LEGO Robotics Summer Camp

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Ballston Spa High School Robotics

FIRST Team 3044

What is FIRST?

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What is FIRST?

FIRST, or *For Inspiration and Recognition in Science and Technology*, is a non-profit organization dedicated to spreading education and growth in STEM-based fields. For over twenty-five years, FIRST has offered a variety of robotics challenges for teams of students of all ages, everything from FIRST Lego League Jr, oriented towards sparking interest in STEM in elementary school students, to FIRST Lego League, a more competitive FLL Jr., to FIRST Tech Challenge, a robotics competition for middle school aged students, to FIRST Robotics Competition, a high school-oriented competition teaching engineering, business, and many other essential skills for the modern world.

Designed as the ultimate sport for the mind, the FIRST Robotics Competition is described by participants as "the hardest fun you'll ever have."

More information can be found at FIRST's website, firstinspires.org

Who is 3044?

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This Week

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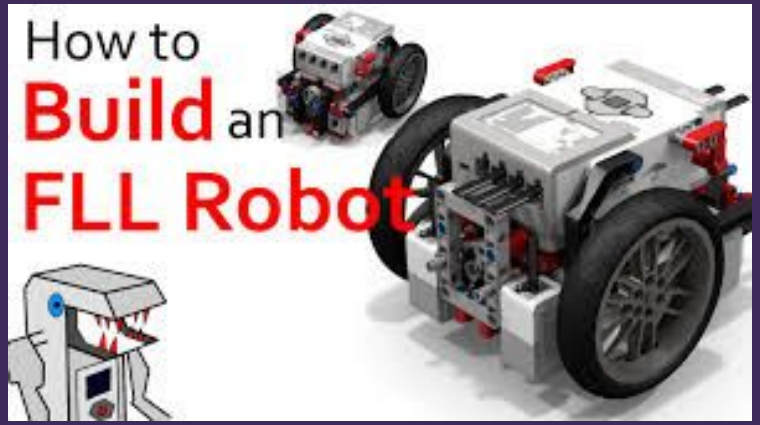
- Introduction to Design and Building
- Introduction to Programming
- Sensors: Light, Color, Touch, Ultrasonic
- End of Week Design and Programming Challenge!



Building a Basic Bot

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How Does Programming Work?

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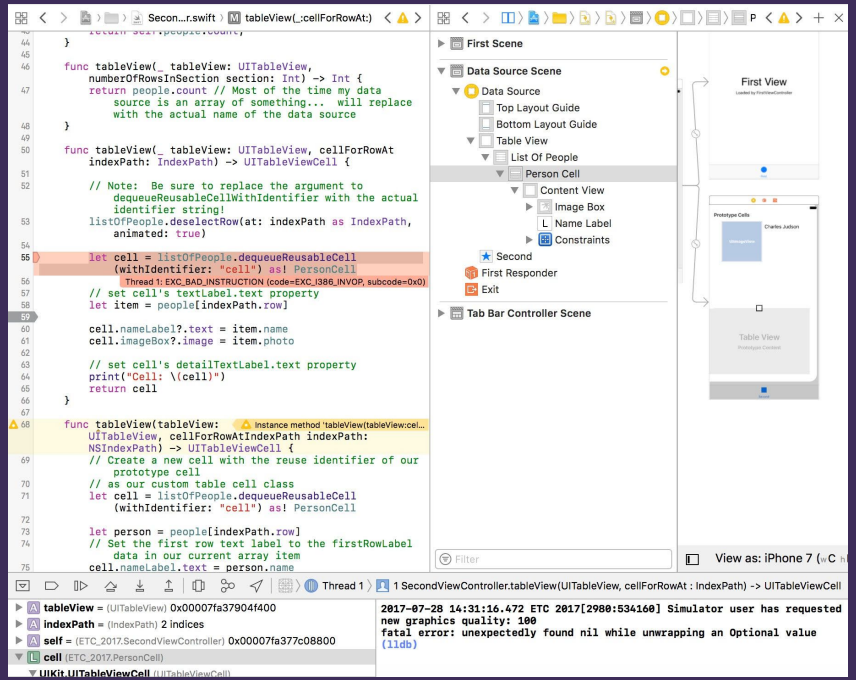
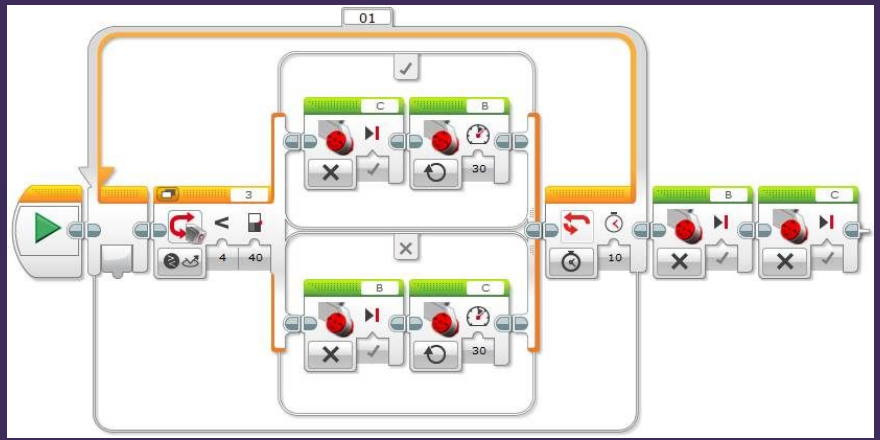


⟵ Programming CAN look like this

But FLL programming looks more like this ⬇



How Far is Far Enough?

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Measuring Distance in Time

- Distance can be expressed as a value of time
- *Task: Have robot travel in a straight line forward for 3 seconds at one speed. Change the speed and run for the same time. What differences do you see?*
- What makes time less reliable?
- How else could we measure distance?

Measuring Distance in Rotations

- Instead of time, rotations are distance values equal to the circumference of the wheel.
- *Try the same task as before, but this time with rotations instead of time.*
- What do you notice?

Taking Turns

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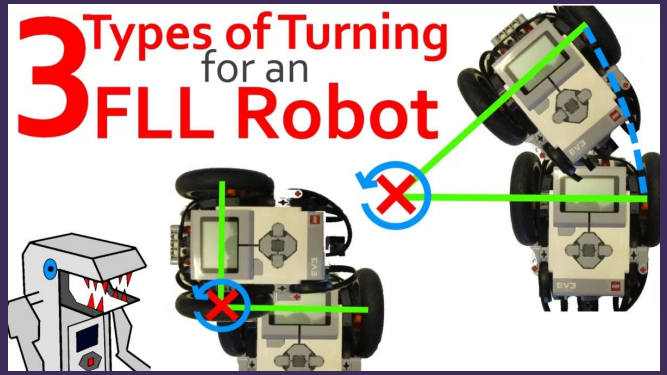
- There's more than one way to make a robot turn
- Can you list the three different ways?

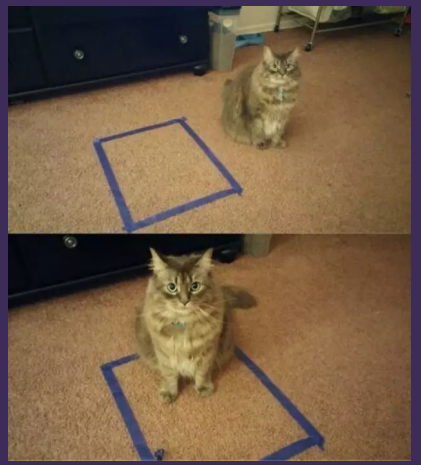


- **Type 1:** One motor forward while the other motor is stationary
- **Type 2:** One motor at a higher speed than the other motor
- **Type 3:** One motor drives forward while the other drives backwards

Day 1 Challenge!

- **Task: The Square**
  - Robot must complete a full lap of the square tape path on the floor
  - Robot must integrate *ALL* three types of turns in it's lap around the square

- **Type 1:** One motor forward while the other motor is stationary
- **Type 2:** One motor at a higher speed than the other motor
- **Type 3:** One motor drives forward while the other drives backwards



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Day 2

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Day 2: Touch Sensors

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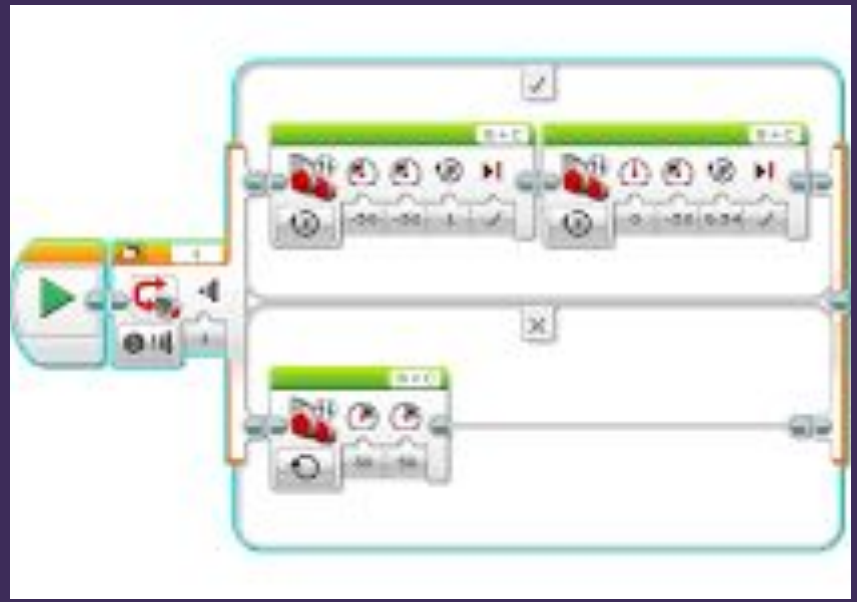
- Programming with touch sensors
  - Loop function
  - Set to touch sensor
  - Give commands



Touch Sensors

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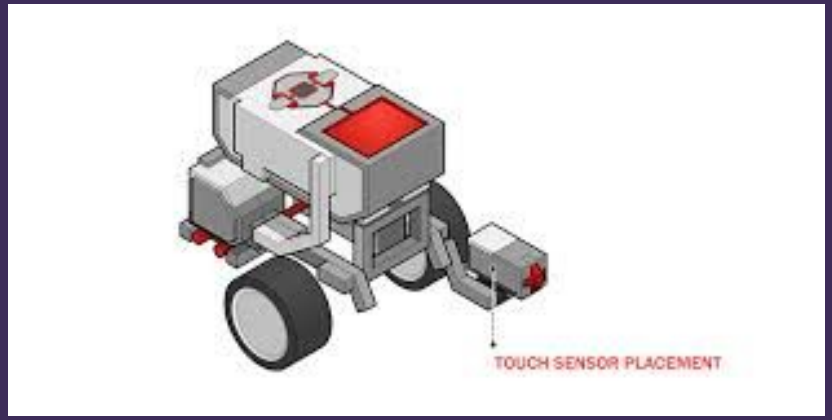
- **Task:**
  - Mount 2 touch sensors on the front of your robot
  - Test program



- **Morning Challenge! Touch sensor obstacle course!**
  - Requirements: Robot must utilize 2 touch sensors to complete the obstacle course

Light Sensors

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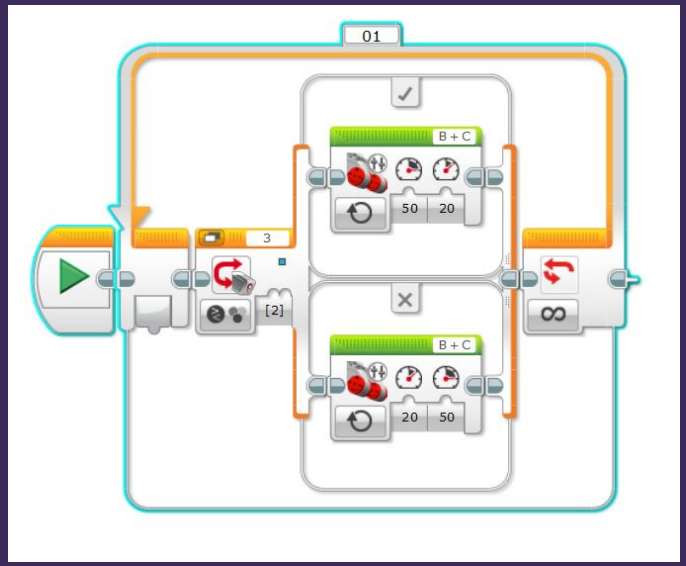
- Mount light sensor on the front center of your robot
- Program

- **Afternoon Challenge: Light Sensor Races!**
  - Robot will need to use a light sensor to follow a line



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Day 3

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Ultrasonic Sensors

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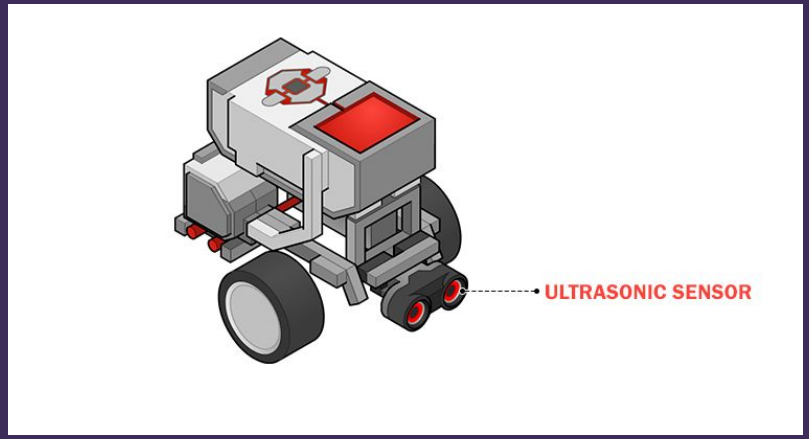
- **Task:**
  - Mount an ultrasonic sensor on the front of your robot



- **Morning Challenge! Skunkbot**
  - Requirements: Robot must utilize 1 ultrasonic sensor
  - When an object is <5inches away, your robot skunk must turn around and lift its tail.
  - Need to build a tail using a motor.

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Day 4

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Lego Zoo

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- **Task:**
  - **Design and build an animal of your team's choice**
    - **Brainstorm 3 ideas, and present all 3 to a 3044 member, then decide on one**
  - **Must include an ultrasonic, color, and touch sensor**

Your animal will need to:

- **Perform a trick of your team's choice, using 1 sensor**
- **Follow a tape course using the light sensor**
- **Must retrieve a toy and put it back in it's toy bin**