



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

WARRANTY

#125-28333 - Rev 062016

- Office phone number: (916) 624-8333
- Toll free technical support (in the U.S.): 888-99-STAMP
- Web site: www.parallax.com/S3 Email: support@parallax.com

Please contact Parallax directly for help!

BOTTOM VIEW

S3 ROBOT PRODUCT INFO

an S3 robot, after reading and understanding all the detailed information The S3 robot is not a toy. This product has moving parts and accessible 53 Robot (Part #28333) - Please read and retain this instruction booklet.

.52/moo.xellareq.www.mont eldelieve electronic components. Only skilled experimenters should customize or hack

contents

(\T000-208#) able (#805-00017) 53 Robot (fully assembled), 53 LiPo Battery (#752-28333), 53 Programming/

Battery Into

short-circuit protection. RCY connector and built in PCM providing overcurrent, overdischarge, and TCL a Mith a 3.7 V, 4000 mAh, 14.8 Wh, Prismatic LiPo battery with a JT The S3 robot includes a rechargeable battery, Parallax part number #752-

FCC Notice

more of the following measures: and on, the user is encouraged to try to correct the interference by one or television reception, which can be determined by turning the equipment off installation. If this equipment does cause harmful interference to radio or However, there is no guarantee that interference will not occur in a particular the instructions, may cause harmful interference to radio communications. radio frequency energy and, if not installed and used in accordance with a residential installation. This equipment generates, uses, and can radiate designed to provide reasonable protection against harmful interference in class B digital device, pursuant to Part 15 of the FCC Rules. These limits are I his equipment has been tested and tound to comply with the limits for a

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that
- to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

where you purchased your product. about where you can drop off your waste for recycling, please contact your local authority, or recycled in a manner that protects human health and the environment. For more information equipment at the time of disposal will help conserve natural resources and ensure that it is electrical and electronic equipment. The separate collection and recycling of your waste equipment by handing it over to a designated collection point for the recycling of waste with your other household waste. Instead, it is your responsibility to dispose of your waste This symbol on the S3 or its packaging indicates that this product must not be disposed of

ONLINE RESOURCES

Free Programming Software

text, all are tree downloads available trom www.parallax.com/s3. software and programming language options. Some use pictures, some use core microcontroller. You can write your own 53 programs with several Your S3 robot contains a reprogrammable brain, the Propeller P8X32A multi-

TOP VIEW

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S3 Tutorials and Projects

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

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Viinnmmo

light sensor

pen port

speaker

power LED link = low battery

power buttor

charging LED

solid red = charging blink blue/red = charge faul

programming/charging port (micro USB)

http://forums.parallax.com show of your hacks, and get help from experienced Propeller programmers. The Parallax Forum community is a great place to share your 53 projects,

Open Source Initiative

https://www.parallax.com/support/open-source-designs design of the Propeller P8X32A multi-core microcontroller itself. source projects include hardware, programming software, and even the The S3 Robot is a project of the Parallax Open Source Initiative. Our open-

See the S3 Open Source Design Files for specific licensing details.



infrared emitters

infrared detecto

bi-color indicator LED lights

reset buttor

USB TX/RX bi-color LED

hacker port

*HACKER PORT

The Hacker Port lets you customize your S3 robot! These pins can connect optional sensors and other accessories to the S3's Propeller microcontroller brain. For information and ideas, visit http://learn.parallax.com/S3



WARNING: Do not insert any object into sensor

damage the unit and will void the warranty.

holes or any other part of the S3 robot case except as described in this S3 Start-Up Guide. This may



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Parallax Inc. warrants its products 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

• Toll free sales and information (in the U.S.): 888-512-1024

HAVE A QUESTION? NEED TECHNICAL SUPPORT?

S3 ROBOT SAFETY

Kattery Safety

battery cover latches

- Only use the Parallax S3 Programming/Charging Cable included with Only use the Parallax S3 Battery included with your S3 robot.
- is bulging, leaking, or discolored, stop and do not use the battery. open the battery hatch and check the condition of the battery. If it Before connecting your robot to a computer or charger each time, your 53 robot.
- Recharge the battery only as described in the Battery Charging Parallax Tech Support. Immediately place battery outside in a freproof container. Contact
- If battery fault occurs as described in the Battery Charging section, section. Do not use other types of hobby battery rechargers.
- Only adults should install and replace batteries. contact Parallax Tech Support.
- Dispose of batteries safely, following your local ordinances for LiPo • The battery supply terminals are not to be short-circuited.
- .endxs ven battery recycling or disposal. Do not dispose of the battery in a fire; it

moving wheels of robot. Caution: Hair entanglement hazard. Keep hair from coming in contact with



Open-source and user-hackable

Scribbler[®] 3 Start-Up Guide



ΒΑΤΤΕ ΑΥ

noitelleten

- bottom side up. other non-scratching surface, 1. Place the S3 on a towel, other
- then lift the battery cover up. down toward the tail wheel, and pulling the battery cover latches 2. Remove the battery cover by
- ·də1s the battery, and then contact Parallax Tech Support. Otherwise, go to the next 3. Look at the battery. If it is bulging, leaking, or discolored, stop and do not use
- nserts one way. partment, sliding the ends together until they click into place. The plug only 4. Connect the cable on the S3 battery to the connector inside the battery com-
- 5. Replace the battery cover.
- not completely plugged in). LED will slowly blink. If it is off, the battery may be completely discharged (or battery voltage is okay, it will be solid blue. If the battery voltage is low, the 6. Turn the robot over and look for the lower-right power indicator LED. If the
- Recharge the battery if needed.

Brighed

- LED (above the Power Button on the right) will turn off. Turn off the robot by holding down the Power Button for two seconds. The Power
- 2. Connect the included USB cable to one of the following:
- A standard USB wall adapter, up to 2 A maximum charging current
- A USB port on a computer
- Charging the robot may take 2 to 3 hours with a 10 W USB wall adapter, or 8-10 3. Connect the S3 robot to the USB cable.
- hours via a computer port or 2.5 W USB wall adapter.
- Observe the Charging LED (to the right of the USB port).
- Solid blue = power is on
- Solid blue = fully charged Solid red = charging
- Battery may be disconnected or not plugged in completely. Unplug USB • Blinking red/blue = charging fault. Check the following:
- Battery may be defective. Unplug the USB cable and battery, the Installation Instructions above. cable and the battery connector, wait a few minutes, and then repeat
- and contact Parallax Tech Support.



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 5: LINE SENSORS





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

Create your own tracks using a flat black electrical tape or by making a black line 3/4" (2 cm) wide, on white 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 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 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.



DEMO 6: LINE FOLLOWING



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!

Or draw your own tracks by making a black line ¾ inch (2 cm) wide, on white paper. To do this you will need: white paper, and a black marker. 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 2: Place the track on a hard floor, and then place the S3 on the track.

STEP 3: Press the reset button 6 times.

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.





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: 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 7: SCRIBBLE BEHAVIOR



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 other writing instrument in your S3. Be aware that some markers can bleed through paper and stain the surface beneath. Test first.

STEP 3: Press the reset button 7 times.

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



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, tile, 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.





Find white pape or poster board and a marker



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





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 get stalled on an object it cannot see, it will back up, turn, and try driving forward again.





DEMO 8: AMBULANCE **BEHAVIOR**

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.



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