SDM283 Mechanics for Design

MiniProject3—ABBIRB460Robot

Presented to you
by SDM283 teaching staffs

2022 年5 月24 日

南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY
设计智造学院 School of System Design and Intelligent Manufacturing

Report/MATLAB/Adams Instructions

In this project, you will form a team of FOUR (or maybe FIVE) to solve the kinematics, statics and dynamics of the ABB IRB-460 robot. You can ignore the fourth actuated degree-of-freedom (DOF) of the robot and treat it as a 3-DOF robot. Write a report of the project and submit it, along with programs, etc., and a work distribution document (as a group assignment).

Task 1. (20 points) Write a MATLAB program that computes the forward kinematics map of the robot, i.e., given the joint angles of the robot, compute the coordinate transformation.

Task 2. (20 points) Write a MATLAB program that computes the forward Jacobian map of the robot, i.e., given the joint angles and speeds of the robot, compute the spatial velocity.

Task 3. (20 points) Write a MATLAB program that computes the three joint torques of the robot according to the given payload at its end-effector at a static configuration.

Task 4. (20 points) Write a MATLAB program that computes the dynamics of the robot, i.e., given the joint trajectories (angle, speed and acceleration) of the robot, compute the three joint torques of the robot.

Task 5. (20 points) Use MSC Adams to verify your MATLAB computation in Task 1, 2, 3 and 4.

Table 1: Point allocations

task	report writing	basic functions	parameters	final
1	5	5	5	5
2	5	5	5	5
3	5	5	5	5
4	5	5	5	5
task	verify task 1	verify task 2	verify task 3	verify task 4
5	5	5	5	5

Table 2: Work distributions

member	task 1 (%)	task 2 (%)	task 3 (%)	task 4 (%)	task 5 (%)

Video Instructions

Aside from your project report, MATLAB program and Adams simulation, you will be required to produce and submit a three to five-minute video on your learning outcomes. The video must include but is not restricted to the following contents:

- A cover with proper title and abstract.
- A brief introduction to your team and project (objective, planning, execution, time management, etc.); each member is required to declare in person his/her tasks in the project.
- What have you learned from lectures of the module (rigid body dynamics)?
- How did you apply your newly acquired knowledge to the accomplishment of mini project three?
- What difficulties have you met and how did you overcome them?
- What have you learned outside the classroom?
- A summary to wrap up your video.

Deadline (for everything): 24:00 PM Wednesday of week 18 (15 June)