Week 8 - Overview

The projects and missions this week involve navigating mazes and scanning an area to find an object. We will start out by an in-depth look into Boolean logic and Boolean operators. We will use these operators to assist in navigating a maze.

The next major technique will be using random number generators to assist in scanning algorithms. We will code the robots to make random motions, which is called a random walk. The random motions of several robots have developed into what is called swarm theory.

When scanning with the ultrasonic sensor, there are two methods. The first is looking for targets close to the robot. However, a perimeter wall can be deceiving, so it is better to compare various sensor readings, which is a second technique.

The week concludes by discussing the concept of random number generators aiding in maze navigation.

Computer Science Skills
- Boolean statements: True and false
- Boolean operators: OR, AND,
- Boolean variables AND, NOT, and NAND
- Weighted Boolean decisions
- Random numbers
- Swarm theory
- Scanning
- Searching for changes in values of a variable

STEM Skills
- Random numbers
- Mean average
- Median average
- Probability
- Series
- Random walk

CoderZ Techniques
- If-Else-Else-Else switch blocks
- Boolean operator blocks
- Random in Range block
- Using variables to record and compare

Implementation Thoughts

There is a lot of logic when it comes to working with Boolean variables. There will need to be some verbal discussion of what a statement is asking. If students have not been exposed to averages and probability, this will be a good place to slow down and reinforce the new concepts.

Lesson topics and concepts are listed below:

Lesson 1: A-Mazing Decisions

- Navigating a maze using Boolean logic.
- Boolean operators
- Boolean variables and switches

Lesson 2: Random Walk

- Random numbers
- Calculating averages
- Probability
- Making weighted decisions
- Random walk

Lesson 3: Search and Rescue

- Scanning back and forth
- Scanning in a spiral
- Scanning randomly

Lesson 4: Searching

- Scanning with the ultrasonic sensor.
- Looking for a target closer than a value.
- Looking for differences in sensor values.

Lesson 5: Advanced Mazes

- Using a scanning algorithm in a maze.
- Using the random number generator in the maze.
- Using weighted probability to direct the path of the robot.
- Permutation