



**Team 3044 FLL Starter Guide**



**Team 3044 0xBe4**

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FIRST, What is it?

**FIRST:**

**“FIRST (For Inspiration and Recognition of Science and Technology) was founded in 1989 to inspire young people's interest and participation in science and technology. Based in Manchester, NH, the 501(c)(3) not-for-profit public charity designs accessible, innovative programs that motivate young people to pursue education and career opportunities in science, technology, engineering, and math, while building self-confidence, knowledge, and life skills.”**

**- FirstInspires.Org**

**FIRST is meant to focus on more than just robots at all levels (FLL Jr., FLL, FTC, FRC).**

## What is FLL?

FLL (First Lego League) was created in partnership with Lego to create a entertaining robotic game that must be completed by Lego Mindstorm Kits.

## Costs and Requirements for Starting an FLL Team

Now as you see, FLL is a really cool program which we think that every kid should be able to do but what are the requirements?

- 2 or more adult coaches (no special technical experience is required)
- Up to 10 students willing to put in time (there are lots of jobs)
- A good place to meet, either public or private. It should be able to accommodate a 4 x 8-foot playing field table, and should have internet access
- The desire to learn, explore, strategize, build comradery, share ideas and talents, make new friends, be accepted, and HAVE FUN!

For new teams, it will cost \$900 for team registration.  
This includes:

- a robot kit of parts (Lego Mindstorms Kit)
- Challenge Set (formerly known as the Field Setup Kit).
- That year's registration

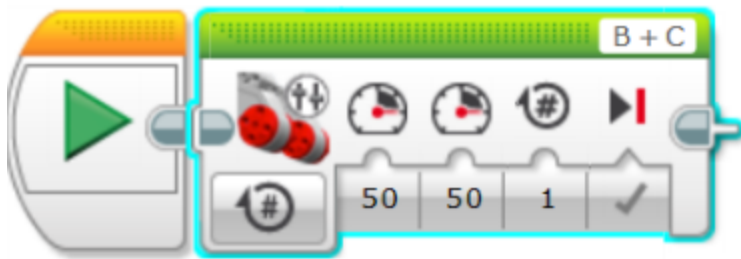
## Building Your Robot

The FLL game requires a robot built entirely from the kits of Lego parts given to the coach. The robot can be as customized as needed and attachments can be built to complete the missions. The design of the robot is entirely dependent on what it needs to do.

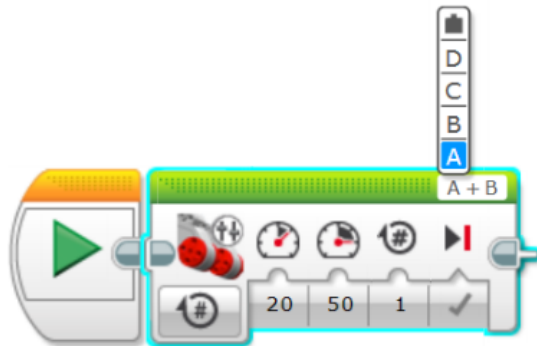
## The Basics Of Programming



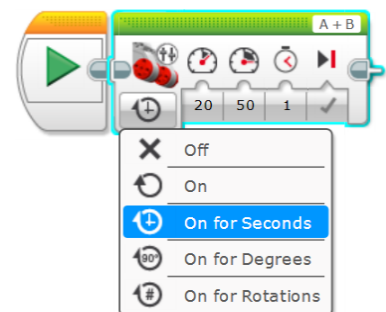
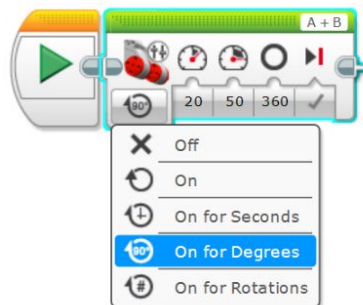
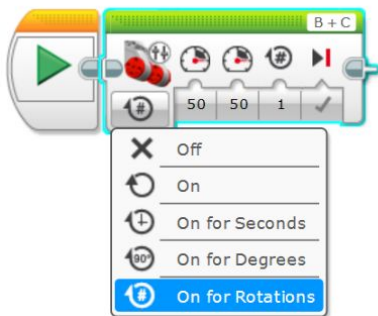
This is the start brick, it allows a program to run.



This is a basic command block, it can be customized to do many things.



First things first, you have to make sure your motors are set correctly, this is one of the most common mistakes made by first time programmers. The motor letters will depend on which ports you plug your motors into (the port letters are above each port).

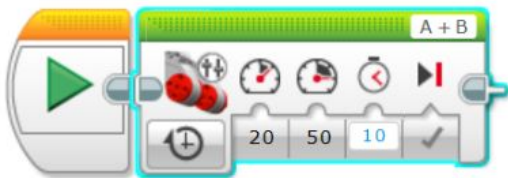


There are three ways to operate the motor: rotations, degrees, and seconds. On for rotations keeps the robot moving for the number of times the wheels spin. On for degrees keeps the robot moving for a set numbered degrees using the wheels (which ideally would be measured beforehand; more on that later). On for seconds does exactly as it says, the robot moves for the set number of seconds. Degrees is the most accurate while seconds is the easiest.

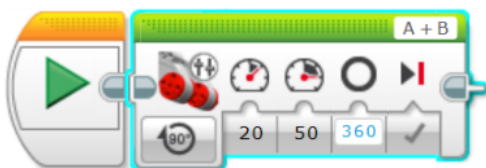
## How to Change the Durations

The third column is the key to success:

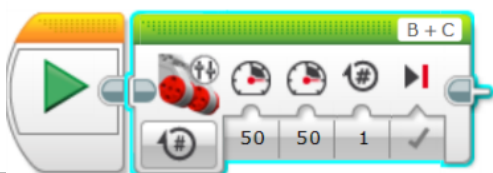
When on for seconds, all you have to do is change how many seconds you want it to last for.



When on for degrees, just put how many degrees you want it to go for, it can be over 360 degrees (and most likely will).



When on for rotations, put how many times you want to wheel to go around.



## How to Measure in Degrees

- Go into port view in the robot menu
- Rotate wheels as far as you need (this number is entered in the degrees column)

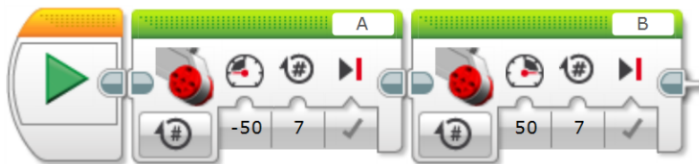


For more help, go to  
<http://ev3lessons.com/translations/en-us/beginner/PortView.pdf>

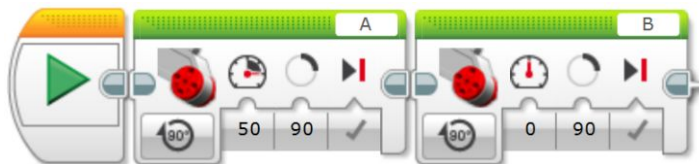
## How to Turn

There are three methods to turn:

1. Set one motor to a positive speed and the other motor to a negative speed with the same integer as the positive one.

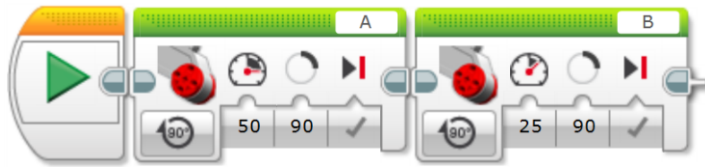


2. Set one motor to a positive speed, with the other motor remaining at zero.



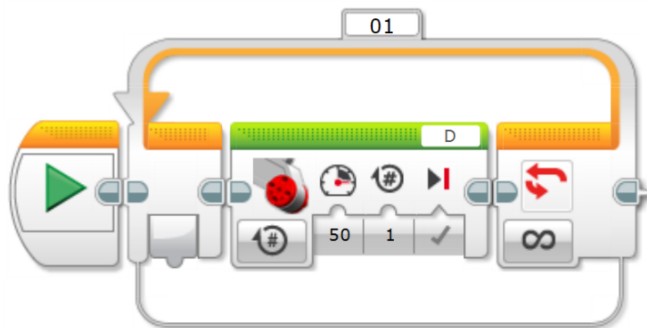
3. Set one motor value higher than the other



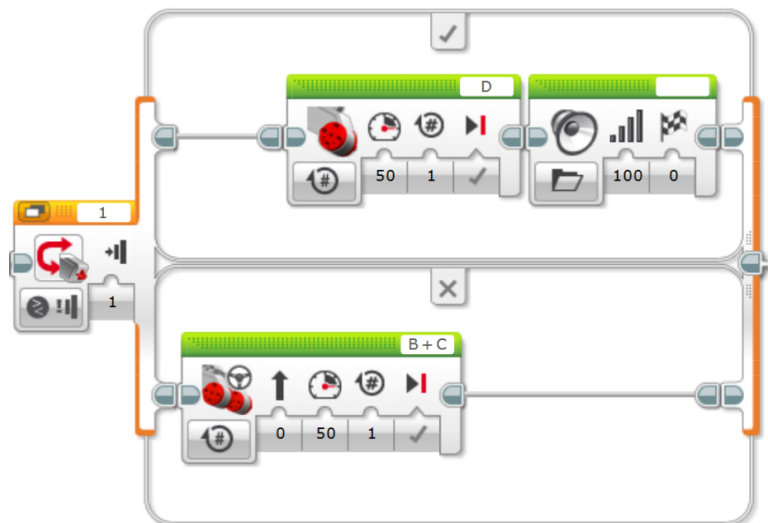


## Repeating/Switch

Repeating your program allows the robot to continue doing a preset action until a set of variables stops the repeating.



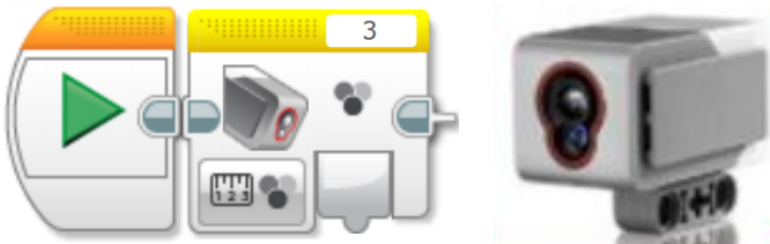
A switch allows the robot to do one action when a certain variable is present and a different action when it is not present.



# Sensors

## Color Sensor

The color sensor allows you to detect changes in color. For example, if you want to follow a black line, you can have the color sensor track black (or no color technically) and follow the line when it senses it.



## Touch Sensor

The touch sensor allows you to trigger actions when the sensor is pressed. This can be useful in situations where something is needed to be moved or picked up.



## Ultrasonic Sensor

This allows your robot to determine how far away it is from (for example) a wall. This can be useful when having to turn in order to do a task and is far more accurate than relying solely on code.



## Project

The robot game will be centered around a real-world problem. The goal of the project is for the kids to come up with a feasible solution for this problem. During their competition, they will have to present this solution to a set of judges in some way (ex. a skit or project board).

## Core Values

The kids will have to answer questions on how they demonstrate Core Values inside and outside of FLL and present a Core Values poster. FIRST prides itself on its core values. Something that on their website they consider “the cornerstones of the program”. They are listed as such on their website:

- We are a team.
- We do the work to find solutions with guidance from our coaches and mentors.
- We know our coaches and mentors don't have all the answers; we learn together.
- We honor showing the spirit of friendly competition.
- What we discover is more important than what we win.
- We share our experiences with others.
- We display Gracious Professionalism® and Coopertition® in everything we do.
- We have FUN!

## Gracious Professionalism

- This is “doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community” (FIRST’s Official Website).

## Coopertition

- This is “displaying unqualified kindness and respect in the face of fierce competition.” This is what coopertition is. Even when

competition can get fierce, everyone still shows that spirit and joy which made FLL fun in the first place.

## Robot Design

Another part of the competition will be robot design judging. The kids will have to explain their robot to the set of judges (ex. why they built it this way, why is theirs unique, etc.). They will also have to show their most accurate mission.

1. Robot Facts: Share bits about the robot built.
2. Design Details:
  - a. Describe the most fun or interesting part of robot design
  - b. explain your team's strategy and reasoning for choosing and accomplishing missions
- C. Design Process: Describe how your team designed their robot.
- d. Mechanical Design: Explain the robot's basic structure.
- e. Programming: Describe how your team programmed the robot
- f. Innovation: Describe any features of the robot's design that the team feels are special or clever.
3. Trial Run: Run the robot briefly to demonstrate how it completes the mission(s) of your team's choice.

**\*\*More information about Project, Core Values, and Robot Design can be found on the official FIRST website: [firstinspires.org](http://firstinspires.org)\*\***