Fairfax Collegiate

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EV3 Robotics Platform 5-6 Syllabus



Course Goals

1 Understand fundamental principles of robotics.

Students will use the EV3 platform to learn about the basics of robotic design and implementation.

2 Understand programming basics using the EV3 language.

Students will learn and apply fundamental programming concepts using the EV3 language, with specific emphasis on sensory feedback.

3 Develop engineering and problem-solving skills

Students will apply what they learned about robotics and programming to complete complex challenges using the EV3 platform. They will work in teams to complete these challenges and create complex robotic behaviors.

Course Topics

1 Engineering principles

Force and torque, leverage, mechanical advantage, electrical motors.

2 Robotics design principles

Gear ratios, stability and center of gravity, articulation and motorized limbs, optimum sensor placement.

3 EV3 Programming

The EV3 programming language, motor and sensor feedback, control loops and datawires, programming sequences and logic.

4 Sensors and feedback

Infrared, light, color, ultrasonic, and touch sensors. Sensor input, feedback, and sensor programming blocks.

5 Geometry and navigation

Measurement and course planning, angles and turn calculation, types of turns, obstacle avoidance and line following.

6 Team problem solving

Assessing the challenge, brainstorming solutions, cooperative planning, trial and error, team member responsibilities.

Course Schedule

Day 1

Class Welcome Students will be introduced to the instructor, the course, the classroom rules, and each other.

Lesson: Intro to Robotics

Students will be introduced to the field of robotics and what it encompasses, as well as the EV3 kits that will be used in class.

"Minefield" Obstacle Course

Students will direct each other through an obstacle course to learn about the importance of accurate programming.

Form Groups

Students will form the groups they'll be working in over the course of the class.

Build the Taskbot

Students will complete their robots and begin writing their first program.

Day 2

Complete Robot Construction

If students have not finished the Taskbot yet, they will have time to complete their robots and begin writing their first program.

Lesson: Uses of Robots in Society

Students will learn about the history of robotics, current uses of robots, and the future of the field. They will brainstorm new applications for robots and new directions for the field.

Lesson: Intro to Programming

Students will learn the different block families in the EV3 programming language, and what the block types are used for.

Movement Checklist

Students will apply the basic programming lesson to have their robot complete a series of tasks.

Sensor Checklist

Students will learn to use the sensors and have their robots complete a series of tasks.

Day 3

Sensor Checklist Students will learn to use the sensors and have their robots complete a series of tasks.

Challenge: Follow the Line

Using the color sensor, students will program the robot to follow a line.

Day 4

Challenge: Ultrasonic Bumpercars

Students will create a program that uses the ultrasonic and touch sensors to locate objects and bump into them.

Challenge: Maze

Students will create a controller using the two touch sensors to navigate through a maze.

Day 5

Lesson: IR Sensor Students will learn about the IR sensors capabilities.

Challenge: IR Beacon Retrieval Students will have their robots search for the IR beacon.

Challenge: IR Remote control

Students will learn to use the IR beacon as a remote control.

Day 6

Lesson: Gear Ratios Explain the concept of gear ratios and have the students modify their robots to incorporate these principals.

Challenge: Hill Climbing New Course Activity Description

Challenge: Race

Students will race through a course.

Day 7

Lesson: Advanced Programming

Students will learn about data wires and basic math blocks. Students will create a simple program using the color sensor.

Animal Bot

Using the random blocks and the medium motor, students will modify their robots to go through a series of behaviors.

Day 8

Day 9

Challenge: SumoBot Students will customize their robots for combat.

Day 10

Robot Breakdown

Students will disassemble their robots and put away their kits, inventorying their pieces in the process.

Class Wrap-Up

Students will recap the material and share their favorite parts of the class. The last remaining class time will be spent watching a robot-related movie.

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