

ROBOTICS

■ Definition of a Robot

- ◆ A machine whose behavior is controlled by a computer program

Fundamental Components

- A "Brain" to control robot's actions & respond to sensory inputs
 - ◆ a computer of some kind
- Robot body -- physical structure that holds pieces together
- Actuators that allow robot to move
 - ◆ usually motors
- Sensors that give information about the environment
 - ◆ Visual/nonvisual
 - ◆ Internal state / external
 - ◆ Active/passive
- A power source
- Communications HW / SW

Types of Robots

- Non-mobile
 - ◆ Machine loading
 - ◆ Pick and place operations
 - ◆ Welding, painting, assembly operations
 - ◆ Manufacturing
 - ◆ Inspection
 - ◆ Robot arms
- Mobile
 - ◆ Tethered
 - ◆ Autonomous
 - † Anthropomorphic
 - † Androids
 - † Biomimetic

Robotics

- Intrinsically Interdisciplinary
- Mechanical Engineering
- Electrical Engineering
- Computer Science
- Chemical Engineering
- Cognitive Psychology / Biology / Neuroscience

Brief History of Robotics

- 1801 - Jacquard Loom
 - ◆ punch card controlled textile machine
- 1890 - 1st autonomous vehicles (Tesla)
- 1922 - 1st reference to "robot" in Capek play ("RUR")
- 1938 - Pollard & Roselund, programmable paint sprayer
- 1946 - DeVol, General purpose magnetic playback device for controlling machines
- 1946 - Eckert & Mauchly, ENIAC electronic computer
- 1948 - MIT Prof. Wiener publishes "Cybernetics"
- 1952 - 1st Numerical Control machine built at MIT
- 1954 - Duvoll designs 1st programmable robot
 - ◆ Unimation: 1st robot company

- 1959 - Planet Corp., 1st commercially available robot
- 1962 - GM installs 1st industrial robot on an assembly line
- 1964 - AI labs opened at MIT & SRI
- 1967 - Mark II Robot imported to Japan for paint spraying
- 1968 - SRI builds Shakey
 - ◆ 1st mobile robot operated using AI techniques
- 1970 - 1st robot arm developed at Stanford
- 1973 - T#, 1st minicomputer controlled industrial robot
 - ◆ used extensively in industry
- 1976 - Robot arms used on Viking 1 & 2 space probes
- 1977 - ASEA(Europe) builds 1st microcomputer controlled robot
- 1980s and on - Rapid growth in robot industry
 - ◆ Japan becomes the biggest player

