Announcements

• Quiz #1 is next Friday, September 21, in class
• Labs begin tomorrow!
• Be sure to have your CS account activated.
  – Go to the CS Help Desk to activate your account.
Today’s Topics

• What is Robotics?
• Anatomy of a Robot
• The Sense-Decide-Act Cycle
• Introduction to the NXT-G Environment

What is Robotics?

• From the OED:
  “Robotics: The area or science of design, construction, operation, and application of robotics and the like; the study of robots.”
  “Robot: A machine capable of automatically carrying out a complex series of movements, esp. one which is programmable.”
• A robot is composed of
  – Hardware: the machine
  – Software: the program that controls the machine
• Robotics includes both aspects.
• Question: Can we have one without the other?
Anatomy of a Robot

- **Hardware Components:**
  - Sensors
  - Control
  - Actuators

- **Software Components:**
  - Sensor Input Processing
  - Decision Making
  - Actuator Manipulation and Output

Tribot Mk II.5
What is this Tribot Doing?

- What is the Tribot sensing?
- What decisions is the Tribot making?
- What actions is the Tribot taking?

The Sense-Decide-Act Framework
What is the Tribot Doing?

- What is being sensed?
- What is being decided?
- What action(s) result?

- We ask these questions all the time.

- Once we know the answers, what’s next?

Lego Mindstorms NXT-G Environment

- Programs are composed of blocks on a girder
- A girder of blocks represents an execution.
- Each block represents an input, decision, or action
Types of Blocks

• Action Blocks
  – Move forward, left, right, back
  – Output text or sound

• Decision Blocks
  – Repeat a group of blocks (loop)
  – Wait until a specific event is sensed
  – Decide which group of blocks to run (switch or if)

To Create and Run a Program

• Specify program name and “go to” a new “program”.
• Add blocks to the girder representing the program.
• Save the program.
• Ensure robot is turned on.
• Connect robot to computer via USB cable.
• Download the program.
• Disconnect the robot.
• Use the robot controls to run the program.
  – My Files ➔Software File ➔ “program name” ➔ Run
Robot Controls

Left
Stop/Back
Right
Select/Enter