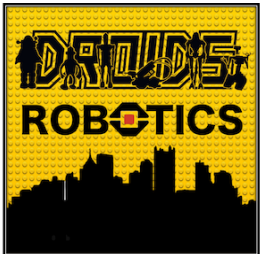# ADVANCED EV3 PROGRAMMING LESSON

Data Logging (Part 1)

By Droids Robotics

Lesson Objectives

↗ Learn what data logging is

↗ Learn the different ways of doing data logging on the EV3

↗ Learn how to use the Live Data Logging, Remote Data Logging and Brick Data Logging feature using a temperature sensor

↗ Prerequisites: Must own an NXT Temperature Sensor, Must have the Edu version of the EV3 Software and Edu version of brick firmware.

What is Data Logging?

➚ The EV3 software provides a simple way to continuously record sensor readings to a file and to plot the values later. This is called *Data Logging.*

➚ Why use Data Logging:

- ➚ Great for science experiments. In Part 1, we will show how you can record values like temperature for a science project.
- ➚ Great for understanding robot programming blocks. In Part 2, we will show how to use data logging to measure the difference between turns.
- ➚ Great for understanding sensor behavior. In Part 3, we will show how to use data logging to understand the details of sensors such as the gyro sensor.

How do you data log on an EV3?

There are 4 ways to data log using the EV3 MINDSTORMS:

Lesson 1: Temperature Sensor Experiment

1. Live Data Logging: Real time data collected directly in the EV3 software

2. Remote Data Logging: Use the the brick to collect data, and transfer the data to the computer for analysis

3. Brick Data Logging: Run the experiment directly from the brick

Lesson 2: Differences Between Turns

4. Autonomous. Collect data with the Data Logging block. The data is stored on the brick.
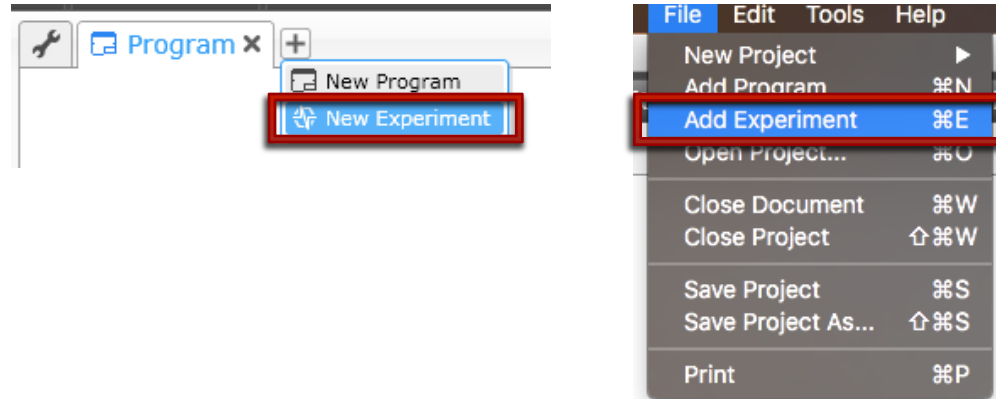
4

Live Data Logging

⤤ Challenge: We will use a Temperature Sensor to log the changing temperature of water.

⤤ Design your own experiment. For example, you can try placing the temperature sensor probe at room temperature water, then boiling water and then cold water.

Live Data Logging (Temperature Sensor)

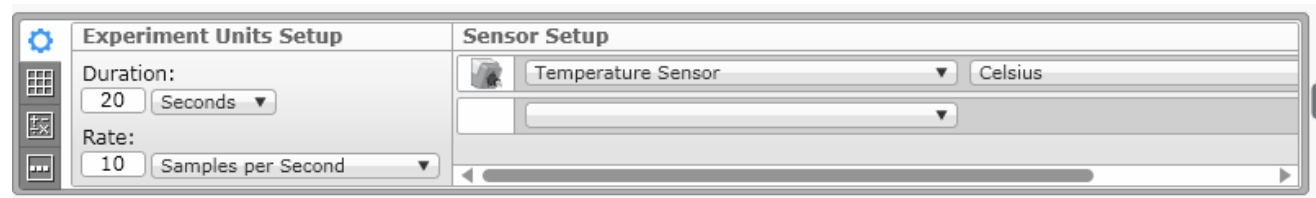**STEP 1:**
Start a New Experiment in an existing project
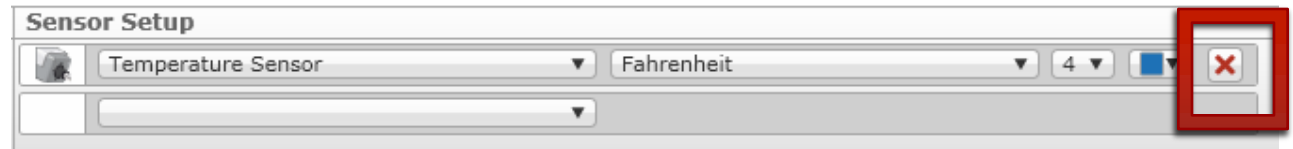

STEP 2:
Turn off Oscilloscope Mode

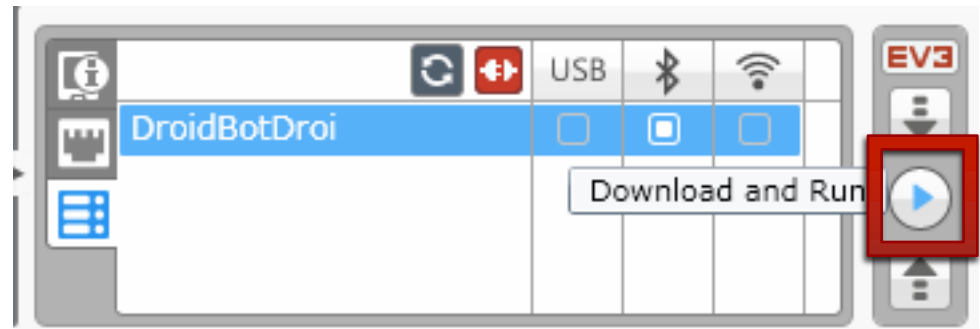**STEP 3:** Pick your duration, sample rate, sensor and units.

Live Data Logging (Temperature Sensor)

STEP 4:

All sensors connected to the EV3 will be automatically added. If you do not want to collect data with a particular sensor, click the "X" next to it.
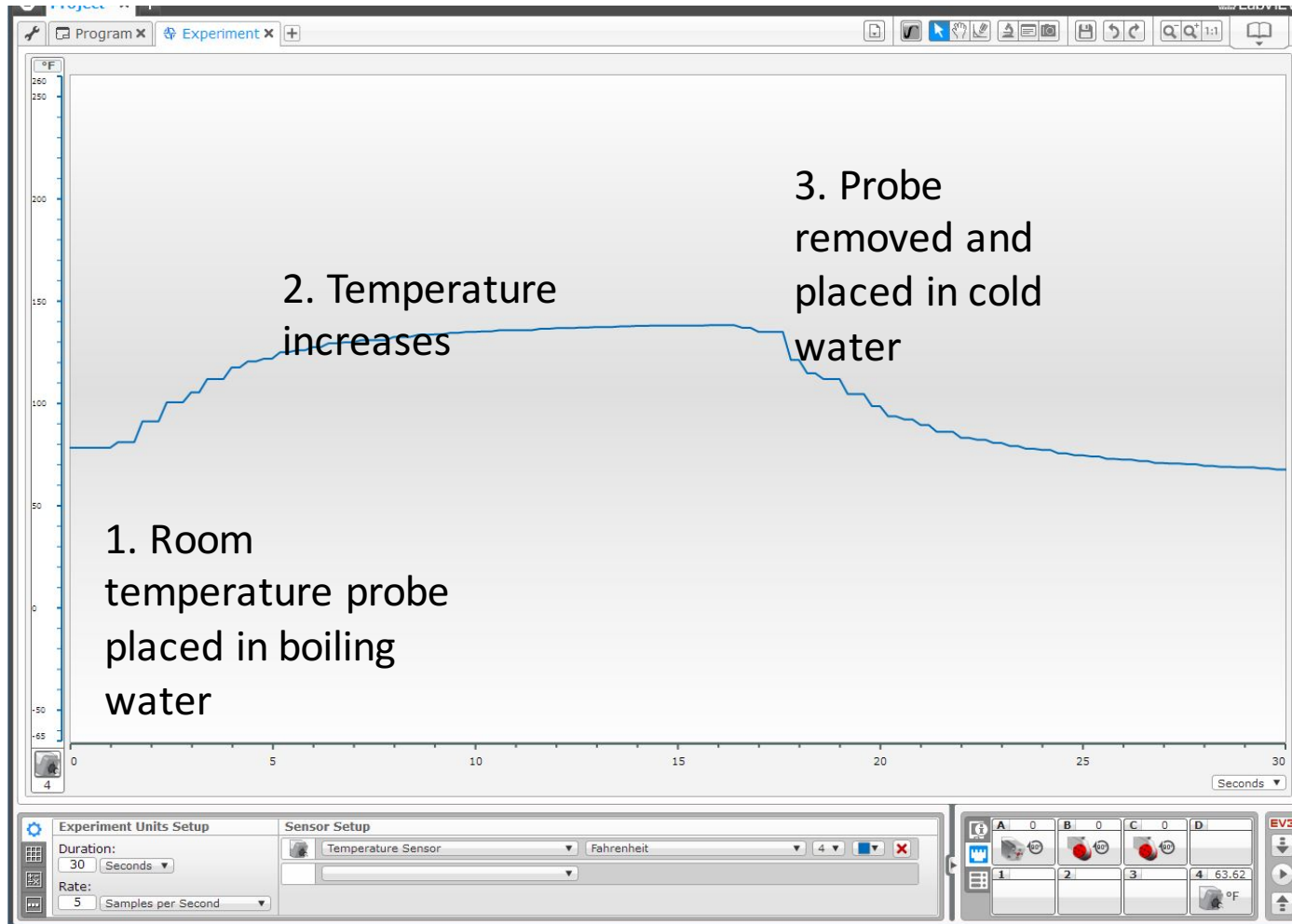

STEP 5: Download and Run

STEP 6: Place temperature probe in hot/cold liquid and watch the graph (see next slide)

Results/Solution

A similar graph will appear live on your screen.

Other Ways to Collect Data

- Now that we have tried Live Data Logging, let's look at two other ways to collect data when the computer isn't around:

  - Remote Data Logging: Use the the brick to collect data, and transfer the data to the computer for analysis

  - Brick Data Logging: Run the experiment directly from the brick
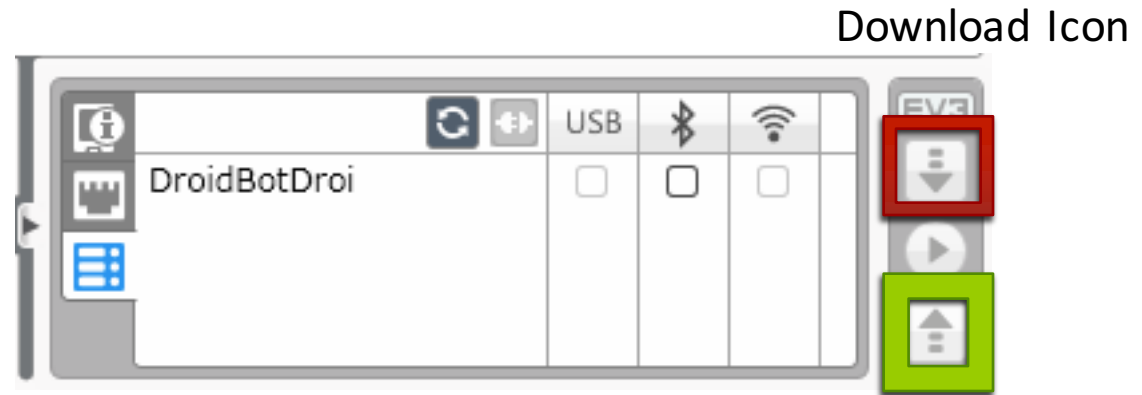
Remote Data Logging Instead

STEP 1-4: Repeat steps 1-4 of the Live Data Logging

STEP 5: Click on the Download icon
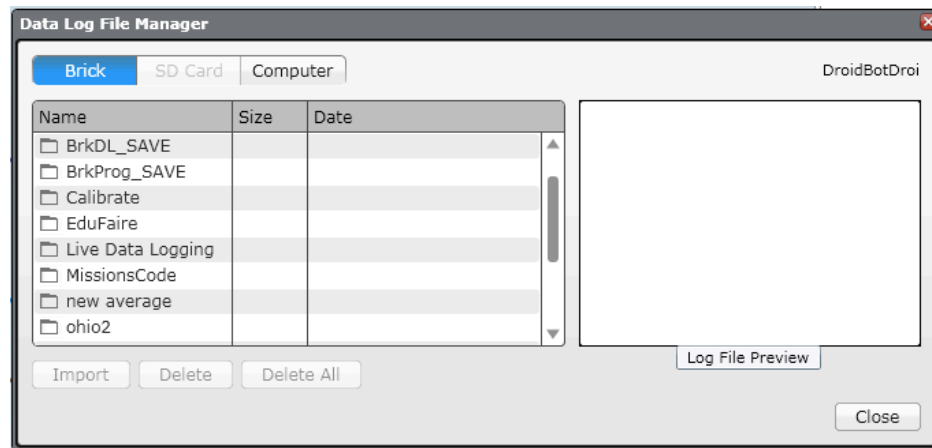
STEP 6: Take your robot somewhere else and run the experiment from the screen

STEP 7: Place temperature probe in hot/cold liquid

STEP 8: Connect your robot and click on the Upload Icon. In the Data Log File Manager, pick the correct file to import.

Download Icon

These icons appear only when you are in an open EXPERIMENT (not a Project)
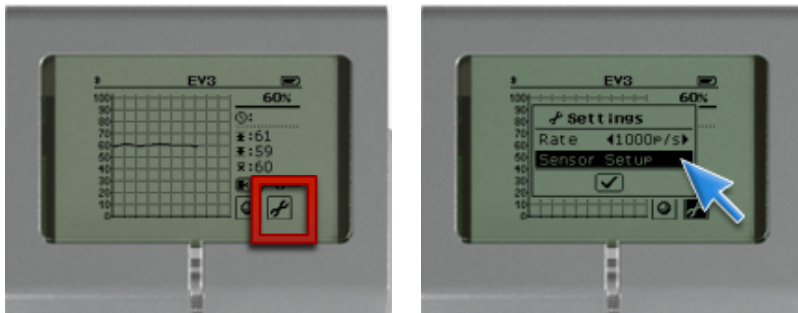
Upload Icon

Using Brick Data Logging Instead (Part 1)
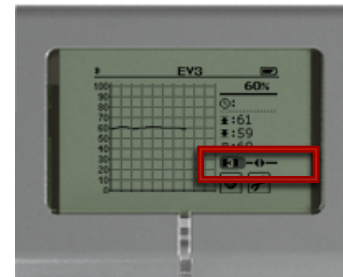
STEP 1: Go to third tab on Brick Menu and pick Brick Datalog

STEP 2: Click on the wrench to set up sensors
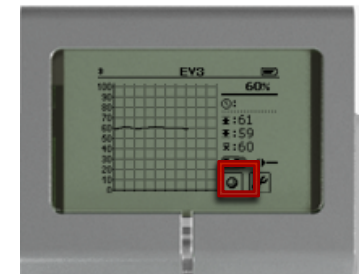

STEP 3: Click on icon with numbers to see the data for a different sensor

STEP 4: Place temperature sensor probe in hot/cold liquid

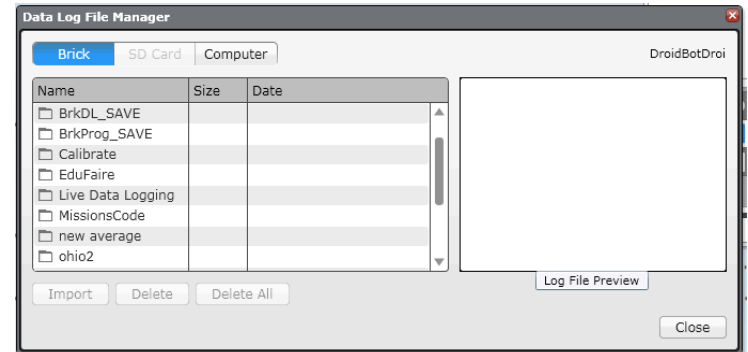**Step 5:** Click on the sphere icon to start and stop collecting data

Brick Data Logging (Part 2)

STEP 6: Pick name for the file on the brick

Upload Icon

STEP 7: Connect your robot and click on the Upload Icon after you are in an Experiment. In the Data Log File Manager, pick the correct file to import.
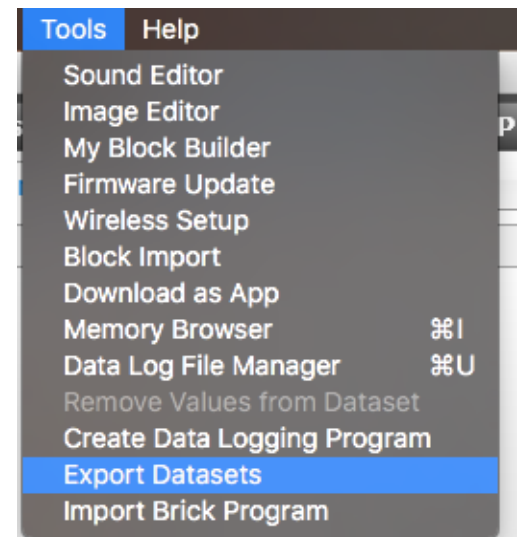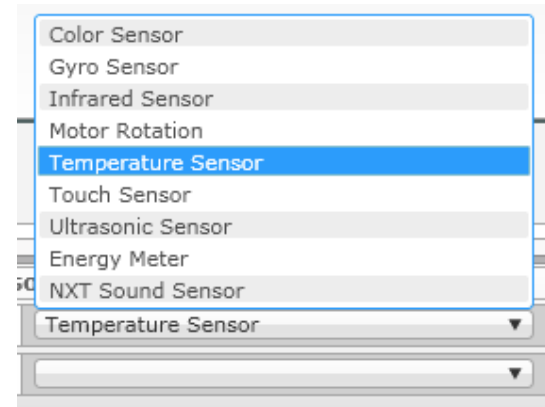
These icons appear only when you are in an open EXPERIMENT (not a Project)

Next Steps

↗ Can you think of other experiments?

↗ Try data logging using other sensors.

↗ Try exporting your data into Excel or another spreadsheet tool.

↗ Learn how to use Autonomous Data Logging in Part 2 of the Data Logging series of lessons.

Credits

↗ This tutorial was written by Sanjay Seshan and Arvind Seshan from Droids Robotics

↗ More lessons at www.ev3lessons.com

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