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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, and Mathematics |
| **Course Name** | Robotics I |
| **Lesson/Unit Title** | Construction Robotics I – Part 2 - Gripper |
| **TEKS Student Expectations** | **130.408. (c) Knowledge and Skills**(3) The student participates in team projects in various roles. The student is expected to:(A) explain the importance of teamwork in the field of robotics(C) demonstrate proper attitudes as a team leader and team member (9) The student uses engineering design methodologies. The student is expected to:(A) use tools and laboratory equipment in a safe manner to construct and repair systems(D) test and evaluate the design in relation to pre-established requirements such as criteria and constraints |
| **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 be able to lay out, dimension, and construct a basic gripper and all its mounting parts, matching the criteria in the How to Construct a Robot Part by Part Rubric.**Specific Objectives:*** Explain how to make the parts and why you are looking at the main considerations – speed and function.
* Calculate speed and how to easily pick up an object.
* Identify that size and speed will be determined by its part.
* Explain what materials you are using and why.
* Explain what machines and tools you are using and how to use them.
* Identify safety required when using the machines and tools.
* Prepare a Plan Sheet using the plan sheets
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| **Rationale** | Students should be able to develop a robot gripper |
| **Duration of Lesson** | Teacher’s Discretion |
| **Word Wall/Key Vocabulary***(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | * Gripper
* Scroll Saw
* Drill Press
* Scratch Awl
* Compass
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| **Materials/Specialized Equipment Needed** | **Instructional Aids:**1. How to Construct a Robot Part by Part Rubric
2. Computer aided design/drafting software
3. Internet access

**Materials Needed:**1. Story Board handout for each student
2. Plan Sheet handout for each student
3. How to Construct a Robot Part by Part Rubric for each student
4. Computer aided design/drafting software
5. Wood, plywood, metal, screws, string, rubber, plastic

**Equipment Needed:**1. Assorted hand tools
2. Metal cutters
3. Scroll saw
4. Drill press
5. Scratch awl
6. Compass
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | **SAY:** Today we are going to learn how to construct a gripper and attach the gripper to the body of therobot.**ASK:** Does anyone know what are the three things you should keep in mind when constructing agripper? (Allow time for answers.)**SAY:** Yes, weight, grip, and speed.**SAY**: We are now going to learn How to Construct a Robot Part 2:Gripper. We will stop twice so that you will be able to create your gripper and parts**.****SAY:** Next, we will look at The Gripper Plan Sheet.**SHOW**: Show the gripper Plan Sheet and then stop and let the students develop their own gripper. Afterthey have completed one device, continue with the rest allowing students to follow the steps to create their own gripper and its attaching parts.**ASK:** Which gripper was best for this Robot and its connecting parts? (Allow time for the students toEXPLAIN their answers.) |
| **Direct Instruction \*** | I. Define a gripper as:A. A device used to move and hold objects over a distanceB. A device used to deposit objects over a distance II. Problem solving process for a gripper:A. Understanding the problemB. Devising a planC. Carrying out the planD. Questioning studentsE. Looking backF. Evaluating III. Follow procedures:A. Construct by a plan sheetB. Things to keep in mindC. Three challengesD. Follow story boardE. First gripperF. Second gripperG. Third gripperH. Revise or select gripperIV. Allow students to construct the gripperA. Students construct different grippersB. Students try different challenges with different grippersV. Evaluation of Gripper Challenges A. Best Device for certain tasks B. Ways to improve each device C. What to do differently if allowed unlimited materials D. How do you do it differentlyVI. Last step of problem solving process – looking back1. Evaluate all designs
2. Vote which griper was the best for certain tasks

*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 \*** | Students will be taught how to make a gripper and its attachments, and how to think critically how to design and draw a gripper and its attachments.*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 be required to be creative, think critically, and make their own gripper and its attachments.*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:** Which gripper was the best for speed?**Answer:** (It depends on the gripper created.) The best answer will most likely be a kind of gripperfeaturing speed, or one that picked up and deposited weight and (or) objects the best.**Question:** Which gripper could best move a lot of weight?**Answer:** (It depends on the gripper created.) The best answer will most likely be a gripper that pickedup, held and deposited objects fast.**Question:** Which gripper worked best for combination and multiple tasks? |
| **Summative/End of Lesson Assessment \***  | Construction of a Robot Part by Part Rubric. The students will create a gripper for different tasks and should be evaluated by efficiency of the gripper and design.*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. Malcolm, D. R. (1988). *Robotics: An Introduction (Electronics Technology)* (2nd ed.). Albany, NY: Delmar.
2. Potter, T., & Guild, I. (1983). *Robotics (New Technology)*. London, England: Usborne.
3. Magazines for mechanics
4. NASA Robotics
5. Internet search for gears, problem solving applications

**Teacher Preparation:**1. Prepare Story Board handout for each student
2. Prepare Plan Sheet handout for each student
3. Prepare How to Construct a Robot Part by Part Rubric for each student
4. Research books and internet for applications
5. Have materials and equipment ready for students to choose
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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) | For more enrichment, students should construct a gripper that can be operated electronically. |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSATSA |
| **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)