### 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 changed the way we manufacture products? How can system control be used in school, work, and home applications?
- Why have manufacturing companies moved towards robotics and automation? How have robotic systems changed space exploration and research for NASA?

### Learning Competencies -
What the students will know and be able to do upon completion of the unit

<table>
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<tr>
<th>Supportive Learning Activities</th>
<th>Assessments</th>
<th>Resources</th>
<th>PDE Academic Standards/ Common Core Standards</th>
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<td><strong>Teaching Strategies</strong> -</td>
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<tr>
<td>Large Group Demos</td>
<td>Formative:</td>
<td></td>
<td>See Addendum for details</td>
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<tr>
<td>Small Group Instruction</td>
<td>Check for understanding questions will be utilized during large group instruction.</td>
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<tr>
<td>Individualized Instruction</td>
<td>Students will be asked open-ended questions during small group and individualized instruction to check for understanding.</td>
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<td>Multimedia Presentations</td>
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<td>Interactive Comp. Software</td>
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<td>Journal Writing</td>
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<td>Hands-On Activities</td>
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<td>Cooperative Learning</td>
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<td><strong>Learning Activities –</strong></td>
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<td><strong>Journal Entries</strong></td>
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<td>Students will complete Journal Entries. Paper and electronic journals will be utilized during lessons and design activities.</td>
<td>Students will be required to complete journal questions and computer programming following instruction.</td>
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<td><strong>Computer Programming</strong></td>
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<td>Students will develop computer programs to control robotic devices to complete a desired outcome. Students will test, troubleshoot, and modify computer programs.</td>
<td>Students will demonstrate proper use of tools and design concepts while completing robotic investigations.</td>
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**Formative:** Check for understanding questions will be utilized during large group instruction.

**Student Resources**
- Tech Ed 7th Grade Web Page
- PowerPoint Presentations
- Tech Lab Equipment
  - Computer Network
  - Tools and Materials
  - Student workstations
  - MS Software
  - Design Tools
  - Calculators
  - NXT Robotics Stations
  - NXT Robotics Displays

**Teacher Resources** –
- Tech Lab Comp. Network
- Tech Lab tools and materials
- Projection Station
- Digital Camera
- Internet resources
- NXT Robotics Software
- Robotics Engineering
- Curriculum

**Wida Access Placement Test (W-APT)**

**Science and Technology and Engineering**
3.2.7.B2
3.4.7.A1
3.4.7.A2
3.4.7.C2
3.4.7.C3
3.4.7.D2

**Mathematics**
2.3.8.A
2.3.8.B
2.3.8.D
2.3.11.A
2.4.11.E
2.4.8.F
2.5.8.A

**Reading, Writing, Speaking**
1.1.8.F
1.2.8.A
1.2.8.B
<table>
<thead>
<tr>
<th>Students will collect data and calculate averages and circumferences.</th>
<th>Students will modify computer programs and mechanical systems to customize technological systems to work together.</th>
<th>Students will complete a technical report for final evaluation that will become part of a digital portfolio.</th>
<th>Digital Cameras- Kodak EasyShare C310</th>
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</thead>
<tbody>
<tr>
<td>Students will understand, compare, and describe the relationship between diameter and circumference.</td>
<td>Students will complete a series of hands-on activities to collect technical data required to complete applied mathematics activities.</td>
<td>Students will complete a post-test for final evaluation.</td>
<td>Internet Access Research Instructor’s Website</td>
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</table>
| Students will describe the relationship between wheel size and distance traveled in a constant number of rotations. | Digital Photo Shoots Students will complete digital photo shoots for technical documentation. | Supplemental Resources:  
- ESL staff  
- Bilingual dictionaries | Career Education and Work 13.3.8.E |
| Students will apply and describe experimental hypothesis, measurement technique, and multiple trials. | Technical Report Students will complete and submit electronically a technical report that will include applied mathematics, technical data, and a written summary of the robotics activity. | ELL: http://www.cal.org/siop: Fifty Strategies for Teaching; English Language Learners, 2nd edition; Adrienne Herrell, Michael Jordan; (Merrill/Prentice Hall, 2003) | Common Core Standards  
RST.6-8.3  
RST.6-8.4  
RST.6-8.7  
RST.6-8.9  
WHST.6-8.2  
WHST.6-8.4  
WHST.6-8.6  
WHST.6-8.8  
SL.7.1  
SL.7.4  
SL.7.5 |
| Students will describe and apply a self-formulated procedure for converting centimeters into wheel rotations. | Students will analyze technical data and write a conclusion that summarizes the lessons learned in the robotics investigations. | 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. |