



# Introduction to Robotics

Manipulation and Programming

## Unit 2: Kinematics

PYTHON LAB PROJECT: SPHERICAL MANIPULATOR (2 DOF) MODELING

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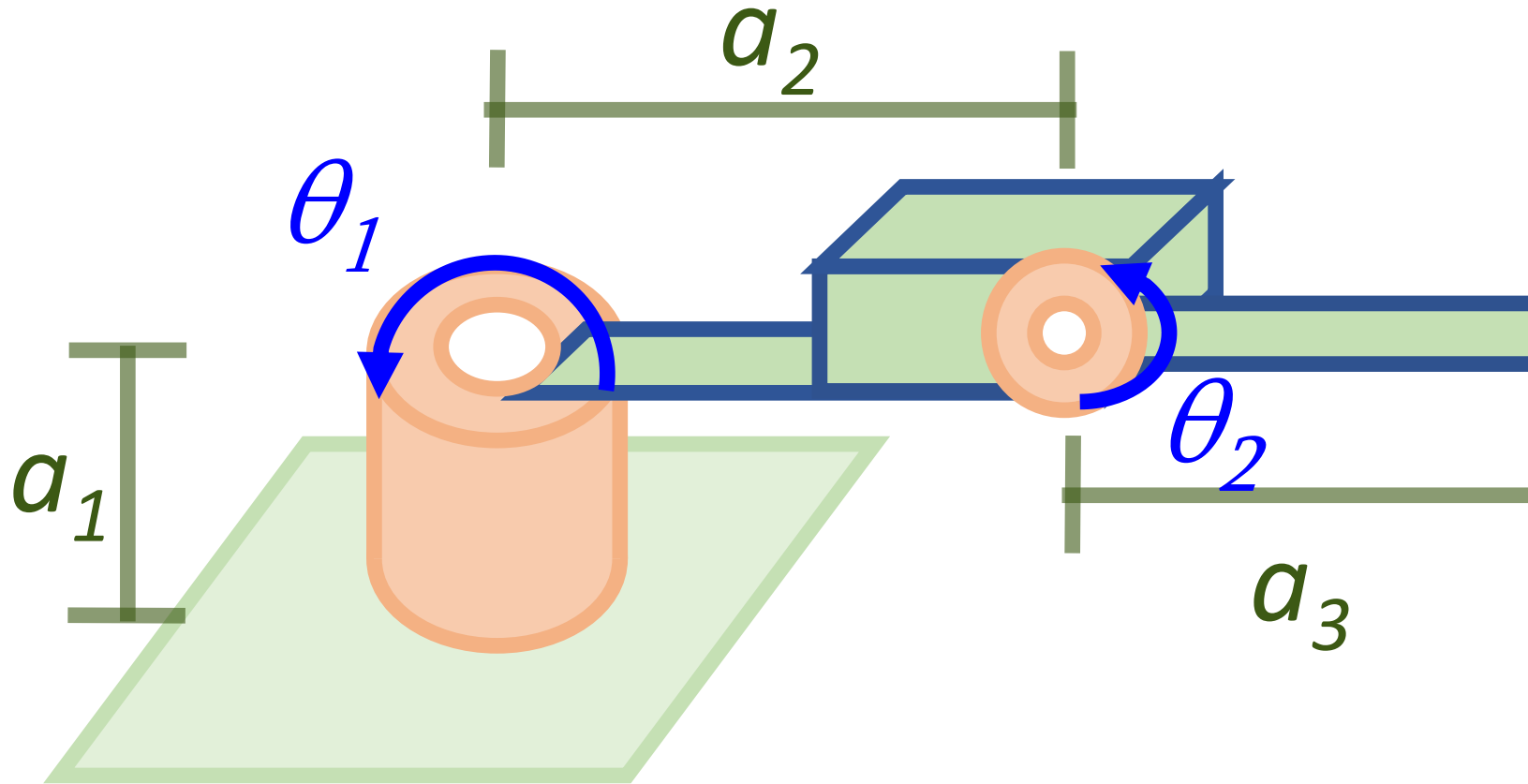
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# 2 DOF Spherical Robot Arm Modeling

## Inverse Kinematics

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# Problem:

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- 1) Use Mathematical modeling to determine the workspace of this manipulator under all possible  $x, y, z$ . Given,  $a_1, a_2$ , and  $a_3$  are all 1. All possible  $\theta_1, \theta_2$
- 2) Given a point  $[x, y, z]$  within the workspace. Find  $\theta_1, \theta_2$  formulas. Write them down in a paper.
- 3) Write a program to calculate these two angles for all given  $[x, y, z]$  with respect to frame 0.