Robotics Terminology

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A Typical Stationary Robot
Stationary Robot Anatomy

- Mechanisms (Mechanical Structure)
- End Effecters
- Tools (Optional)
- Controllers
- Actuators
- Sensors
- Programming Interface
Figure 7.1 Diagram of robot construction showing how a robot is made up of a series of joint-link combinations.
Links and Joints

- Links are rigid parts
- Joints permit relative motion between links
Prismatic Joint

Input link

Joint motion

Output link
Prismatic Joint
Revolute Joint

(c) 

Input link  

Joint motion  

Output link
Revolute Joint

Input link

Joint motion

Output link
Revolute Joint
Degrees of Freedom in Mechanisms

• How many degrees of freedom (DOF) are needed to position and orient an object in space?
Desired Degrees of Freedom

• 3D Dimensional Case
  – 3 DOF for positioning (x, y, z)
  – 3 DOF for orientation (pitch, yaw, roll)

• 2 Dimensional Case (Planar case)
  – 2 DOF for positioning (x, y)
  – 1 DOF for orientation (tilt)
Mechanism Types

• Two different category
  – Arm
    • Two to three degrees of freedom
  – Wrist
    • One to three degrees of freedom
Arm: Cartesian Configuration
Arm: Cylindrical Configuration
Arm: Polar Configuration
Arm: SCARA Configuration
Arm: Articulated Configuration
Comparison of Arm Configurations

More Revolute Joints

Biologically Inspired
HW #1

• Due 2PM Tuesday February 12\textsuperscript{th} 2008