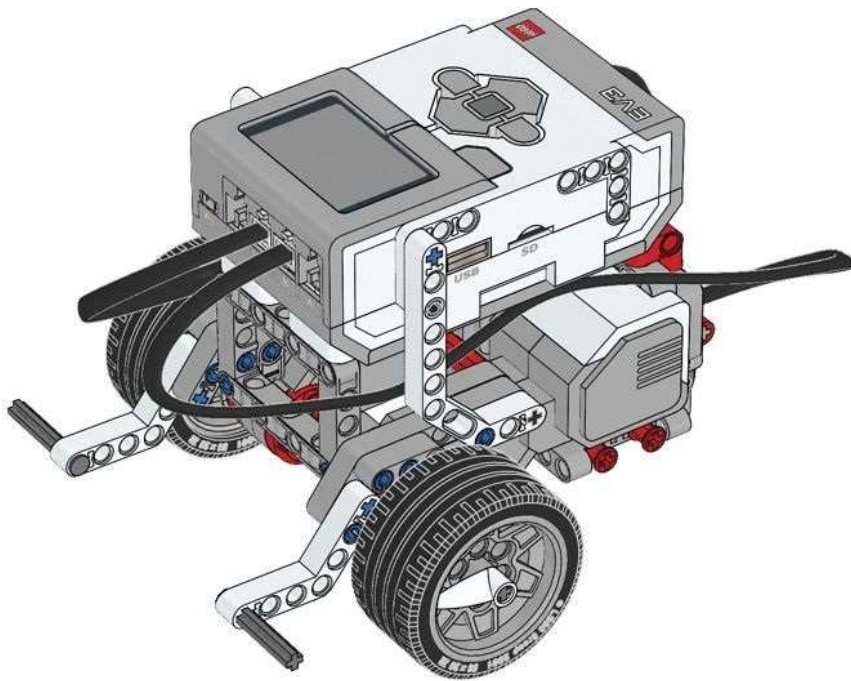


# ROBOTICS 101



- 2023 Version
- Resources/Activities from Hendricks County 4-H Robotics Curriculum Handbook

# AGENDA

## Day 1 Agenda:

- Introductions & Rules
- Robot Moment
- Differential Drive Robots
- Inventory, Building Your Rover, Mounting Your Sensors
- Coding Basics and Tasks
- Cleanup and Next Dates

# 1

## Introductions & Rules

Who are you?

Why are you interested in Robotics?

# INTRODUCTION AND RULES

## Introductions

- Name
- Grade
- Why are you interested in Robotics?

Hello  
my name is

Mr. Burke

# INTRODUCTION AND RULES

## Rules

- Respect for instructors, each other, the room, and equipment.
- Use bathroom as needed down the hall – be sure to wash hands!
- Take Turns!
- Equipment will stay with us each day.
- Ask questions, but explore and try to find answers!
- Answer the questions in the instruction booklet, I want to see what you are learning

# 2

## Robot Moment

- Who is working on Robots?
- “Robots work, People Rule!” - *Plus1 Robotics*

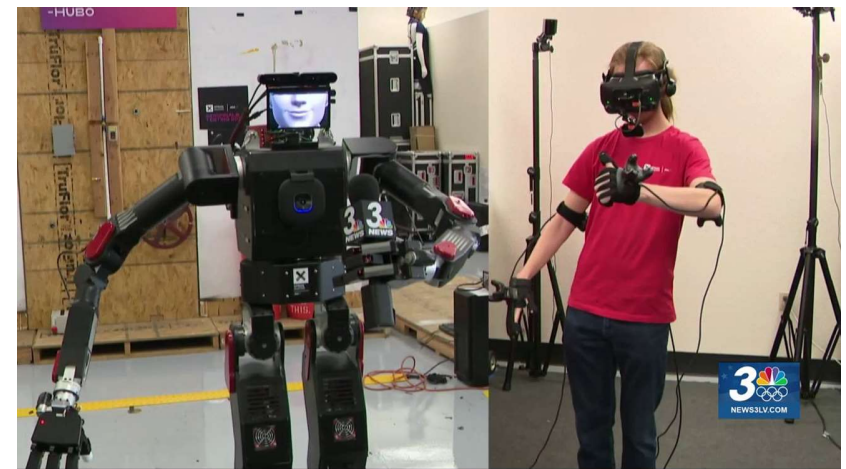
# ROBOT MOMENT

## UNLV Robotics

- University of Nevada, Las Vegas (UNLV) developed a Human Robot Avatar in 2021
- It can walk, climb, see, sense, and feel (touch). Design was to allow an individual to remotely work. (Avatar)
- Entered into XPRIZE Avatar Global competition and placed 6 out of 100 entries.



UNLV/XPRIZE



UNLV/KSNV

# 3

## Differential Drive Robots

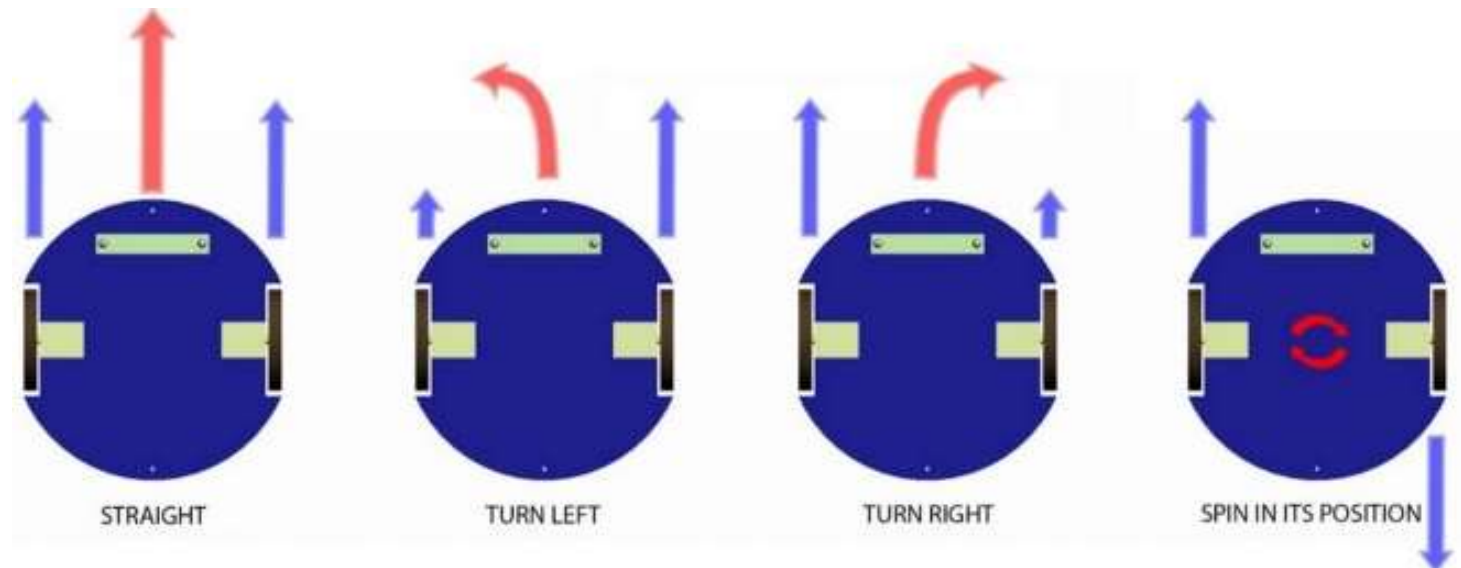
- What makes your Robot mobile?
- What makes your Robot perceive it's environment?



# DIFFERENTIAL DRIVE ROBOT

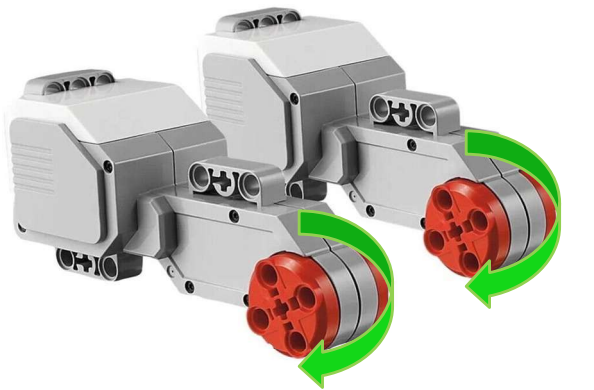
## Differential Drive Robot Definition

- A differential drive robot is a robot whose movement is based on 2 independent motors placed on either side of the robot.  
*Wikipedia, Differential Wheeled Robot*
- Forward, Reverse, and Turning are all based on which way the motors are spinning. NO STEERING WHEEL

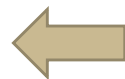
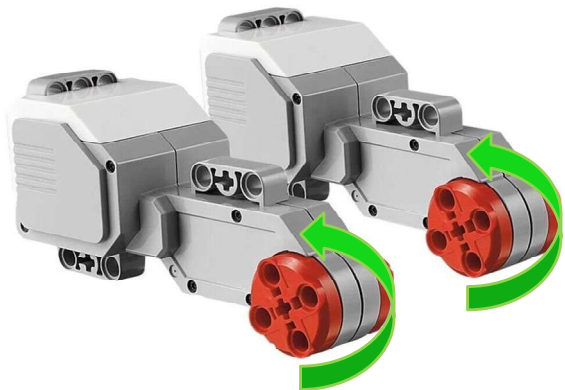


lcreator.wordpress.com/CC BY-SA 4.0

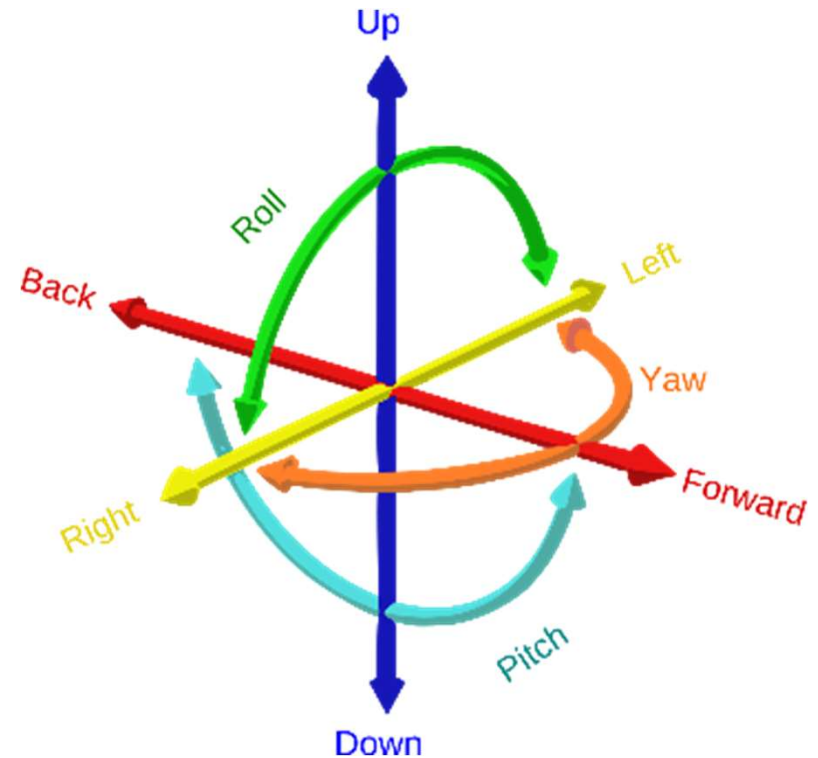
## Differential Drive Mobile Robots - Forward and Reverse



Forward  
Same Speed\*  
Same Direction



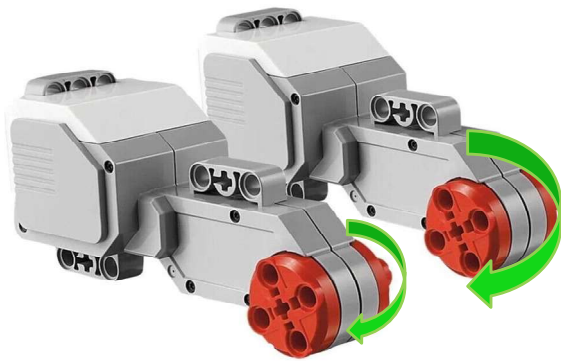
Back  
Same Speed\*  
Same Direction



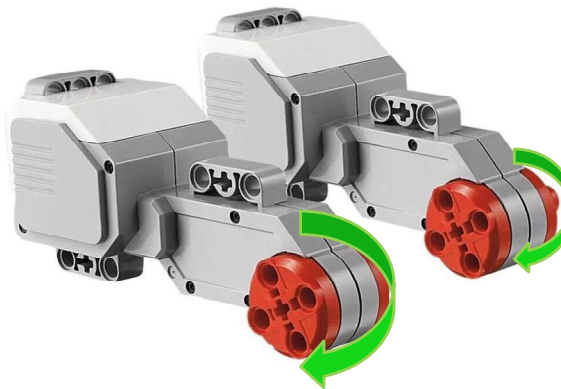
CC BY-SA 4.0

\* Motor Output speed, NOT command speed

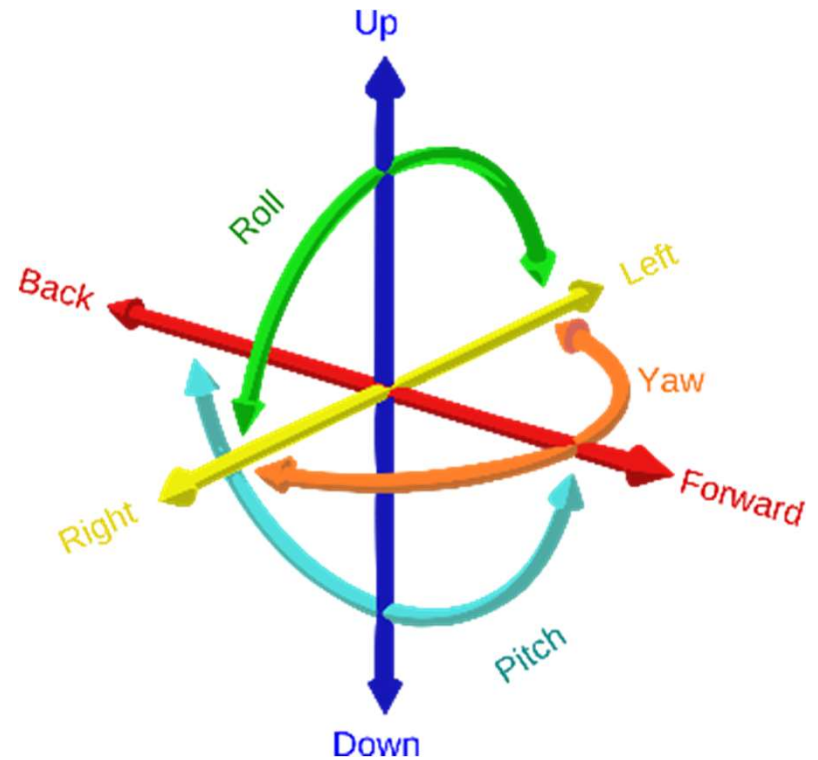
# YOUR EV3 ROBOT



Right Turn (YAW)  
Different Speed  
Same Direction

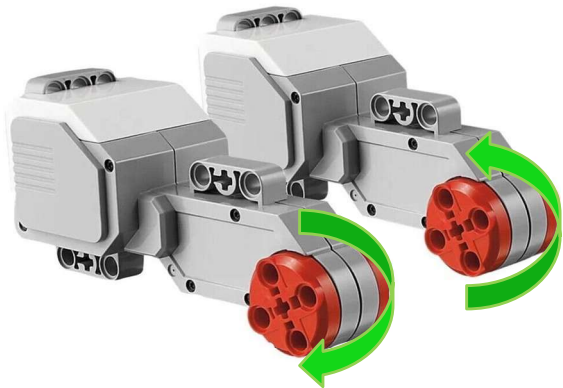


Left Turn (YAW)  
Different Speed  
Same Direction

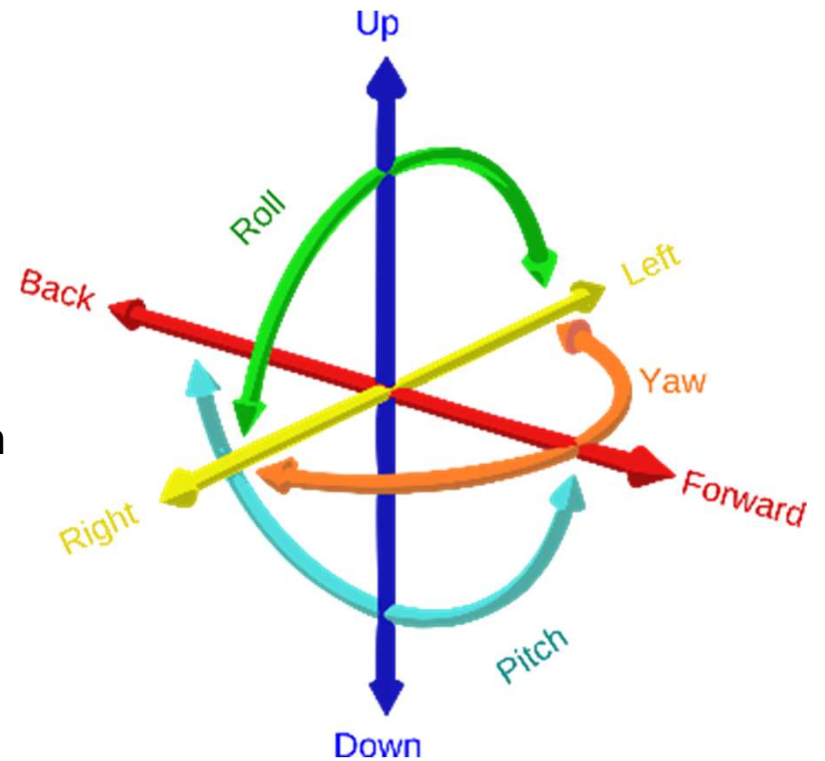


CC BY-SA 4.0

# YOUR EV3 ROBOT



Forward  
Same Speed\*  
Different Direction

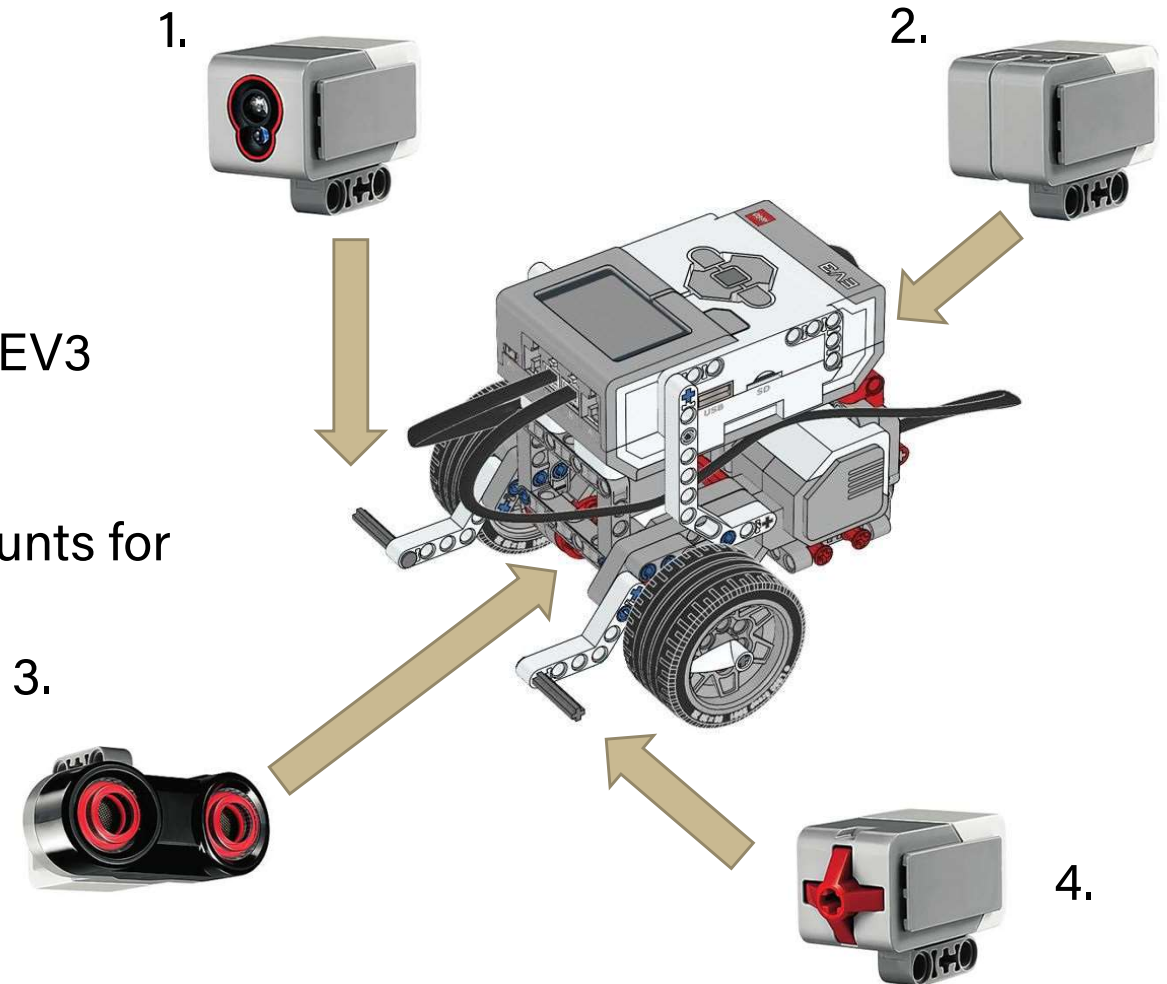


CC BY-SA 4.0

# YOUR SENSORS

1. Color
2. Gyro (YAW)
3. Ultrasonic
4. Touch

- Big Book builds the main EV3 differential robot.
- Small Book builds the mounts for the sensors.



# 4

## Let's Build!

- Inventory your kits
- Follow Instructions to build a differential Robot.
- Make sure to answer questions, right down kit and team name.

# ***ELEVATOR MUSIC***

Inventory and Build

# 5

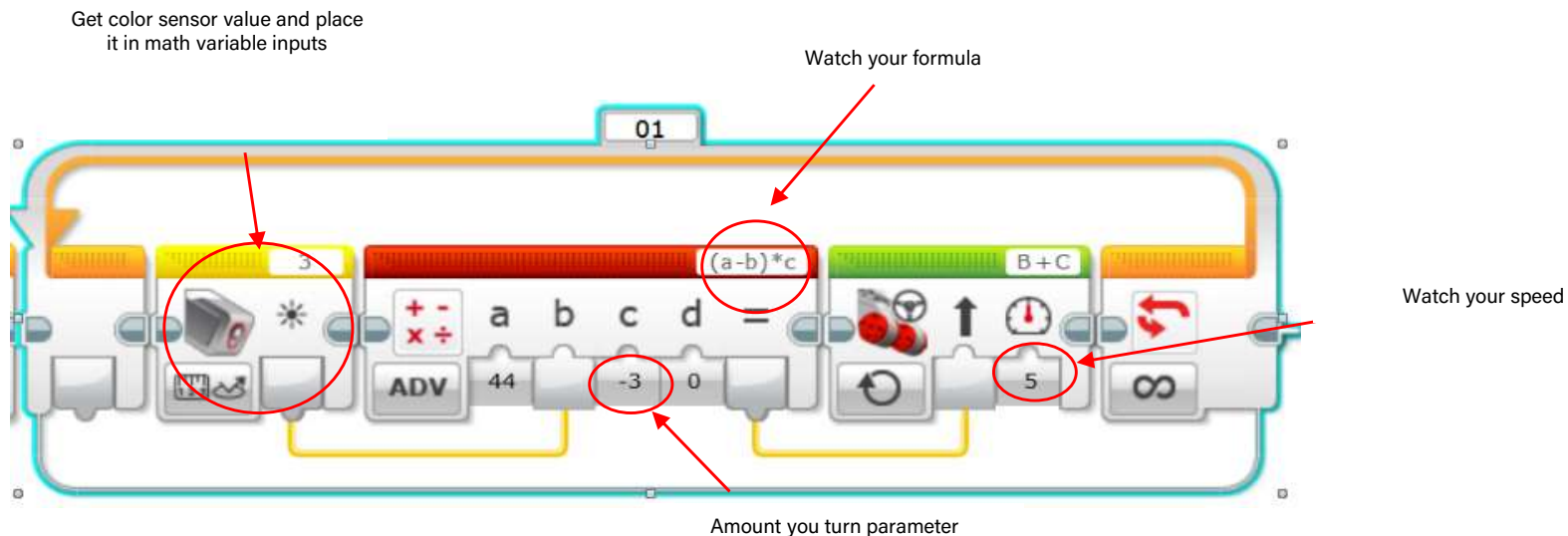
## Coding Basics

- Diagram Coding with EV3
- Main Blocks and Loop Coding



## Diagram Programming

- Diagram programming is picture descriptive, allows you to follow and visualize your code with ease.
- Currently used to develop control algorithms, mathematical models, and the US government and military is using it for Model Based Systems Engineering (MBSE), which is an easy way for them to understand what large complicated system and your code is doing.



## Block or Scratch Programming

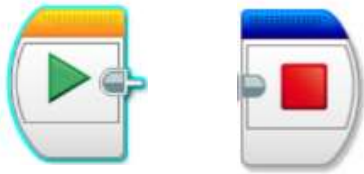
- Stack blocks of code on top of each other to better understand how complex code is written.
- Developed by Massachusetts Institute of Technology (MIT) for kids to learn programming. Many of you may be using this in school.
- Robotics 102 will use this for tablet control of a robot, but not needed for Robotics 101.



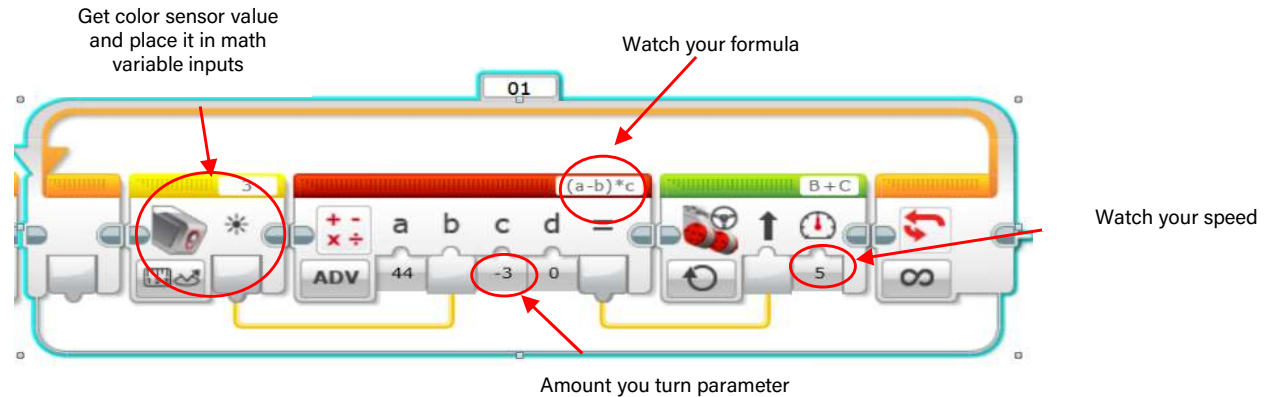
MIT/CC BY-SA 4.0

# CODING BASICS

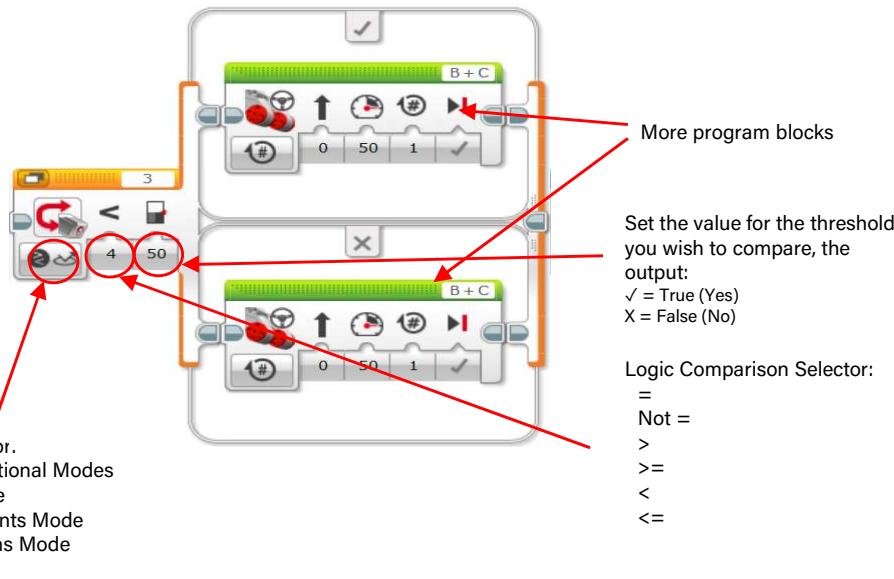
## Main blocks



Start and Stop  
- ensures safe operation of robot.



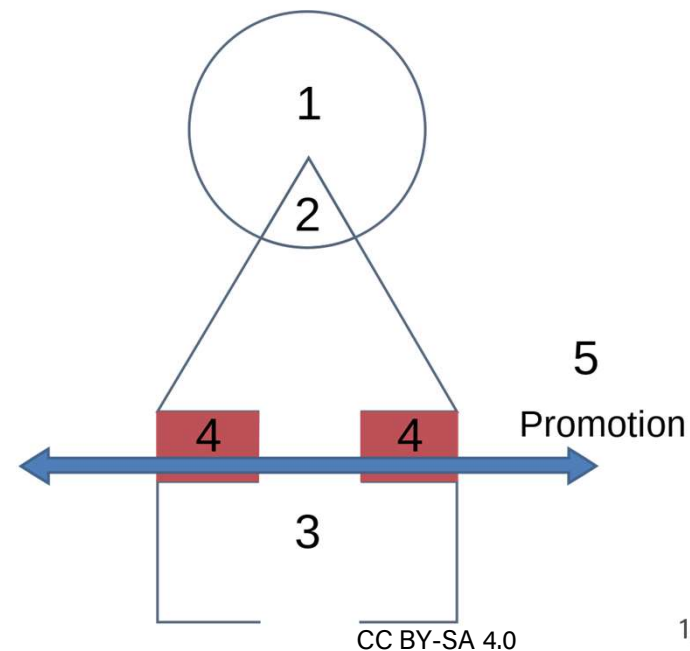
Loops - Robots are real time systems, loops are how real-time systems work.



Conditional (Switch) Blocks  
- Set your conditions to run your Robot, inside your loop.

## Programming Your EV3 for Safety and Differential Drive

- Robot Actions
  - Task 1: Move Straight
  - Task 2: Move Tank
  - Task 3: Move Steer
- Robot Sensors - Loops and Switch
  - Task 4: Stop at a Line
  - Task 5: Stop at Angle
  - Task 6: Stop at Object
  - Task 7: Stop at Touch
- Robot Safety
  - Task 8: Multitasking
  - Task 9: Safe Random
  - Task 10: Line Follow
- Robot Group Project
  - Robot Line Following – The Robot Squid Game



## Task Instructions

- Make sure to read each task.
- It introduces a new block or sets of blocks to use.
- There are hints to executing the task.
- Ask questions, but ask your team, and ask your self. Don't be afraid to try anything.
- Save your code in the Robot Projects Folder on your desktop  
TEAMNAME\_KIT#\_2023

# ***CLEAN UP***

Time to clean up your station!

# ***THANK YOU***

Questions?

Next Dates: (Thursdays)

February 16<sup>th</sup>, 2023 – 6 to 8 PM (Classroom A, B, C)

March 16<sup>th</sup>, 2023 – 6 to 8 PM (Classroom A, B, C)

April 20<sup>th</sup>, 2023 – 6 to 8 PM (Classroom A, B, C)

May 11<sup>th</sup>, 2023 – 6 to 8 PM (Classroom A, B, C)

June 8<sup>th</sup>, 2023 – 6 to 8 PM (South Hall)