Reinvigorating STEM Through LEGO.
Block 4 (Tuesday, July 10: 11:00 AM - 12:00 NOON)
Room Location: Dods 10

https://www.dropbox.com/s/wazhc12rc3q08al/EV3-2018-IBSC.pptx?dl=0

Mark Lockett
mark.lockett@tss.qld.edu.au

Messages for the workshop ☺

Get your hands dirty

Have Fun!

Get connected

Software and Curriculum Resources

Google: LEGO Education downloads

Downloads: choose your product

LEGO® MINDSTORMS® Education EV3

VIEW DOWNLOADS

WeDo 2.0

VIEW DOWNLOADS

MINDSTORM EV3 Curriculum content

In order to use the curriculum materials you need to have the LEGO MINDSTORMS Education EV3 software installed. These resources focus on students aged 10-16 with links to national curriculum standards. Includes student-ready resources, full teacher support, assessment tools, sample programs, and building instructions.

Choose Platform/Device

Windows (7, 8.1, 10)

Windows (7, 8.1, 10)

Mac OS

Choose Your Language

English (UK)

EV3 Maker Activities

EV3 Coding Activities

EV3 Design Engineering Projects

EV3 Science Curriculum

Projects and Activities

EV3 Maker Activities

These six activities require the LEGO® MINDSTORMS® Education EV3 Core Set (45544). Supporting materials for teachers and...

VIEW MORE

EV3 Coding Activities

Provides 30+ hours of classroom instruction in PDF format. Includes sample programs and 12 computer science activities, ...

VIEW MORE

EV3 Design Engineering Projects

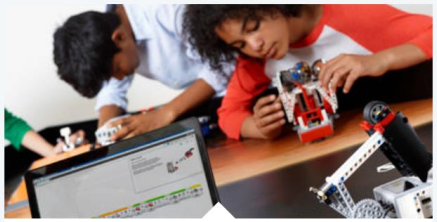
Provides 30+ hours of classroom instruction and problem-solving activities focusing on STEM learning using real-life rob...

VIEW MORE

EV3 Science Curriculum

Provides 28+ hours of classroom instruction integrated into the EV3 Software. Includes 14 physical science experiments c...

VIEW MORE



EV3 Space Challenge Curriculum

Projects and Activities

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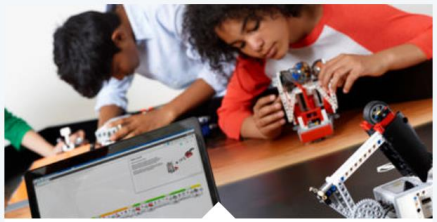

EV3 Space Challenge Curriculum

LEGO mindstorms education EV3

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Projects and Activities

EV3 Maker Activities

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EV3 Space Challenge Curriculum

EV3 Coding Activities

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Australian Curriculum Documents

Digital Technologies GRADE 7 - 8

Strand		Content Descriptions	Elaborations	Teacher notes
Process and production skills	Defining	Define and decompose real-world problems taking into account functional requirements and economic, environmental, social, technical and usability constraints (ACTDIP027)	Identifying that problems can be decomposed into sub elements, for example creating a decision tree to represent the breakdown and relationships of sub elements to the main problem or identifying the elements of game design such as characters, movements, collisions and scoring	Create instructions for program including loops and switches for FIRST LEGO League Challenge or RoboCup competition. Create Flowchart showing robot instructions. Use Flowchart to evaluate robotic system and incorporate flowchart in FIRST LEGO League robot design presentation.
	Designing	Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors (ACTDIP029)	Using diagrams to describe key decisions, for example creating flowcharts using digital systems to describe a set of computational instructions	
			Using structured English to express algorithmic instructions, for example using conventional statements such as 'while' and 'endwhile' in a 'while loop' when describing interactive instruction	
	Implementing	Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language (ACTDIP030)	Programming a robot to recognise particular objects and to treat them differently, for example choose objects based on colour	Program an EV3 colour-sorting robot using the colour sensor.

SCIENCE GRADE 7

Strand	Content Descriptions	Elaborations	Robotics activities	Teacher notes
Science Understanding	**Physical sciences** Change to an object's motion is caused by unbalanced forces acting on the object. (ACSSU117)	Investigating the effects of applying different forces to familiar objects. Investigating common situations where forces are balanced, such as stationary objects, and unbalanced, such as falling objects. Investigating a simple machine such as lever or pulley system.	**Design and build an amusement park ride using pulleys and gears. Investigate how simple machines (levers, ramps, gears and pulleys) reduce effort and/or force. Use gears to change the speed and direction of the ride.** **Design a 'safe' robot car and investigate the use of seatbelts by testing different power levels and ways of stopping car (brake or coast).**	Minifig can be placed on car. How far forward does it travel at different Powers (velocities).
Science as a Human Endeavour	Use and influence of Science Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management. (ACSHE121)		**Give examples of robots working in industry, agriculture etc.** **What advantages does a robot have over a human worker?** **What disadvantages?** **What type of jobs will robots have in the future?**	

MATHEMATICS GRADE 7

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Numbers and Algebra	**Patterns and algebra** Introduce the concept of variables as a way of representing numbers using letters. (ACMNA175)	Understanding that arithmetic laws are powerful ways of describing and simplifying calculations and that using these laws leads to the generality of algebra.	**For a robot car - draw up a table for a series of trials.** **Distance (d) travelled and a uniform increase in Duration Time (t).**	dentify a relationship between d nd t. Express algebraically. se relationship to predict (and ial) time required to stop robot front of LEGO minifig (teacher pecified distance). se relationship to predict time to travel 1m, 1km, 1000km (from Sydney to Melbourne).
	Patterns and algebra Create algebraic expressions and evaluate them by substituting a given value for each variable. (ACMNA176)			
	Real Numbers Recognise and solve problems involving simple ratios. (ACMNA173)	Understanding that rate and ratio problems can be solved using fractions or percentages and choosing the most efficient form to solve a particular problem.		
	Real Numbers Round decimals to a specified number of decimal places. (ACMNA156)	Using rounding to estimate the results of calculations with whole numbers and decimals, and understanding the conventions for rounding.		

Useful Websites

legoengineering.com

LEGO® Engineering

Getting Started | Inspiration | Support | Big Ideas | News | About

Welcome

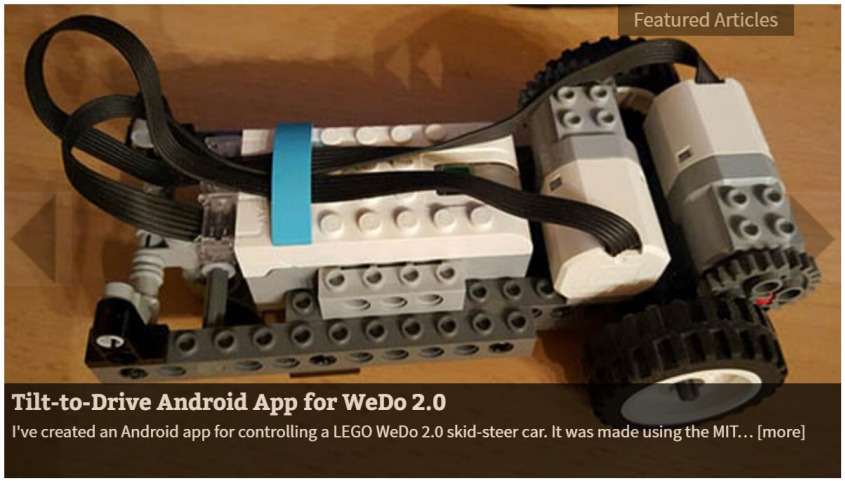
The aim of this site is to inspire and support teachers to go beyond the basics in bringing LEGO-based engineering to all students.

New to LEGO robotics? Let us help you Get started.

Want an idea for a challenge to give your students? Look here for Inspiration.

Subscribe to our newsletter for a regular email of any new posts or join our Facebook group.

If you've got an idea for activity, a story to tell, or some great tips & tricks, we invite you to Submit a post.

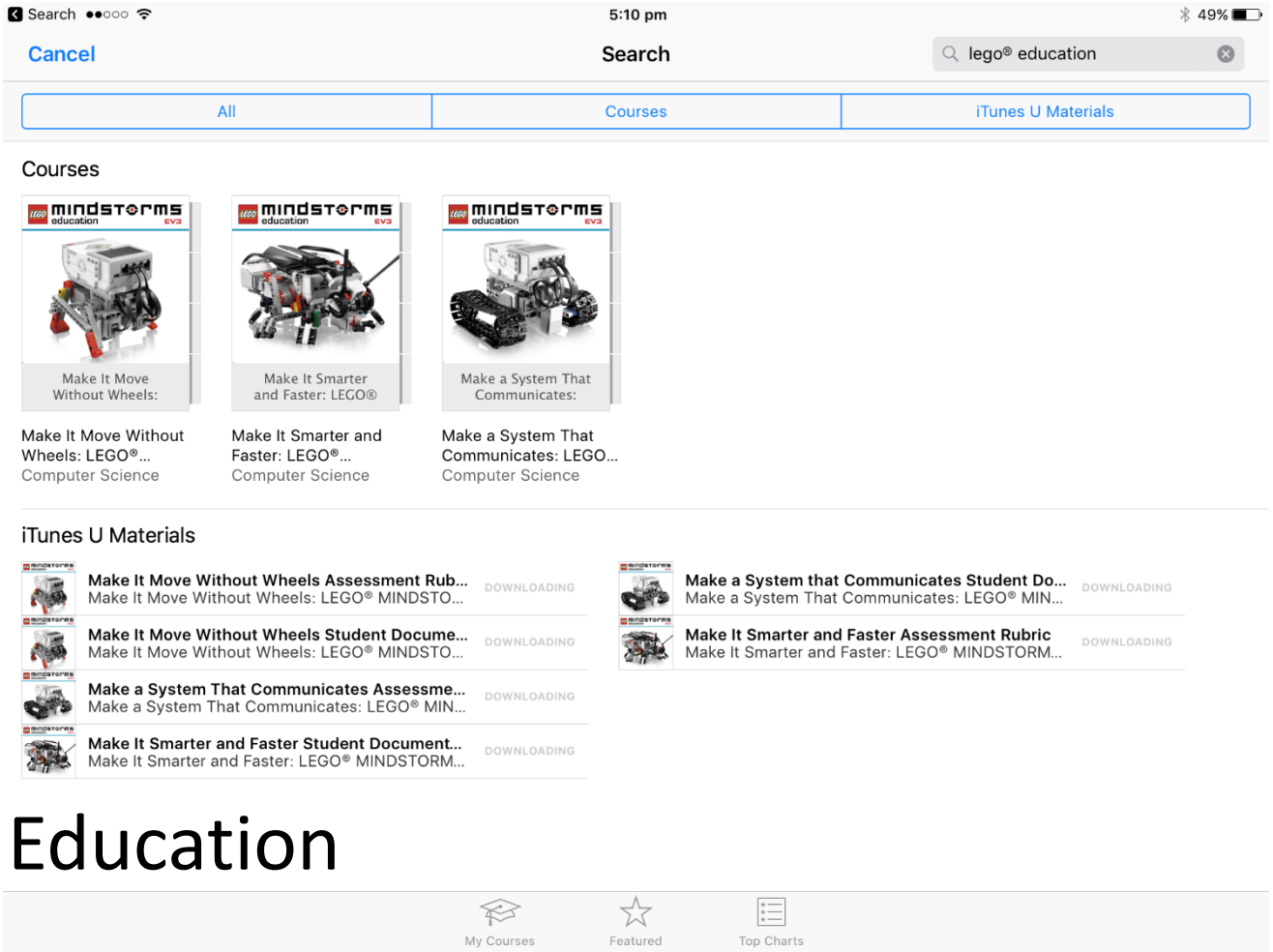


Inspiration

Recent Posts

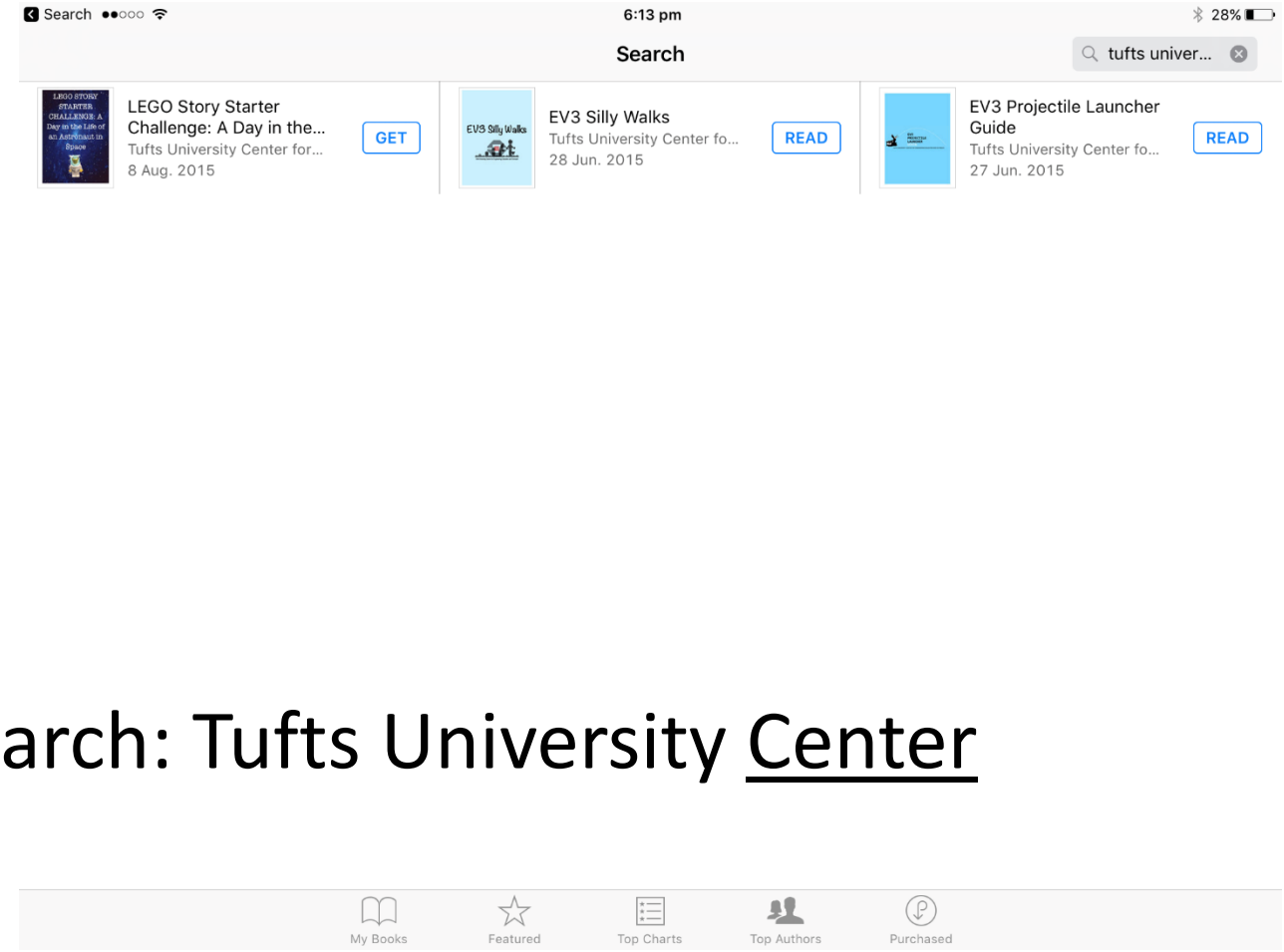
- Robotics challenges: Workshop handouts
- Meet Pi

Free Resources- iTunes U



Search: LEGO Education

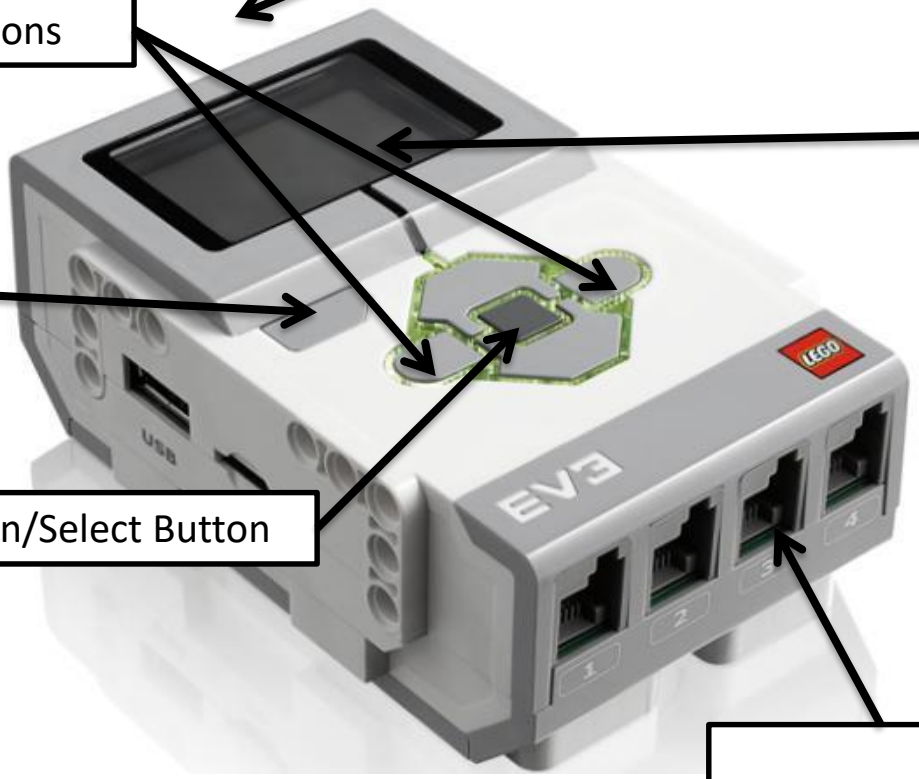
Free Resources- iBooks



Search: Tufts University Center

EV3 BASICS

EV3 Overview



OUTPUTS on Port A, B, C and D

Side Menu Select Buttons

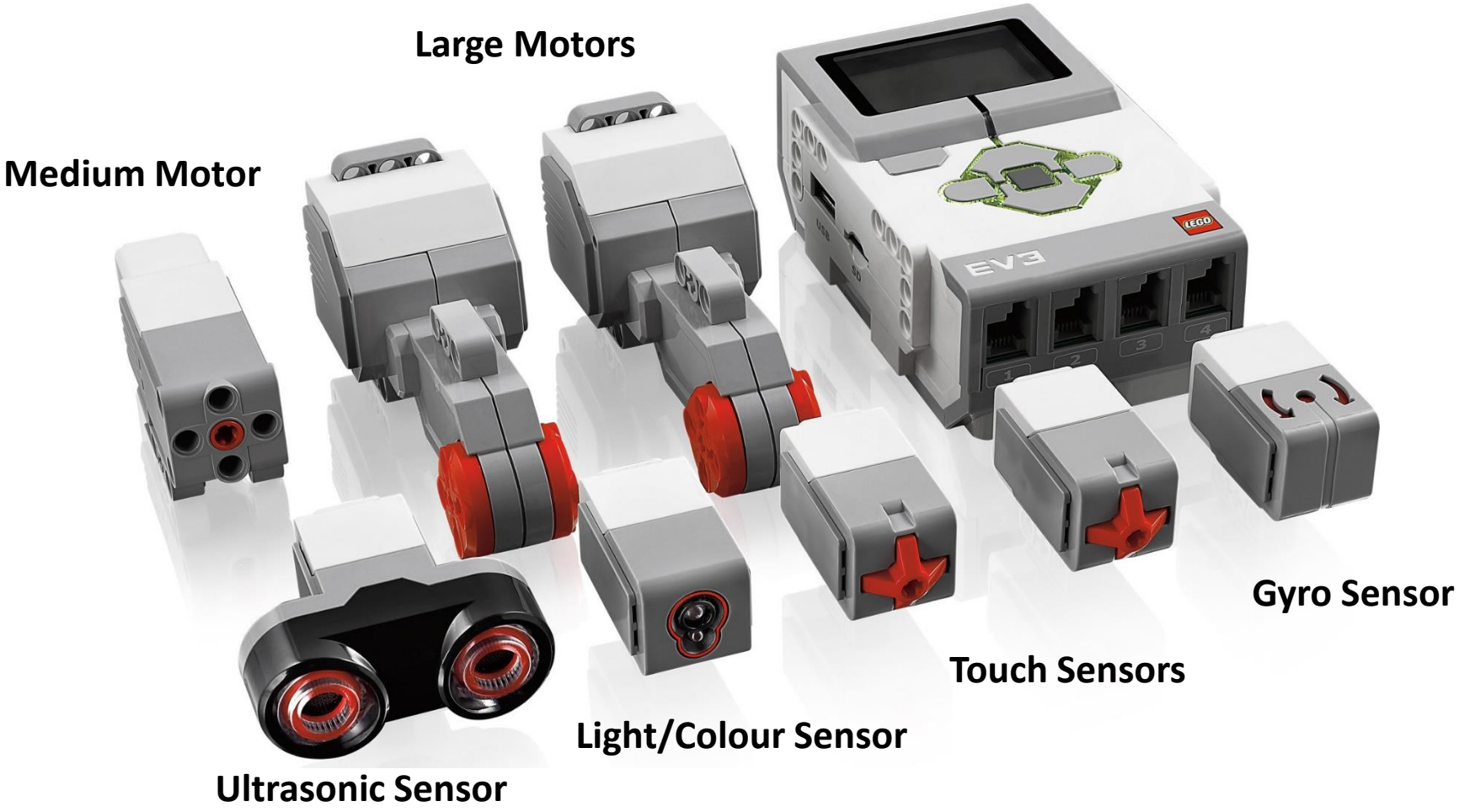
Information Display

Off/Back Button

On/Select Button

INPUTS on Port 1,2,3 and 4

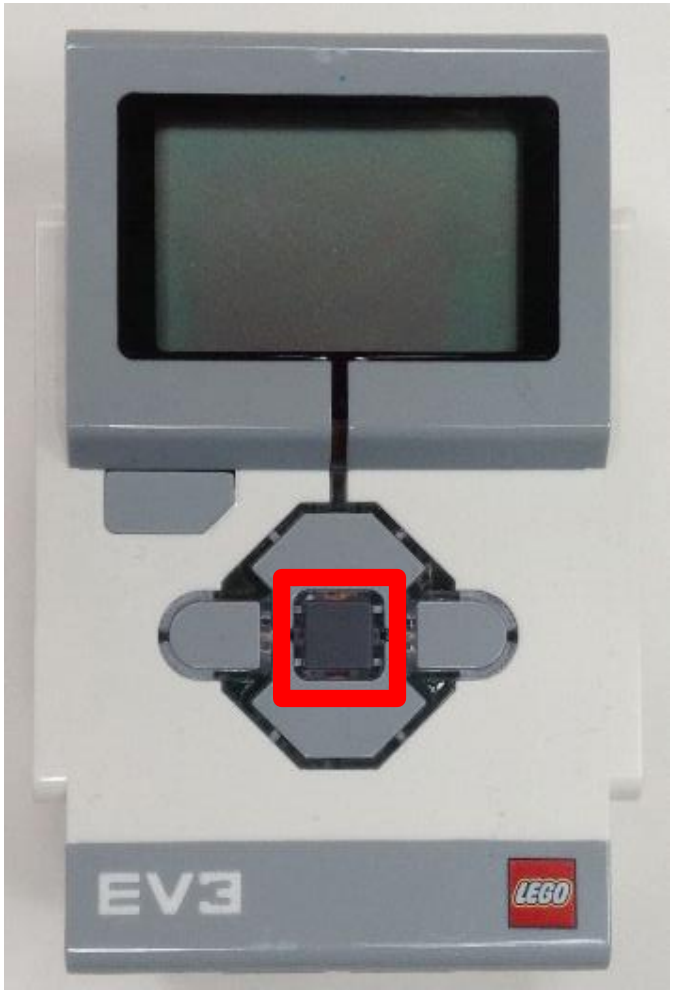
EV3 Sensors


Large Motors
Medium Motor
Gyro Sensor
Touch Sensors
Light/Colour Sensor
Ultrasonic Sensor

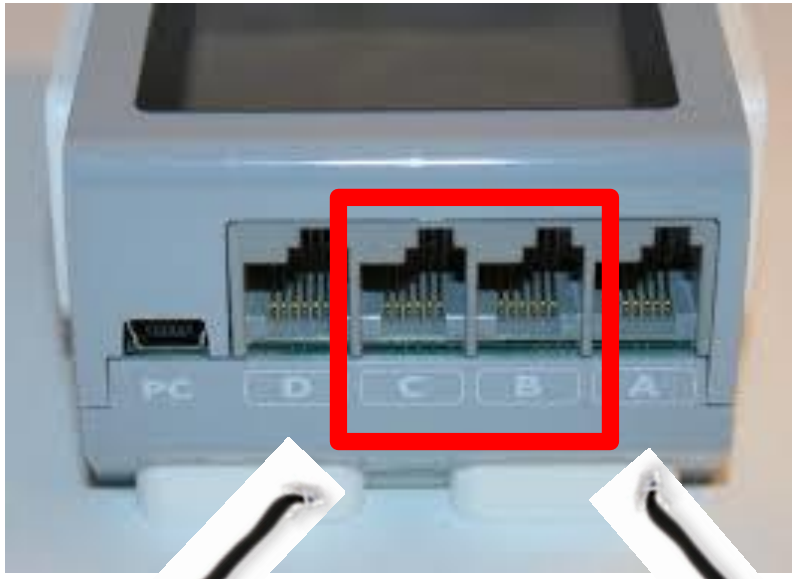
Challenge Setup

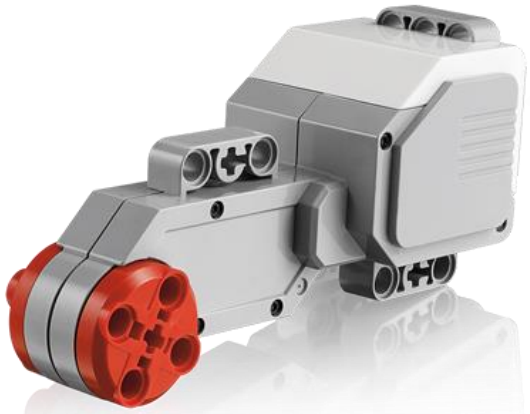
EV3 Setup

- Turn EV3 On

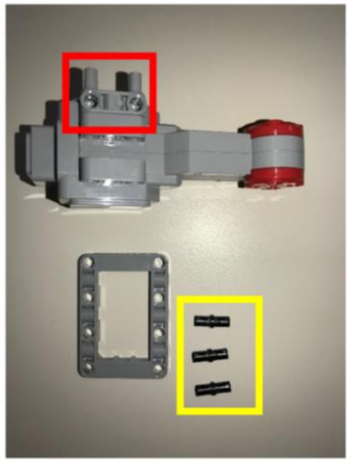


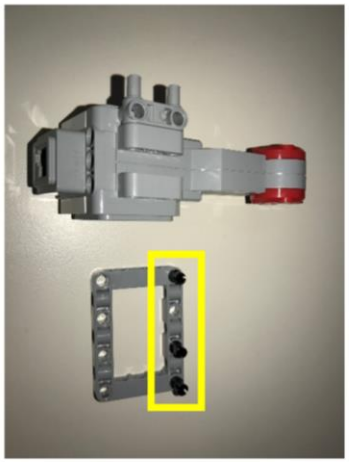
Plug Motors into Port B and C

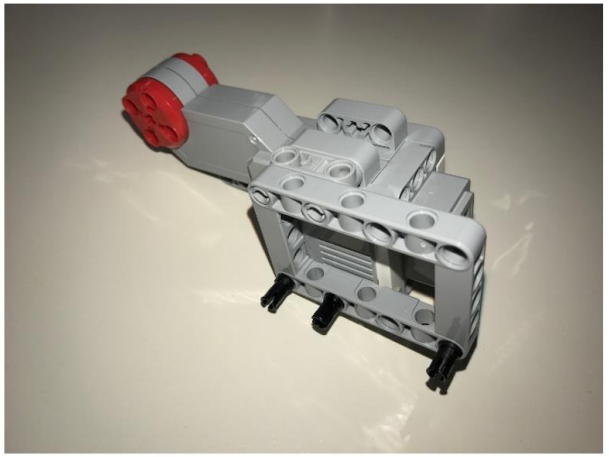


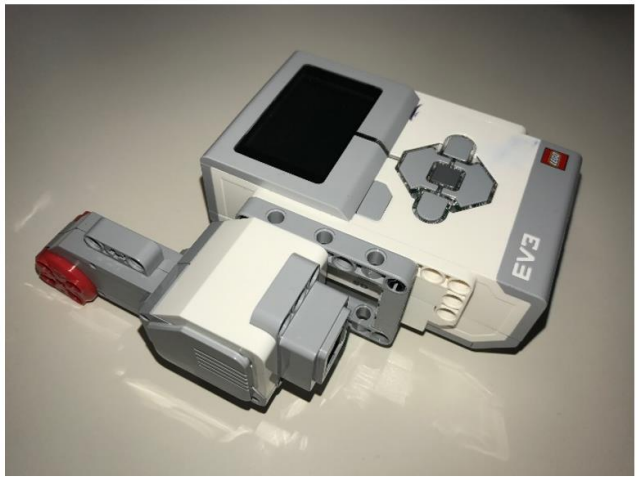


Build a motorised Robot – If stuck there are basic Instructions on Parts Card

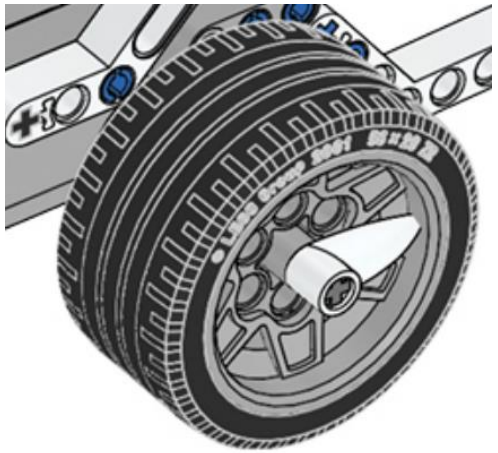








Add Axle, Wheels and White Pointer



Possible Problems on the Robot

The Rollerball is not in centre.

What could be a solution?

If the Rubber tyres touch the motor.

What could be a solution?

Build your minifigure for the challenge

Open iPad App

MINDSTORMS EV3 LEGO® Education 4+

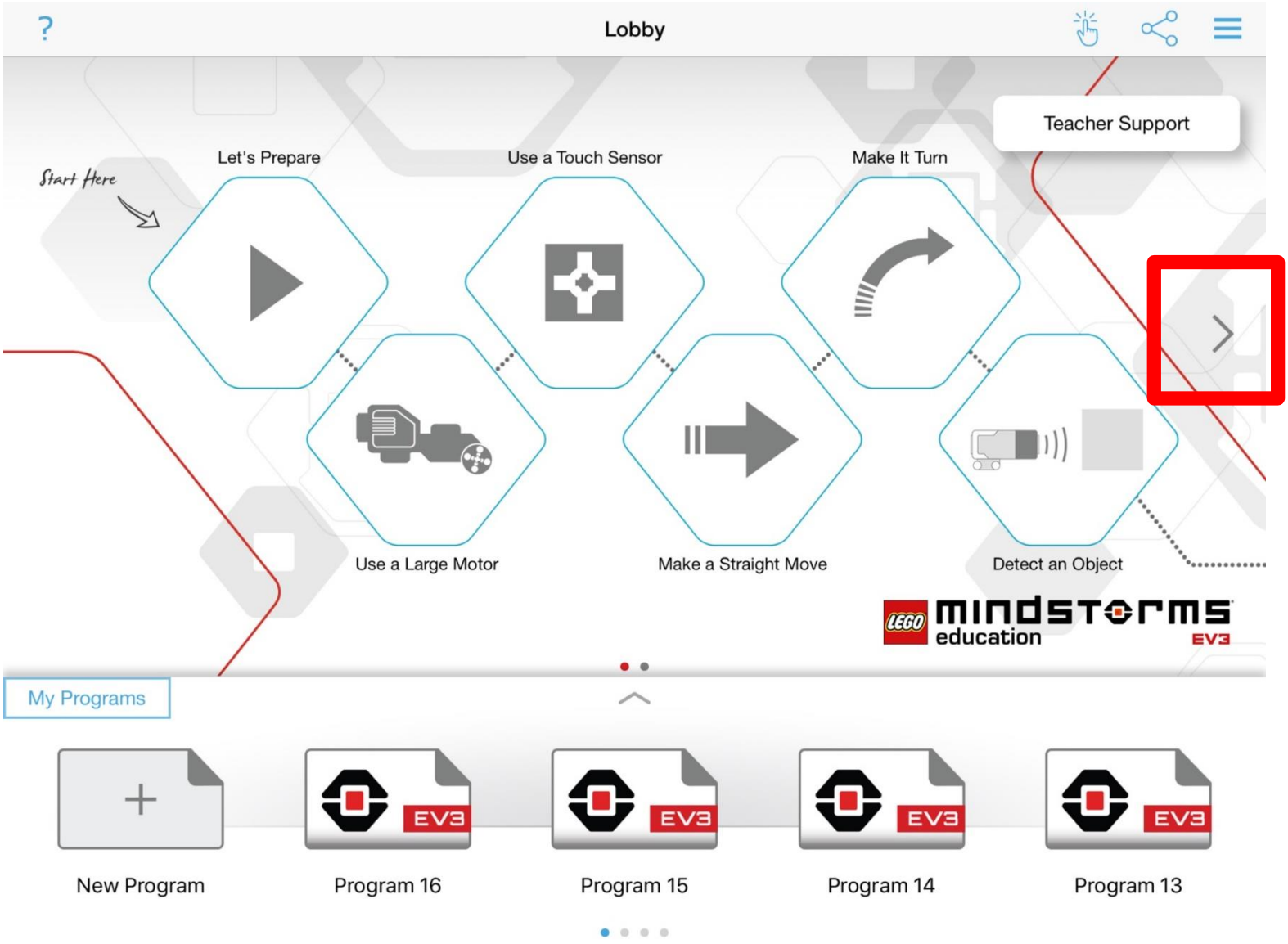
Try More, Discover More

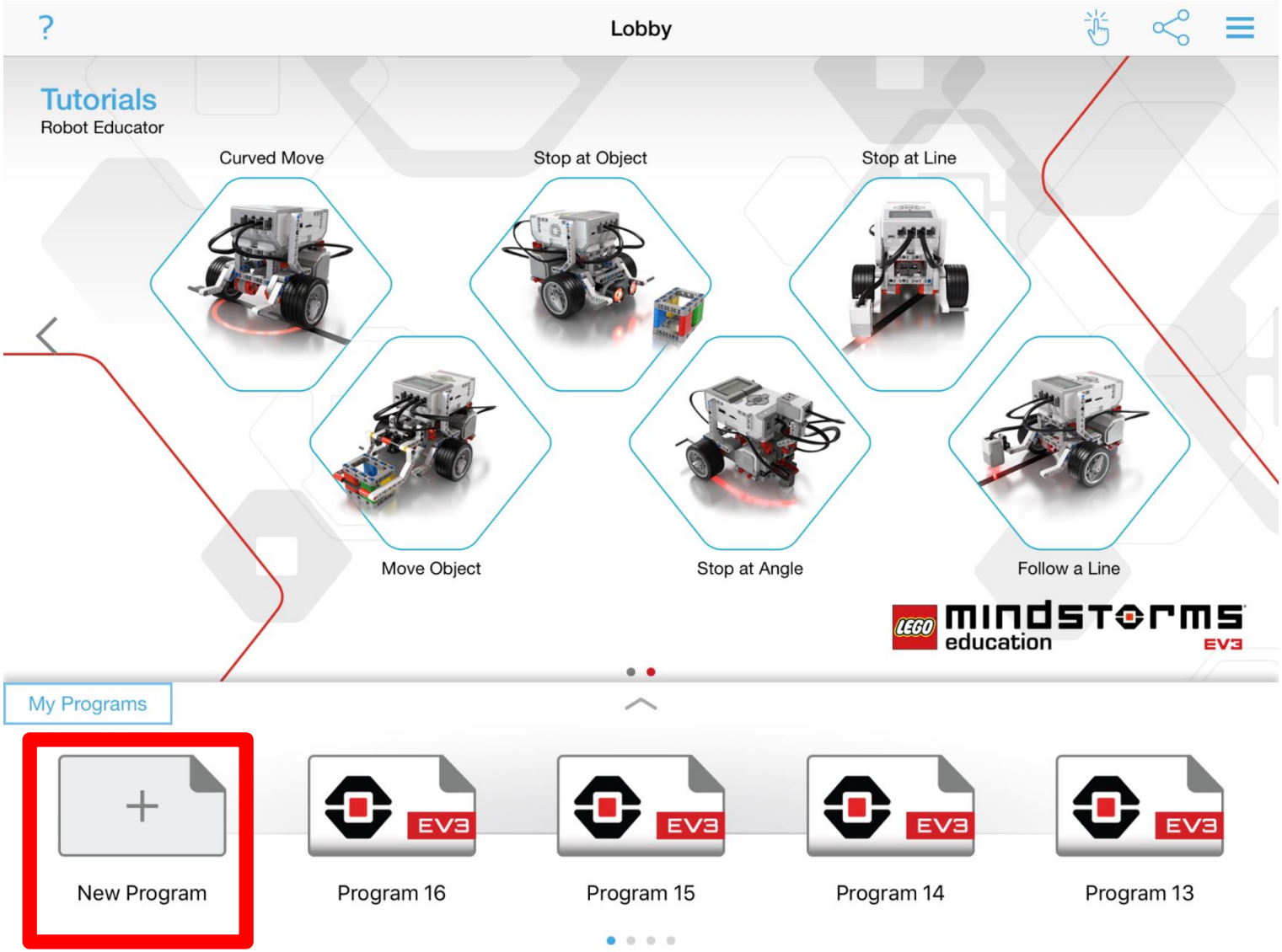
LEGO Education

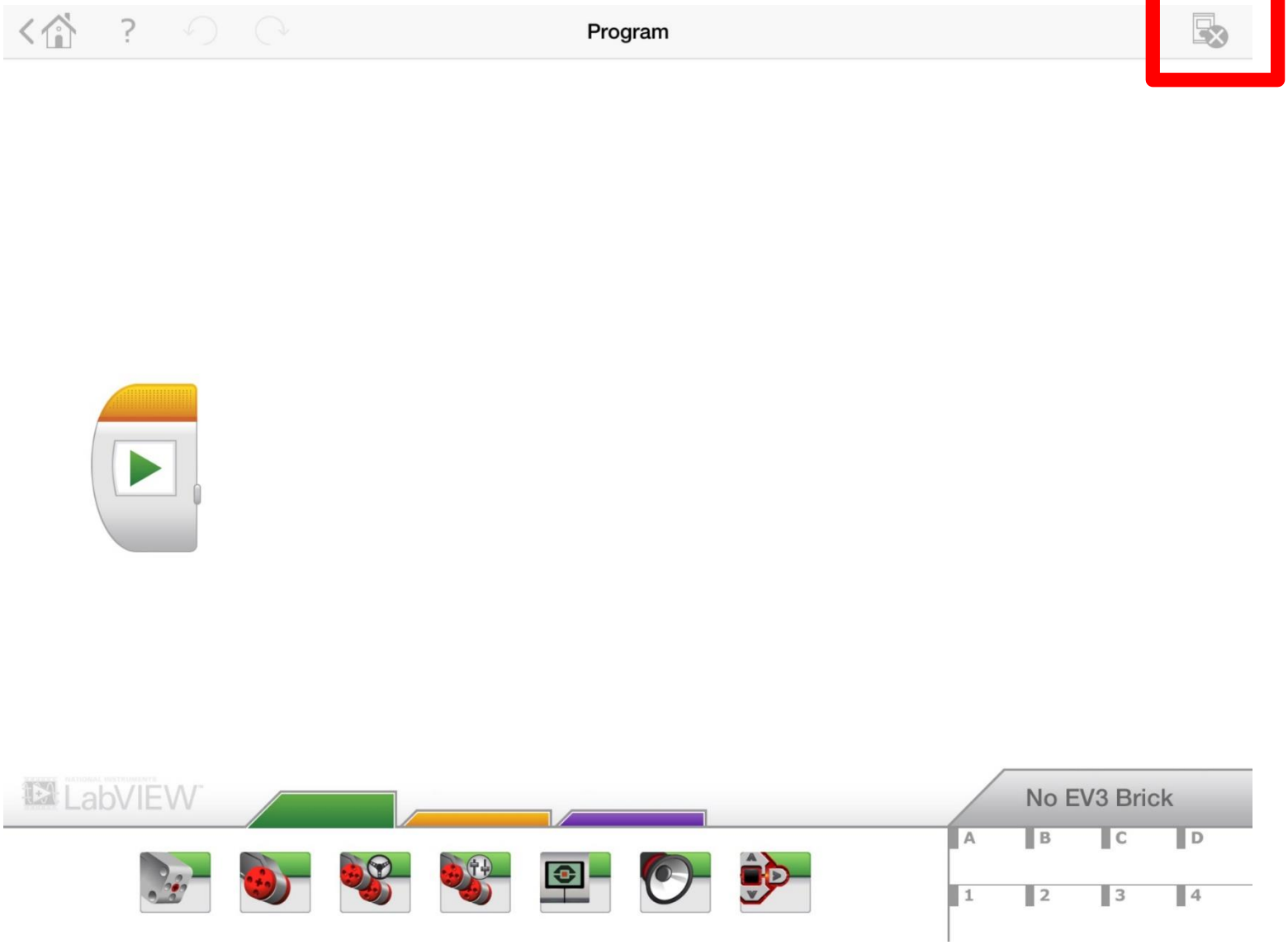
★★½☆☆ 11 Ratings

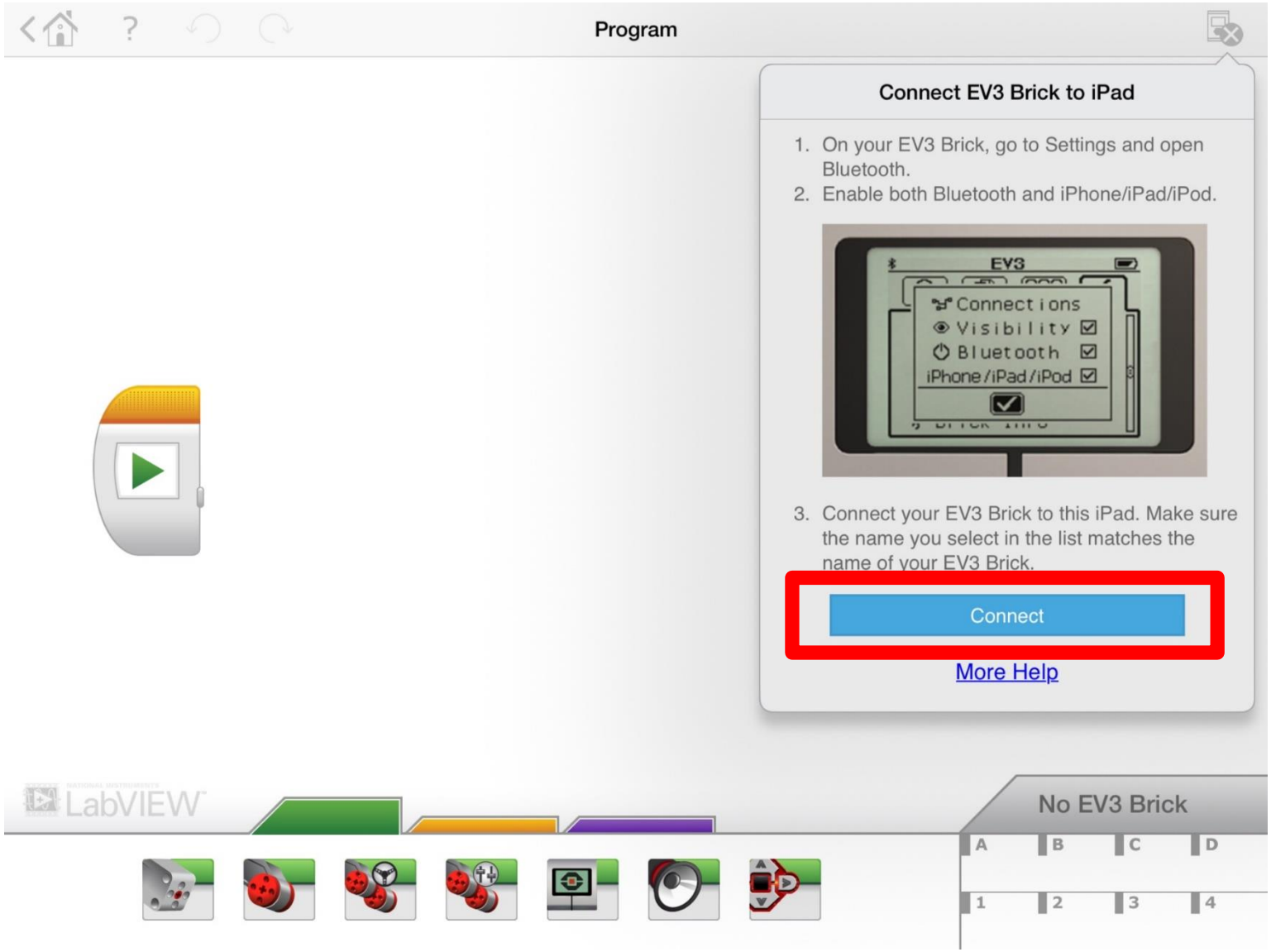
Free

iPad Screenshots


Lobby
Teacher Support
Start Here
Let's Prepare
Use a Touch Sensor
Make It Turn
Use a Large Motor
Make a Straight Move
Detect an Object
mindstorms education EV3
My Programs
New Program
Program 16
Program 15
Program 14
Program 13


?
Lobby
Tutorials
Robot Educator
Curved Move
Stop at Object
Stop at Line
Move Object
Stop at Angle
Follow a Line
mindstorms education EV3
My Programs
New Program
Program 16
Program 15
Program 14
Program 13


Program
LabVIEW
No EV3 Brick
A
B
C
D
1
2
3
4


Program
Connect EV3 Brick to iPad
1. On your EV3 Brick, go to Settings and open Bluetooth.
2. Enable both Bluetooth and iPhone/iPad/iPod.
EV3
Connections
Visibility
Bluetooth
iPhone/iPad/iPod
3. Connect your EV3 Brick to this iPad. Make sure the name you select in the list matches the name of your EV3 Brick.
Connect
More Help
LabVIEW
No EV3 Brick
A
B
C
D
1
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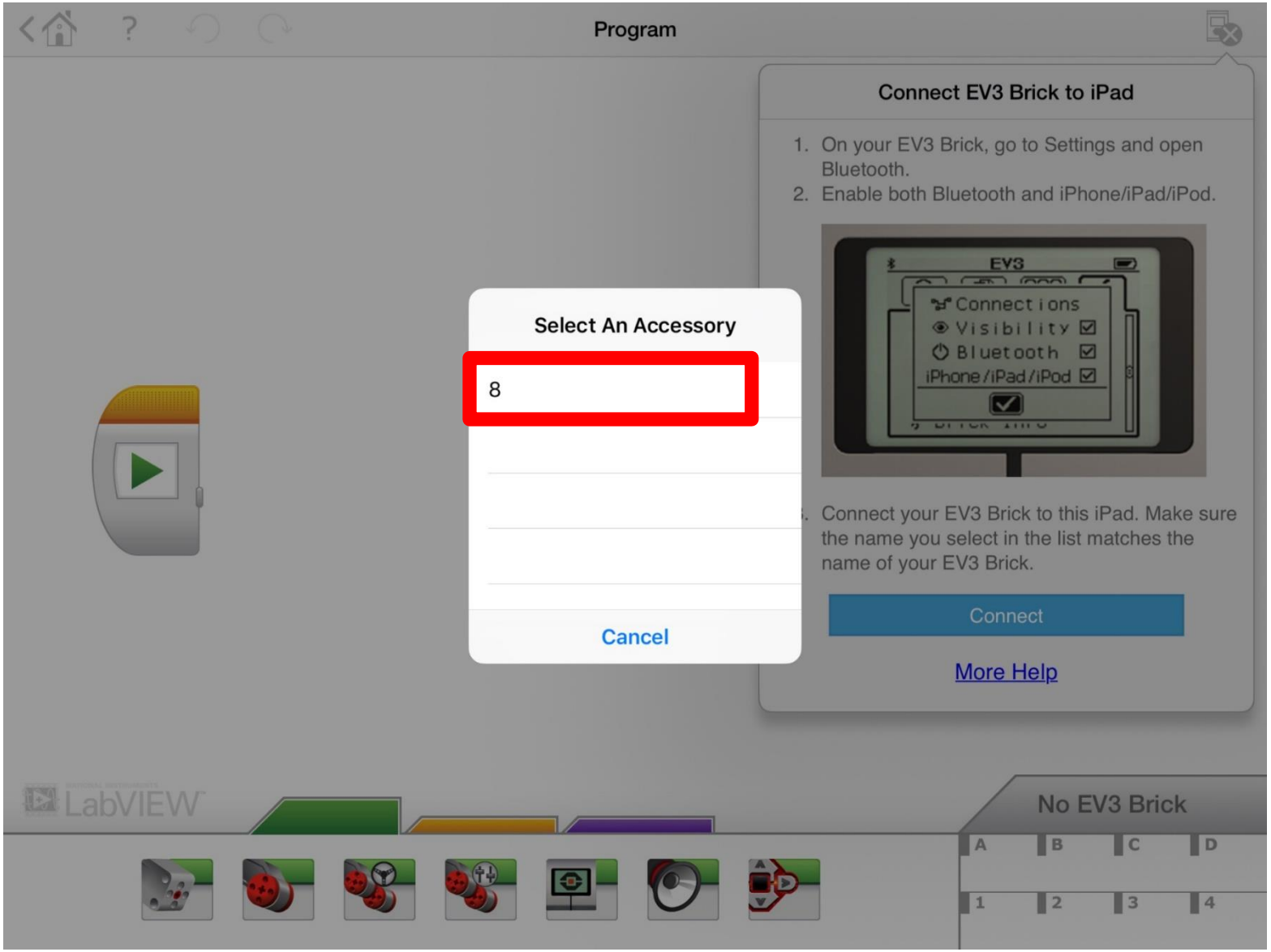
4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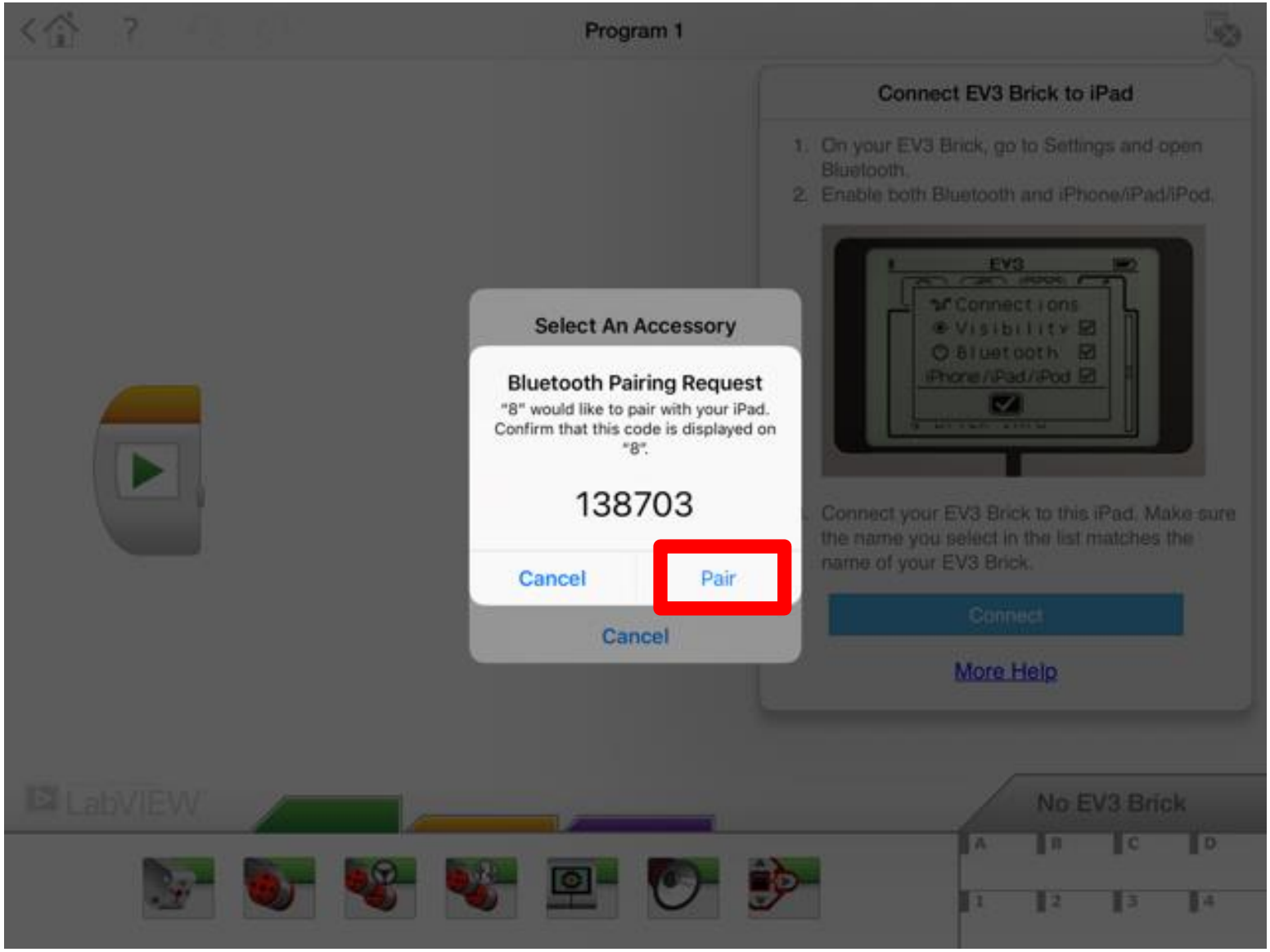
1. On your EV3 Brick, go to Settings and open Bluetooth.
2. Enable both Bluetooth and iPhone/iPad/iPod.
EV3
Connections
Visibility
Bluetooth
iPhone/iPad/iPod
Connect your EV3 Brick to this iPad. Make sure the name you select in the list matches the name of your EV3 Brick.
Connect
More Help
Select An Accessory
8
Cancel
LabVIEW
No EV3 Brick
A
B
C
D
1
2
3
4


Program 1
Connect EV3 Brick to iPad
1. On your EV3 Brick, go to Settings and open Bluetooth.
2. Enable both Bluetooth and iPhone/iPad/iPod.
EV3
Connections
Visibility
Bluetooth
iPhone/iPad/iPod
Connect your EV3 Brick to this iPad. Make sure the name you select in the list matches the name of your EV3 Brick.
Connect
More Help
Select An Accessory
Bluetooth Pairing Request
"8" would like to pair with your iPad. Confirm that this code is displayed on "8".
138703
Cancel
Pair
Cancel
LabVIEW
No EV3 Brick
A
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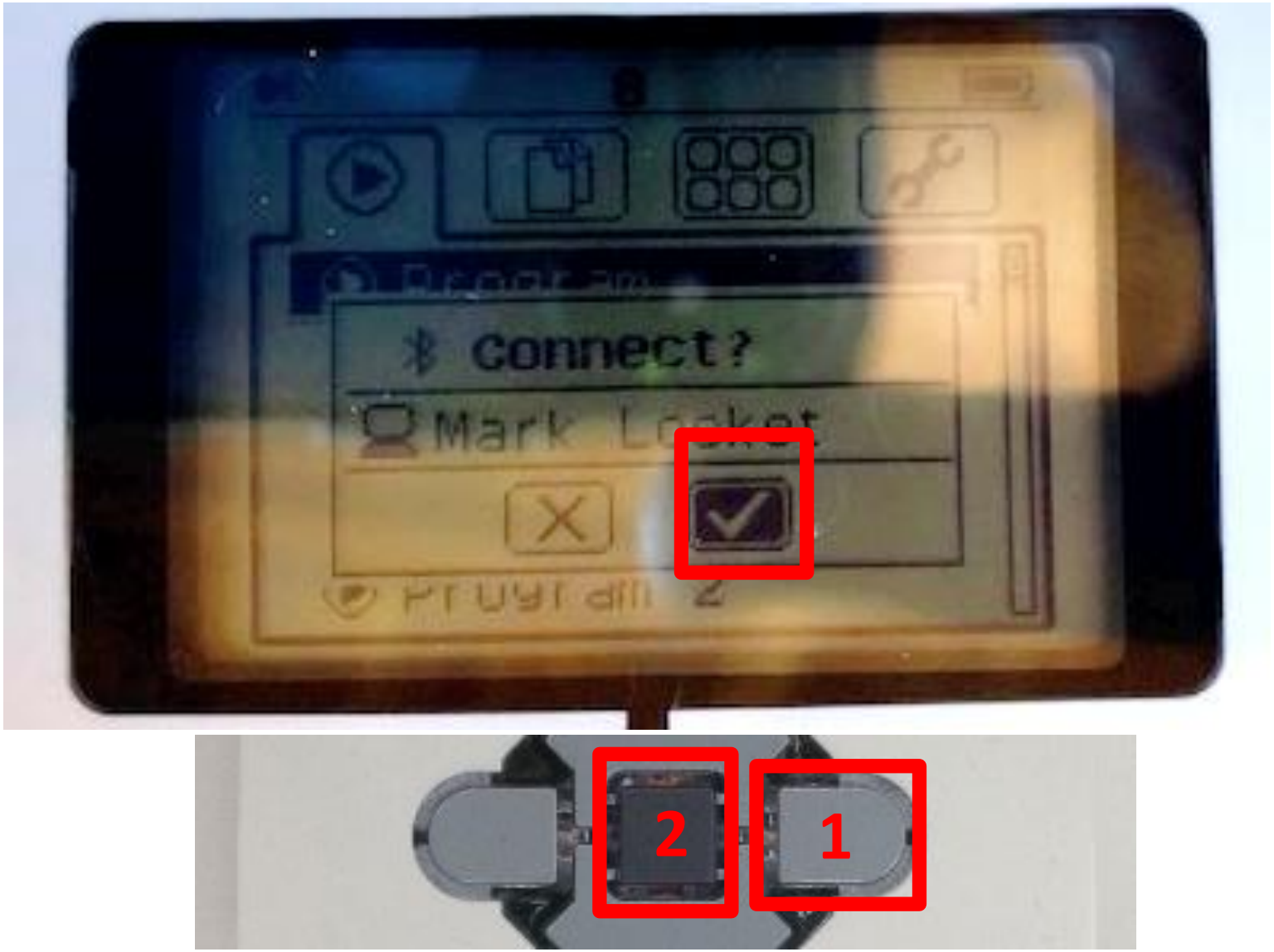
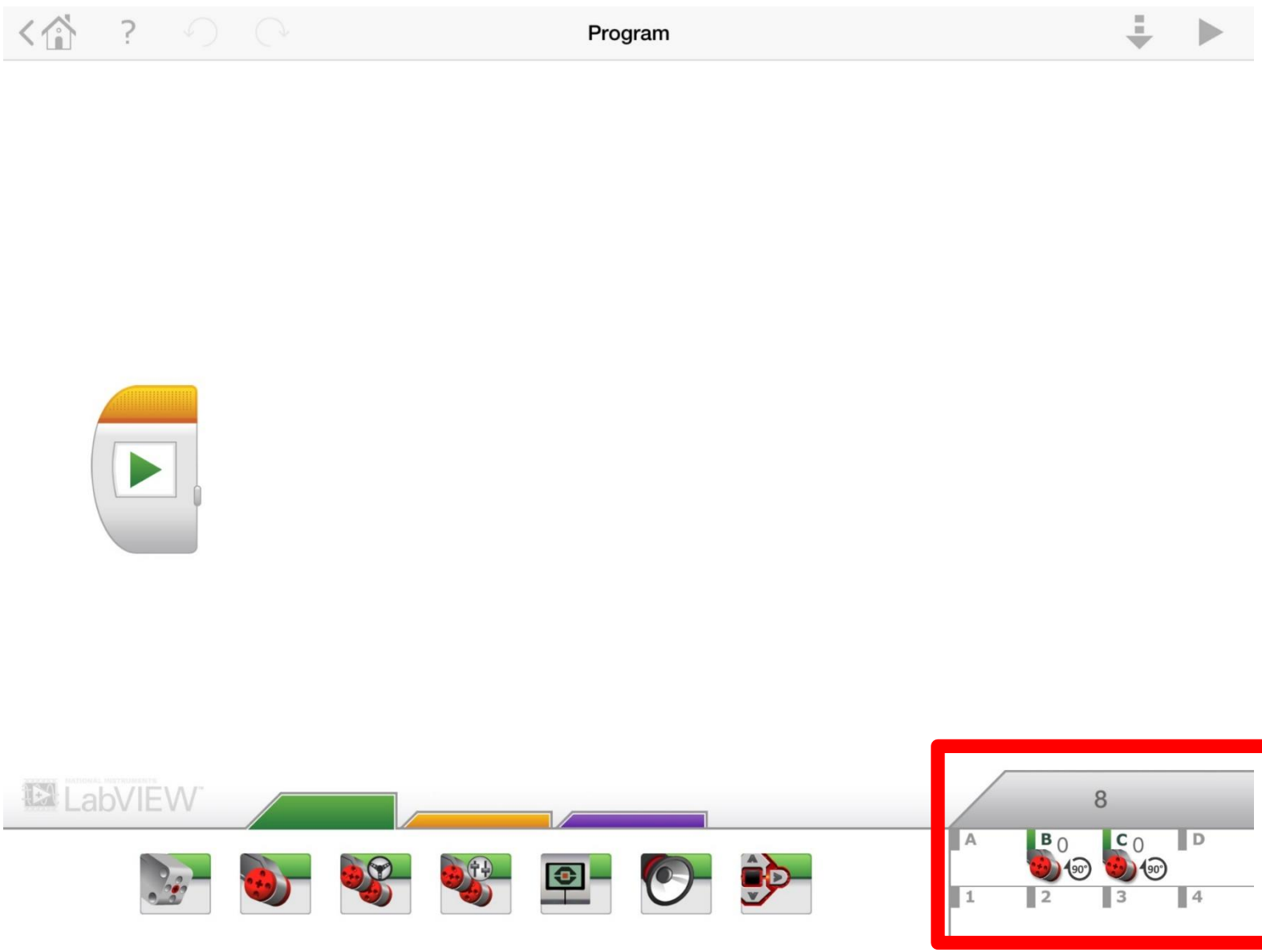
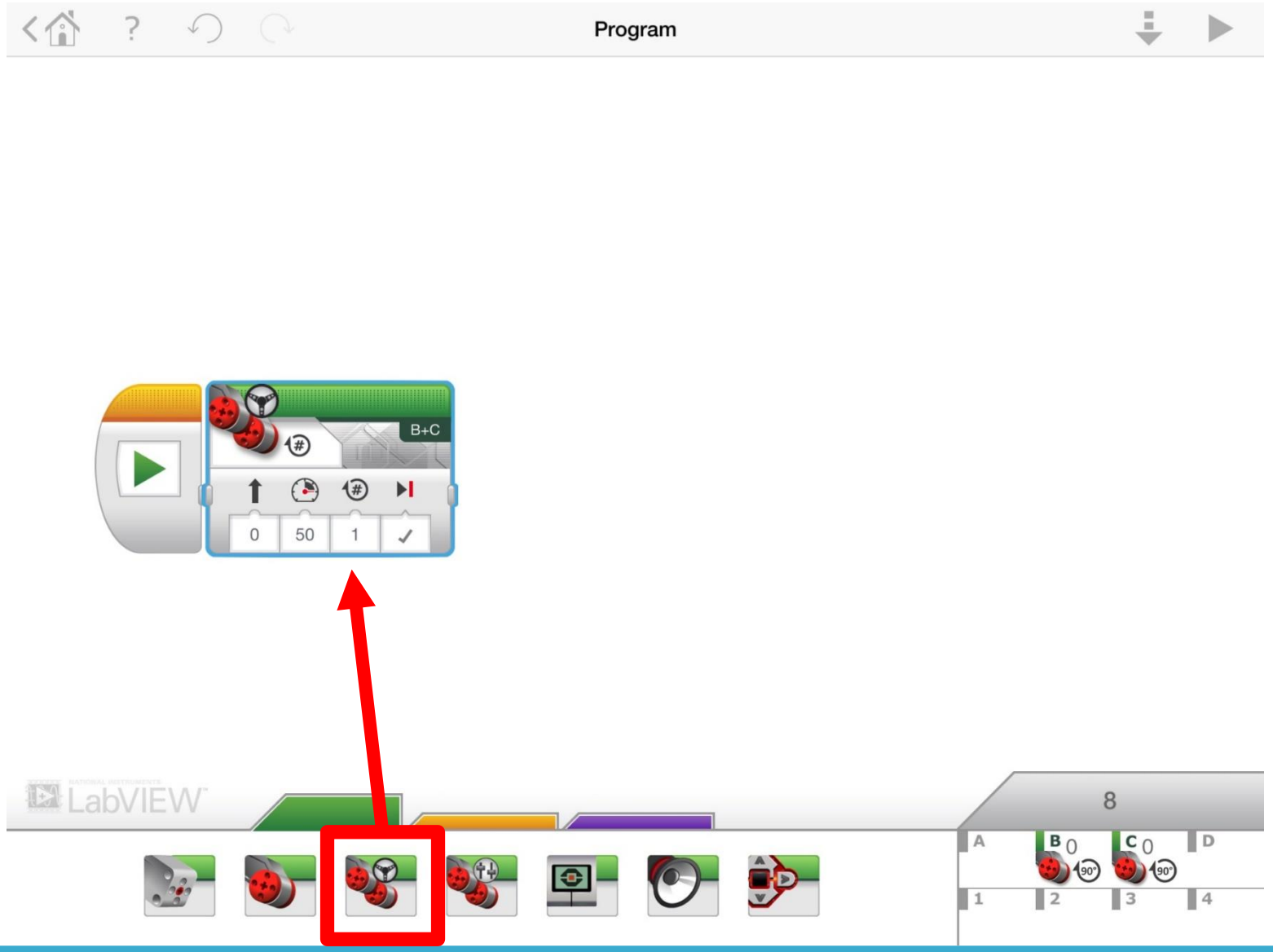

Connect?
Mark
2
1


Program
LabVIEW
8
A
B 0
C 0
D
90°
90°
1
2
3
4


Program
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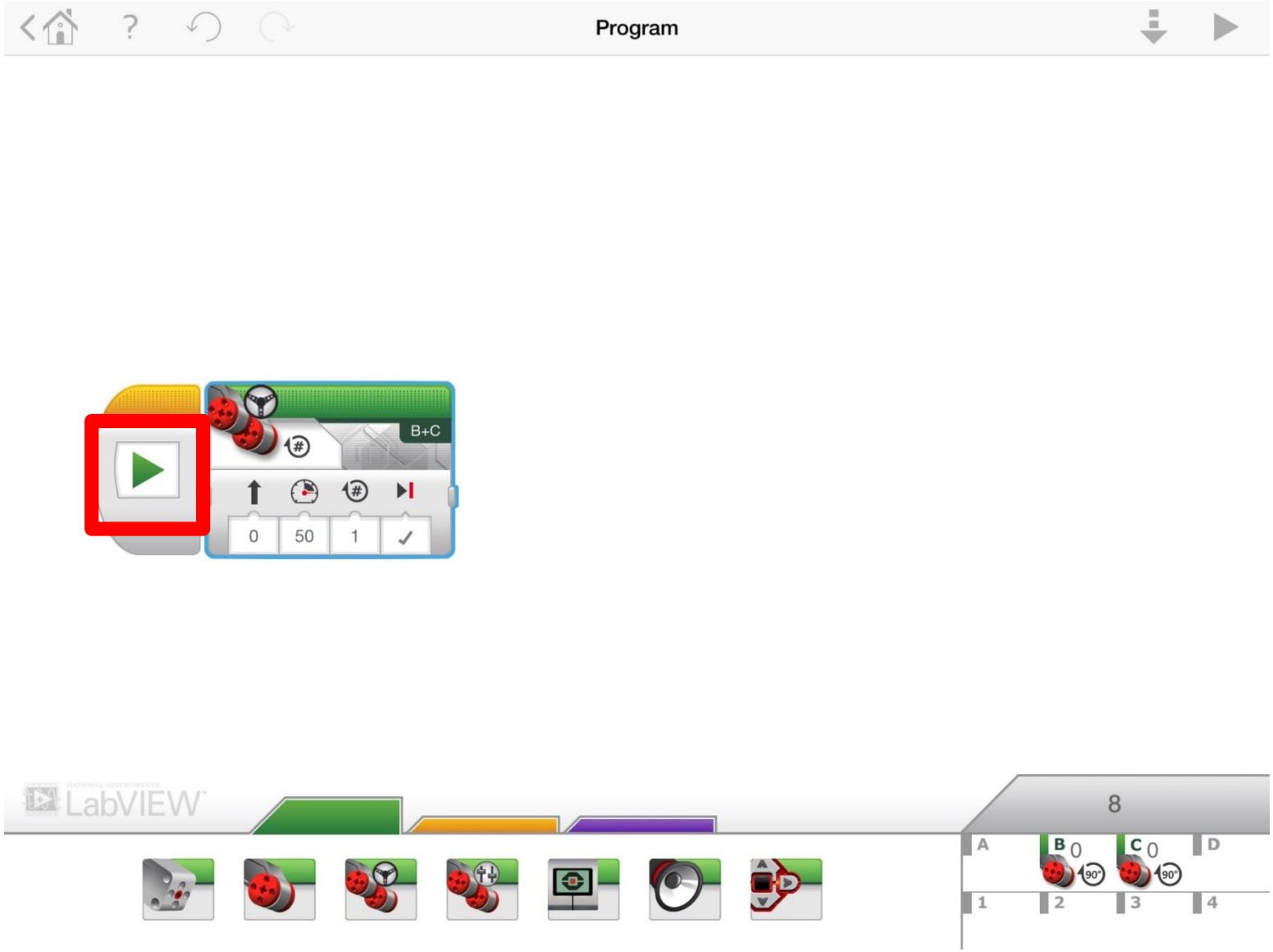
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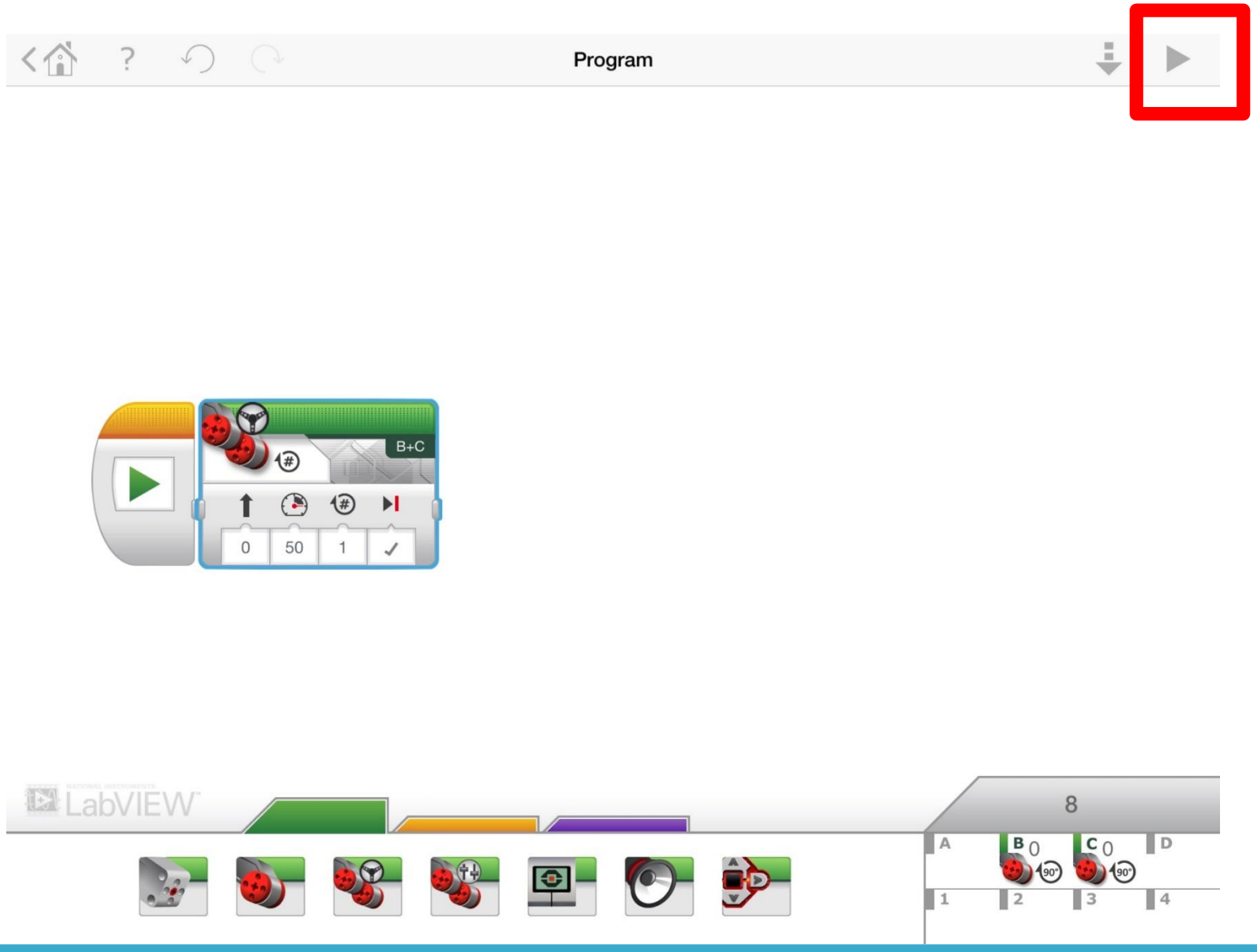
Program
B+C
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LabVIEW
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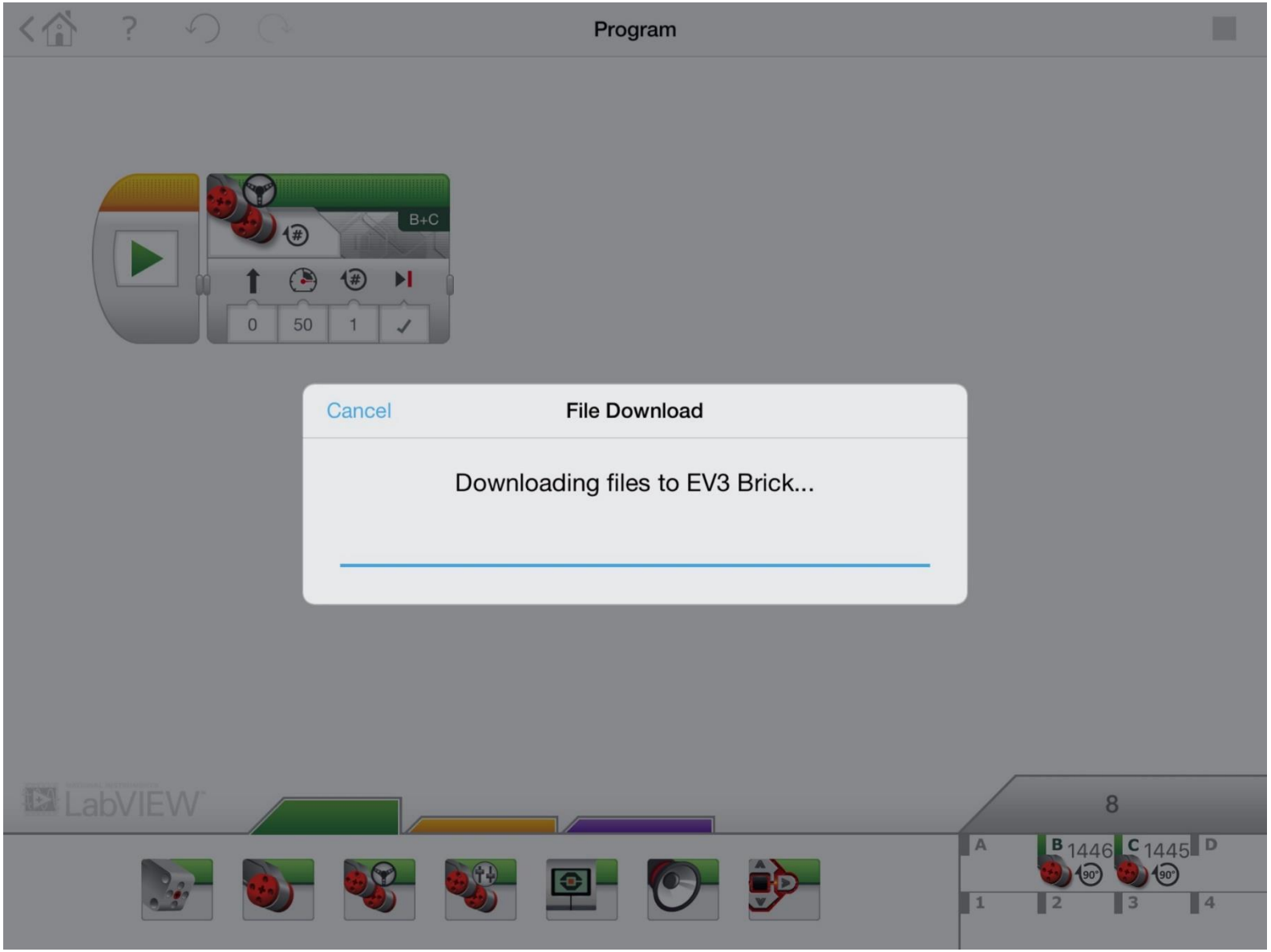
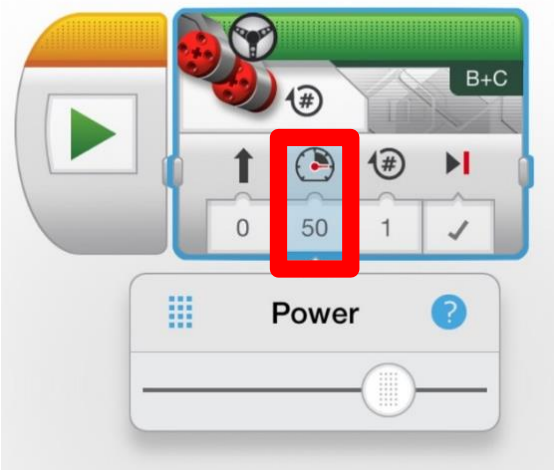
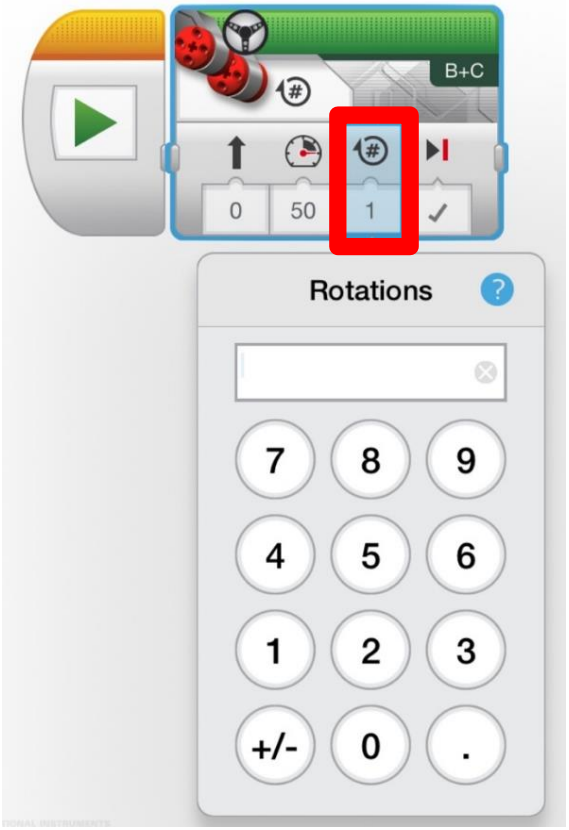
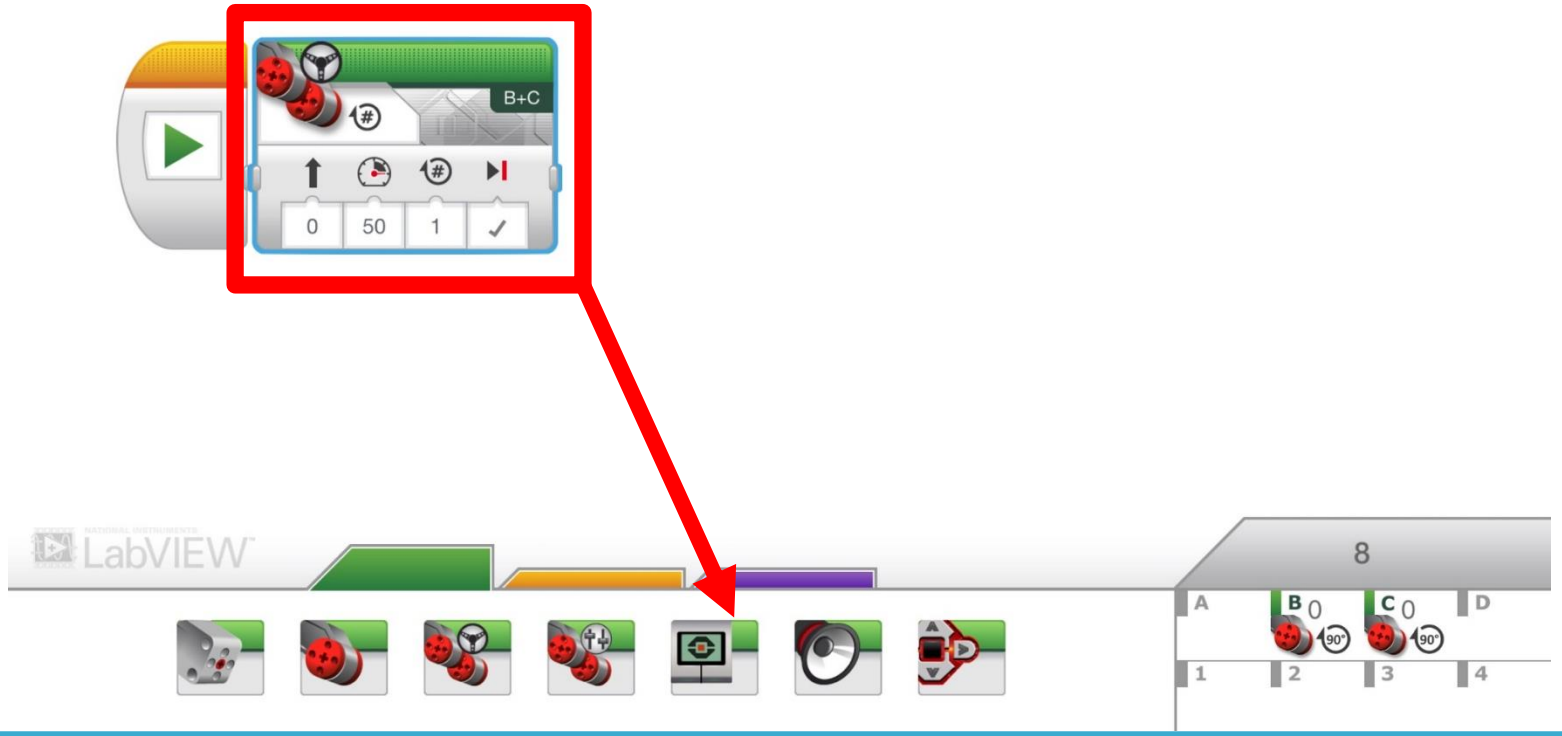

Program
B+C
0
50
1
Cancel
File Download
Downloading files to EV3 Brick...
LabVIEW
8
A
B
1446
C
1445
D
1
2
3
4

Quick play with these settings ..

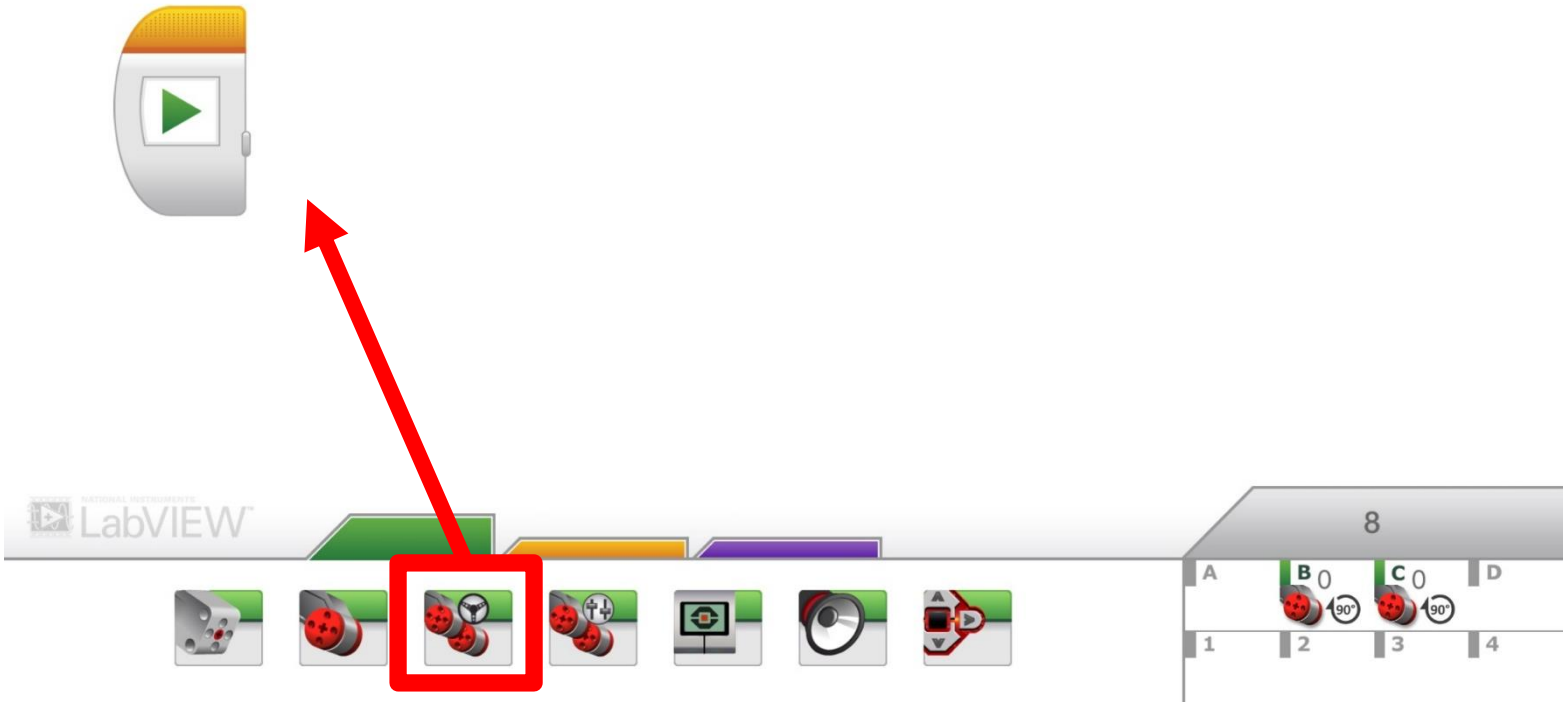




Delete the Block



Add a new Move block



Basic Information for the Challenge

Going the Distance

The Challenge

Daredevil Dan is preparing for an amazing stunt. As Daredevil Dan's stunt coordinator, your challenge is to build and program a robot car to drive as close to Dan as possible, without knocking him over!

Constraints

This is a “dead reckoning” challenge. You are not allowed to use any sensors to detect Dan.

You will have a time to practise making your robot drive various distances. At the end of the practise time, Dan will announce exactly far from the starting line he will be. You will then have time to program your car, but you may not test it.

Once all the cars are programmed, they will take turns driving from the starting line. The car that finished closest to Dan without knocking him over is the winner!

Work out the relationship between rotations and distance using the A3 sheet i.e. 15cm and 40cm

Then:
I'll give you the distance to Dan!

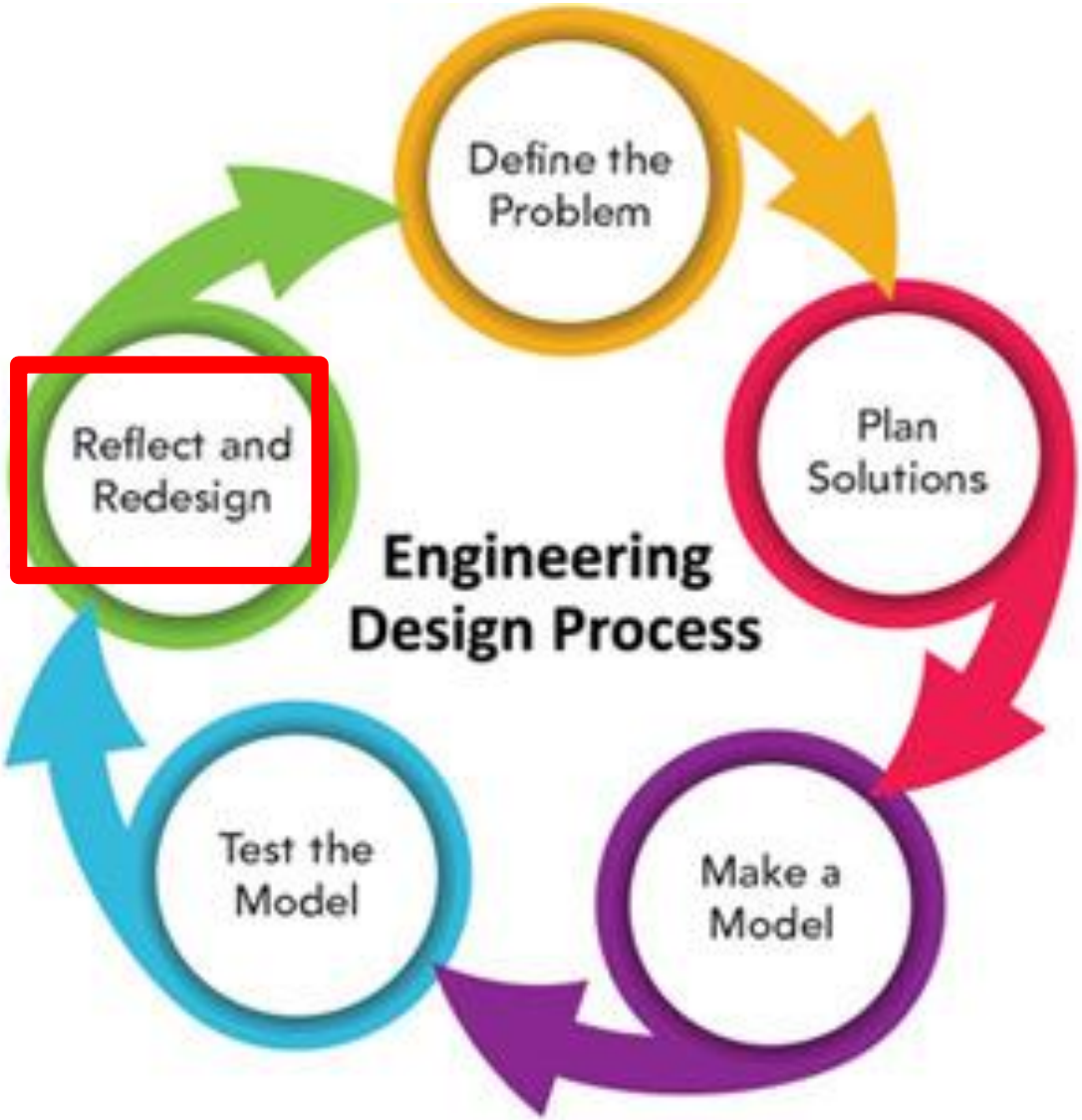
Using the Robot, work out how many rotations is needed to go 15cm.
Work out the relationship between distance and rotations.
Calculate how many rotations to travel 40cm.
Test your calculation using the robot.
Check your formulae for the relationship between distance and rotation
Calculate how many rotations to travel NEW DISTANCE.
WAIT UNTIL ALL THE GROUP IS READY TO TEST TOGETHER ….

Predict how far 1 rotation is.

Distance is

2m

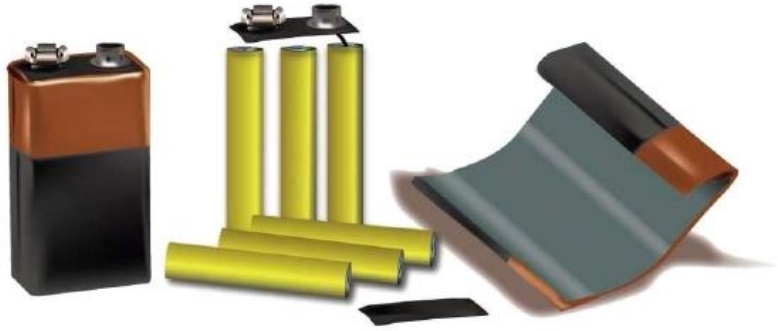
Test your Calculations


Define the Problem
Plan Solutions
Make a Model
Test the Model
Reflect and Redesign
Engineering Design Process

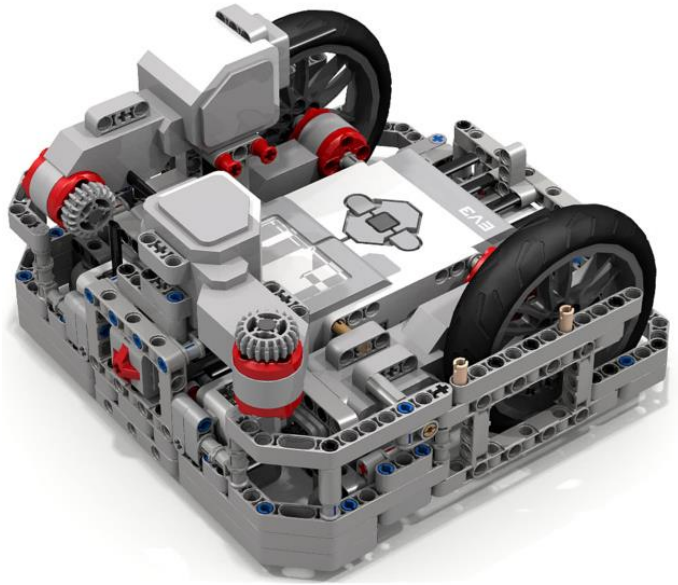
Retest your Calculations

What did you learn?

Science - Transfer of Energy

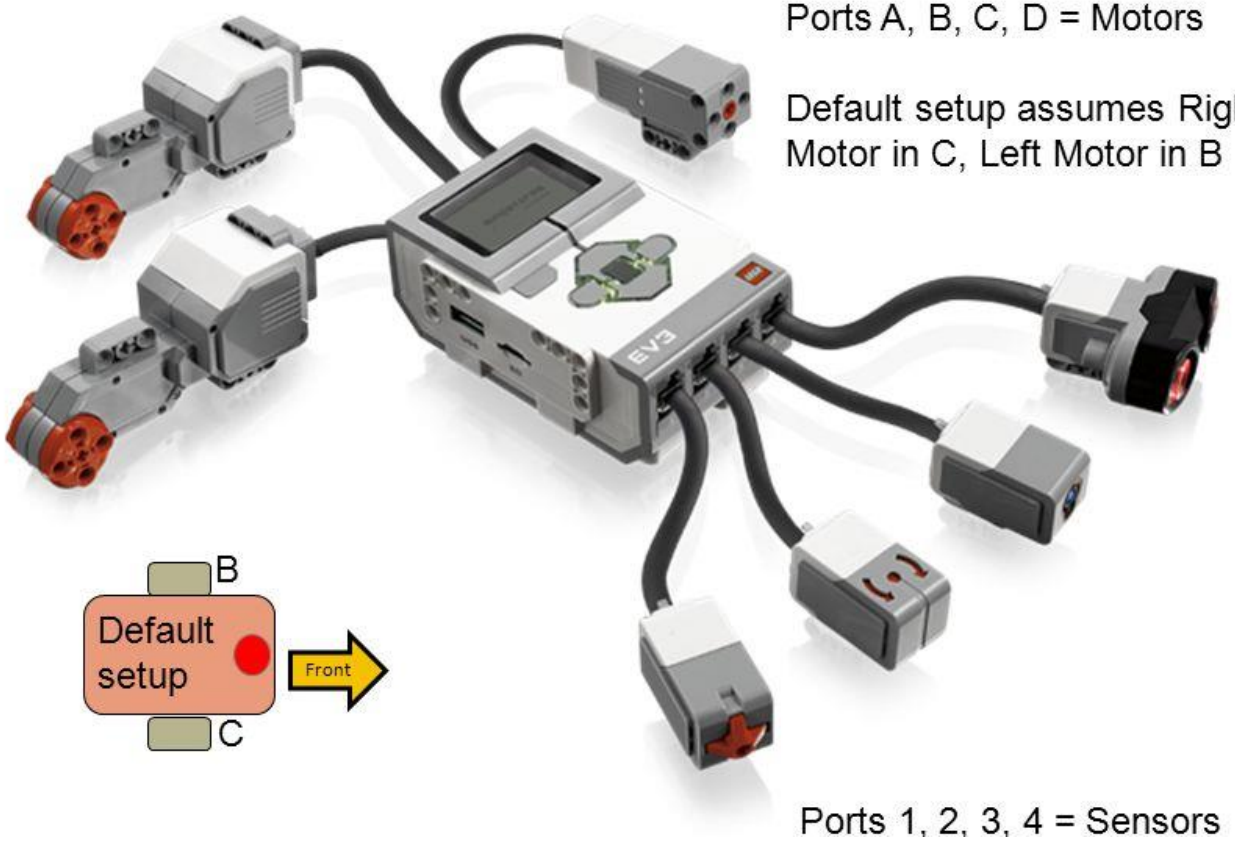


A battery has **chemical** potential energy in the **electrolyte** in its electrochemical cells.

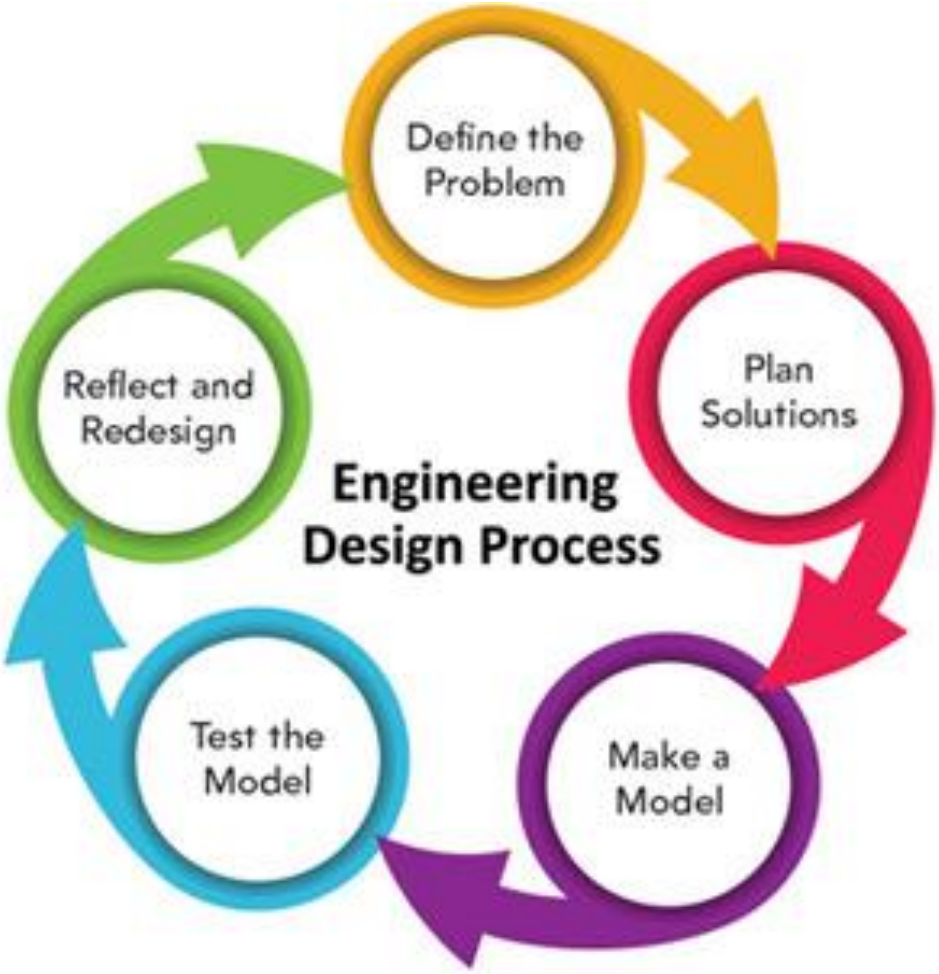


Technology

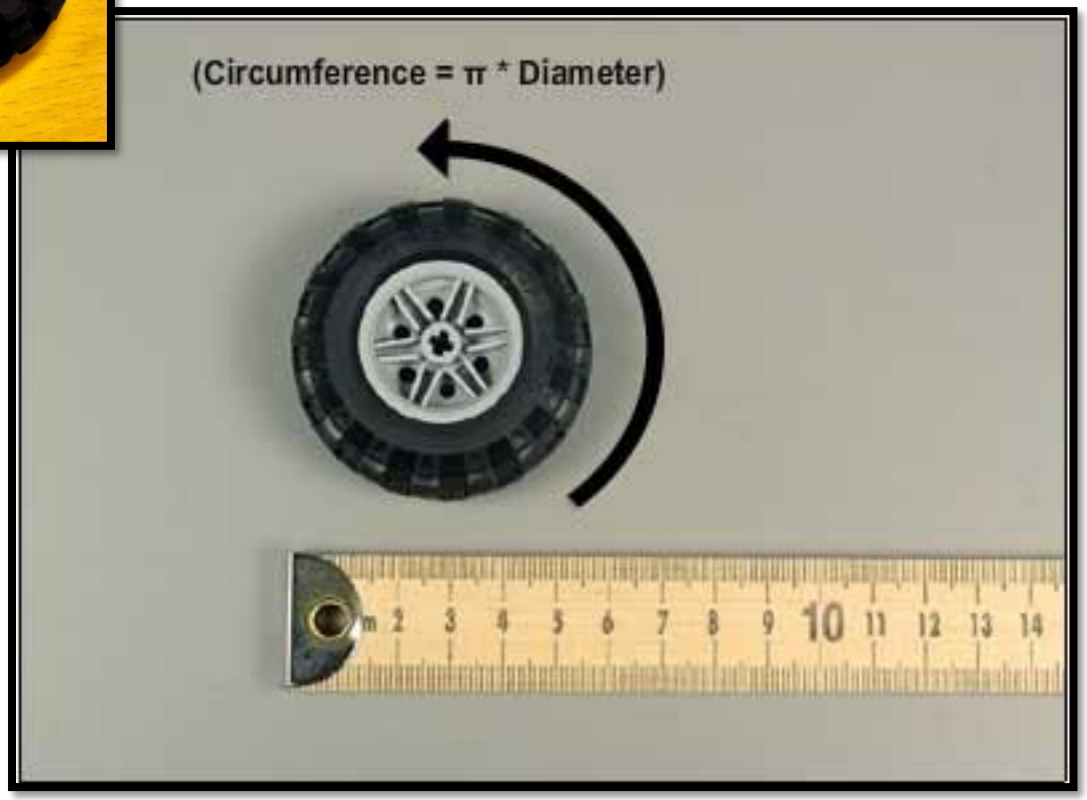
PORTS, SENSORS, MOTORS



Engineering



Maths - How far does 1 rotation go?



Assessment

Your grade will be based on an average of these two criteria..

Grade	Performance	Creativity & aesthetics
A+	Your car finishes the closest, without knocking over Dan. Evel Knievel would be proud!	Best in show!
A	Your car finishes within 100mm, without knocking over Dan	Outstanding
B	Your car finishes within 400mm	Good
C	Your car moves forward!	Okay
t	You have something resembling a vehicle	Nothing special
Z	You run away!	Look away!

Any Questions or Comments?

Packing Up Instruction

- Put all LEGO Robots parts shown on the back of the Build Guide in the Red Box.
- Return the Build Guide sheet and Distance Sheet
- You can keep the LEGO consumable parts or put them in box in the front ☺

Thank you for a great workshop.

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