SPHERO RVR ROBOTS- GETTING STARTED

Required:
DOWLOAD THE SPHERO EDU APP FROM SELF SERVICE or The APP store
https://apps.apple.com/us/app/sphero-edu/id1017847674

The APP is available for the iPad, iPhone, and Mac OS
Link to Mac OS app: https://apps.apple.com/us/app/sphero-edu/id1349872101?mt=12

This tutorial will give you step-by-step instructions for using your Sphero RVR robots in your classroom.

Step 1: Included in the classroom kit are the following materials:

- 5 RVRs
- 5 Batteries
- 5 Roll Cages
- 5 Mounting Plates
- 5 USBs
- 5 Sets of color cards
- 5 Keys (Unlocks RVR battery compartment)
- 1 Quick Start Guide
- 1 Getting Started Card

Pictured are all the parts for putting together ONE of the RVR robots

Step 2: The battery needs to be fully charged when you use your RVR robot. First you will need to remove the battery from the case.

Start by using the blue key tool included with your robots. Turn the key counter clockwise to open the battery compartment.

Step 3: Press on the blue bar under the battery to release it. Then slide the battery out of the compartment.

Press blue bar to release battery


Remove Battery from RVR to Charge Fully
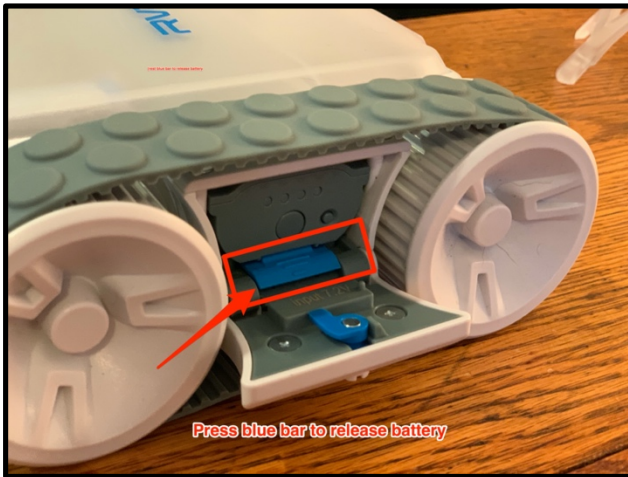
Step 4: The blue USB cord, included in your kit is used to charge the battery. It can be plugged into your laptop but can also be connected to an iPhone or iPad brick.
The charging cable plugs into the underside of the battery.

Input 7.2V
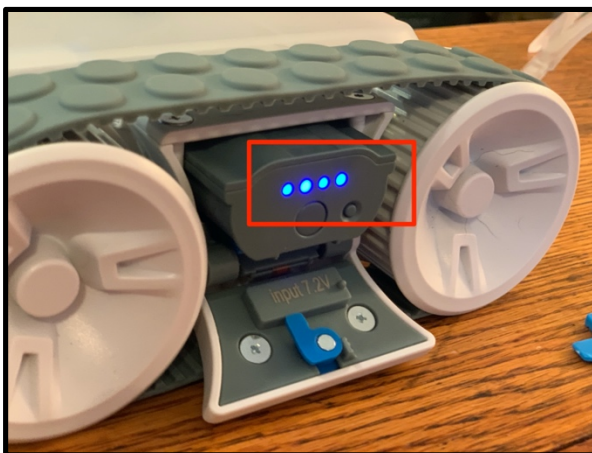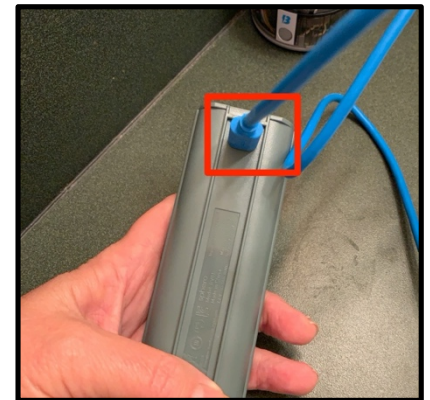
Step 5: Leave the battery charged until you see 4 blue dots NOT blinking. The four blue dots show that the battery is fully charged.

**Step 6:** Close the battery compartment and lock it with the key by turning the blue key clockwise.

Turn the blue key clockwise to lock the battery compartment
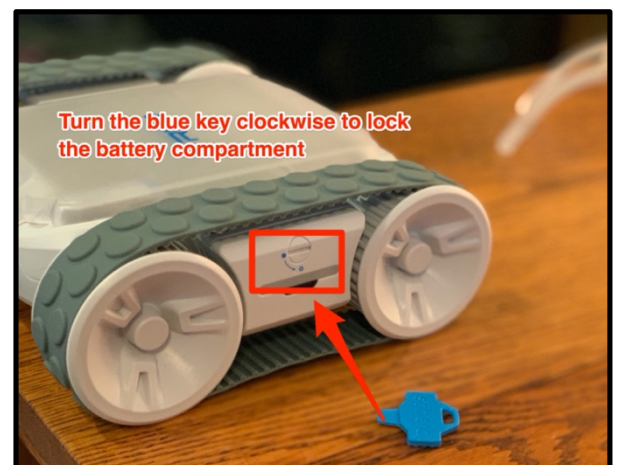
Step 7: Now it's time to program the Sphero RVR robot.
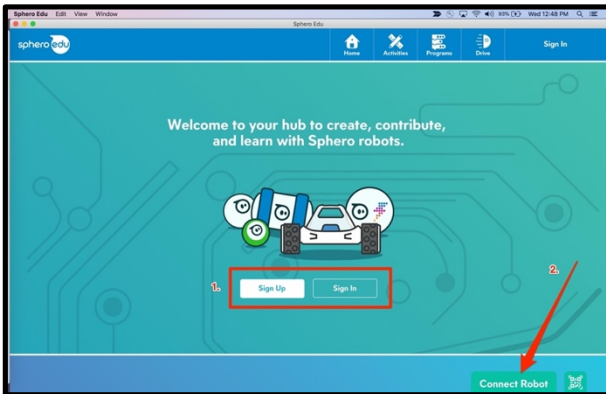
Step 8: Open the Sphero Edu application on your device. **Sign in** if you would like to be able to keep the programs you write for the RVR.

Step 9: Power on the Sphero RVR robot by pressing the power button on the side.

Power Button
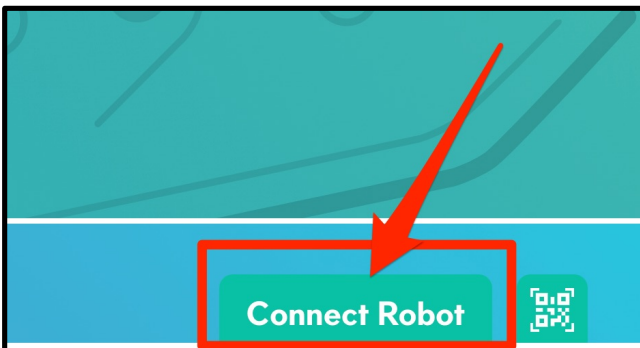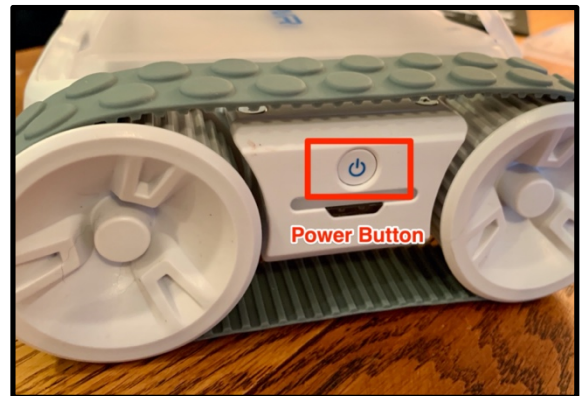
Step 10: Open the Sphero Edu application and Click on **Connect Robot. You will need to have BLUETOOTH ON to connect.**
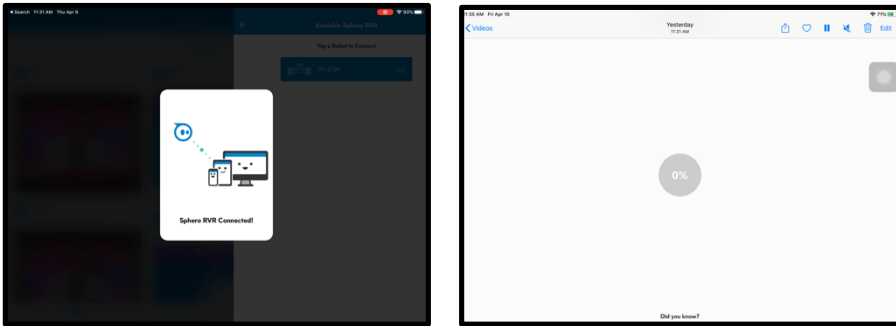
Connect Robot

Step 11: Each Robot has an alpha-numeric identifier on the bottom of the robot. When you click Connect you will see that RVR identifier.

Once you have connected your Sphero RVR robot you will see that identifier in place of Connect Robot.

RV-DB53

Step 12: If there is a firmware update for the Sphero you will see a message at this point in the process.

**The firmware update must be done using the Sphero Edu app on an iPad or iPhone mobile device.


Step 13: Once the Sphero RVR robot is connected with the Sphero Edu application it's ready to go.

- Drive - Drive around in the **Sphero EDU** app using a joystick.
- **Program** - Use **programming** blocks or JavaScript to control **RVR** in the **Sphero EDU** app.
- Create - Attach things to the top of **RVR** to really bring it to life.

Step 14: To get a feel for the Sphero RVR robot and how it is controlled click on Drive within the application.
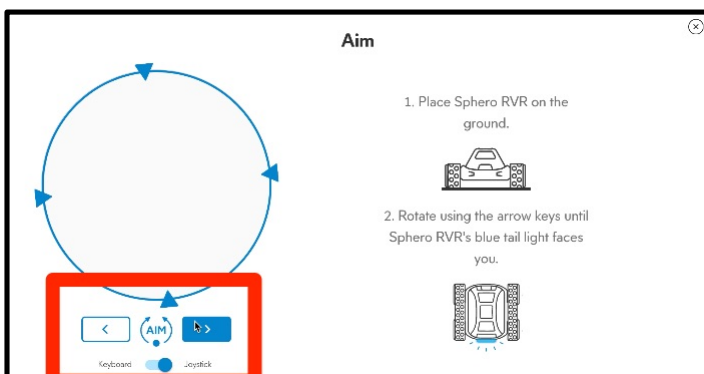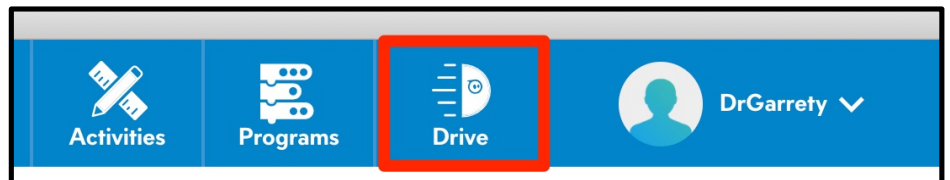
Step 15: First, adjust the aim of the RVR robot.
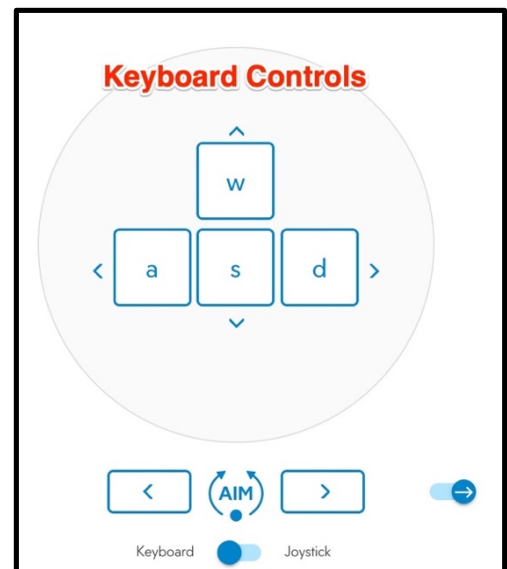
Step 16: In the next step of the **Drive** option, select whether to control the RVR robot by keyboard controls or the joystick. Here are the keyboard controls: (keyboard controls are only available when using the Mac OS Sphero Edu app)
.
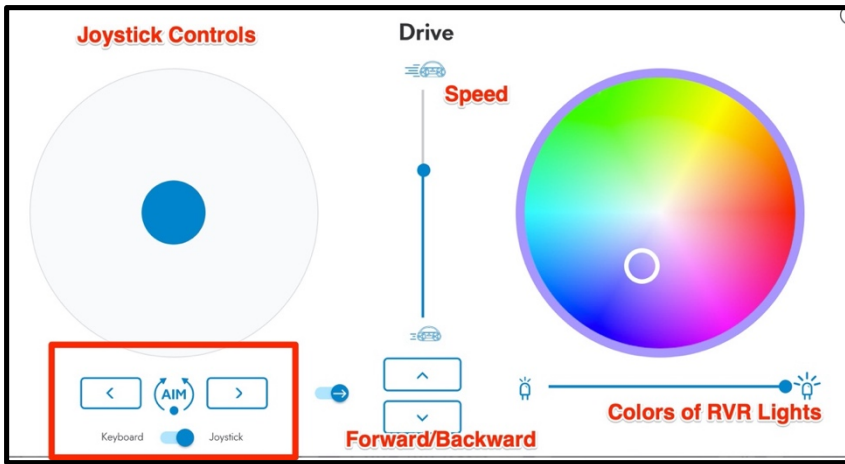
Step 17: This image shows the joystick controls. It also highlights other options that can be controlled using the Drive option.

- RVR light colors
- RVR speed
- Direction- backwards or forwards
-

**To begin driving the RVR, start moving the joystick.**

Step 18: The next option to explore, and the one you will use most often is the Programming option. Sphero RVR robots can be programmed with the Sphero Edu application. There are several more advanced options but for this tutorial we're going to stick with the basics.
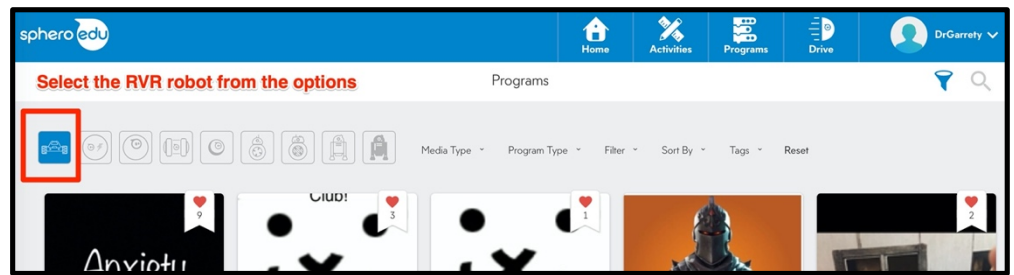
Click on Programs
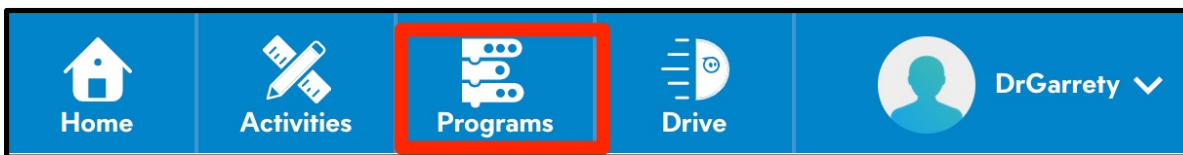
Step 19: When the Programs option opens, you will see example programs and activities from Sphero.

Sphero has several robots so it is recommended that you filter the results.
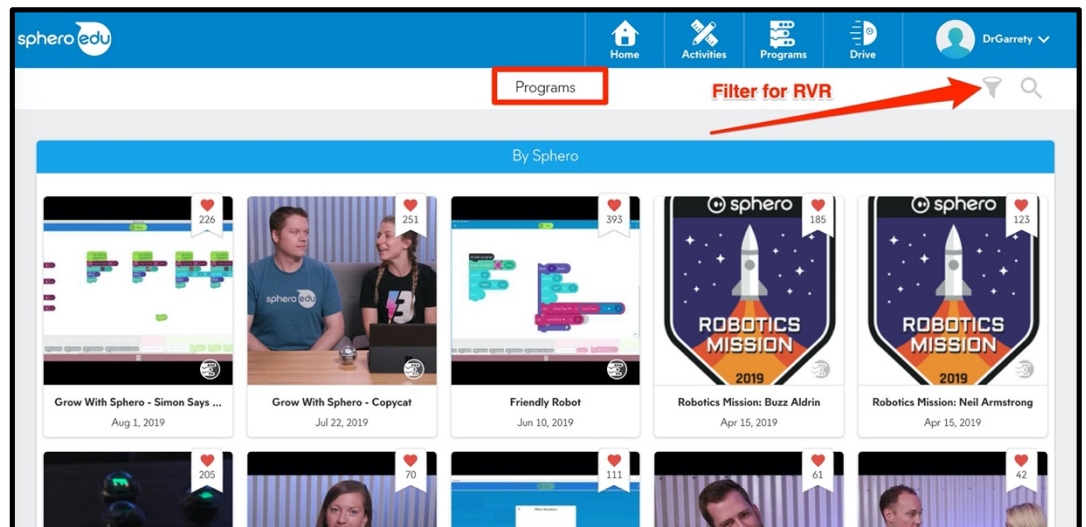
Step 20: Select the RVR robot from the options.


Other filtering selections include:
- Media Type- programs or media
- Program Type- draw, blocks, text
- Filter- by likes, or creator, or by Sphero
- Sort By- dates, activity, likes
- Tags- to sort by subject or terms
- Reset all search criteria

Step 21: Click on Programs and select **Create New** to begin creating a program to control the Sphero RVR.
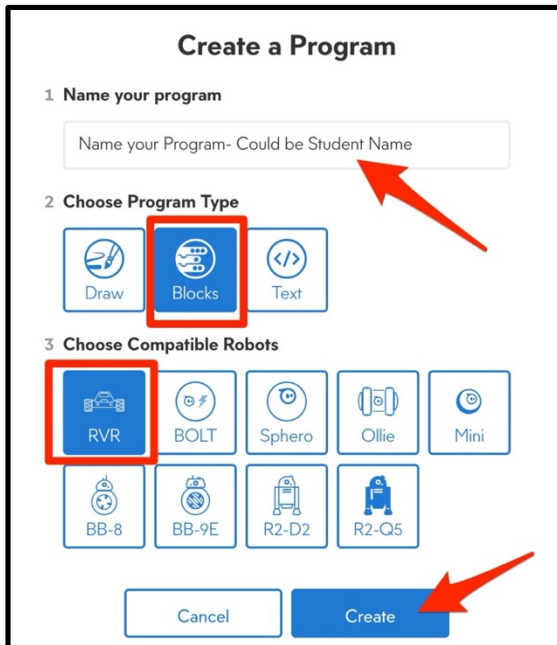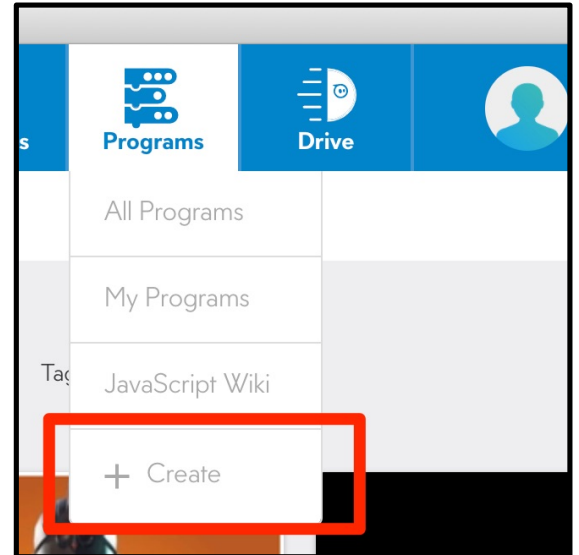
Step 22: Before you can start programming you will be asked to **Name your Program**, **Select the RVR Robot**, and then click the **Create Button.**

Step 23: Take a look at the programming space. There is a **START** button at the top of the window. Once you have used the blocks to create a program (a set of instructions) for Sphero RVR, you will click this Start Button to run the program.
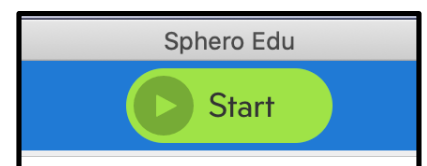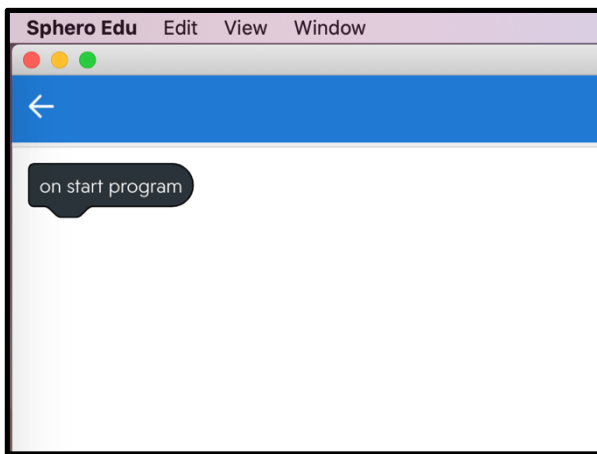
Step 24: In the upper left of the programming window you will see the first block in the program, **on start program**.

All blocks that you select from the menu below will attach to this block in order to run your program.

Step 25: Block programming is a good way to learn how to program the Sphero RVR robot. The various block code option are available at the bottom of the programming window and are color coded to make them easier to locate.
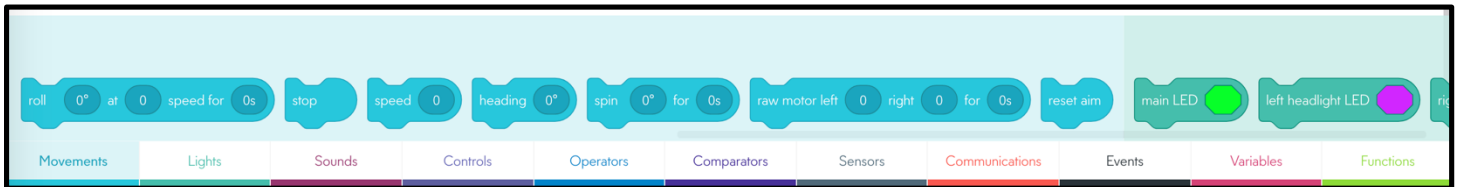

The block coding options are:
- Movements
- Lights
- Sounds
- Controls
- Operators
- Comparators
- Sensors
- Communications
- Events
- Variables (Create a Variable)
- Functions (Create a Function)

Step 26: To move a selected block from the bottom menu to the '**on start program**' beginning block, click and drag until the blocks snap together.
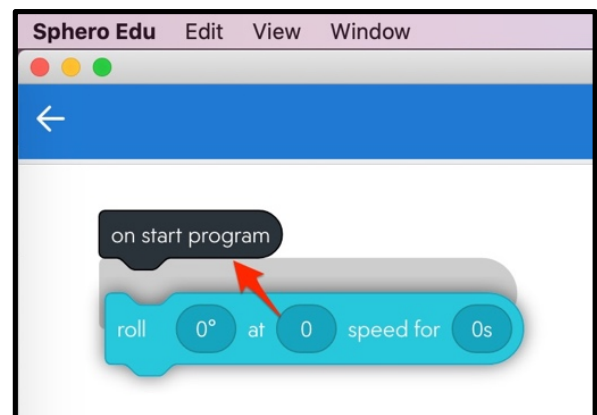
Step 27: Movement Blocks- to make your robot move, you will need at least one movement block to the program.

Sphero RVR robots move with three basic instructions**: heading, speed, and duration**.
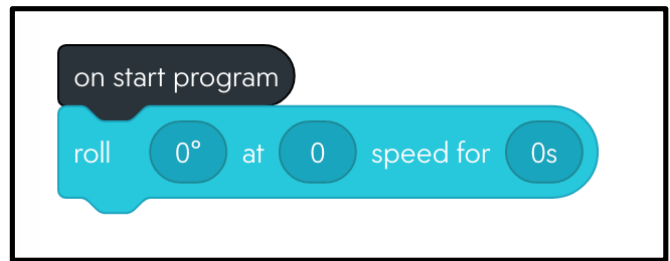
After you drag the first movement block to start your program you will select the:
1. direction (by degree),
2. the speed
3. the duration (how long will the robot move in this manner

Click inside the circles to change the numbers and settings.

Step 28: Other movement block options are stop, spin, and raw motor which controls each motor of the robot independently.

Step 29: The Light blocks give the options of turning lights on the Sphero RVR on, off, changing colors and the duration of the time each light in on and particular color.
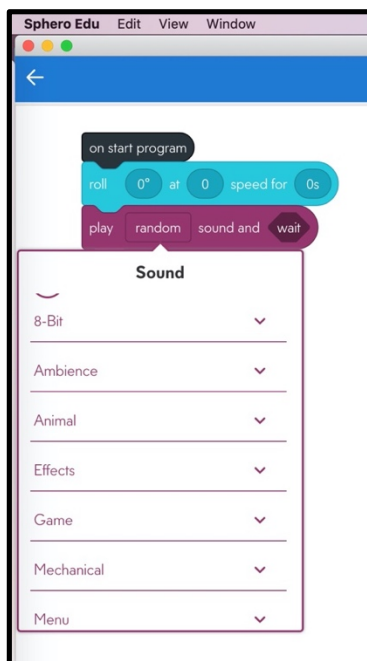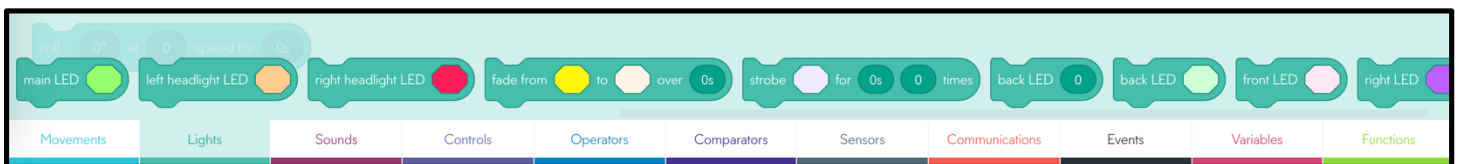
Step 30: The sound blocks offer options of pre-recorded sounds and spoken text. The sounds play from the programming device i.e. iPad or iPhone, or Macbook, but NOT the robot

To change the sound in the sounds block- click on the dropdown menu

You can also select wait, and continue before the next block step of the program.
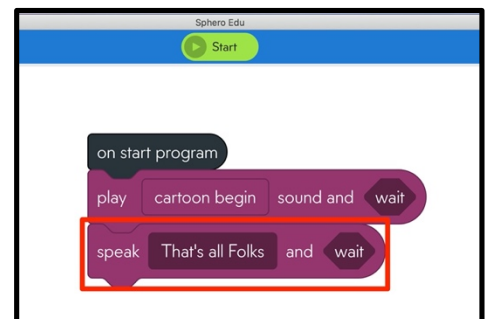
Step 31: The spoken text programming sound block speaks whatever you type into the block through the programming device.

Step 32: The Controls programming blocks give you options for IF/Then scenarios that change the flow of your program.
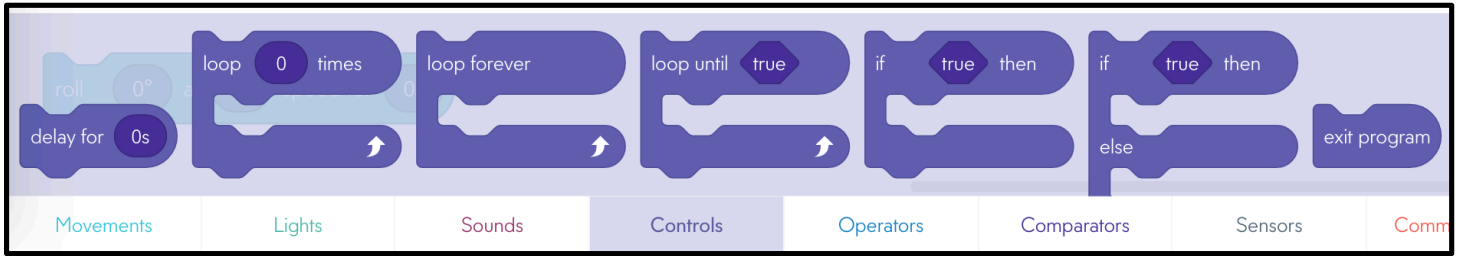
Step 33: The Operators programming blocks are mathematical actions that modify or create values. Remember to follow your order or operations when using multiple operators.
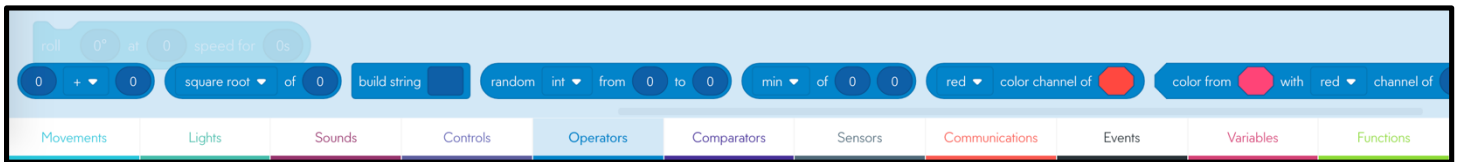
Step 34: Comparators are used to compare values and create conditional logic; aka as Logical Operators or Relational Operators.
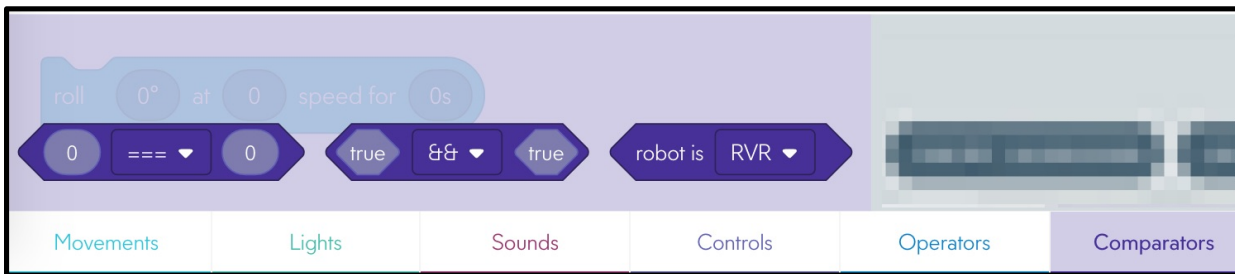
Step 35: The Sphero RVR comes with several internal sensors.
- Ambient light detector.
- RGB **sensor** with normalizing LED and focus objective.
- Complete 9-axis IMU - accelerometer, gyroscope, magnetometer.
- 10 individually addressable RGB LEDs.
- Infrared **sensor**.
- High resolution 20-pole magnetic encoders.

Querying sensor data allows you to react to real-time values coming from the robots' physical sensors
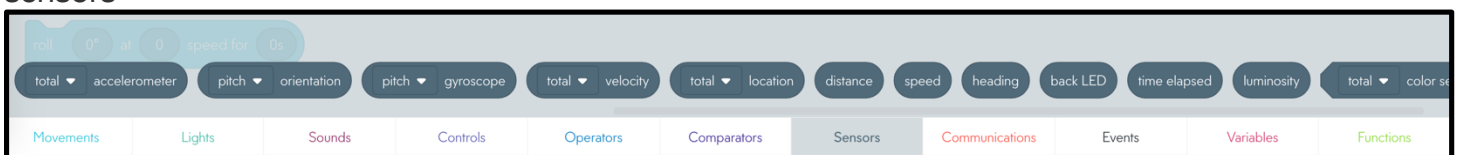
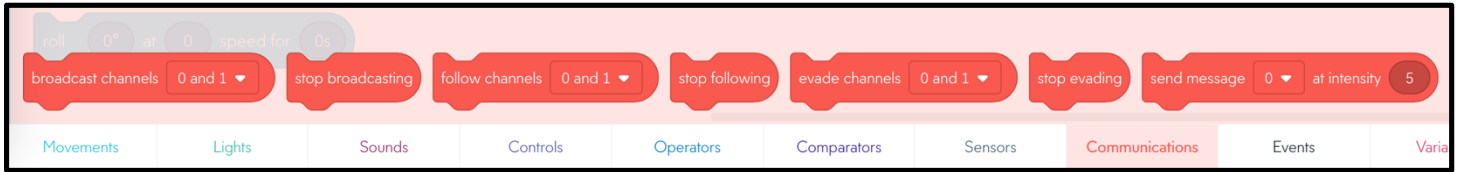**Step 36:** Using the built-in infrared sensors in RVR, you can program one robot to follow RVR as it rolls around the room using the communication programming blocks.

Step 37: Events are predefined robot functions into which you can embed conditional logic. When an event occurs, the conditional logic is called and then the program returns to the main loop where it left off.
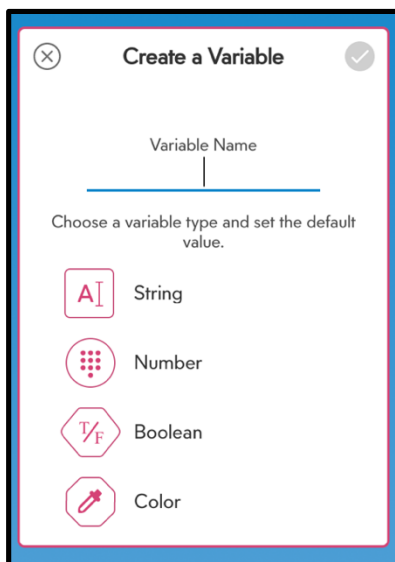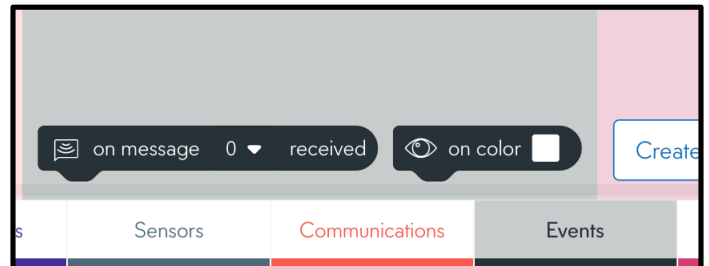
Step 38: Variables

A **variable** is a named memory location in which you can store a value like a number. There are four types of **variables**: number, string, boolean, and color. You must declare a **variable** type when you create one, and you can't change it later.

Step 39: Functions
Functions contain code that can be reused throughout your program, which helps organize complex logic. Think of a function as a program within a program. Parameters specify different input values for your function; they are like a variable but only apply to the function, and they are not global to the rest of the program.

Removable Protective Rollcage

Removable Coverplate

Removable, Rechargeable High-Capacity Battery

Battery Key

High-Power Compact Motors

Circuit Board
Color Sensors
IR Sensors
Ambient Light Sensors
Full 9-Axis IMU
Programmable RGB LEDs
5V 2.1A USB-A Onboard Power + Data
4-Pin UART Port

Hypergrip All-Terrain Treads
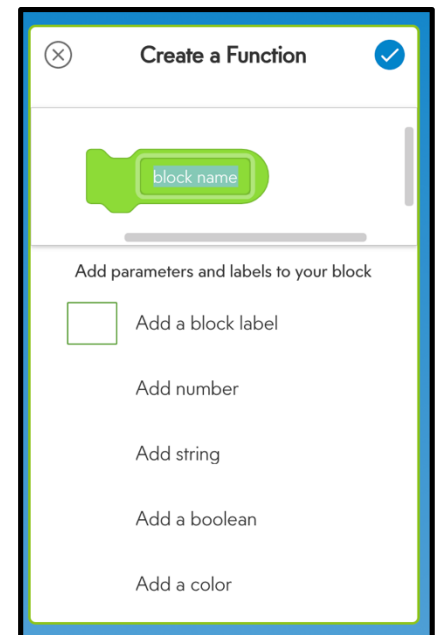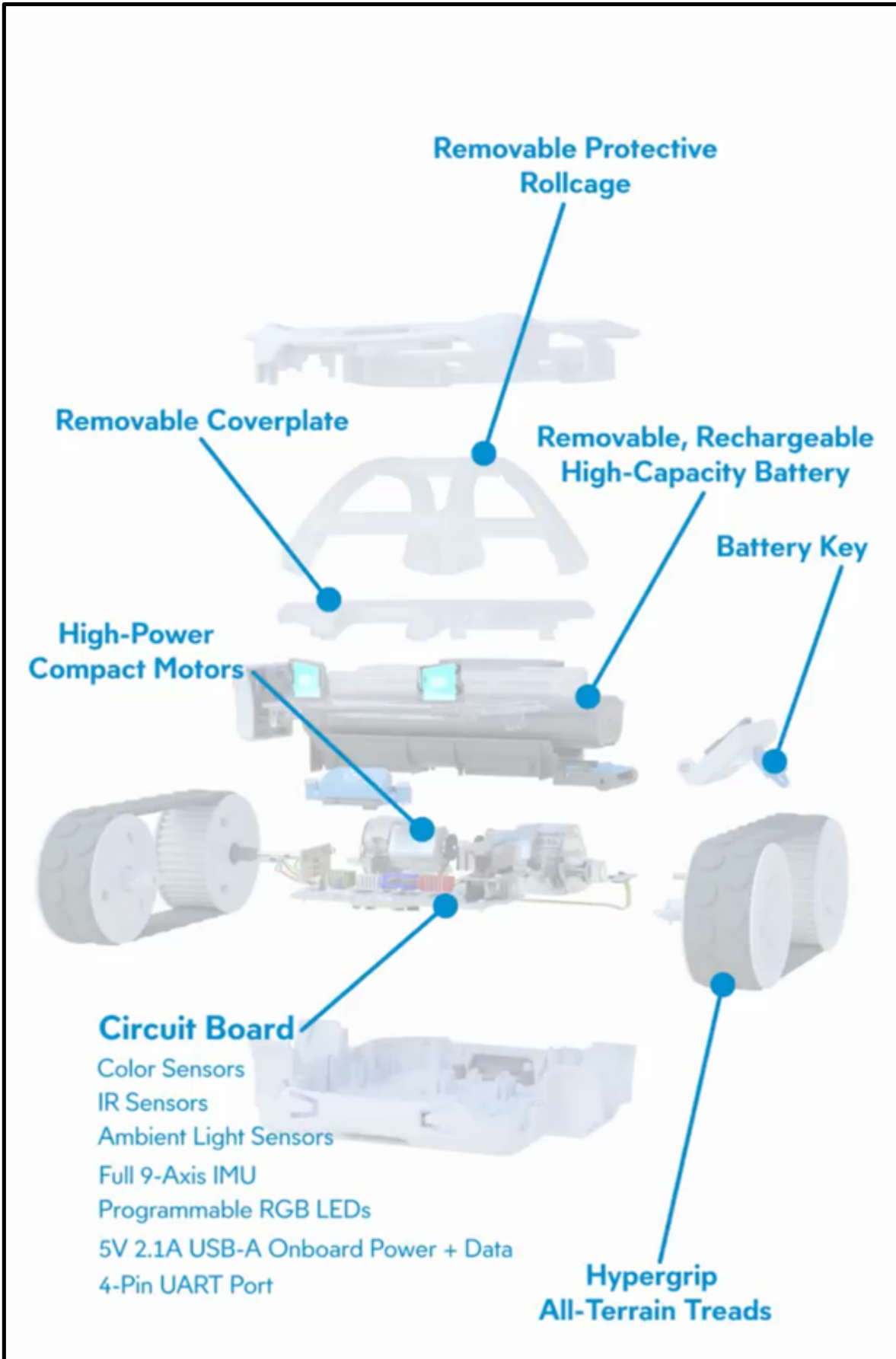
Sphero RVR schematics: Here is a detailed drawing of the Sphero RVR robot.

(animated drawing in SpheroEDU app under 3D models)

Resources for further learning:

Sphero Edu Activities: https://edu.sphero.com/cwists/category

Programming Wiki for Sphero Edu: https://sphero.docsapp.io/

Troubleshooting: https://sdk.sphero.com/docs/troubleshooting/rvr_help/

Sphero RVR Lights- What are they telling you?
https://sdk.sphero.com/docs/troubleshooting/lights_help/

Sphero Public Developers Site: https://sdk.sphero.com/

Sphero Educators Page: https://sphero.com/pages/educators
- Coding and Activities
- Professional Development
- Education Community

Sphero RVR warnings: https://support.sphero.com/article/55rqhi2yn4-sphero-rvr-warnings

Sphero RVR articles- Sphero Edu: https://support.sphero.com/category/k1q5et7w17-rvr

Sphero Teacher Resource Guide: https://tinyurl.com/synuzbf

Thingiverse Sphero RVR: https://www.thingiverse.com/Sphero/collections/sphero-rvr-projects

Frequently Asked Questions:

Is Sphero's RVR Waterproof?

No, it is not! Please don't take your new robotic friend for a swim.

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