More Challenges

By Sanjay and Arvind Seshan

BEGINNER PROGRAMMING LESSON

CHALLENGES IN THIS LESSON

- Last year, we came across a really good set of videos by a robotics teacher in Texas.

- He used EV3Lessons materials and combined them with his own project ideas.

- This tutorial is a collection of challenges created by Thom Gibson at Headwaters School in Austin, Texas, USA

- The challenges are reproduced here with his permission. Please credit Thom Gibson for the work.

- For each challenge, Mr. Gibson provides a description of the requirements, a project rubric, as well as a project reflection sheet.

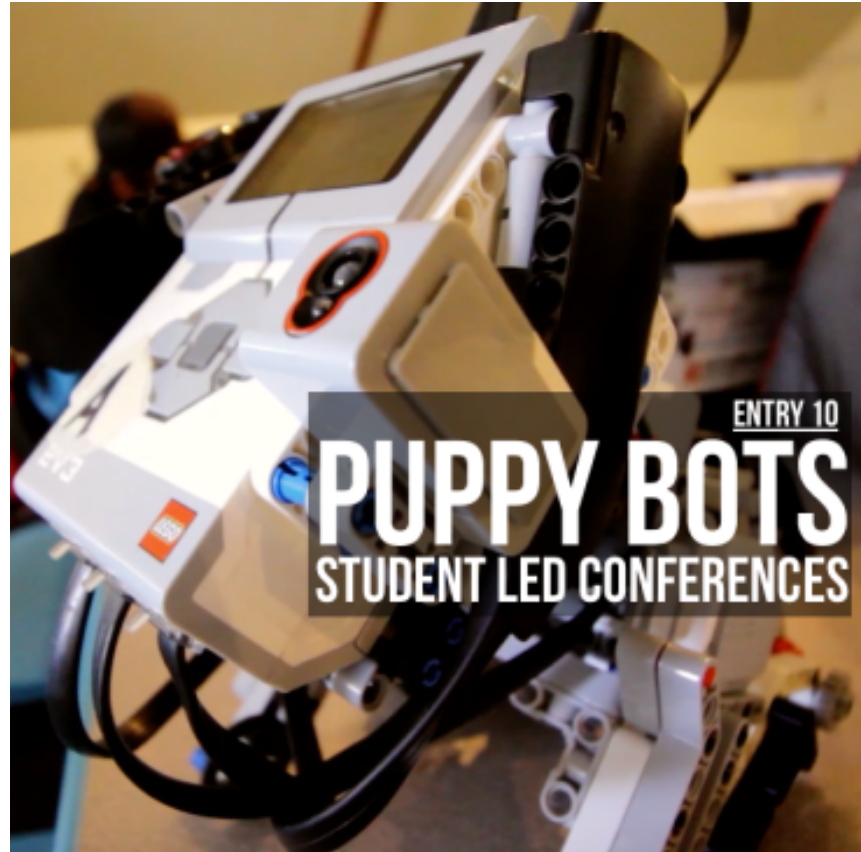- Links to videos from Mr. Gibson's class have also been provided for inspiration


Image Credit: Thom Gibson

GOLD DIGGER PROJECT

Project Requirements

- Find 3 pieces of randomly placed yellow-colored paper on a table using the color sensor, without falling off the table

- *Note from EV3Lessons: It is a good idea to test out if your colored paper is easily recognized by the color sensor. The closer the color is to LEGO colors, the better. We have found that rather than kids' construction paper, thicker card stock with more vivid colors work better with the EV3 Color Sensor. You can use Port View to check the paper.*
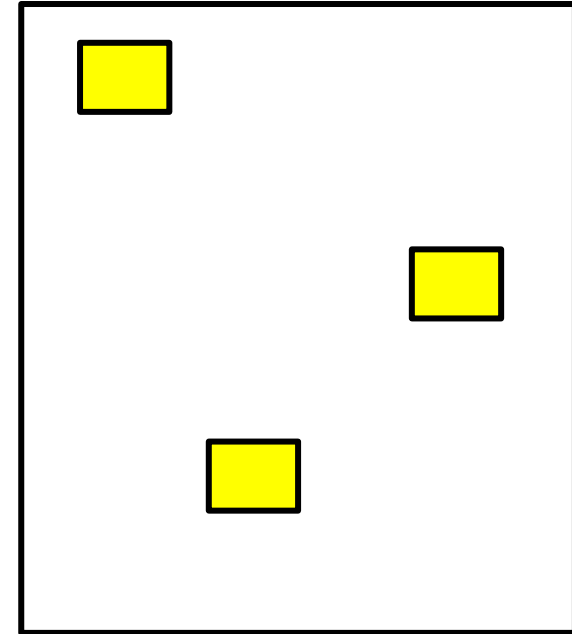
Videos:
https://youtu.be/8LnsCfJbRFY
https://youtu.be/_4kJwx6QzGU

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GOLD DIGGER RUBRIC

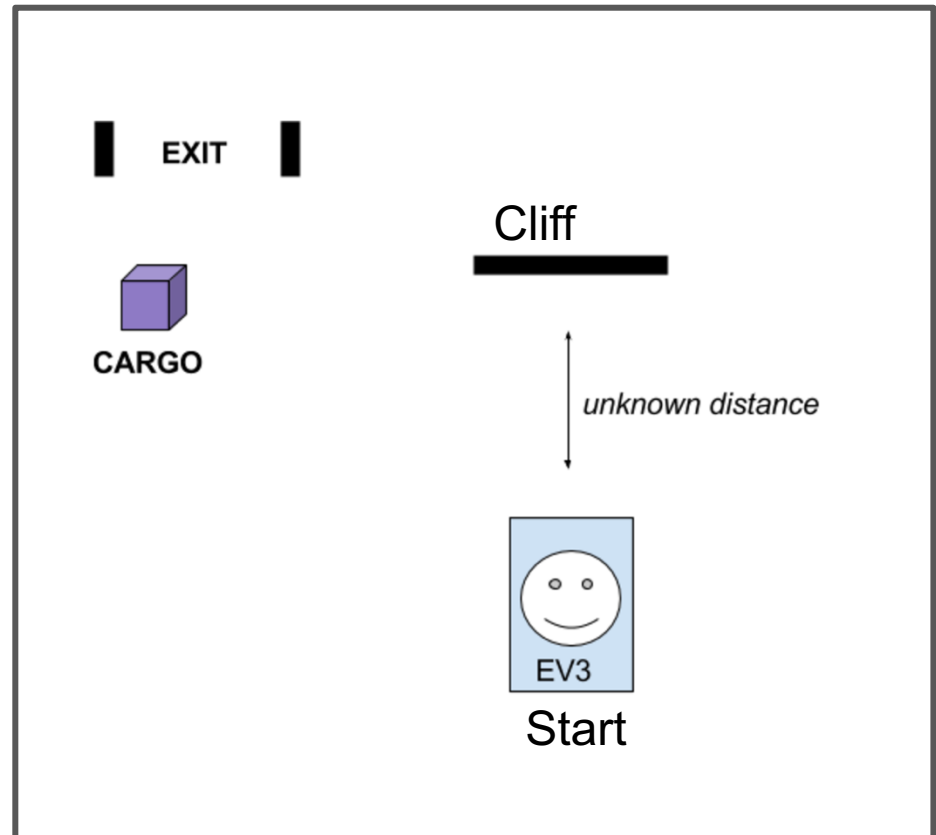| CATEGORY	4	3	2	1	SCORE
SENSORS	The touch sensor, brick buttons, and color sensor were utilized	Only two elements are utilized	Only one element was utilized	None of the elements were utilized.	
SCREEN	Lights, sounds, text, and images are all incorporated	Only 3 screen elements incorporated	Only 2 screen elements incorporated	One or less screen elements incorporated	
GOLD	Robot finds all 3 pieces of gold (and announces it) and is able to go to the edge w/out falling off	Robot is able to find 2 pieces of gold (and announces it) and go to the edge w/out falling off	Robot finds at least 1 piece of gold but falls off	Robot does not find 1 piece of gold or falls off	
SWITCHES/ LOOPS	Both a switch and loop are used to make the code more efficient	Only a switch OR a loop is used to make the code more efficient		Neither a switch or loop is used	
REFLECTION	Includes all 3 parts of documentation (code, clear video, thoughtful written reflection)	includes 2 parts of the documentation	includes 1 part of the documentation	No documentation	
				TOTAL:	/20

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CARGO RESCUE PROJECT

After retrieving the gold in the previous challenge, you realize that you have dropped precious cargo that's vital to the mission! You are able to scan the map and see where it is.

You know you will have to travel an unknown distance to a cliff wall, turn exactly 90 degrees to the left, travel an unknown distance forward to retrieve the cargo, and then turn exactly 90 degrees to the right to make you exit back to base camp.

Your rover is equipped with an Ultrasonic Sensor. (Gyro sensor is optional if you have not learnt how to use this sensor yet.)

Video: https://youtu.be/8ErF489RfhQ

Created by Thom Gibson (slightly modified slightly by EV3Lessons)

CARGO RESCUE RUBRICS

CATEGORY	4	3	2	1	SCORE
BUILD	Sensors and 'grab' apparatus are secure and in optimal location to complete the tast	Any sensor or apparatus is not securely attached to the EV3	Missing 1 sensor / apparatus	Missing 2 sensors / apparatus	
GYRO	Gyro sensor is used appropriately to make program more efficient	Gyro is used but could have been used more efficiently for turns	Gyro is attached but not used	Gyro is neither attached or used	
ULTRASONIC	Ultrasonic sensor is used appropriately to make program more efficient	Ultrasonic is used but could have been used more efficiently for covering unknown distances	Ultrasonic is attached but not used	Ultrasonic is neither attached or used	
COMPLETION	EV3 doesn't hit cliff wall, retrieves the cargo, and safely exits	EV3 completes 2 of these 3 tasks	EV3 completes 1 of these 3 tasks	EV3 does not complete any of these 3 tasks	
REFLECTION	Includes all 3 parts of documentation (code, clear video, thoughtful written reflection)	includes 2 parts of the documentation	includes 1 part of the documentation	No documentation	
				TOTAL:	/20

Created by Thom Gibson

SENSORY PROJECT

Project Requirements

- Create a robot that uses each of the sensors at least once (touch, color, ultrasonic/infrared)
- Use text on screen
- Use brick sounds and lights
- Use at least one brick button
- Optional: If you have learnt how to use the Gyro sensor, add the gyro sensor

Video: https://youtu.be/9dEupLZSI6s

Ideas

- Create an obstacle course for your robot
- Create an interactive game

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SENSORY PROJECT RUBRIC

CATEGORY	10 (exceeds)	9 (meets)	7 (approaching)	5 (below)	SCORE
SENSORS	Task was designed so that all sensors were **needed** (and used) to accomplish task	All sensors were utilized	3 sensors were utilized	2 or less sensors were utilized	
BRICK	Task was designed so that all brick features were **needed** (and used) to accomplish task	Text, sound, light, and brick buttons were utilized	3 brick features were utilized	2 or less brick features were utilized	
REFLECTION	Student went above and beyond what was required for the written reflection	All parts of reflection were written about	Reflection is missing 1 element	Reflection is missing 2 or more elements	
EFFORT	Student put in a lot of time and effort both in and out of class.	Student utilized class time well and appropriately challenged themselves	Student created a fairly simple robot that wasn't much of a challenge	Student put very little time or effort into this project	
OVERALL IMPRESSION	The project was new, unique, surprising, and showed a personal touch	The project had some new ideas, but has similar elements to other projects	The project was an exact replica of other work.	N/A	
				TOTAL:	/50

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PROJECT REFECTION SHEET (FOR ALL PROJECTS)

1) What is the intended action for your robot (original plan)? Did your plan change in any way? Why or why not?

2) What challenges did you come across? Were there any that seemed too difficult to overcome in the time given?

3) Did you go through many iterations? (Provide video or other documentation of your robot failing)

4) Did you have any "aha" moments?

5) What parts of this project are you most proud of?

6) Include a screenshot of your code and a video of your robot in action

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CREDITS

- **This challenges in this tutorial were created by Thom Gibson (https://thomgibson.com/)**

- **The material was compiled and slightly modified by Sanjay Seshan and Arvind Seshan**

- **More lessons are available at www.ev3lessons.com**