# Unit 3:  Patterns and Structure of Robotics- Programming and Problem-Solving

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

## Enduring Understandings

Big Idea: Computer hardware and software can be used to control a variety of devices to complete specific tasks and do work. Unit 3 of 5

- Technology is constantly changing and requires continuous learning of new skills.
- Selection of technology should be based on personal and/or career needs assessment.
- Components of a robot can be changed to produce motion, speed, torque, and acceleration.
- Failure is an important and valuable part of the engineering process.
- Engineers work cooperatively in teams to accomplish a task.

## Essential Questions

- How do I choose which technological tools to use and when is it appropriate to use them?
- What techniques can you use to work cooperatively to accomplish an engineering task?
- How have system control technology and robotics systems change the way we manufacture products?

## Content

## Skills

- Design, build, and test a robot to successfully accomplish a given task.
- Explore and understand the concept of Inputs and the way to control them.
- Explore and demonstrate mastery of the concept of a Wait for function.
- Explore the concept of the Loop – Understand the concept of a switch and how to use it for true and false operations.

Vocabulary:

Loops

Functions

Conditions

Iteration

## 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

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| TECH.8.1.8 | Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. |
| 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.C.2 | Explain the need for optimization in a design process. |
| TECH.8.2.8.D.1 | Design and create a product that addresses a real world problem using a design process under specific constraints. |