Robotics

Nature Summer Camp 2016

Project description:

Students will learn about different aspects of Robotics from simple to complex.

Project Objectives:

1. They will learn how to collaborate in groups and teams
2. They will learn how to design robots for specific activities and scenarios
3. To design, develop and complete robotic activities and challenges

Timeline

9:00 am – 9:30 am Culture

9:30 am – 10:00 am Power Point

10:00 am – 11:00 am Activity 1

11 am – 11:15 am Break

11:15 am – 12:00 pm Activity 2

12:00 pm – 12:45 pm Lunch

12:45 pm – 1:30 pm Activity 3

1:30 pm – 2:15 pm Activity 4

2:15 pm – 2:30 pm Tour of 3D lab or You tube video

2:30 pm – 3:00 pm Wrap up

Activity 1: Virtual Robot

Introduction:

In this activity we will build, study, and interact with a virtual replica of Iris, a real robot designed and built by the Mind Project.

Materials:

Computer with internet access

Process: (No groups needed for this activity)

1. Please type the following

[www.mind.ilstu.edu/curriculum/**virtual**\_**robotics**\_**lab**/**lab**.html](http://www.mind.ilstu.edu/curriculum/virtual_robotics_lab/lab.html)

1. Please follow the prompts and you will learn the following:
   1. As a virtual researcher, you will: (1) review and assemble the hardware and software components of Iris, (2) write a script to drive Iris across the lab, (3) build and control Iris’s intelligent software, and (5) configure Iris to perform an environmentally-conscious task using what you’ve learned from the rest of the lab.

Activity 2: Robot Hands

Introduction:

In this activity we will learn that a robot with only a few joints isn’t very flexible. A robot without sensors can’t feel or see anything. How a robot is designed and built puts limits on the kind of job it can do.

Materials:

* Shoes that tie
* Popsicle sticks
* Masking tape
* Heavy gloves
* Cloth for a blindfold
* 2 pair of pliers

Process: (2 people per group and set up stations for heavy gloves and pliers)

1. Try tying your shoes blindfold. Was that hard?
2. Take the blindfold off. Put on heavy gloves. Does this make it harder to tie the laces?
3. Tape popsicle sticks onto your thumb and forefingers. Is it easy to tie your shoes without bending your fingers?
4. Tie your shoes with pliers. The pliers remove your sense of touch and coordination. Is it easy to tie your shoes with the pliers?

Activity 3: Mechanical Grabber

Introduction:

In this activity you will learn how to design and build a Mechanical grabber that you can use to pick up all sorts of things depending on the way you design it.

Materials:

* Wire clothes hanger (use the type with a cardboard tube attached to open-ended wire.)
* String
* Rubber bands
* Duct tape
* PVC Plastic pipe (1 inch in diameter and 3 feet long)
* Wooden dowel (¼ inch in diameter and at least 3 feet long)

Process: (1-2 people per group)

1. Remove the cardboard tube from hanger. Reshape the two sides to form the “hands” of the grabber.
2. Straighten out the hooked part of the hanger (the part that hangs over the rod in your closet).
3. Attach a dowel to the straightened hanger with duct tape. Place the straightened hanger and dowel into one end of the PVC plastic pipe. The “hands” of the hanger should poke out of one end of the pipe and the dowel should poke out of one end of the pipe and the dowel should poke out of the other.
4. Add rubber bands and duct tape to each of the “hands” of the hanger.
5. Pull on the dowel to make the “hands” of the grabber come together and push on the dowel to release them.
6. Try it out.
   1. Can you pick up a piece of paper?
   2. A soda can?
   3. How can you improve your grabber?

Activity 4

Introduction:

In this activity we will learn it is easy to make mistakes when writing programs for robots. Programmers write a program, and then test it to find mistakes. If a bad instruction is found, they fix the problem and retest the program until it works correctly. This is called iterative testing.

Materials:

* Large room
* Supplies to use as obstacles: pillows, chairs, etc.
* Blindfold
* Pencil/Pen
* Paper

Process: (2 people per group)

1. Clear a space of all items in a room.
2. Build a maze in the space with the items you have gathered.
3. Blindfold your friend. Using step-by-step instructions, guide your friend through the maze. Try not to hit any obstacles. You can make corrections as your friend moves.
4. Write down each step it would take for your friend to move through the maze.
5. Give the instructions to your friend, and have her navigate the maze again. Did she hit an obstacle? If so, change the instructions and try again. Keep repeating this process until she makes it all the way through the maze without hitting anything.