Unit 5: Engineering Practices-Building Solutions to Real-World Problems

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

Enduring Understandings

Big Idea: Computational Thinking Applies Everywhere. Unit 5 of 5

- Safety is everyone's responsibility.
- Engineering design is an interactive process with a defined cycle of steps.
- Robots can be controlled in different ways.
- Components of a robot can be changed to produce motion, speed, torque, and acceleration.
- Technological outcomes have the potential for anticipated and unanticipated positive and negative results.

Essential Questions

- How does a gear ratio impact robot speed and force?
- How do the programming components of a robot interact, relate and connect?
- What techniques can you use to work cooperatively to accomplish an engineering task?
- Can we control the paces at which technology is created?

Content

Skills

- Integrate and reinvest what they have learned in the previous coding lessons.
- The learner will design, use, and evaluate solutions to a real-world problems and physical systems.
- Develop a consciousness of what drives technology and its' development.
- Understand and critique how cultural differences can drive different solutions to real world problems.

Vocabulary:

Array Operations

Feedback

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	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
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.