Unit 2: Intermediate Concepts of Programming and the Lego EV3

Content Area: **Technology**
Course(s): **Robotics**
Time Period: **October**
Length: **3 weeks**
Status: **Published**

Enduring Understandings

Unit Focus:

• Program Flow Model

• Simple Sensor behaviors

Big Idea: Data Underlies the Core of all Processing.Unit 2 of 5

- Computational thinking is used in various fields and situations, and we use it in our daily lives.
- Computational thinking skills are present in science, engineering, and mathematics.
- A program uses data to make decisions, and a robot acts on those decisions.
- Sensors allow robots to interact with the world.

Essential Questions

- What core computer programming logic and reasoning skills are used in a robotics engineering context?
- How has system control technology and robotics systems change the way we manufacture products?
- How do the components of a robot interact, relate, and connect?
- How has system control technology and robotics systems change the way we manufacture products?

Content

Skills

- Students will control the Driving Base and trigger events based on input from various sensors
- Student will understand the design, construction, and programming of robots
- Students acquire the skills necessary to debug their own code, as well as analyze and evaluate others' codes

- Students will understand the brainstorming process behind creating an original solution to a real world problem

Vocabulary:

Data

Trigger events

Sensors

Dexterity

Events

Resources

Every student in every school should have the opportunity to learn computer science. Exposing the learner to multiple platforms for learning code facilitates a better understanding of the extensive resources available while creating a broad foundation of the basic concepts and principles behind computer science. The Robotics class will use the following platforms and resources:

(1) MAC Computers with OS X Yosemite version 10.10.5 with 8GB Memory

(2) Ideally, each pair of students will work together at one MAC computer, with one EV3 robot.

(3) Set up each workstation with: • LEGO® MINDSTORMS® Education EV3 Programming Software installed • Education version required*.

(4) EV3 Firmware V1.06H.bin or most current version

(5) Access to the Introduction to Programming LEGO® MINDSTORMS® EV3 curriculum software • This can be installed locally or on a local network server • This can be accessed remotely via internet, if our network infrastructure/firewall and policies allow*

(6) Two pairs of headphones with headphone splitters • One pair for each student to avoid using speakers, as multiple workstations in the same classroom will generate too much overlapping noise

(7) One 45544 LEGO® MINDSTORMS® Education Set per 2 students. Please NOTE: based on class size, additional Mindstorm Kits may need to be ordered.

(8) Additional LEGO® MINDSTORMS® parts may need to be ordered due to incomplete existing kits or loss.

Throughout this course the learners experience will be enhanced using the following:

- TED-Ed Originals; short, award-winning animated videos about ideas that spark the curiosity of learners everywhere.
- Ted Talks videos (Ted.com). TED Talks are influential videos from expert speakers on education, business, and computer science.

Standards

TECH.8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
TECH.8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
TECH.8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
TECH.8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
TECH.8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
TECH.8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
TECH.8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
TECH.8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
TECH.8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.