PROGRAMMING EV3RSTORM

Moving, Turning, Move Until,
Loops and Switches,
Using Sensors
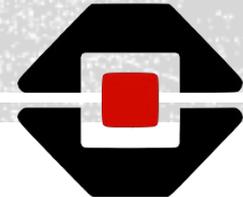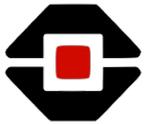
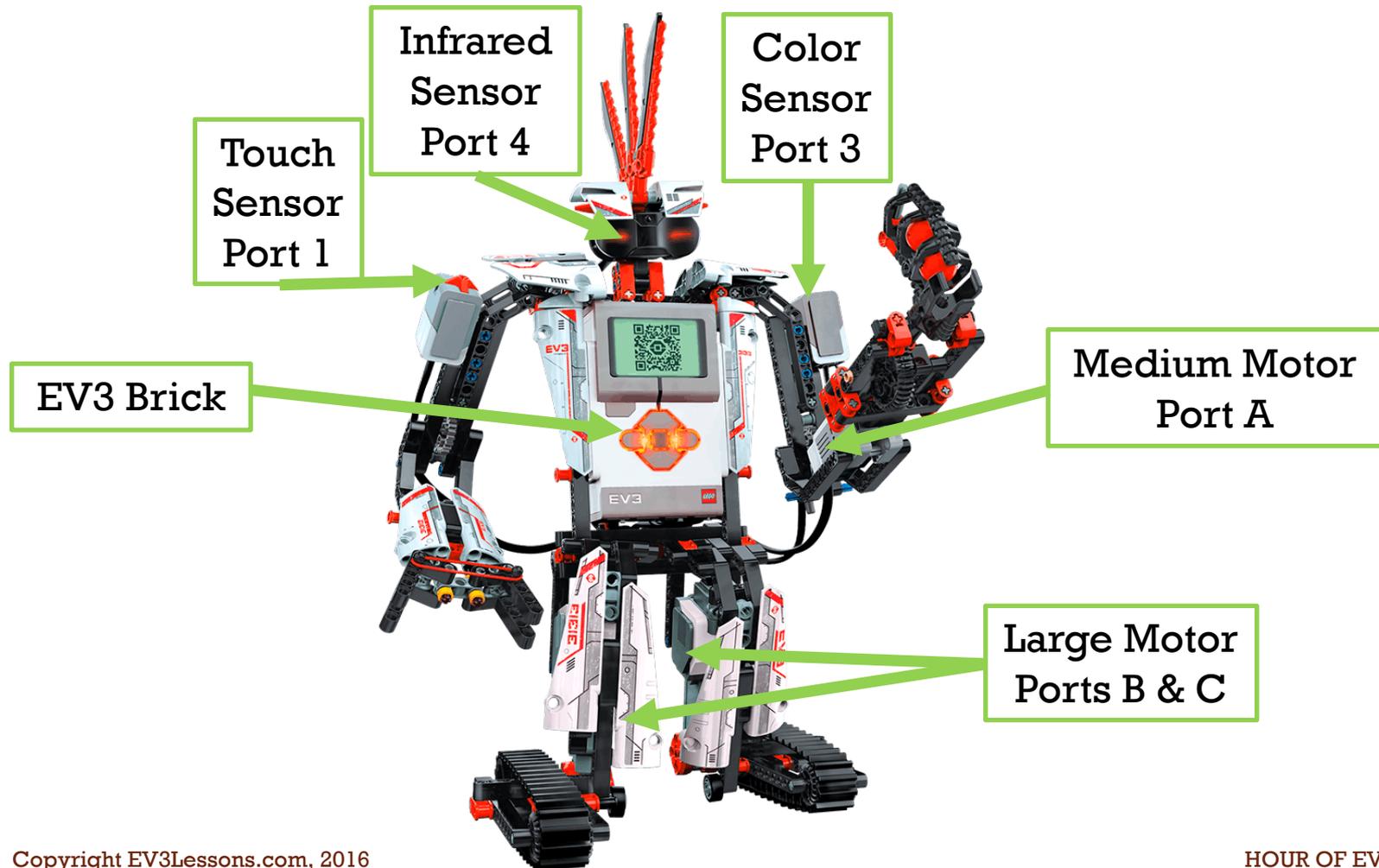Photo Credits: EV3STORM images by LEGO

INTRODUCTION TO YOUR ROBOT

- Can you identify the following parts on your robot?
  - 1 EV3 Brick
  - 1 Touch Sensor
  - 1 Color Sensor
  - 1 Infrared Sensor
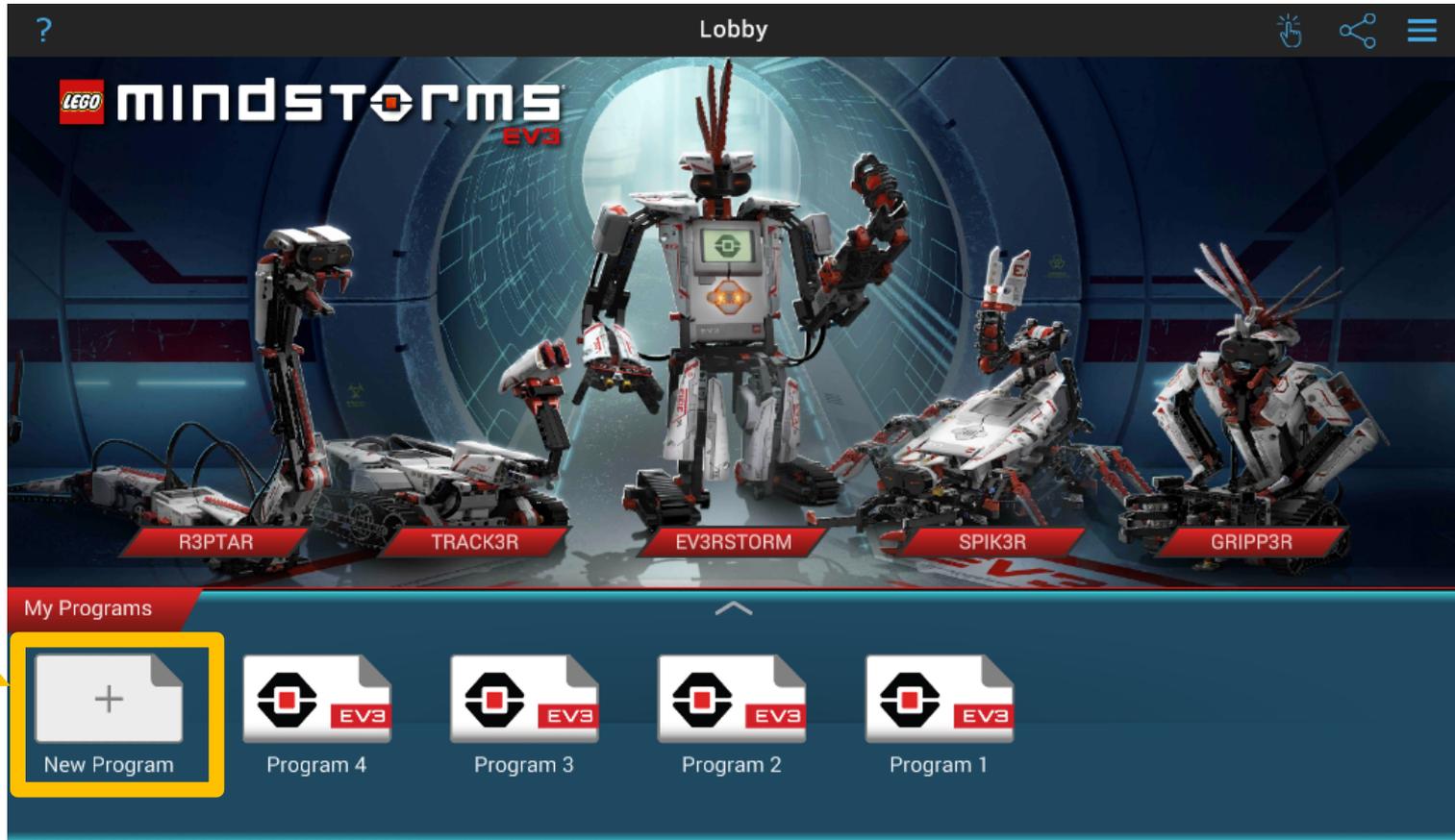 - 2 Large Motors
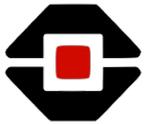 - 1 Medium Motor

INTRODUCTION TO YOUR ROBOT

Touch Sensor Port 1

Infrared Sensor Port 4

Color Sensor Port 3

EV3 Brick

Medium Motor Port A

Large Motor Ports B & C

INTRODUCTION TO THE PROGRAMMER APP

START HERE

PROGRAMMING APP CANVAS

Program 5

Download & Play

Start Block
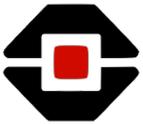
Drag programming blocks from below and attach them to this block

Note: This shows up only when your robot is connected. Press the Play button to test your code on your robot

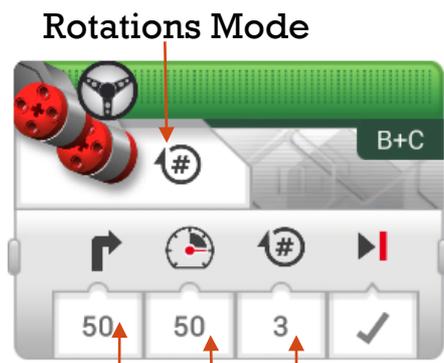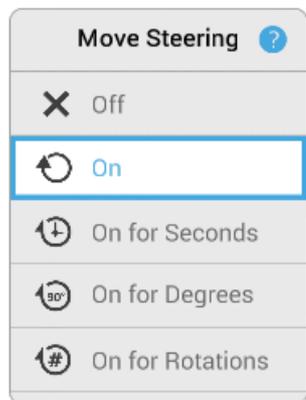**Programming Blocks in 3 Colored Palettes**

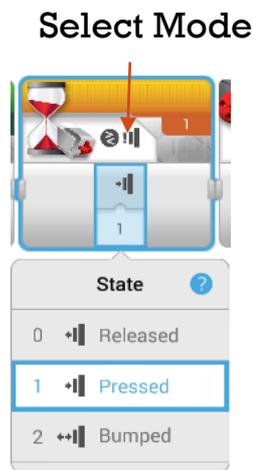**Brick Status**

EV3M

CHALLENGE 1: TAP ON THE SHOULDER

- In this activity, you will program EV3RSTORM to move forward until it's Touch sensor is pressed. Then you will make the robot move back 720 degrees and then make a right turn of 1000 degrees.

- Your robot will Move Until the touch sensor is Pressed

PROGRAMMING BLOCKS YOU NEED

"On" Mode

Rotations Mode

Select Mode

Steering (Straight or Turns)

Number of Rotations

Power (Forward or Backwards)

Move Steering — Off / On / On for Seconds / On for Degrees / On for Rotations

State — 0 Released / 1 Pressed / 2 Bumped

- **Move Steering Block**
  - In "On" mode, the motors are turned on and the program moves to the next block immediately
  - In Rotations mode, you can tell the robot to move a specific number of rotations of the motor
  - The Steering value sets whether your robot should move straight or turn
  - Using a negative number in the Power value tells your robot to move backwards

- **Wait Block**
  - This block lets you wait until something
  - Select the Touch Sensor in Pressed Mode

CHALLENGE 1 SOLUTION IN 4 EASY STEPS

- **STEP 1:** Turn the motors on

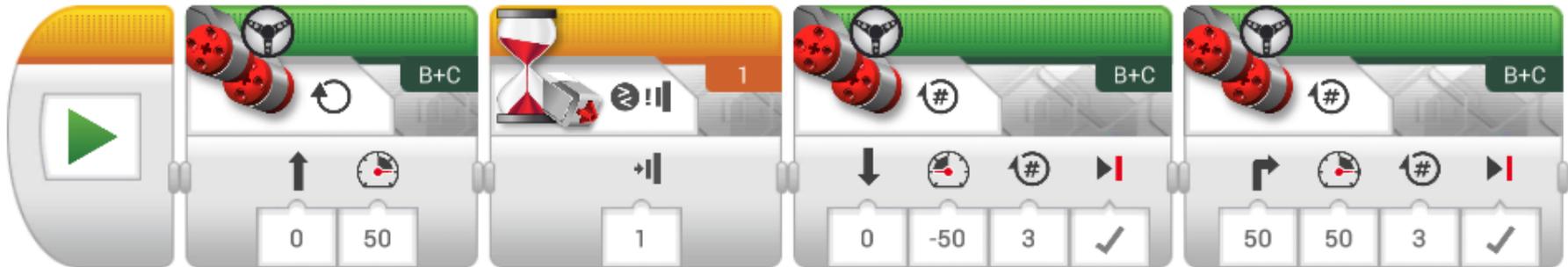- **STEP 2:** Wait until Touch Sensor is pressed

- **STEP 3:** Move robot straight and backwards 3 rotations

- **STEP 4:** Make your robot turn right 3 rotations

CHALLENGE 1 SOLUTION

Move Steering Block in "On" Mode. Set to go forward

Move Until the Touch Sensor is Pressed

Move Steering Block set to go backwards

Move Steering Block set to turn

CHALLENGE 2: TRAFFIC LIGHT

- In this activity, you will program EV3RSTORM to move forward when the color sensor detects green, stop when it detects red, and slow down when it identifies yellow.

- You are having your robot choose between multiple actions,
  - In the EV3 programming language, you use a SWITCH statement

- You are also going to have the robot keep repeating the action again and again
  - In the EV3 programming language, you use a LOOP

- Collect a few spare red, yellow and green LEGO blocks for your traffic light (see image)
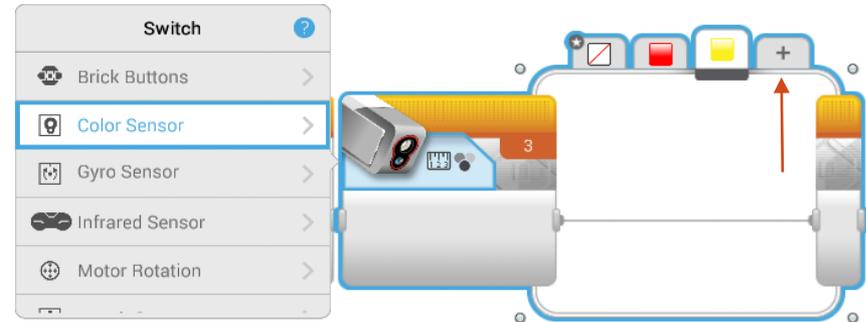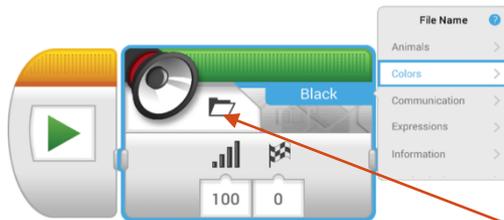
ADDITIONAL BLOCKS YOU NEED

- Loop Block set to infinite
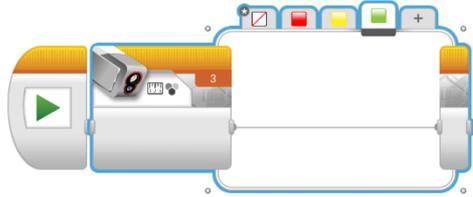
- This Block lets you repeat your code

- Switch Block based on the Color Sensor's readings in Measure Color Mode

- Click on the "+" and create 4 tabs – Red, Green, Yellow and No Color

- Sound Blocks let your robot make sounds
- Select File Mode Choose "Colors"

CHALLENGE 2 SOLUTION IN 3 EASY STEPS

- **STEP 1:** Start with the Switch Block with 4 tabs

- **STEP 2:** Add the code to each of the 4 tabs
  - No Color – Leave blank since we want the robot to do nothing
  - Red – Turn the Motor "Off" and Say "red"
  - Yellow – Turn the Motor "On", move slower (lower the power), say "yellow"
  - Green – Turn the Motor "On", move faster (increase the power), say "green"
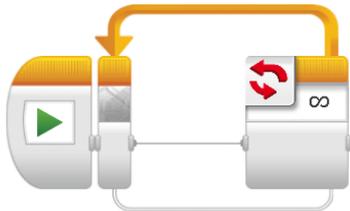
- **STEP 3:** Place the entire switch in a Loop
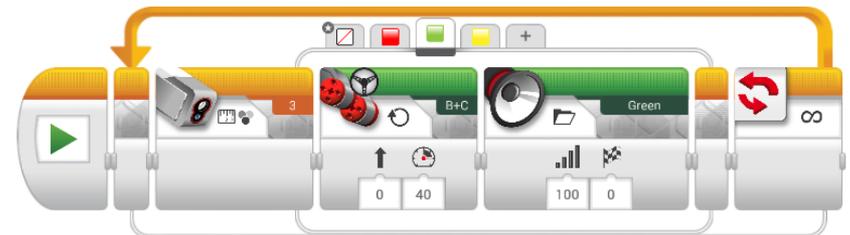
CHALLENGE 2 SOLUTION

When the robot reads no color the robot does nothing

When the robot reads yellow, the robot moves at 20 power

When the robot reads red, the motors stop

When the robot reads green, the robot moves at 40 power

CHALLENGE 3: USE THE FORCE

- In this activity, you will program EV3RSTORM to move forward until it is a certain distance away from you or move back if it is too close

- Use the Infrared sensor on your robot to detect when it sees a hand

- You will combine the concepts of Move Until, Switches and Loops with the Infrared sensor

- Please make sure you use low values for power (~30) to make sure your robot doesn't fall over

ADDITIONAL BLOCKS YOU NEED
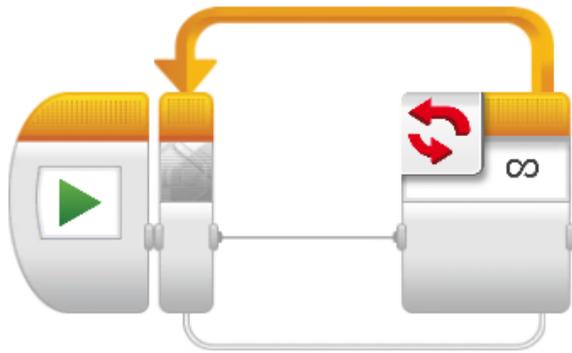
- Loop Block set to infinite

- This Block lets you repeat your code
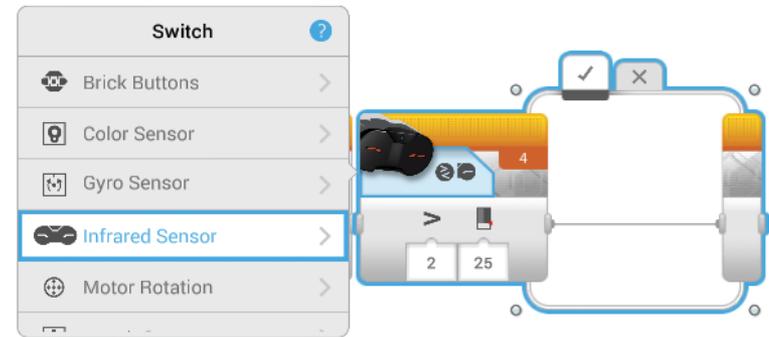
- Switch Block based on the Infrared Sensor's readings in Compare Proximity Mode
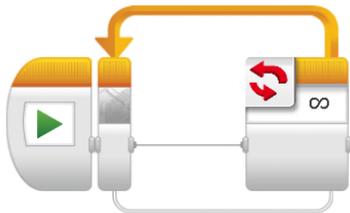
CHALLENGE 3 SOLUTION IN 3 EASY STEPS

- **STEP 1:** Start with the Switch Block that uses the Infrared Sensor in Compare Proximity mode with 2 tabs

- **STEP 2:** Add the code to each of the 2 tabs
  - Greater than 25 proximity – Make the robot move forward using a Move Steering block slowly (30 power)
  - Less than 25 proximity – Make the robot move backwards using negative power in the Move Steering Block. Go slow.

- **STEP 3:** Place the entire switch in a Loop

CHALLENGE 3 SOLUTION

When the Infrared Sensor is greater than 25 proximity go forward slowly
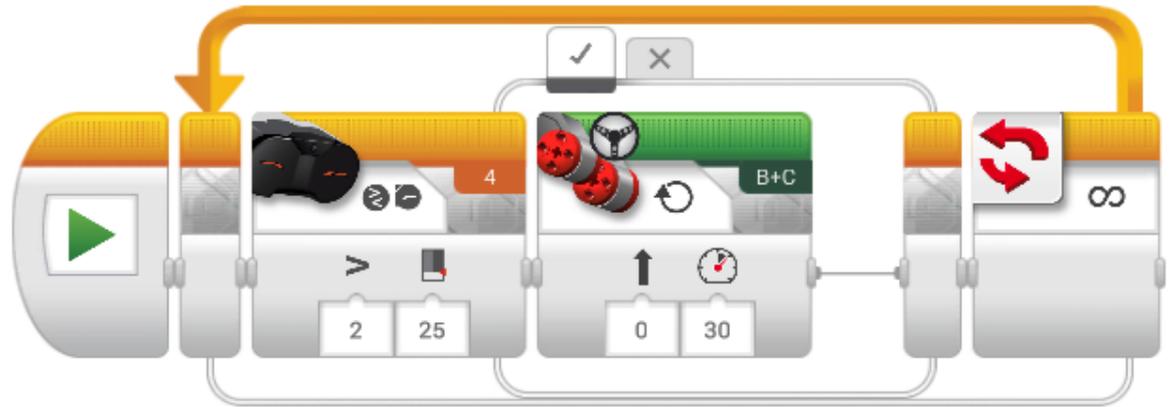
When the Infrared Sensor is less than 25 proximity go backwards slowly (negative power value)

NEXT STEPS: PROJECT IDEAS

- Using the Move Steering, Move Until, Sound, Loop and Switch blocks try some of these additional challenges:
  - Program the robot to move and talk
  - Program the robot to follow the Infrared Beacon
  - Program to find a target and shoot balls (you will need to also use the Medium Motor block)
  - Program the robot to display images on the screen (you will need to also use the Display Block)