Hello everyone!
Turn your microphones off, and you may leave your camera on if you want.

Zoom Names should be written (Name - Team Number)
If you have no team, write "Student"

If you'd like to support,
connect with me on Linkedin! =>

Sandpiper Training Session
Creating an Autonomous!

10/8/22

Presented by Rien Gupta, Kevin Li, and Rick Taylor

If you have not already...

Last meeting, we took a look at arm mechanisms and VEX and some small tips you can use to build a better robot.

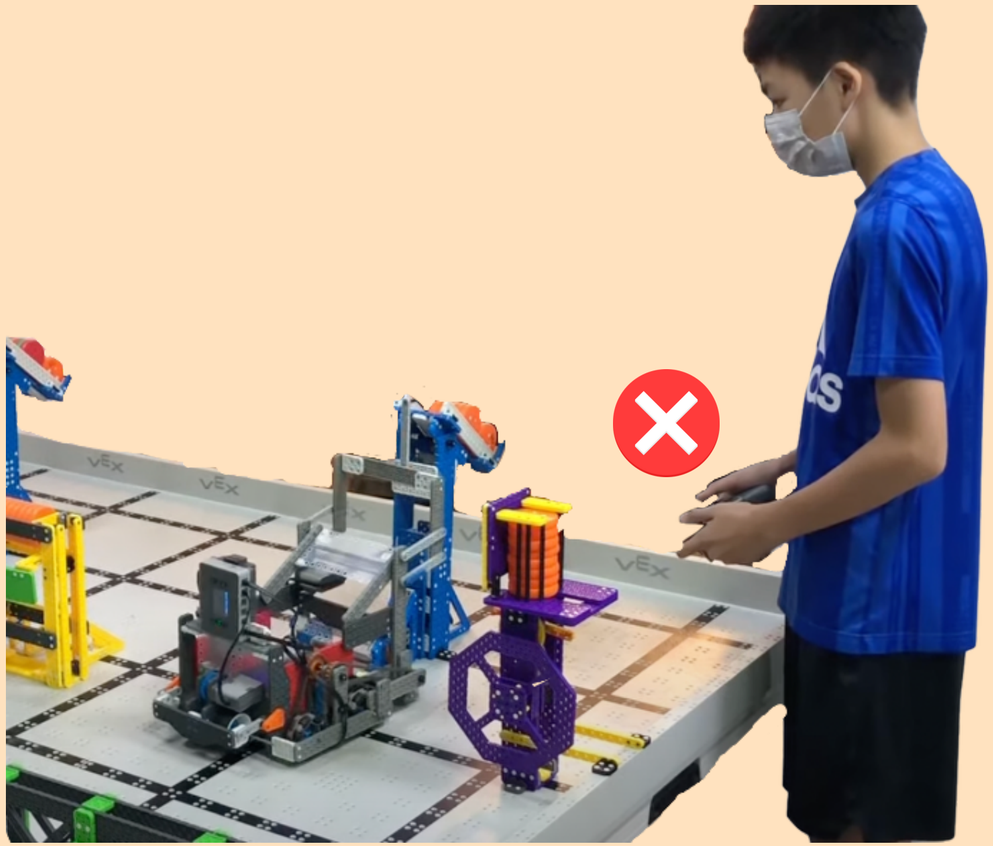
Before trying out coding, consider creating

- an arm and drive base
- the main mechanism you use to score

If you need any help, with these, take a look at last week's meeting!

Presentation =>

What are Autonomous programs?



Autonomous Programs are the true show of skill in coding for Vex Robotics. During a tournament, teams will have 1 minute skills matches where a robot will have to score as many points as they can **without a driver**. Autonomous in Vex is complicated to understand, so we will be going over the basics.

Getting Started

VEXcode allows students to get started coding quickly and easily. VEXcode is consistent across Blocks, Python, and C++. VEXcode can be used on a variety of platforms, even on a browser! Look at the QR Code below, or type codeiq.vex.com

Basic Overview

What is VEX code?

- Sequential instructions to the robot.
  - Tells the motors when to spin and how fast.
- Uses blocks, with clear, readable language

What can you do in VEX code?

- If/Else statements
  - Sensor Inputs
- Loops
- Direct instructions

Last but not Least...

Code is all about reliability!

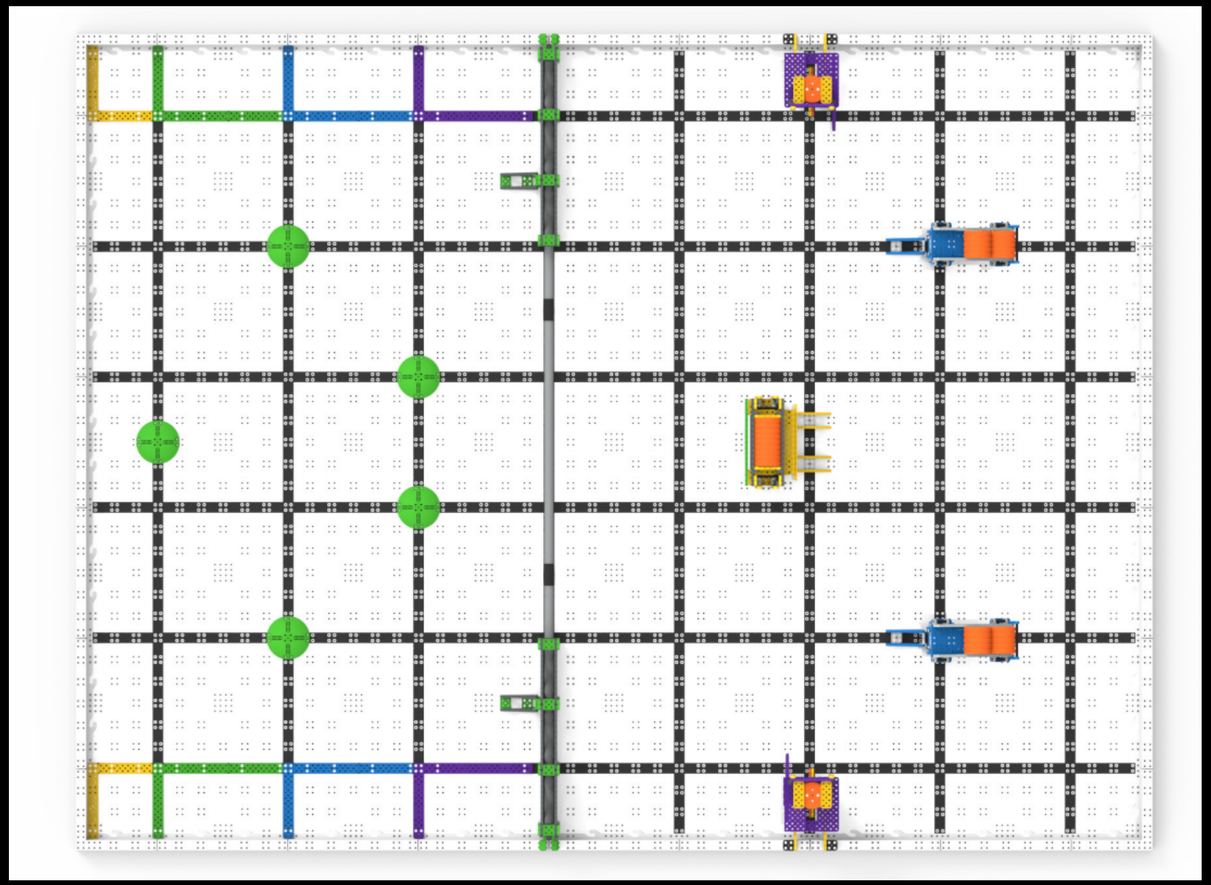
The robot has little sense of its surroundings, can't fix it's mistakes and cannot adapt. Your job is to make a series of **rigid** instructions which can still work in many environments.

What you need to program

1. VEXCode
2. A Computer
3. Your Robot with a Vex Brain & controller
4. The right wires (USB-C for 2nd generation brains, Micro USB for older generation brains

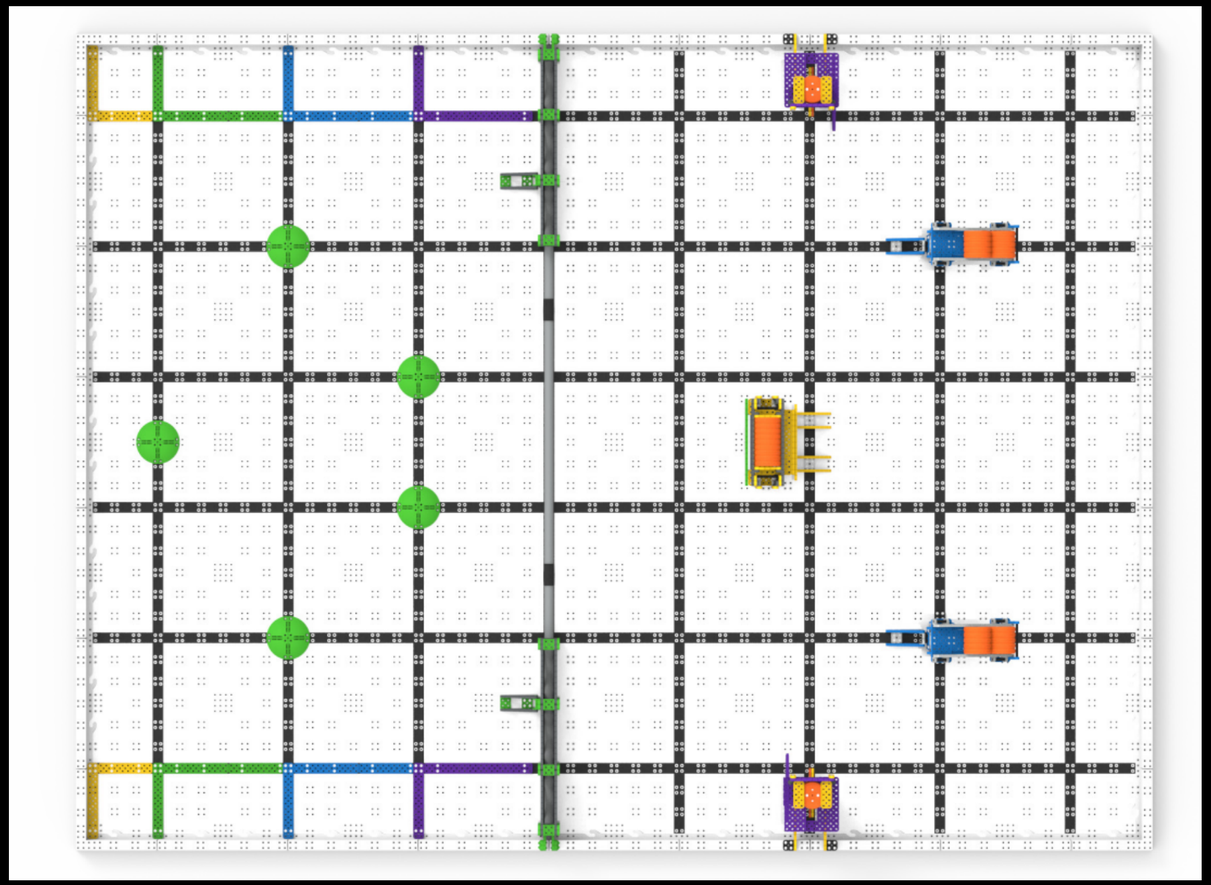
2nd generation brain

1st generation brain



Plan First!

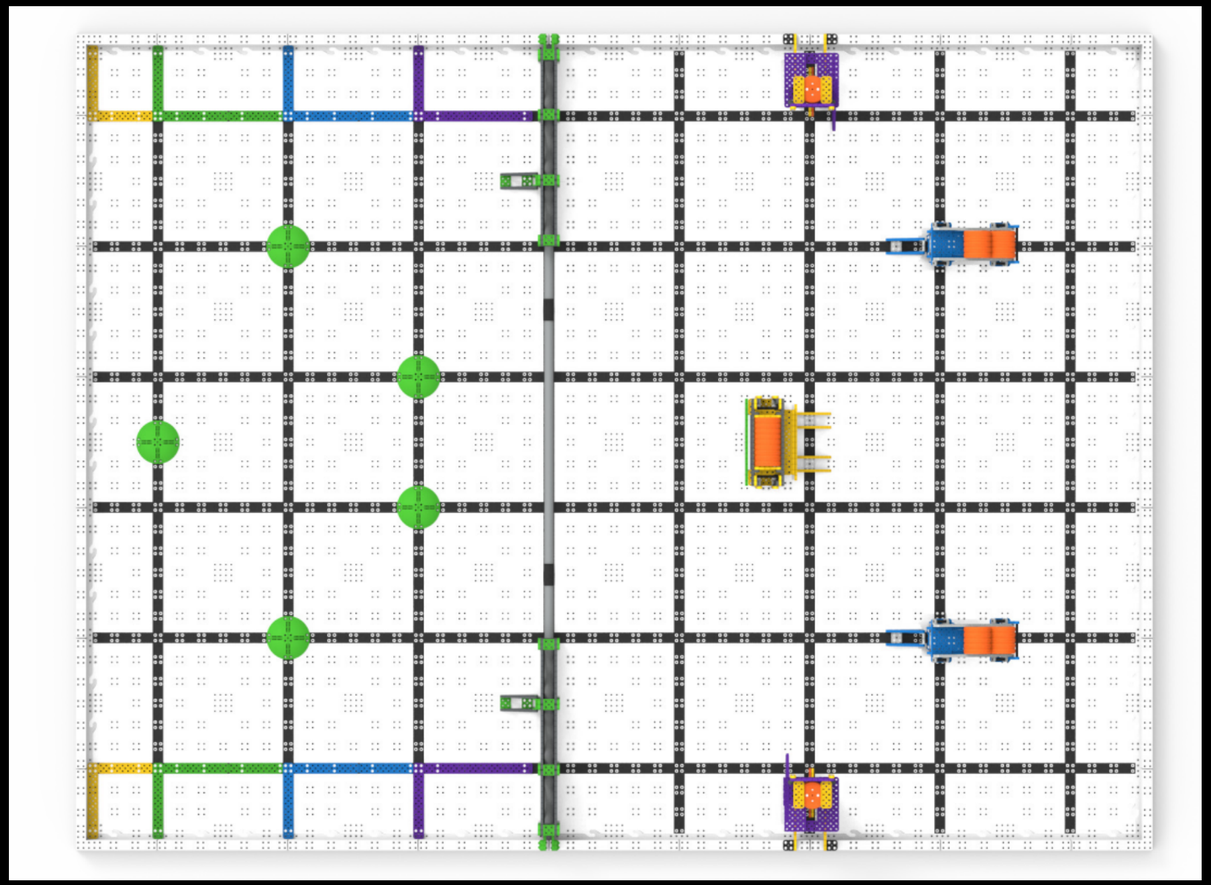
Before starting, come up with a plan for your autonomous route. Do not free hand your autonomous program.



Make it Reliable!

Before rushing to program collecting or scoring the disks, make sure **the route** the robot travels **is reliable!**

- **Move in directions parallel to the black lines.**
- **Align yourself using the field elements or the walls.**
- **Adjust the center of balance of the robot so it is more stable.**

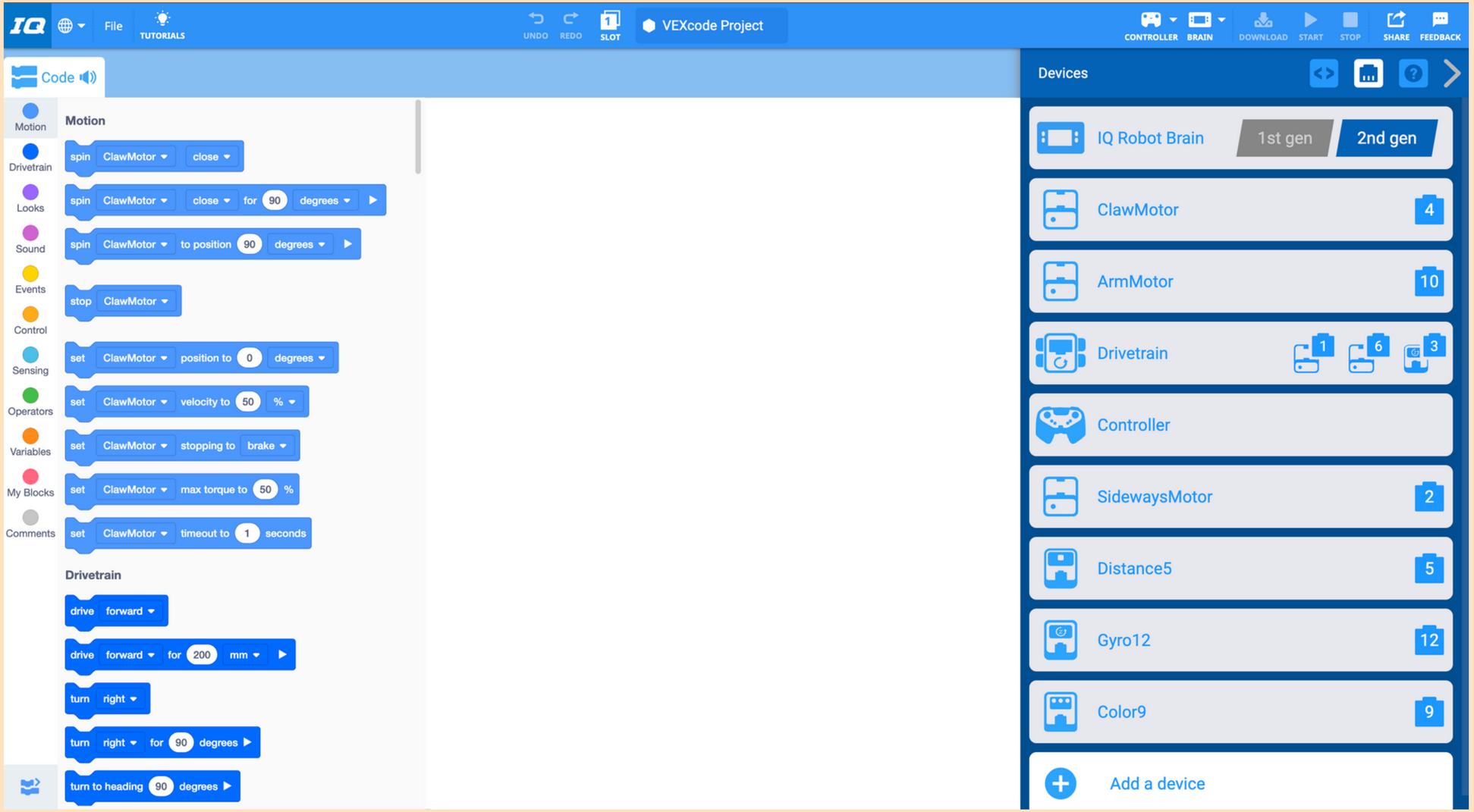


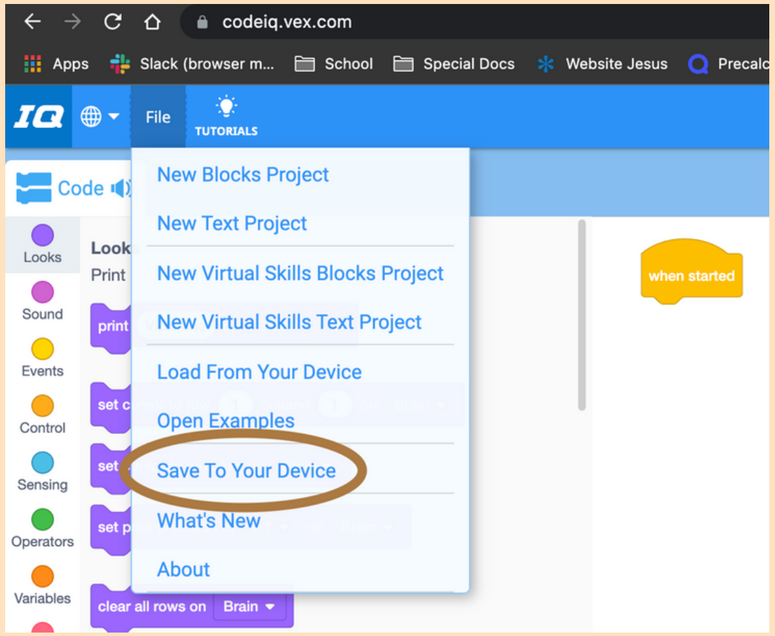
Work in Modules!

Don't try and do everything in one go!

- Make sure you have a few dispensers reliably working before moving on.
- Use comments!
- You can move the robot if there's no field elements in it!
  - Consider moving the robot back to the start after finishing scoring for reliability.

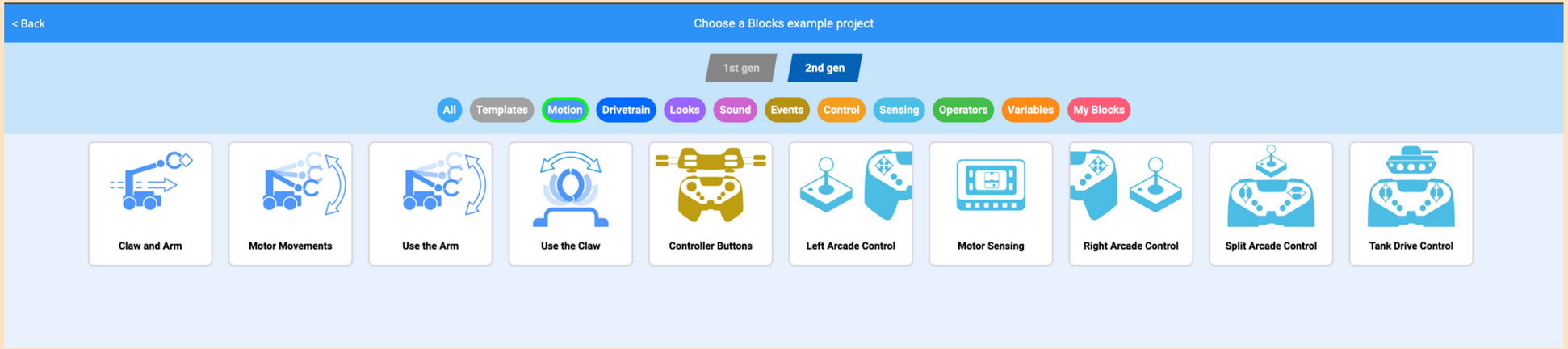
Configure your devices





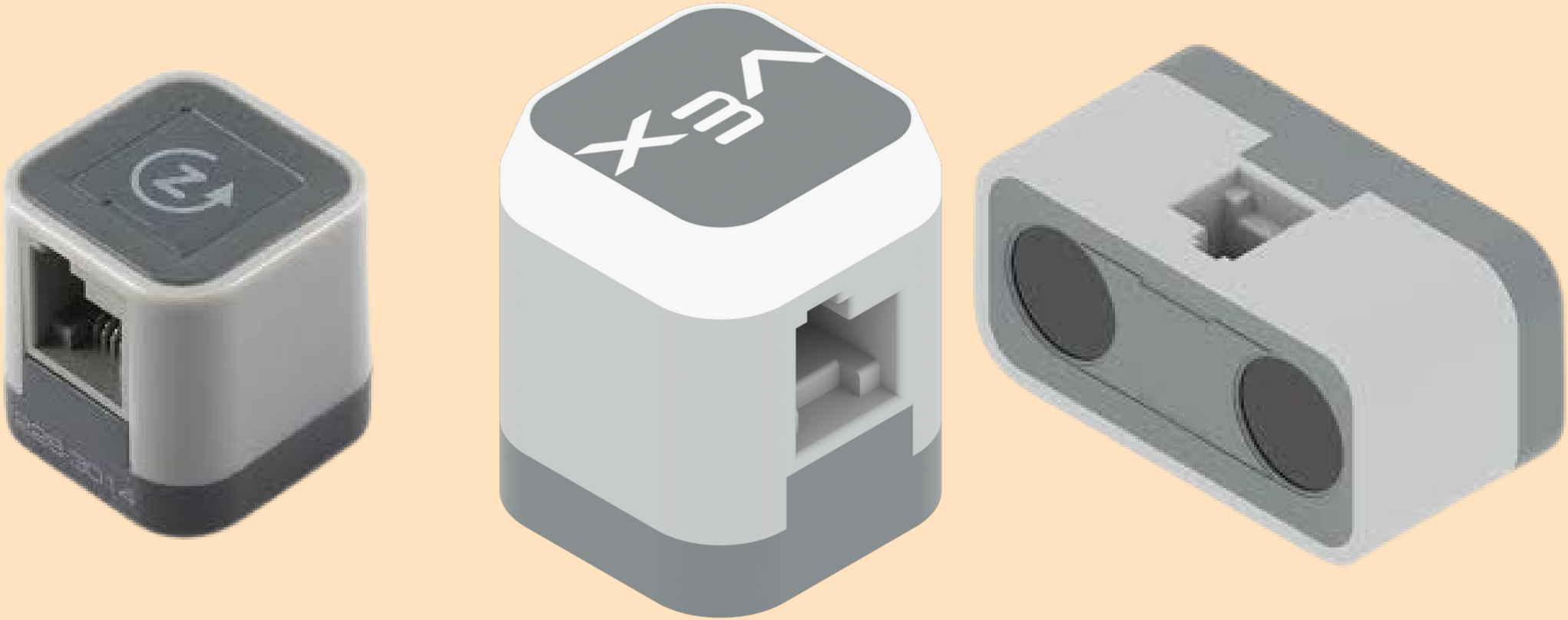
Create a basic drive route!

Create a basic drive route for the robot to follow, and find the functions you will use to drive a motor.



Looking for Precision

... with Sensors!



Key Sensors

Gyro

Button/Bumper

Color

Proximity

What do we use sensors for?

1. Use sensors for allignment
2. Precise tracking
3. Fixes position when something wrong happens

Gyro Sensor!

What does it do?

- Precisely tracks rotation and alignment of robot.

How is it used?

- Place the gyro face up on the robot and use the gyro sensor to make sure your turns are reliable.
  - If there's some changes to the field, simply timing the turn won't work. Use a gyro!

Make sure to calibrate the gyro before running the program. The sensor needs to know the orientation your robot at the start!

(If you have a second generation brain, use inertial!)

Color Sensor!

What does it do?

- Senses the color and brightness of the object directly in front of them.

How is it used?

- Use the color sensor face down on your robot to track the lines on the bottom of the field!
  - For example, a program could stop moving the robot after passing some number of lines. At that point, you'd know exactly where the robot is!

This sensor can only sense ***directly in front of it!*** Make sure it is positioned well!

Gen 1 Version

Gen 2 Version

Proximity Sensor

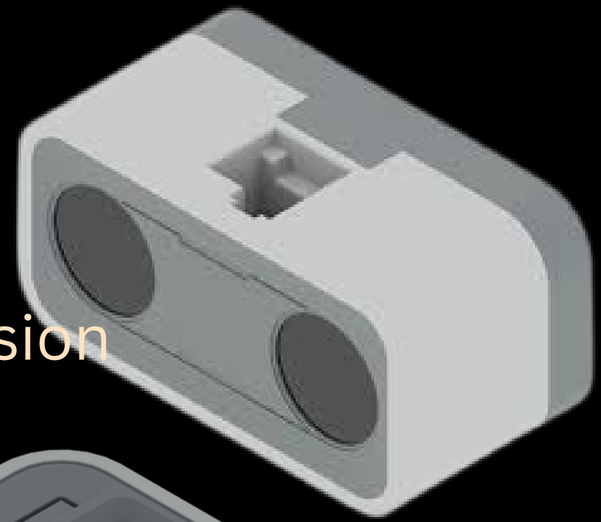
What does it do?

- Senses how far the nearest object is **directly in front of it.**

How is it used?

- Use this sensor at the front of your robot or assemblyto sense how far away a wall is!
  - The wall is always there, so when the robot is near the wall, use this sensor to precisely adjust the poistion of the robot.

This sensor isn't very good at sensing field elements!
Sometimes, the field element is too small, or the sensor is badly positioned.



Gen 1 Version

Gen 2 Version

Touch Sensor

What does it do?

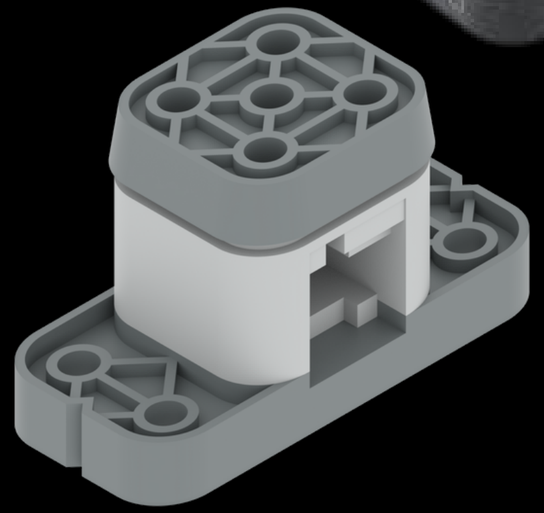
- Senses touch, or collision.
- Press to activate functions

How is it used?

- Primarily used to seperate modules in a program.
  - When programs are separated into different modules, the LED and bumper switch are used to signify the start of the next module. (As opposed to simply waiting a period of time)

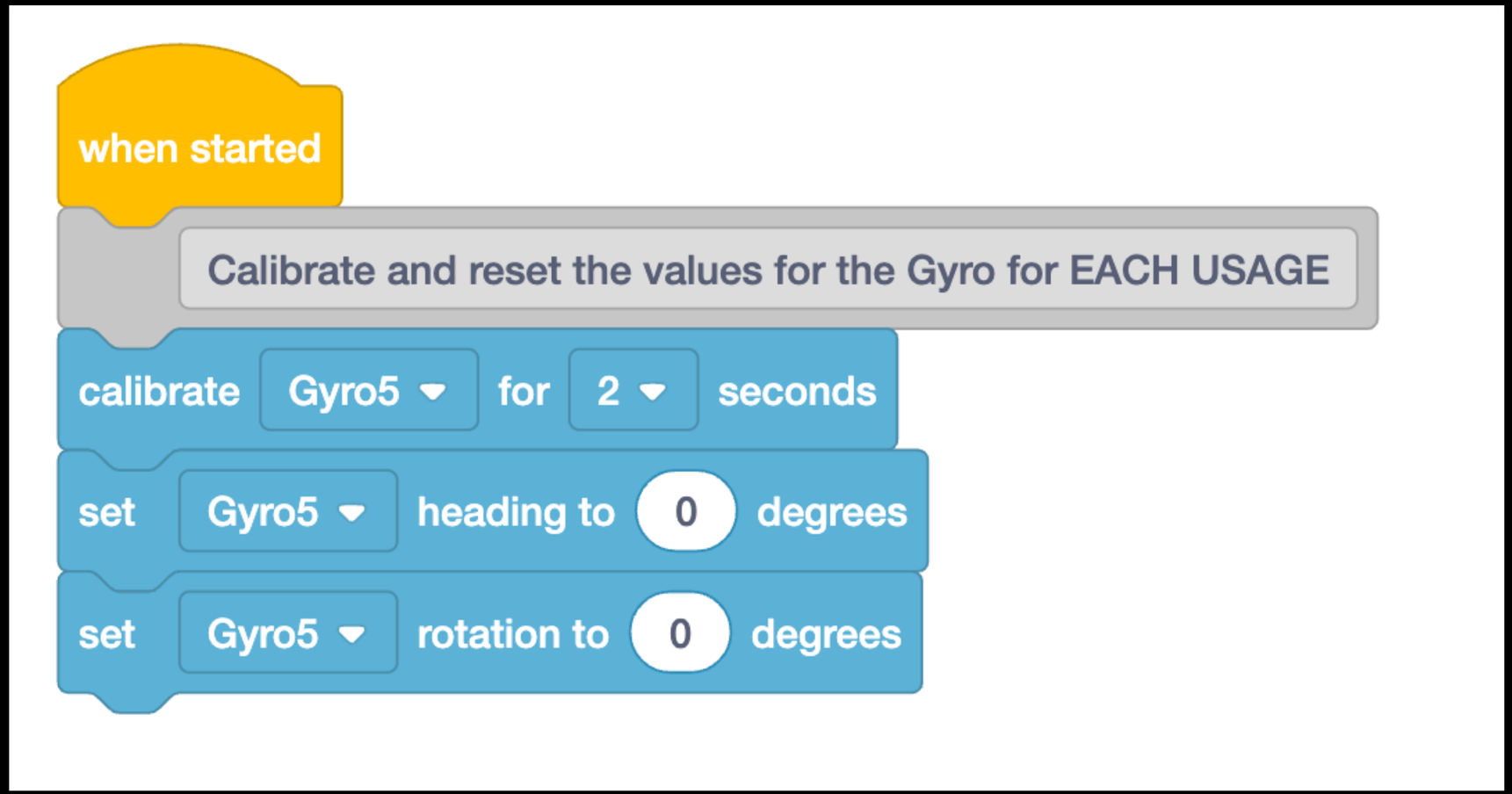
These sensors aren't very good at sensing collisions with field elements, since most elements are not perfectly flat.

Touch LED

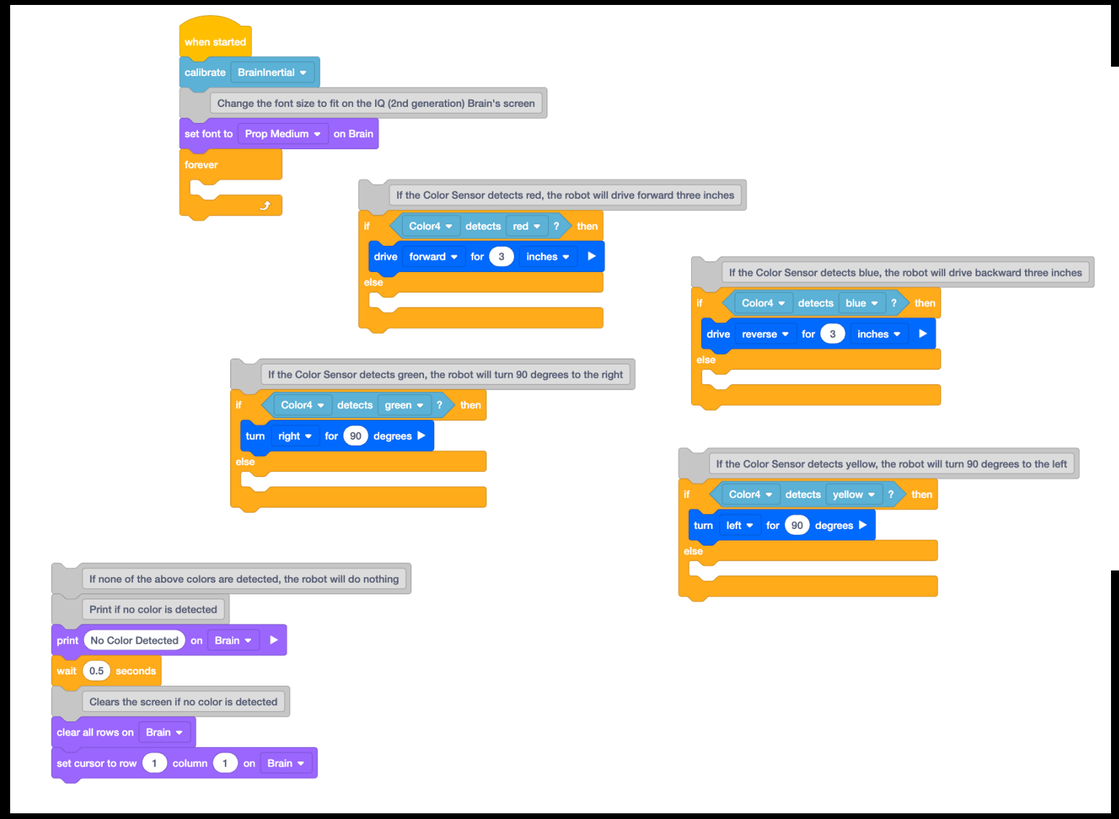


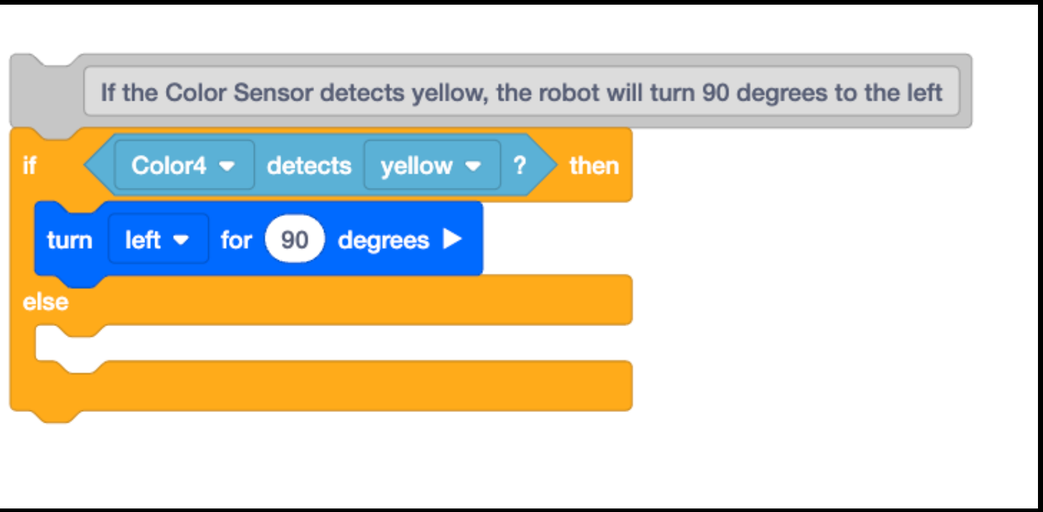
Bumper Switch

Gyro Sensor!

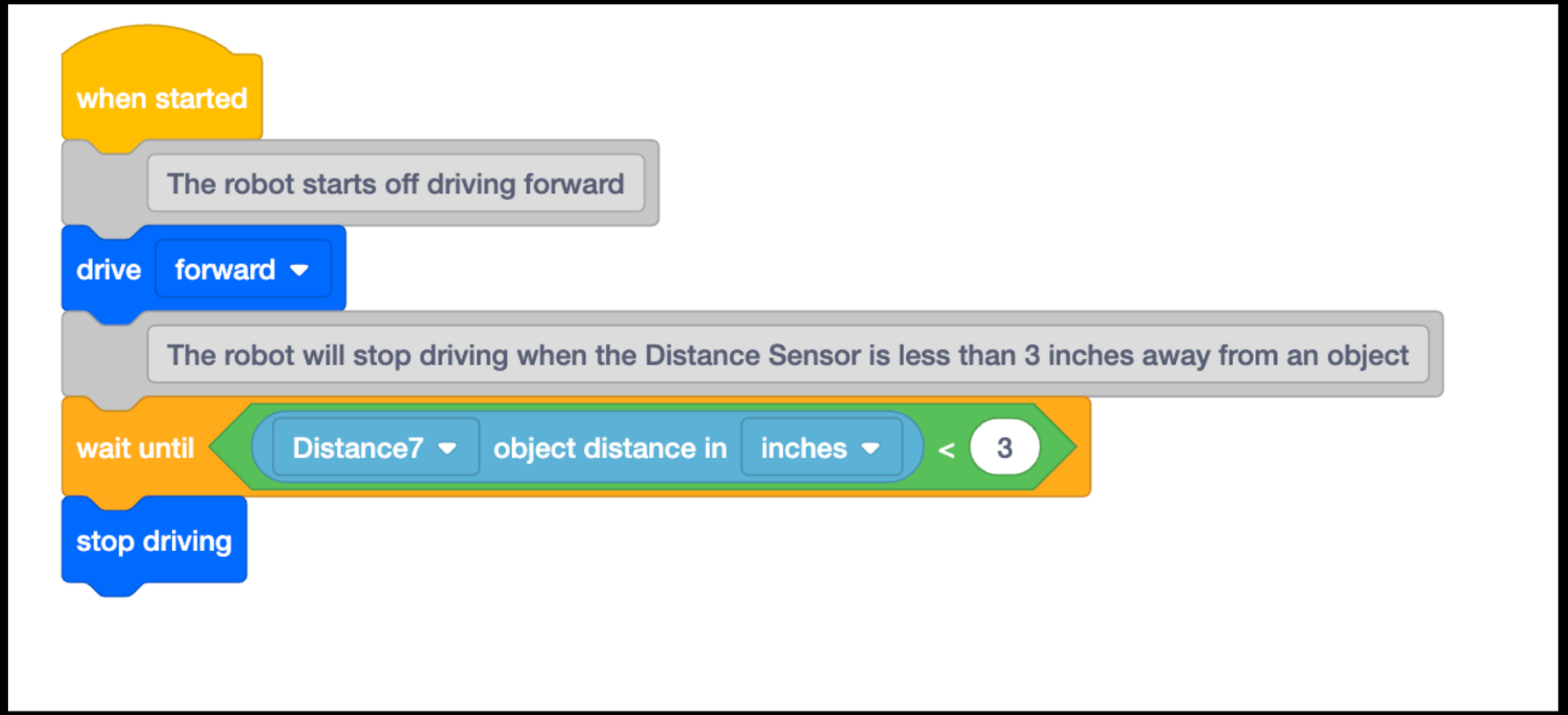

when started
Calibrate and reset the values for the Gyro for EACH USAGE
calibrate Gyro5 for 2 seconds
set Gyro5 heading to 0 degrees
set Gyro5 rotation to 0 degrees

Color Sensor!

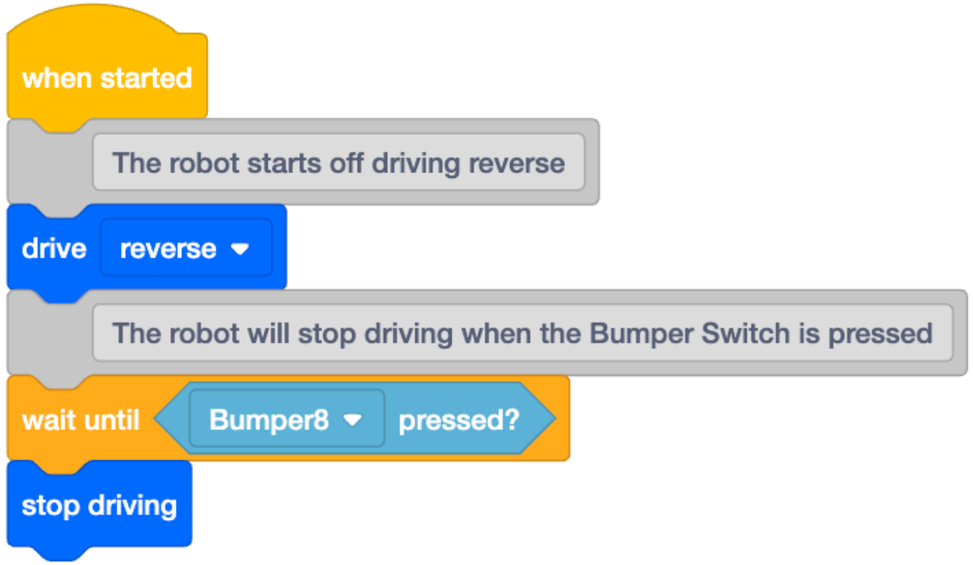




Proximity Sensor



Touch Sensor



Project Name: Bumper Switch

Description:
This program will drive reverse until the Bumper Switch comes into contact with an object.

Brain Supported: 2nd generation

Configuration:
BaseBot (Drivetrain 2-motor, Inertial)
Bumper in Port 8

What to do now?

1. Write on a piece of paper your plan for autonomous
2. Prototype the drive code using the driving functions
3. Slowly develop a code (Action by Action) that preforms a singular task reliably

Before we end!

- Coding is not difficult, it is time-consuming. Do not give up!
- Autonomous can help get you the skills award, which will qualify teams for states, so there is a lot of value!

Thank You

If you'd like to support,
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