**EV3 Movement and Sensors**

Over the next few days, you will be programming your robot using EV3-G, the computer-based programming software, while exploring its capabilities to move and use its sensors for input. As you do this, you will be given a paper “task sheet” that must be signed off as you go.

To complete your task sheet, you will complete the following mini-challenges. You should complete “Moving Straight” and “Turning” first. You can choose the order in which you complete the sensor mini-challenges. **You need to successfully demonstrate the mini-challenges to either Mrs. Wade to get signed off.**

Use the EV3 Trainer videos referenced below for help - they will walk you through the steps required to program and complete each of the challenges below.

***“Moving Straight” - 3 points***

***Choose to do both:***

1. ***50 cm Challenge: 1 pt.*** Place two pieces of black electrical tape 25 cm apart. Your robot should travel exactly from one to the other to complete the challenge!
2. ***Cargo Retrieval Challenge: 2 pts.*** Place two pieces of black electrical tape 50 cm apart, and place the colored block on the ending line. Your robot should travel to the block and bring it back to the starting line.

***OR complete the following:***

1. ***Sensabot Challenge: 3 pts.*** Program your robot to move from its starting box to three different lines on the “Factory” game board, stopping at each one to perform an inspection, represented by lowering and raising the robot's arm. When the robot is done inspecting all three locations, it should back up and return home to its starting box to recharge.

***“Turning” - 3 points***

***Choose one of the following:***

1. ***Orchard Challenge: 3 pts.*** Start anywhere on the “Orchard” board and program the robot to move from its starting area through three rows of fruit trees (represented by blue tape). You may choose your own path through the orchard, but the robot must pass along both sides of each row during its run, and may not cross the trees or go in the river.
2. ***Maze Challenge: 3 pts.*** On the “Maze” board, start in the starting area and end with your robot fully in the finish area without crossing any lines along the way.

***“Move Until Touch” (Touch Sensor) - 3 points***

***Choose to do both:***

1. ***Vacuum Challenge: 2 pts.*** Use a 4x4 game board and place robot in the middle. Program your robot to touch all four walls, using its Touch Sensor.
2. ***Recycle Challenge: 1 pt.*** Program your robot to push a can off the edge of a table and stop moving once the can is released.

***OR complete the following:***

1. ***Cliffhanger Challenge: 3 pts.*** (This challenge requires the use of two touch sensors). Start with your robot in the center of the “Cliff” board. Program your robot to drive forward until it touches the first wall, back up and touch a second wall, then turn and push the block off of the cliff without falling off after it.

***“Move Until Near” (Ultrasonic Sensor) - 3 points***

***Do both of the following:***

1. ***Two Alarms Challenge: 2 pt.*** Program your robot to make a sound when an object comes within 100 cm of the sensor. Create a second program that will make a sound if an object placed 20 cm in front of the sensor is removed.
2. ***“No Parking within 30 cm” Challenge: 1 pt.*** Program your robot to back away from a wall and stop when it is 30 cm away.

***OR complete the following:***

1. ***Fake-Out Challenge: 3 pts.*** Place a Lego Dude on one side of a wall made of wooden blocks, and your robot on the other side. Program your robot to back up and turn around the wall to face the Lego Dude, then drive toward the Lego Dude and stop within 2 cm of running Lego Dude over.

***“Turn for Angle” (Gyro Sensor) - 3 points***

***Complete the following:***

1. ***Shoe Box Challenge: 3 pts.*** Program the robot to drive around a shoe box. You MUST use the gyro sensor to make the turns. DO NOT use a turning motor block.

***“Move Until Color” (Color Sensor) - 3 points***

***Do both of the following:***

1. ***Railroad Crossing Challenge: 1 pt.*** Position the color sensor so it is facing forward. Program your robot to move forward and stop if a red flag is lowered before the color sensor, then move forward when the red flag is lifted.
2. ***Line Dance Challenge: 2 pts.*** Position the color sensor so it is facing downward. Program your robot to move forward, where it will pass over a black line and then a red line. When it crosses the black line, it should make a 360-degree turn. When it crosses the red line, it should stop for 3 seconds before moving forward for one rotation.

***OR complete the following:***

***Traffic Signal Challenge: 3 pts.*** Program your robot to pass through three stoplights. You will not know what color the stoplights will be in advance. If the light is red, the robot should stop and wait for the green light before it continues to move forward. If the light is green, the robot should not stop and should move through the intersection. (The “stoplights” will be pieces of colored paper lowered in front of the color sensor, so the color sensor can be in a fixed position facing straight ahead.) The robot does not need to be programmed to stop after the third light - you can stop it by hand at the end.