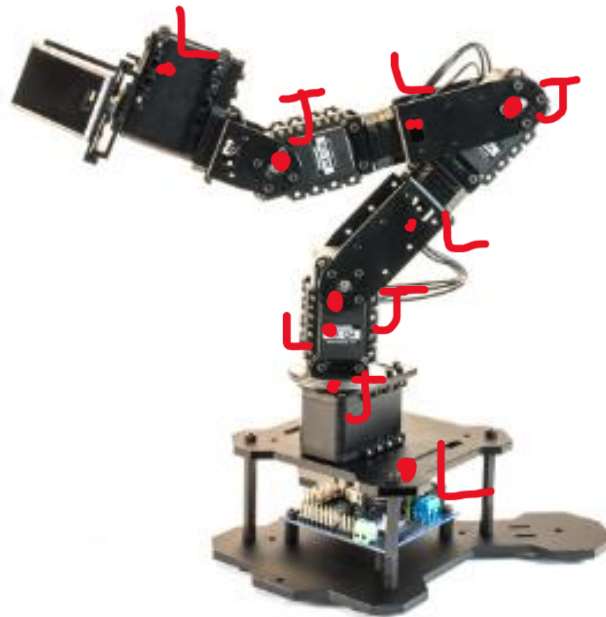


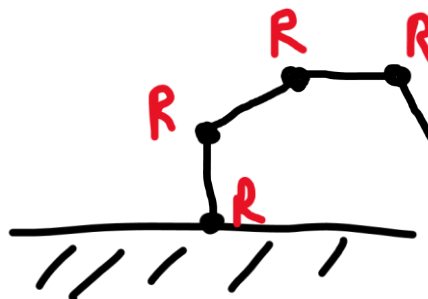
Figure 1.1: Phantom X Pincher Arm

L- Link, J- Joint

(b) 4 Joints and 5 Links



(c)

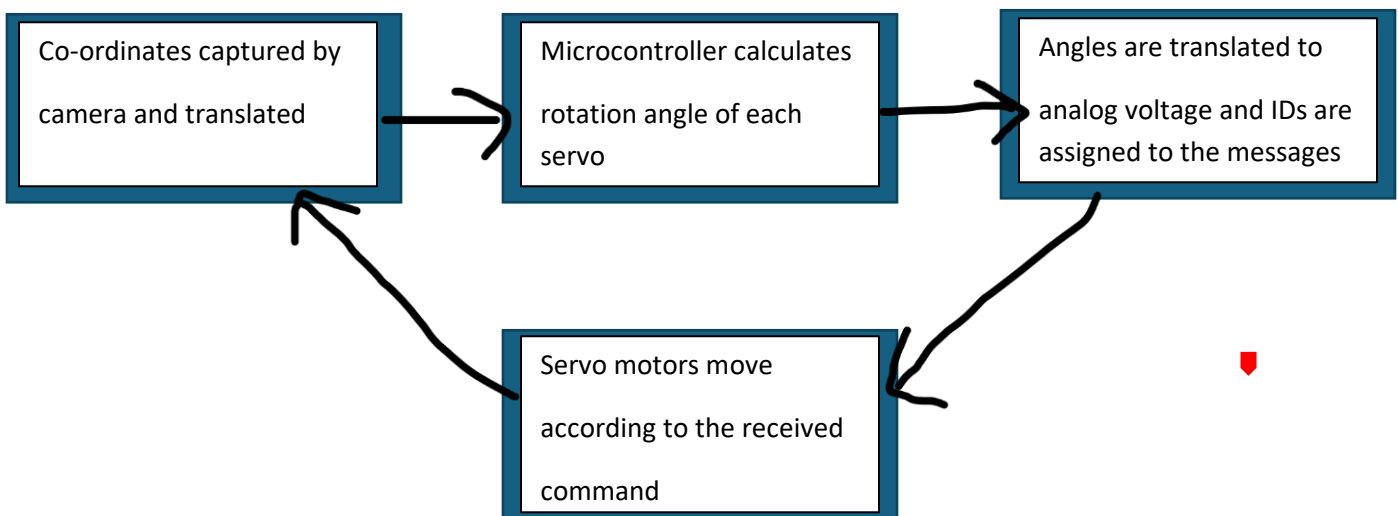


- (d) Using Grubler's formula, $m = 6$, $N = 5$, and sum of constraints provided by each joint $= 5 \times 4 = 20$,
 $m(N-1) - \text{sum of constraints} = 6(5-1) - 20 = 4$. The arm has 4 degrees of freedom.
- (e) When it is connected to power, yes.

Task 1.3

(a) The potentiometer provides analog voltage readings proportional to the rotation angle. So, to get the angle of rotation, the voltage reading is translated to the angle once the relationship is known.

(b)



(c) We have camera as our sensor which through images senses the surroundings, servo motor as the actuator that is performing action according to the control signals and inside the servo we have a position sensor that senses the actual position of the shaft (inside the servo motor).

Stateflow Onramp Course Completion



Shaaf Farooque:

The screenshot shows the Stateflow Onramp course completion survey screen for Shaaf Farooque. The page has a blue header with the course title and a progress indicator showing 100% completion. A central modal window displays the 'Course Survey' title and a 'Course complete!' message. The modal text reads: 'Congratulations! You have completed the course! You may retake any section that you want, or continue your learning with MathWorks Training.' Below the modal, there are buttons for '< Previous' and 'Give Us Feedback'.

Mysha Zulfiqar:

The screenshot shows the Stateflow Onramp course completion next steps screen for Mysha Zulfiqar Ali. The page has a blue header with the course title and a progress indicator showing 100% completion. The main content area is titled 'Next Steps' and contains the following text: 'Congratulations, you have just built your first Stateflow charts! You've learned how to use states and transitions to define the structure of your chart, and how to use transition conditions, condition actions, and state actions to control the execution of your chart. In this course, you learned how to build Stateflow charts in Simulink. Stateflow is a powerful environment for modeling dynamic systems with instantaneous changes. Simulink allows you to model dynamic systems with continuous changes. Using Stateflow and Simulink together, you describe many real-world systems, such as reactive control systems, finite state machines, scheduling, fault detection, and operational mode logic. (Stateflow can also be used with MATLAB only; see Additional Capabilities below.) MathWorks has many resources to help you continue your learning. Explore the links below for information on related topics, or to get ideas of how to use Stateflow in your work.' Below the text, there are sections for 'MathWorks Training' and 'Stateflow Resources'. The 'MathWorks Training' section includes links to 'My Courses' and 'Instructor-led courses'. The 'Stateflow Resources' section includes links to 'Get Started with Stateflow', 'MathWorks examples', and 'Debugging'. At the bottom, there is a section for 'Additional Capabilities' with a link to 'Stateflow in MATLAB'. Navigation buttons for '< Previous' and 'Next >' are located at the bottom of the page, along with a 'Give Us Feedback' button.

