

# ADVANCED EV3 PROGRAMMING LESSON



## Introduction to Bluetooth

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By Sanjay and Arvind Seshan



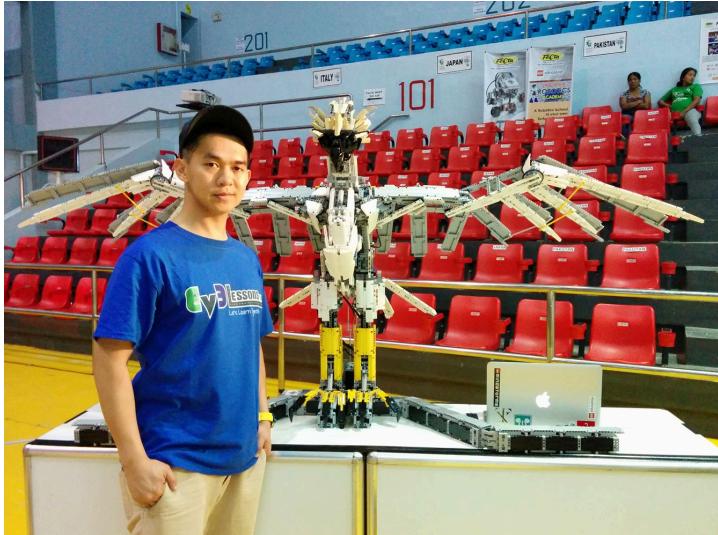
# Objectives

- ↗ Learn how to use the Bluetooth functionality on your EV3
- ↗ Learn to send and receive messages between EV3 bricks

# What is Bluetooth?

- ↗ Bluetooth uses radio frequencies to communicate between devices
- ↗ The EV3 uses Bluetooth to download programs wirelessly
- ↗ The EV3 also uses Bluetooth to connect to another EV3

# Why Use Bluetooth on the EV3?



- ↗ Controlling a large single robot with multiple bricks
- ↗ An alternative to daisy chaining:  
Requires less wiring but needs separate programs

- ↗ Coordinating multiple robots
  - ↗ Have them perform similar actions
  - ↗ Synchronize their actions

# Tips for Success

- ↗ Give each brick an unique name (Sender and Receiver for this lesson)
- ↗ Use an USB cable for downloading code to the bricks (rather than Bluetooth). You cannot connect between EV3s and a PC at the same time
- ↗ Turn on the receiver robot first then the sender in the challenges in this lesson. This is because the challenge solution only sends the message once in Challenge 1.

# Activating Bluetooth on the EV3

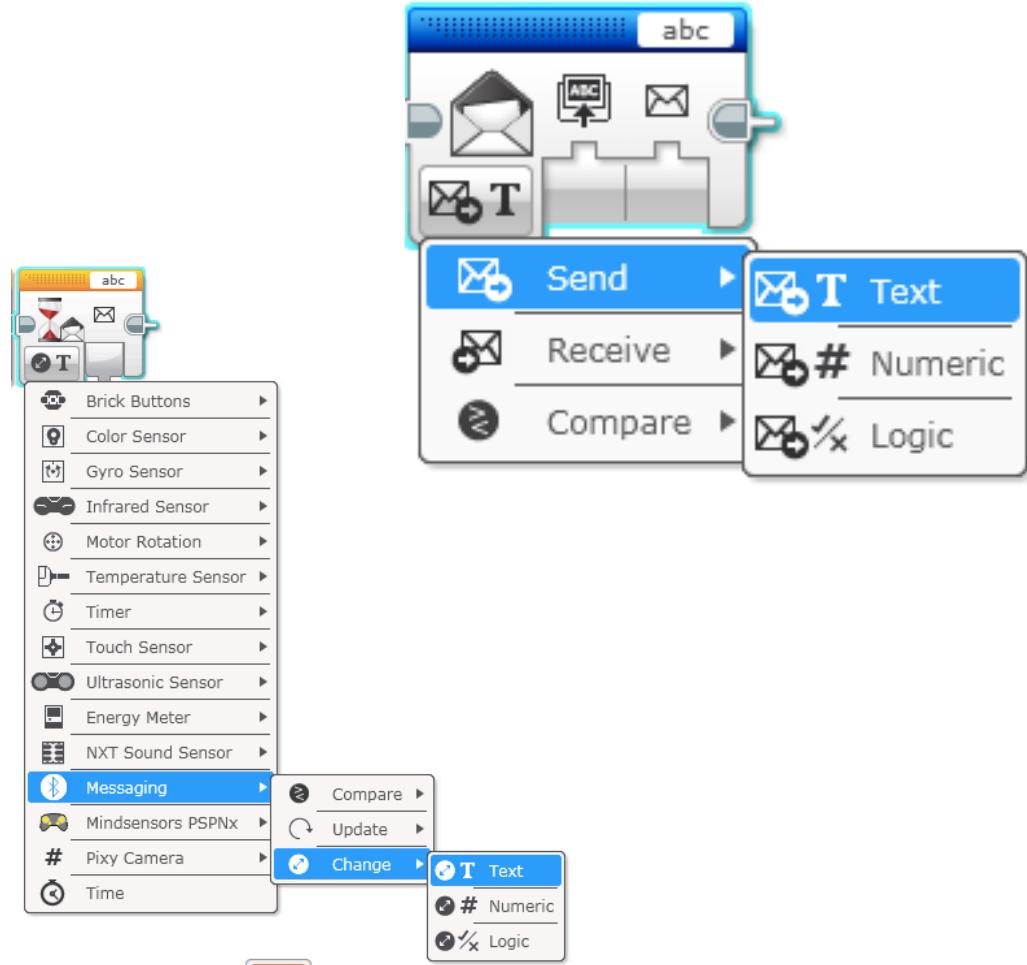
- ↗ Turning on Bluetooth:
  - ↗ On the EV3 menu, go to the symbol that looks like a wrench
  - ↗ Go down to the word “Bluetooth” and activate it
- ↗ To connect to another brick go back into the Bluetooth menu
  - ↗ Go to “Connections”
  - ↗ Select “Search” and find the other brick’s name
- ↗ You can also manage your connections with the Bluetooth Connection Block. But we do not use this block in this lesson.



# New Block: Messaging

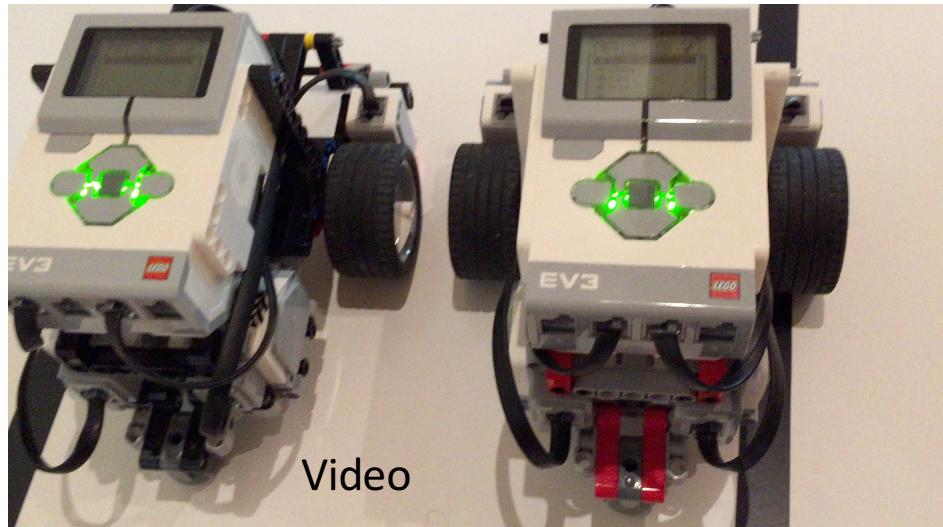
➤ The messaging block can be found in the Blue Pallet.

➤ You will also use the Wait For block in Messaging Mode



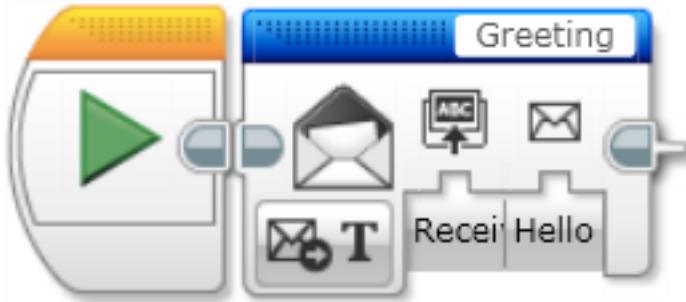
# Challenge 1

- ↗ Send a “Hello World” message from one brick to another
- ↗ The second brick should receive and display the message on its screen for 5 seconds
- ↗ Tips:
  - ↗ You will need to pair the two robots ahead of time
  - ↗ Name one robot Sender and the other Receiver for this challenge
  - ↗ For this challenge, you will use the Messaging block → Send → Text
  - ↗ You will use the Wait For block in the Messaging Mode → Change → Text



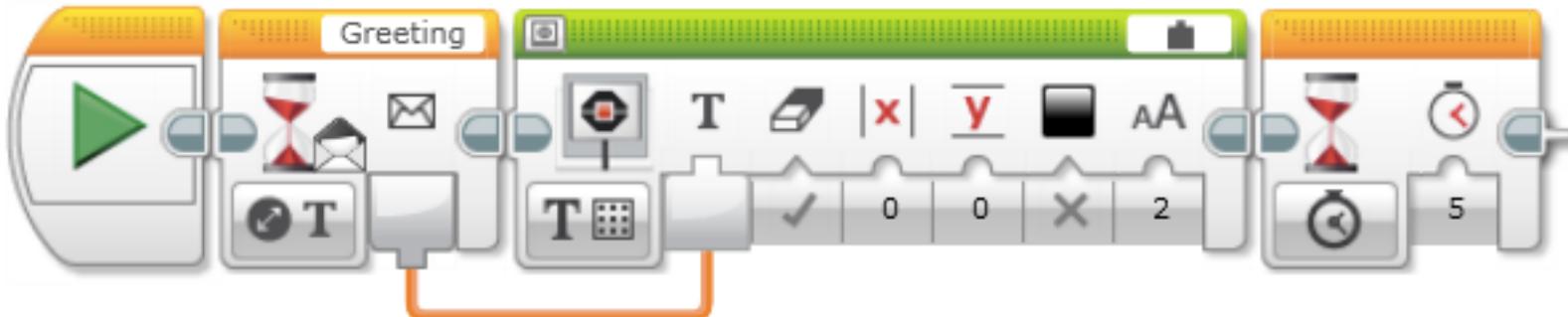
# Challenge 1 Solution

Code on  
the Sender  
Robot



Sends the message “Hello World” to the Receiver robot. The message title “Greeting” must match in the receiver’s program.

Code on the Receiver Robot



Wait for a message from  
the first robot and display  
the text for 5 seconds

# Challenge 2: Synchronized Swimmers

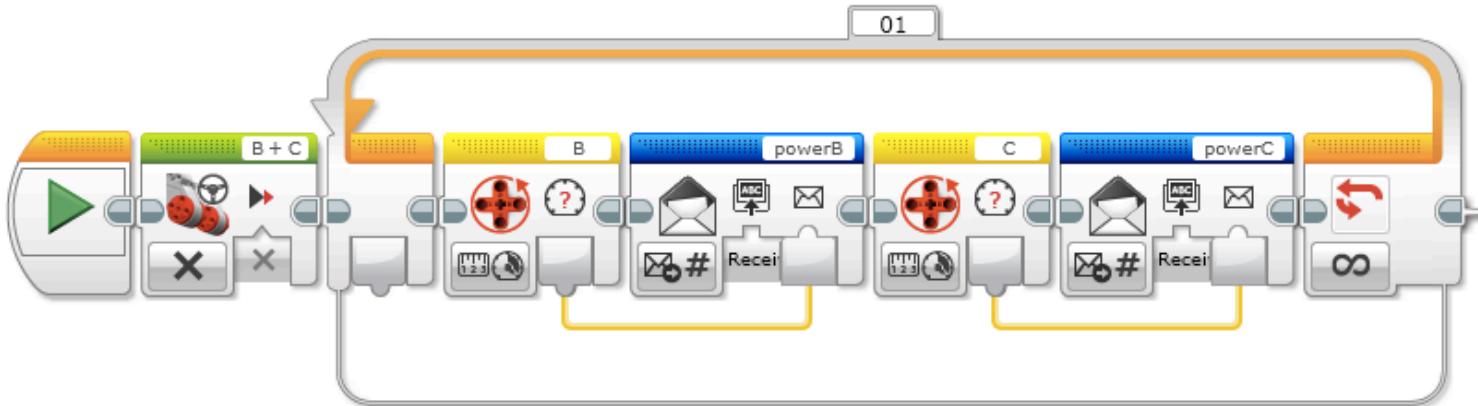
- Move the first robot by hand and send the motors' power to the other robot
- Have the second brick receive the data and copy the movement



# Challenge 2 Solution

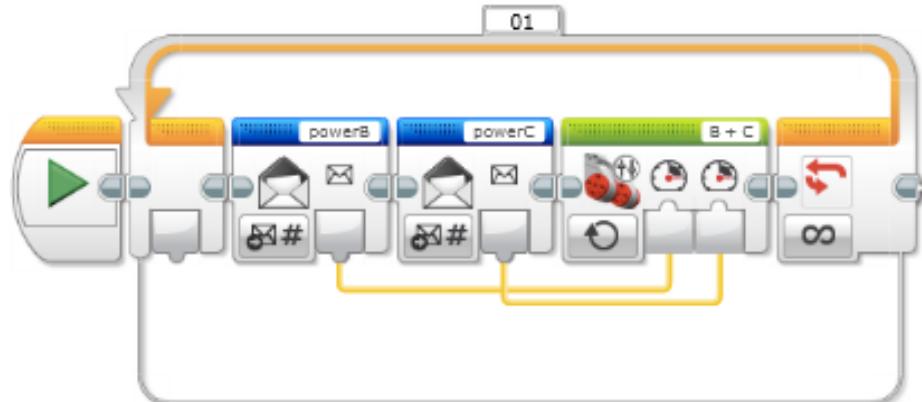
Code on the Sender Robot

Read each of the motors' power  
and send them using two different  
message titles to the Receiver robot



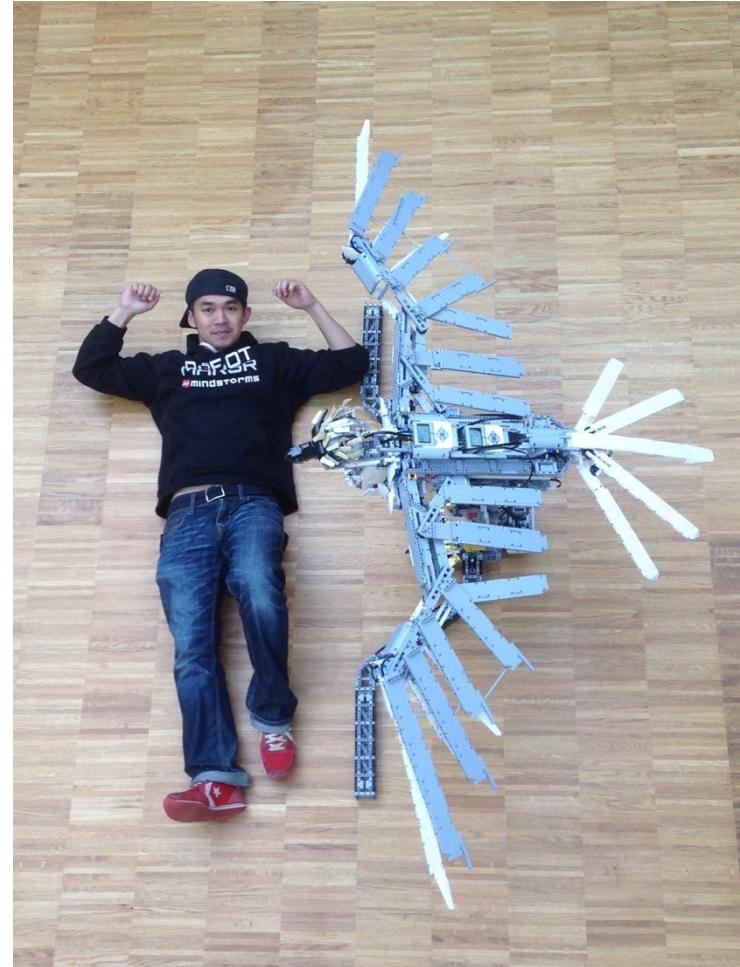
Code on the Receiver Robot

Read the two different  
message titles and apply  
the received power values



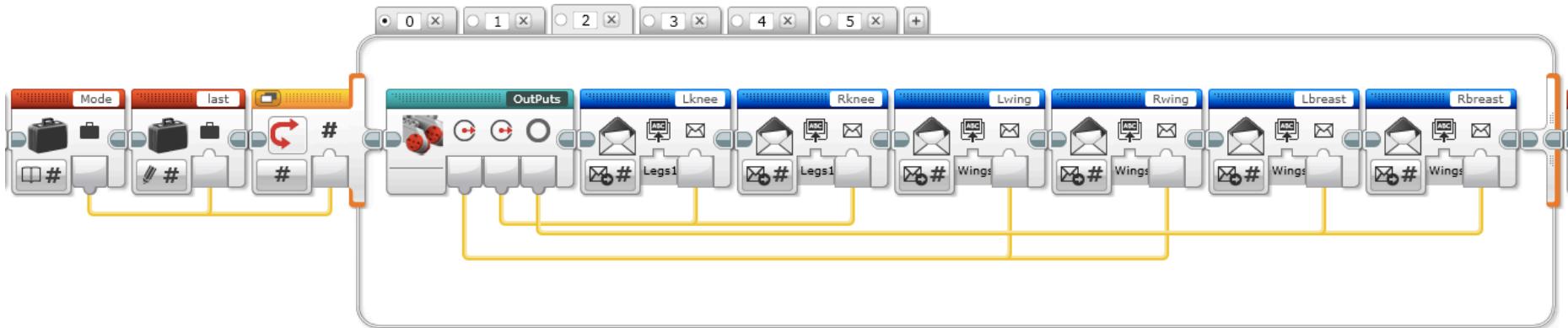
# Putting it all Together

- ↗ Once you know how to use Bluetooth on the EV3, you can create complex robots where movement is coordinated and synchronized
- ↗ Master Lee Magpili's Eagle is an example of such a project where Bluetooth messages are used to coordinate head, leg and wing movement. (Photos and code posted with permission.) Another brick uses Bluetooth to remotely control the Eagle.
- ↗ This project requires the following parts for the bird and a remote:
  - ↗ 5 EV3s
  - ↗ 17 Motors
  - ↗ 2 Touch Sensors



# The Eagle

This is small part of the Eagle's code. Here you see that the Eagle has five modes. In this view, you see that messages are being sent to "Legs1" and "Wings" EV3 bricks.



Thank you to Master Lee Magpili for sharing his code with EV3Lessons.