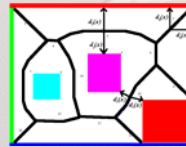


# ROBOT TYPES

by  
Dr. Ahmet OZKURT  
@DEUEEE

some of images from the notes by  
Allison M. Okamura and  
Jean-Claude Latombe  
© Stanford University

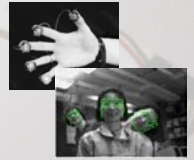
# ROBOT DESIGN



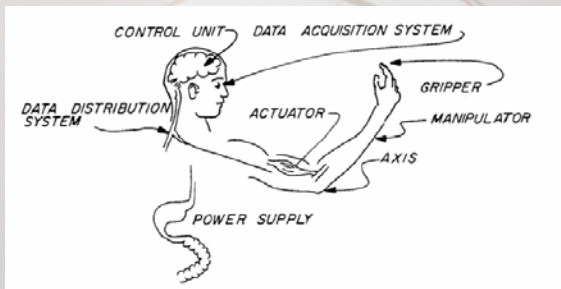
SENSE

PLAN

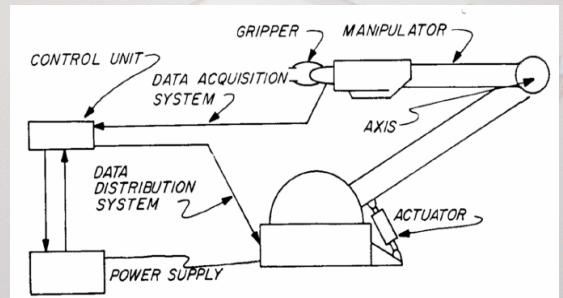
ACT



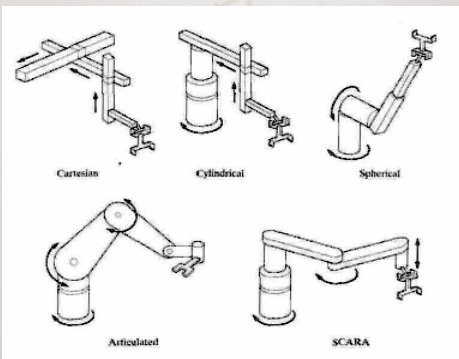
# Human Manipulator



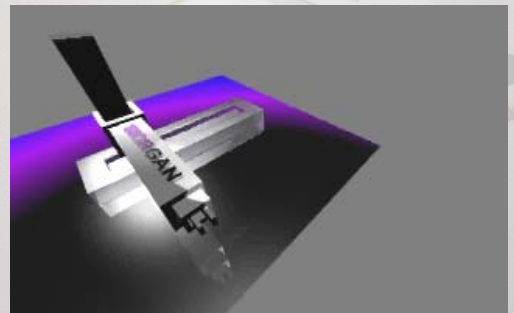
# Robot Manipulator



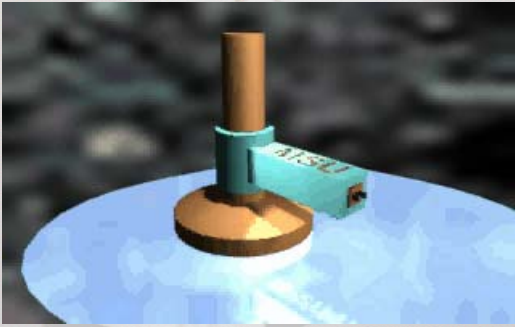
# Fundamental Robot Coordinate Frames



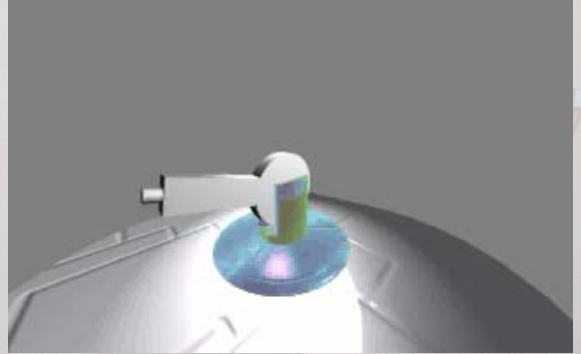
# CARTESIAN



## CYLINDRICAL



## SPHERICAL



## ARTICULATED



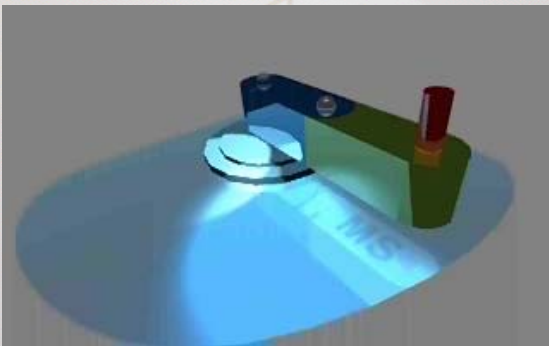
## Articulated Manipulator

- Also called jointed, elbow, or anthropomorphic manipulator
- Least intrusion into the workspace

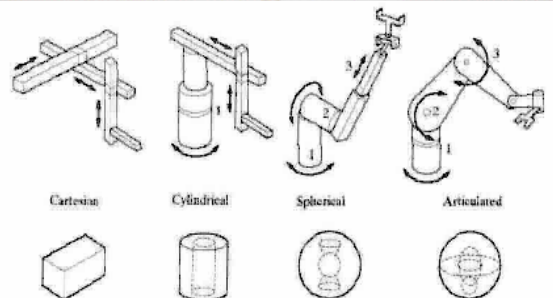


*FRLM models from Gerd Hiringer*

## SCARA



## Typical Workspaces



Typical workspaces for common robot configurations.



## Other Robots

- Mobile Robots
- Manipulators
- Haptic Devices
- Humanoid Robots

## Mobile Robot Examples

- Search and Rescue
- Remote-controlled
- Robust, Tethered

Center for Robot-Assisted Search and Rescue (University of South Florida)



## Mobile Robot Examples

- Guides (museum, tourist attractions, etc.)

Rhino (CMU/Bonn ICS)



## Mobile Robot Examples

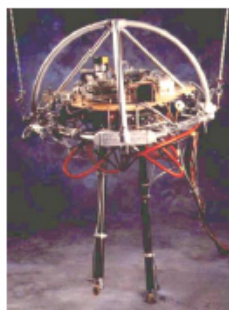
- Walking and running robots (one or more legs)
- Purpose:
  - Handle uneven terrain
  - Help us understand biological locomotion



"Sprawllita" (Stanford)

## Mobile Robot Examples

- Hopping robots use accurate dynamic models of the system
- Specialized controllers stabilize the system



3D Biped (MIT)

## Mobile Robot Examples

- Soccer-playing robots
- Cooperating Agents





## Manipulator Examples

- Medical robots (teleoperated)



da Vinci (Intuitive Surgical, Inc.)

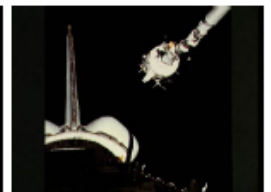
Surgeon Console



Surgical Site

## Manipulator Examples

- Space shuttle arm (teleoperated)



## Manipulator Examples

- Painting robots
- Interesting issues in coverage, path planning

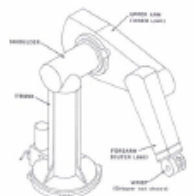


## Manipulator Examples

- Industrial robots (teleoperated & autonomous)



Conan (Alstom Schilling Robotics)

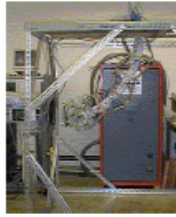
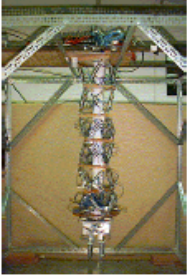


PUMA Robot



## Manipulator Examples

### Binary Robots



JHU Binary Robot

## Example: Haptic Device

- 3dof actuation
- Torque not important for many virtual environments
- However, 6dof positioning is important

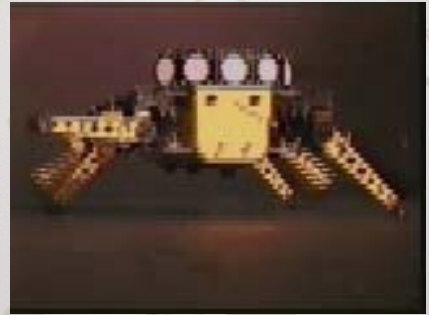


*Sensable Technologies*

## ROBOT EXAMPLE 1 BOTWALK



## ROBOT EXAMPLE 2 GENGHIS



## ROBOT EXAMPLE 3 ROBUG



## Humanoid Robots

