ONLINE RESOURCES

**FREE PROGRAMMING SOFTWARE**

- **ONLINE RESOURCES**
  - **Free Programming Software**

Your S3 robot contains a reprogrammable brain, the Propeller P8X32A multi-core microcontroller. We believe that having a truly programmable brain gives you the best chance to create something unique. Your S3 robot will come with lots of free programming software and programming language options. Some use pictures, some use text, all are free downloads available from our website.

**Explore tutorials and projects for the S3. You will find guides for getting started with different S3 software options, fun projects, resources for teachers, and tips especially for hackers.**

Visit [http://learn.parallax.com/S3](http://learn.parallax.com/S3) for more details.

**ONLINE COMMUNITY**

- **ONLINE RESOURCES**
  - **ONLINE COMMUNITY**

If you need help with anything, you can post questions about the S3 and any other Parallax products in the forums.

Visit [http://forums.parallax.com](http://forums.parallax.com) for more information.

**OPEN SOURCE INITIATIVE**

- **ONLINE RESOURCES**
  - **OPEN SOURCE INITIATIVE**

Source projects include hardware, programming software, and even the design of the Propeller P8X32A multi-core microcontroller itself. Visit [https://www.parallax.com/support/open-source-designs](https://www.parallax.com/support/open-source-designs) for more information.

**BATTERY USE**

- **BATTERY USE**

A rechargeable battery, Parallax part number #752-28333. This is a 3.7 V, 4000 mAh, 14.8 Wh, Prismatic LiPo battery with a JST connector.

**Warning:** Do not insert any object into sensor holes or any other part of the S3 robot case except as described in this S3 Start-Up Guide. This may damage the unit and will void the warranty.

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**Power Button**

- **BATTERY USE**

Connect the included USB cable to one of the following:

1. A computer's USB-A port
2. A wall adapter that is USB Type-A to DC 5V 1A (10W), 700mA, or equivalent

**Charging the robot**

When properly charged, the robot's solid red Charging LED will be on for approximately 20 minutes. The robot can then operate for about 4 hours. Recharge the battery if needed.

**Battery Safety**

- **BATTERY USE**

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- **Battery Safety**

The battery supply terminals are not to be short-circuited. Overcharging or using a non-rechargeable battery may cause the battery to overheat, generate smoke or even catch fire. If the battery case appears to bulge, leak, or discolored, do not use it.

**S3 Robot (part #28333)**

- **S3 ROBOT SAFETY**

**S3 Robot (part #28333)** - Please read and retain this instruction guide.

**WARRANTY**

Parallax Inc. warrants this product against defects in materials and workmanship for a period of 90 days from receipt of product. If you discover a defect, Parallax Inc. will, at its option, repair or replace the merchandise.

**Have a question? Need technical support?**

Please contact Parallax directly for help!

- **Customer Support**
  - **Phone:** 888-99-STAMP (888-997-8267)
  - **Fax:** 888-898-4580
  - **Email:** support@parallax.com
  - **Website:** [http://www.parallax.com](http://www.parallax.com/S3)

**Office hours:**

- **Monday-Friday:** 7am - 4:30pm Pacific Time Zone

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**DEMO 1: LIGHT SENSORS**

**STEP 1:** Place your S3 on the floor in a brightly lit room.

**STEP 2:** Put the power switch in the “ON” position. You will hear a song and all 3 LEDs will light up. The LEDs will be green in a bright room (and yellow in a dim room).

**STEP 3:** Cover a light sensor with your finger. An LED will turn off.

In this demo mode, the left light sensor controls the left LED, the center light sensor controls the center LED, and the right light sensor controls the right LED. Other demos will use the indicator LEDs in a different way.

**EXTRA:** You can cover the sensors with your fingers then press and release the reset button to choose Demo modes. Binary 0 (all uncovered) = Demo 1, Binary 7 (all covered) = Demo 7.

**DEMO 2: LIGHT-SEEKING BEHAVIOR**

The three light sensors can detect bright light in front of the S3 robot. One sensor looks straight ahead, the other two look 30˚ to the right and the left.

**STEP 1:** Press the reset button 2 times.

**STEP 2:** The S3 will play a short song, then drive around the room seeking the brightest light within its view.

**TRY THIS:** In a dark room, hold a flashlight at floor level facing the S3 robot. As you move the flashlight around the floor, the S3 will follow it.

**EXTRA:** If the S3 can see the object with both sensors it will play both tones and both green LEDs will turn on. The S3 can see light objects better than very dark objects, because dark objects do not reflect much infrared light.

**DEMO 3: OBJECT DETECTION**

Infrared light shines from the emitters, even though your eyes cannot see it. The S3 robot can detect the light after it reflects off an obstacle and bounces back to its infrared detector “eye.”

**STEP 1:** Press the reset button 3 times.

**STEP 2:** Place an object on the floor in front of the S3 robot. If the S3 sees the object on its right, the right LED turns on, and the speaker plays a tone. If no object is detected on the right side, the right LED turns red.

Similarly, if the S3 sees an object on its left, the left green LED turns on and the speaker plays a different tone. If no object is detected on the left side, the left LED turns red.

**EXTRA:** Battery charge changes, motors warm up, and wheel joints relax when avoiding objects.

**DEMO 4: AVOIDING OBJECTS BEHAVIOR**

**STEP 1:** Press the reset button 4 times.

**STEP 2:** The S3 robot will drive around the room, turning to avoid objects.

The S3’s rear tail wheel is a stall sensor. If it gets stalled on an object it cannot see, it will back up, turn, and try driving forward again.

**DEMO 5: LINE SENSORS**

The S3 has two pairs of infrared sensors, and detects obstacles on its side, front, and back. It can see a black line on white paper.

**STEP 1:** Print out a set of black lines from the “Tracks.pdf” (Download file from www.parallax.com/go/S3). Do not use photograph printing ink, which reflects infrared light.

**STEP 2:** Press the reset button 5 times.

**STEP 3:** Place the S3 on the paper, and move it back and forth across the black line. If the right sensor sees the line, the right green LED will light up. If the left sensor sees the line, the left green LED will light up. If both sensors see the line, both green LEDs light up. The LEDs will be red if no line is detected.

**EXTRA:** The S3 robot must be resting on the paper to see the line.

**DEMO 6: LINE FOLLOWING BEHAVIOR**

Make black lines on white paper as a track for the S3 robot to follow. Make sure the tip of the marker must touch the paper.

**STEP 1:** Print out a set of black lines from the “Tracks.pdf” (Download file from www.parallax.com/go/S3). Do not use photograph printing ink, which reflects infrared light.

**STEP 2:** Press the reset button 6 times.

**STEP 3:** Place the track on a hard floor, and then place the S3 on the track.

**STEP 4:** Listen for the beep. After a short tune the S3 turns from side to side to find the line, then starts following it. If the S3 loses the line on a tight corner, it will turn back and forth to look for it again.

**NOTE:** Just like handwriting, each S3 drawing will be recognizable but unique every time you run a program. Variations occur as battery charge changes, motors warm up, and wheel joints relax with use over time.

**EXTRA:** The S3 does best following black lines about 3/4 inch (2 cm) wide, on a white background. Line following works best when the track is placed on a hard, level surface. Carpet, felt, or other uneven surfaces may not work well. A dark surface may show through thin paper and make the line harder for the S3 to see.

In this demo the S3 will use the infrared light emitter and detectors and stall sensors to detect obstacles.

**STEP 1:** Press the reset button 8 times.

**STEP 2:** The S3 robot drives around blaring its “siren” and flashing its lights, while avoiding walls and obstacles.

**DEMO 7: SCRIBBLE BEHAVIOR**

**STEP 1:** Place paper on the floor, and then place the S3 robot on the paper.

**STEP 2:** Place a Sharpie® marker in the pen port.

The tip of the marker must touch the paper. Always protect surfaces with paper or poster board when using a marker or any other writing instrument in your S3. Be aware that some markers can bleed through paper and stain the surface beneath, so test first.

**STEP 3:** Press the reset button 7 times.

**STEP 4:** Listen for the beep. After a short tune the S3 moves back and forth while avoiding side-to-side, front-to-back while avoiding obstacles.

**STEP 5:** Pick up the S3 and put it down on another part of the paper. Then it will draw a box.

**DEMO 8: AMBULANCE BEHAVIOR**

**STEP 1:** Press the reset button 8 times.

**STEP 2:** The S3 robot drives around blaring its “siren” and flashing its lights, while avoiding walls and obstacles.

The S3 robot drives around blaring its “siren” and flashing its lights, while avoiding walls and obstacles.