**AP CSP CodeBot**

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| **MISSION 5 Obj 1-5 Fence Patrol** | | **Time: 45 minutes** |
| **Project Goal:** Students will gain an in-depth understanding of CodeBot’s line sensors  **Learning Targets**   * I can print values in the console panel while debugging to get real-time sensor values. * I can use ls.read() to get real-time line sensor values. * I can show each line-detect on the user LEDs. | **Key Concepts**   * Analog sensors are non-contact sensors used in many industrial and commercial applications. * Use threshold comparisons to make decisions with sensor data. * The console panel can be used to print real-time data using the print() statement. | |
| **Assessment Opportunities**   * Mission 5 Obj 1-5 Assignment * Quiz after Objective 5 * Submit the “LineSense” program (part 1) | **Success Criteria**   * Read data from a line sensor and display it on the Console Panel. * Use a variable for the threshold that is specific for the testing environment. * Use a condition with the threshold to determine if a line is detected. * Define a function for checking one sensor. * Define a function for checking all line sensors. | |
| **AP CSP Framework**  **DAT-2.D** Extract information from data using a program.  **AAP-2.E** Write expressions using relational operators and evaluate those expressions.  **AAP-2.K** Write iteration statements.  **Computational Practice 4.C** Identify and correct errors in algorithms and programs, including error discovery through testing. | **Materials**   * Mission 5 Obj 1-5 Assignment / Answers * Analog and Digital slides * Test surfaces document * Code solution for LineSense\_obj5 | |
| **Teacher Notes**   * Students will follow the instructions and CodeTrek, but then make modifications to the code using these instructions so they use functions in their code and become familiar with creating them and using parameters. * Objective 1: Students use the debugger to see the values of the first line sensor. When they open the console and enter the debugger, they need to click on “Debug” to see val in “Globals”     Put different surfaces under the ‘bot to see different readings. Click “Step In” each time you change the surface.   * Objective 2: Have students use the **test surfaces** paper for readings (link above). If you want students to spend more time with this, there are two possible data sheets they can use that accompany Obj. 2, in the learning portal: [Obj 2 Line Sensor Data Sheet](https://learn.firialabs.com/teacher-resources/CodeBot/Lab%20Data%20Sheets/Mission%205%20Obj%202%20Line%20Sensors.pdf) / [Obj. 2 Debug Console](https://learn.firialabs.com/teacher-resources/CodeBot/Lab%20Data%20Sheets/Mission%205%20Obj%202%20Debug%20Console.pdf) * Objective 3: This objective discusses analog values. Show the **Analog and Digital** slides to quickly review the difference between analog and digital and how a computer handles the data. * Objective 3: The CodeTrek covers up the last line of code. Close the instructions in CodeTrek to see all the code. * Objective 3: When the code is running, put your finger under the robot and then remove it. You should see the LED turning on and off. * Objective 4: The function can go below the variable threshold instead of above. This is different from CodeTrek. * Code snippets for all the objectives, when changed, are included in the answer document. * Refer to the CodeBot Curriculum Guide for specific information about this mission. * Another suggestion for assessment is for students to keep a daily journal, or use a reflection form for students to process information they learned and reflect on questions they may still have. | | |