SuGO^{tm} EV3 User Guide

Rev 1.0   1/24/2015

Welcome to the latest SuGO^{tm} software, re-designed from the ground up for the new LEGO Mindstorms EV3 Platform. It's noisy, colorful and cheeky ;)

The new SuGO^{tm} EV3 software still embodies the essential fun of SuGO, but it adds cool new features like:

- A third motor control for offensive and defensive actions (like lifts, slaps or pushes).
- Smart Opponent seeking after each bounce off the ring perimeter.
- Lots of new sounds, screen animations and LED color indicators.
- A pre-match Standby Mode for more reliable starts.
- A built-in Mechanic for faster diagnostics & setup.
- The ability to mix 'n match EV3 and NXT color/light sensors without needing to change programs.

The new software will still work with your existing stock of SuGO^{tm} Sensor Upgrade kits, as well as the color sensors that come with your EV3 Kit.   You can even download "SuGO" onto the brick as an "App" which means it's always available at the bottom of the "App" Menu tab.

Best of all, there's a new "Simple SuGObot^{tm}" design, just for the EV3, that's easier than ever to build.
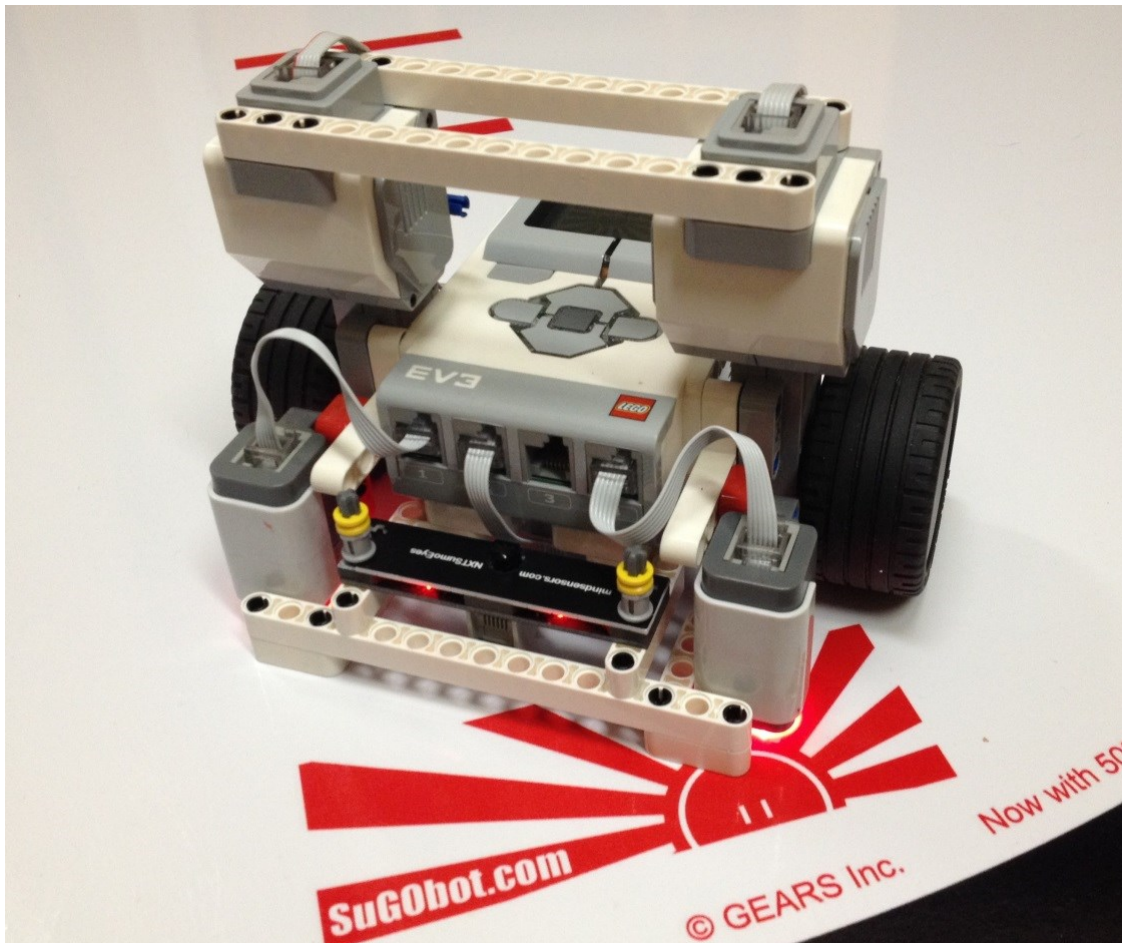
Getting Started

The SuGObot EV3 program assumes a basic robot with two drive motors, two Light/Color sensors, a "Sumo Eyes" sensor, and an optional "Slap" motor. The sensors and motors are hooked up as follows: Note: "Left" and "Right" are from the robot's Point of View:

- Right Drive Motor (Large): Port A
- Slap Motor (Medium): Port B
- Left Drive Motor (Large): Port D
- Right Line Sensor (Color/Light): Port 1
- Sumo Eyes (Mindsensors.com): Port 2
- Left Line Sensor (Color/Light): Port 4

The SuGO EV3 program can be downloaded from www.SuGObot.com. Just take the EV3 Program link from the menu at the top of every page and download the SuGObot.ev3 file to your Computer. Start the LEGO Mindstorms EV3 program and use the Open/Project menu to open the SuGO program you just downloaded. This is what you should see:
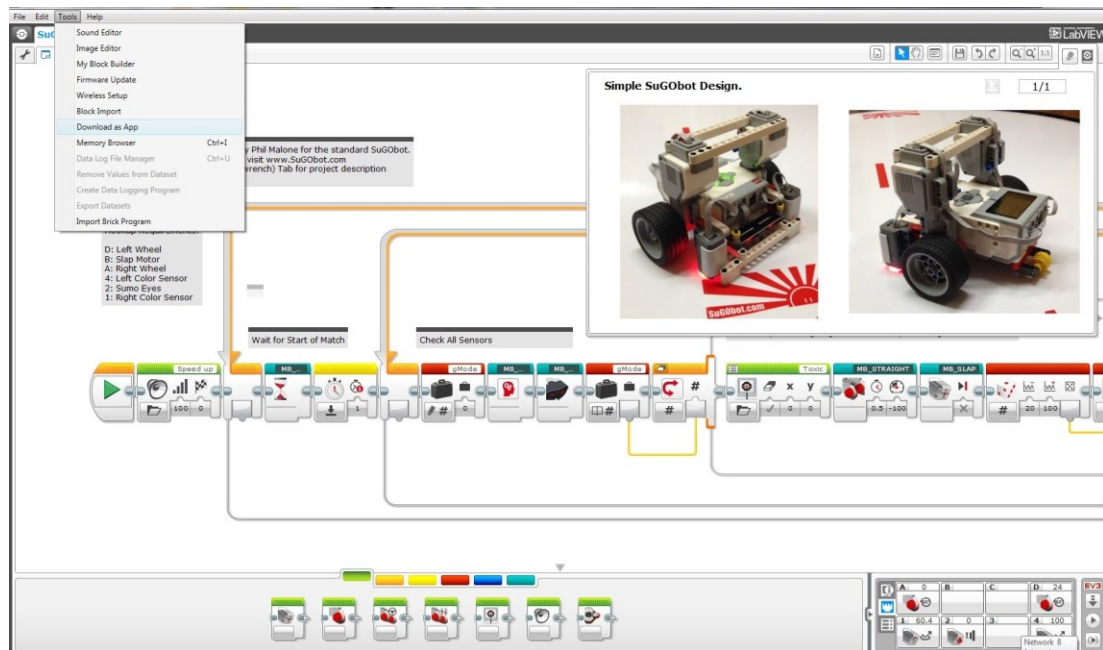
Once you connect to your Robot, you should transfer the program to your EV3 by using the "Tools/Download as App" menu item (above). This will place a "single" SuGO program on the NXT (rather than a host of programs and MyBlocks) . The SuGO program will always be located at the bottom of the "Apps" tab, which appears as the third tab on the top of the EV3 Screen.

When the **Download dialog** pops up, enter "**SuGO**" as the App name and, click Download. When the EV3 beeps completion, navigate across to the Apps tab and scroll down to verify that the SuGO program appears at the end of the list.

Running the SuGO^{tm} Program

Since the SuGO program has a new "Standby" mode, you can start the program any time, in anticipation of the next match. Just find SuGO on the App menu (see pic) and press the dark gray "Enter" button. The program will start and display the SuGO logo and Program version on the screen.

The Front Panel will start flashing Green. This is the indication that the robot is in "Standby Mode", and ready to PLAY!

At this point there are two options:

A) Press either the **top, middle or bottom button** to start a **SuGO** match,
B) Press either the **left or right side button** to start the **Mechanic**.

WARNING: In either case, it's important to place the SuGObot **down** on the white ring **befor**e making a selection, otherwise the light sensors will not be able to calibrate correctly.

A) Running a match

If one of the center buttons is pressed during Standby Mode, the SuGObot font panel will immediately change to solid Orange, and the 'bot will start a 5 Second match countdown. During the countdown, the robot will beep each second, and show animated eyes on its display.   At the end of the countdown, the robot will yell "SuGO" and start the match by moving forward.

As the SuGObot moves around the ring, the front panel indicator lights will show what the Sumo Eyes are seeing. Dark means no opponent seen. **Green** means opponent to the left, **Orange** means opponent to the right, and **Red** means opponent straight ahead. The SuGObot should turn to track the opponent, and the eyes will follow. When the opponent is directly ahead, the SuGObot increases to full speed, and the "Slap" motor will turn on to power an offensive or defensive tool.

If the robot reaches the black ring perimeter, it will back up and turn away from the nearest edge. As the robot turns, it will start searching for its opponent. If it sees the opponent before completing the rotation, it will stop and immediately move forward.

During the match, the SuGObot will create various sounds and eye animations as it changes from one movement type to another.

The program also has a deadly-embrace prevention mode. If two robots get locked together and don't change tactics for 10 seconds, the robots will back off, and execute a random turn, before re-entering combat. This action is critical for maintaining the excitement of a match.

To end a match, simply press ANY button in the central cluster. This will generate a powerdown sound, and the program will return to Standby Mode, ready for the next match.
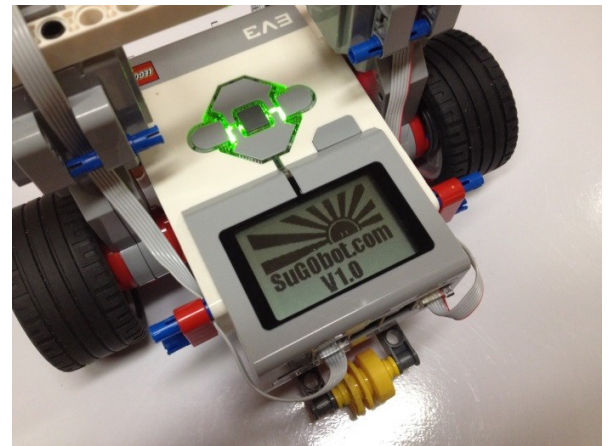
B) Running the Mechanic

If either of the side buttons is pressed in Standby Mode, the SuGObot will make an air-wrench noise, and then enter Mechanic Mode. This mode is used to test all the sensor/motor wiring, and also configure any optional SuGO modes. These modes are needed to adapt to any peculiarities of a specific SuGObot design.

Note: In the following tests: Left and Right are relative to the robot's Point of View.

Sensors:

First, the sensors should be checked. This is done by putting a suitable target in front of each sensor. Begin by pointing the SuGObot away from any obstacles. This may require that you clear a path three feet in front of the robot.

For the Sumo Eyes, place you hand approximately 1 foot directly in front of the robot. It should speak "Forward Object". If it does not, check that the eyes are firmly plugged into port 2. Next move your hand to the left until the robot speaks "Left Object". If it changes to "Right Object" then the Sumo Eyes sensor must be upside-down. Repeat the test to the right of the robot. If the robot continually reports an object, even if you have removed your hand, then it's likely that some part of the robot is blocking the Sumo Eyes sensor. Make any corrections and try again.

For the line sensors, first verify that both sensors are illuminating the ring RED. If not, verify that the cables are firmly plugged into ports 1 and 4. Once both sensors are lit, stop, and re-start the Mechanic program. Now move the robot such that the left sensor is positioned over the black perimeter. The robot should speak "Left". If it speaks "Right" then the sensor cables are reversed. Swap them either at the sensors, or the EV3. Re-run the test. Now check the Right sensor the same way.

Menu:

Next, while testing the motors you may need to reconfigure directions and speed. This is done using a menu of options presented on the EV3 screen. Each line of the display holds one menu item/option. Each option has a name, and two possible values. The Option name is on the left, and the current value for each is shown on the right. Default values are shown in CAPS and alternate values are shown in lower case.

A pointer indicates which menu item is currently being changed. The pointer is moved with the up/down buttons. The Value is changed with the Left/Right buttons.
Changes are saved automatically.

In the example shown here there are three menu items: DRV (Drive), TURN and SLAP. The current selections are:

- The SuGObot drive direction is set to the default of "FWD" (Forward).
- The Turn rate is set to the alternate value of "Slow".
- The Slap motor is set to run in the default "FWD" (Forward) direction.
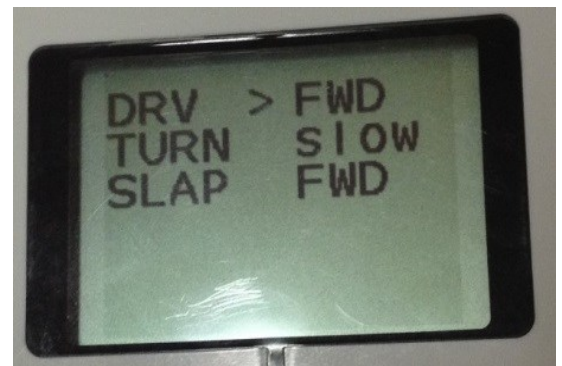
To change any selection, simply use the up/down buttons to move the pointer to the desired option, and then use the left right buttons to change the selected value.

Note: The SuGObot should be placed on a plain surface and pointed away from any obstacles prior to making these changes; otherwise the robot will be announcing a variety of other sensor values, which will complicate using the menu.

Motors:

To test the motors, simply press the center Gray button. The SuGObot will announce its action and then perform it.

1. It will announce "Forward" and move forward and back.
2. It will then announce "SuGO" and run the Slap motor.
3. Finally it will announce "Right" and then turn right and return to center.

The first action to verify is the Forward motion. If the SuGObot moves backwards, then the Drive direction must be reversed. Use the Menu to switch the value of the DRV option. Press the center button again to verify that the SuGObot moves forward correctly.

Next, if you have a medium Slap motor connected; verify that it moves in the desired direction (for maximum effect). If you need to reverse the direction of rotation, use the menu to change the value of the SLAP option.

Finally, verify that the SuGObot turns to the right first and then returns to the center. If the robot turns LEFT first it means that the motor cables are reversed, so you must swap the wires in ports A and D. Also, some robots with a very narrow wheelbase will turn very quickly. If you wish your robot to turn more slowly, set the TURN menu option to "slow". Conversely, if your robot is turning too slowly, set the menu option to "FAST".

After making changes, it's always a good idea to re-run the sensor and motor tests again, just to verify correct operation. When testing is complete, just stop the program.

Game Tips:

- Remember to start the SuGO program before the match. Flashing Green means "Standby".
- At the beginning of each match, ensure that the Panel is FLASHING GREEN.
- Click any center button to start the match. Solid ORANGE means the countdown is running.
- During gameplay, watch the Panel colors to see if the Sumo Eyes are seeing the opponent.
- Click any button to stop the match (after the 5 second countdown).
- Have FUN!!!!!