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| **TEXAS CTE LESSON PLAN**[www.txcte.org](http://www.txcte.org) |
| **Lesson Identification and TEKS Addressed** |
| **Career Cluster** | Science, Technology, Engineering, & Mathematics |
| **Course Name** | Robotics I |
| **Lesson/Unit Title** | Robotics 1 – Programming Languages |
| **TEKS Student Expectations** | **130.408. (c) Knowledge and Skills**(6) The student develops the ability to use and maintain technological products, processes, and systems. The student is expected to:(A) demonstrate the use of computers to manipulate a robotic or automated system and associated subsystems(B) maintain systems to ensure safe and proper function and precision operation |
| **Basic Direct Teach Lesson**(Includes Special Education Modifications/Accommodations and one English Language Proficiency Standards (ELPS) Strategy) |
| **Instructional Objectives** | **Performance Objective:**After completing this lesson, students will develop the ability to use and maintain technological products, processes, and systems; and will demonstrate the use of computers to manipulate a robot or automated system and associated subsystems by completing the Assignment: Robot Programming Languages and Rubric.**Specific Objectives:**The students will be able to:* demonstrate the use of computers to manipulate a robot or automated system and associated subsystems
* demonstrate knowledge of process control factors
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| **Rationale** | This lesson helps students develop the ability to use and maintain technological products, processes, and systems. |
| **Duration of Lesson** | Teacher’s Discretion |
| **Word Wall/Key Vocabulary***(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | The key words document is in the lesson plan attachment section. |
| **Materials/Specialized Equipment Needed** | **Instructional Aids:**1. Internet access
2. Video screen projector

**Materials Needed:**1. Pen/Pencil
2. Engineering Notebook
3. Technical Terms and Definitions handout
4. Assignment: Robot Programming Languages handout

**Equipment Needed:**1. Computers
2. Video screen projector
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | **SAY:** Today we will understand that robots are programmed using several robot programminglanguages. The languages are classified by levels. Robots may be programmed on-line and off-line and robot programmers use robot programming steps to program robots. **ASK:** What are programming languages?**SAY:** Students should check out aRobot Programming Languagebook from the school’slibrary.**SAY:** Our first objective is to inform that robot programming languages are used to design thecontrol needs of the robot arm and to design the new control language structures: conditional branching and input/output interfacing. |
| **Direct Instruction \*** | Instructor is recommended to make and present a Robot Programming Languages PowerPoint presentation in conjunction with the following outline.Outline:1. Introduction
	1. Teacher proceeds through presentation with questions and answers from students
2. Technical Communication
	1. Teacher will distribute Terms and Definitions handout.
	2. Technical terms and definitions
3. Section 1: Robot Program Language Development
4. Section 2: Language Classification
	1. Level 1 – Joint Control Languages
	2. Level 2 – Primitive Motion Languages
	3. Level 3 – Structured Programming Languages
	4. Level 4 – Task-Oriented Languages
5. Section 3: On-line and Off-line Robot Programming
	1. Teacher proceeds through presentation with questions and answers from students.
6. Section 4: Robot Program Steps
	1. Step 1 – Basic Program Structure
	2. Step 2 – Process Analysis
	3. Step 3 – Tasks and Subtasks
	4. Step 4 – Task Point Graph
	5. Step 5 – System Variables
	6. Step 6 – Write and Enter the Program
	7. Step 7 – Teach the Translation Points
	8. Step 8 – Test and Debug the Program
7. What is First Robotics?
8. What is BEST Robotics?
9. Rubrics for Grading the Assignment: Robot Programming Languages
	1. Teacher discusses the grading rubrics for the Robot Programming Languages
10. Assignment: Robot Programming Languages
	1. Teacher will need to have copies of the Assignment: The Robot Programming Languages handout for each student
	2. Discuss the Robot Programming Languages

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:**NONE* |
| **Guided Practice \*** | Review the Assignment: Robot Programming Languages with the students.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:**NONE* |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Students will research Robot Programming Languages lesson using the Internet.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:**NONE* |
| **Lesson Closure** | **Question:** What are the four system functions supported by robot programming languages?**Answer:** The four systems functions supported by robot programming languages are: Manipulation, Sensing, Intelligence, and Data Processing.**Question:** What are the four basic programming language levels supported by robotmanufacturers?**Answer:** The four basic programming languages levels supported by robot manufacturers are:1. Level 1 – Joint Control Languages
2. Level 2 – Primitive Motion Languages
3. Level 3 – Structured Programming Languages
4. Level 4 – Task-Oriented Languages

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:**NONE* |
| **Summative/End of Lesson Assessment \***  | **Informal Assessment**Teacher observes as students complete the robot programming languages research.**Formal Assessment** Students will complete the Assignment: Robot Programming Languages with the teacher and answer the reflection question: “O\*NET Online has detailed descriptions of the world of work for use by job seekers, workforce development and HR professionals, students, researchers, and more! Visit the O\*NET Online website (http://www.onetonline.org/). Do you think that this website may help you locate career opportunities in Robotics? What types of Robotics career opportunities are listed?*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:**NONE* |
| **References/Resources/****Teacher Preparation** | 1. Introduction to Robotics in CIM Systems – Fifth Edition by James A. Rehg.
2. The McGraw-Hill Illustrated Encyclopedia of Robotics Artificial Intelligence by Stan Gibilisco Editor in Chief.
3. Merriam-Webster Online Dictionary - http://www.merriam-webster.com/
4. O-NET Online - http://www.onetonline.org
5. ClipArt – http://www.clipart.com/en/
6. FIRST Robotics http://www.usfirst.org/
7. BEST (Boosting Engineering, Science, and Technology) http://www.bestinc.org/
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| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy****Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies****Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication****90 Second Speech Topics** |  |
| **Other Essential Lesson Components** |
| **Enrichment Activity**(e.g., homework assignment) | Students will discuss their Robot Programming Languages research in class. |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA, TSA |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)