Enduring Understandings / Big Ideas: System control and robotics is the future of manufacturing in business and industry. System control technology is used in building control systems at school, work, and home applications. Computer hardware and software can be used to control a variety of devices to complete specific tasks and do work.

Essential Questions: Why do software engineers develop computer programs to control technology systems? How has system control technology and robotics systems change the way we manufacture products? How can system control be used in school, work, and home applications?

<table>
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<tr>
<th>Learning Competencies - What the students will know and be able to do upon completion of the unit</th>
<th>Supportive Teaching / Learning Activities</th>
<th>Assessments</th>
<th>Resources</th>
<th>PDE Academic Standards/ Common Core Standards</th>
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<tr>
<td>Students will use the Engineering Design Process to solve a design challenge.</td>
<td>Teaching Strategies - Large Group Demos Small Group Instruction Individualized Instruction Multimedia Presentations Interactive Comp. Software Journal Writing Hands-On Activities Cooperative Learning</td>
<td>Formative: Check for understanding questions will be utilized during large group instruction. Students will be asked open-ended questions during small group and individualized instruction to check for understanding. Students will demonstrate proper use of tools and math skills while completing a measurement activities Students will complete journal entries. Electronic and paper journal entries will be evaluated and assessed.</td>
<td>Teacher Resources – Tech Lab Comp. Network Tech Lab tools and materials Video Camera Digital Camera Internet resources NXT Robotics Kit Robotics Engineering Curriculum Materials Student Resources PowerPoint Presentations Worksheets and Handouts NXT Robotics Kit NXT Multimedia Robotics Engineering Multimedia Tech Lab Equipment • Computer Network • Tools and Materials • Student workstations • MS Software • Design Tools • Calculators</td>
<td>See Addendum for details</td>
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</tbody>
</table>
**Research, Reading, and Writing**
Students will complete classroom activities to develop an understanding of robotics and system control.

**Applied Mathematics**
Students will develop measurement, estimation, and calculation skills while completing hands-on activities.

**Design Challenge**
Students will complete a variety of robotic activities and design challenges.

- **Maze Design Challenge**
- **Touch Sensor Design Challenge**
- **Ultrasonic Sensor Design Challenge**
- **FLL Robotics Competition Design Challenge**

**Self Evaluation**
Students will complete a self-evaluation form at the end of the unit.

**Summative:**
Students will complete an Engineering Journal / Portfolio for final evaluation.

**Supplemental Resources:**
- ESL staff
- Bilingual dictionaries
- Alternative assessment

**ELL:**
http://www.cal.org/siop: Fifty Strategies for Teaching; English Language Learners, 2nd edition; Adrienne Herrell, Michael Jordan; (Merrill/Prentice Hall, 2003)

**Internet Access**
Research
Instructor’s Website

**Career Education and Work**
13.3.8.E

**Common Core Standards**
- RST.6-8.3
- RST.6-8.4
- RST.6-8.7
- RST.6-8.9
- WHST.6-8.2
- WHST.6-8.6
- SL.6.1
- SL.6.2

**Every Teacher Teaches ESL**
ELP Standard 1: English Language Learners communicate in English for social and instructional purposes within the school setting.
ELP Standard 2: English Language Learners communicate information, ideas, and concepts necessary for academic success in the content area of Language Arts.