Syllabus

Introduction to Robotics

"The robots are coming whether we like it or not, and will change our economy in dramatic ways."
Kristen Soltis Anderson

Overview

Robots are everywhere! This exciting online course introduces students to the modern world of robotics. Using self-paced interactive lessons and exciting hands-on activities, students will learn how to design, build and program a robot. Students will demonstrate a basic understanding of robotics, programming and manufacturing automation.

Learning Targets

- I can explain the 4 different types of robots.
- I can create a list of important events in the history of robotics.
- I can define robotic terms like: robot, actuator, sensor, animatronics, artificial intelligence, hydraulics, etc.
- I can identify at least 3 different programing languages used in robotics.
- I can explain what a microcontroller is and how it is used in robotics and automation.
- I can explain the relationship between voltage, current and resistance in electronic circuits.
- I can identify different materials that make good insulators and conductors of electricity.
- I can explain what a schematic is.
- I can program various robot sensors and control systems to do basic and some advanced functioning.
- I can demonstrate troubleshooting and problem solving.
- I can identify 3 important math concepts used in robotics.
- I can explain where different sensors and switches might be used.

Materials Needed

(Having difficulty finding materials? Click HERE to view our school store)

- Approximately 25 sheets of 8-1/2" x 11" card stock
- ¼" thick cardboard (this is an approximate thickness, you can also stack cardboard together)
- Hobby knife
- Scissors
- Clear tape
- Masking tape
- 8 Plastic syringes (for hydraulics)
- Bolts, screws
- 5' plastic tubing

- Glue gun and glue sticks
- White glue
- Plastic 1 liter soda bottle (empty)

Course Outline

What's a Robot?

- "First day of class" welcome and course orientation
- What is a Robot?
- ACTIVITY – Spot the "Bot"
- Different Types of Robots
- What Makes a Robot a Robot? (3 ingredients)
- RESEARCH - Where are Robots Used Today?
- Robotics in the News!

History of Robots and Automation

- When Did We First Start Thinking About Robots?
- ACTIVITY - Build an Automaton (Hammer-bot)
- Recent History
- THINK ABOUT IT - Are Robots Taking Away Jobs?
- ACTIVITY - Build a Water Clock
- Family Video Night!

Robots - The Nuts and Bolts

- How Do Robots Move?
- ACTIVITY - Build a Robotic Arm
- How do Robots Know What's Around Them?
- How are Robots Controlled?
- RESEARCH – Control systems
- How to Build a Robot
- Robots (and a little math)
- ACTIVITY – Build a Virtual Robot

Electronics in Robotics

- Electricity and Electronics
- Voltage, Current and Resistance
- Insulators & Conductors
- What is a Microcontroller?
- ACTIVITY – Creating circuits
- Programming a circuit
- Let's Look Inside a Robot
- Advanced Learning

Let's Build a Virtual Robot

- Getting Started in Our Virtual Builder
- Build Your First Robot

Programming a Robot

- How Robots Think - Robot Programming Languages
- The Programming Mindset
- Introduction to Programming
- The Programming Interface
- Your First Program - Movement
- Drivetrains - a better way
- CHALLENGE - Movement
- Loops
- Bumper Switches
- LED Light
- CHALLENGE - LED Light
- If/Do Timers
- Sensors
- SOLVE A MYSTERY - Range Sensor Loop
- CHALLENGE - Range Sensor
- CHALLENGE - Clawbot
- Want to Learn Python?

Robots on Mars

- The Ultimate Robot (on Mars)
- NEWS!! Mars Rover "Opportunity" is Dead
- Explore More!
- CHALLENGE - Rover

What is Automation

- Introduction to Automation
- Automation in Your Home
- Other Amazing Examples!
- Family Video Night!

Automation - Building and Programming

- Building Automation
- AUTOMATION CHALLENGE - Spinning Sign
- AUTOMATION CHALLENGE - Garbage Can
- AUTOMATION CHALLENGE - Shaking Machine

The Future of Robotics

- What does the future look like?
- Animatronics
- Artificial Intelligence
- Bionics
- V/R

Conclusion

- Jobs in Robotics
- 10 Essential Skills
- How to Become a Roboticist