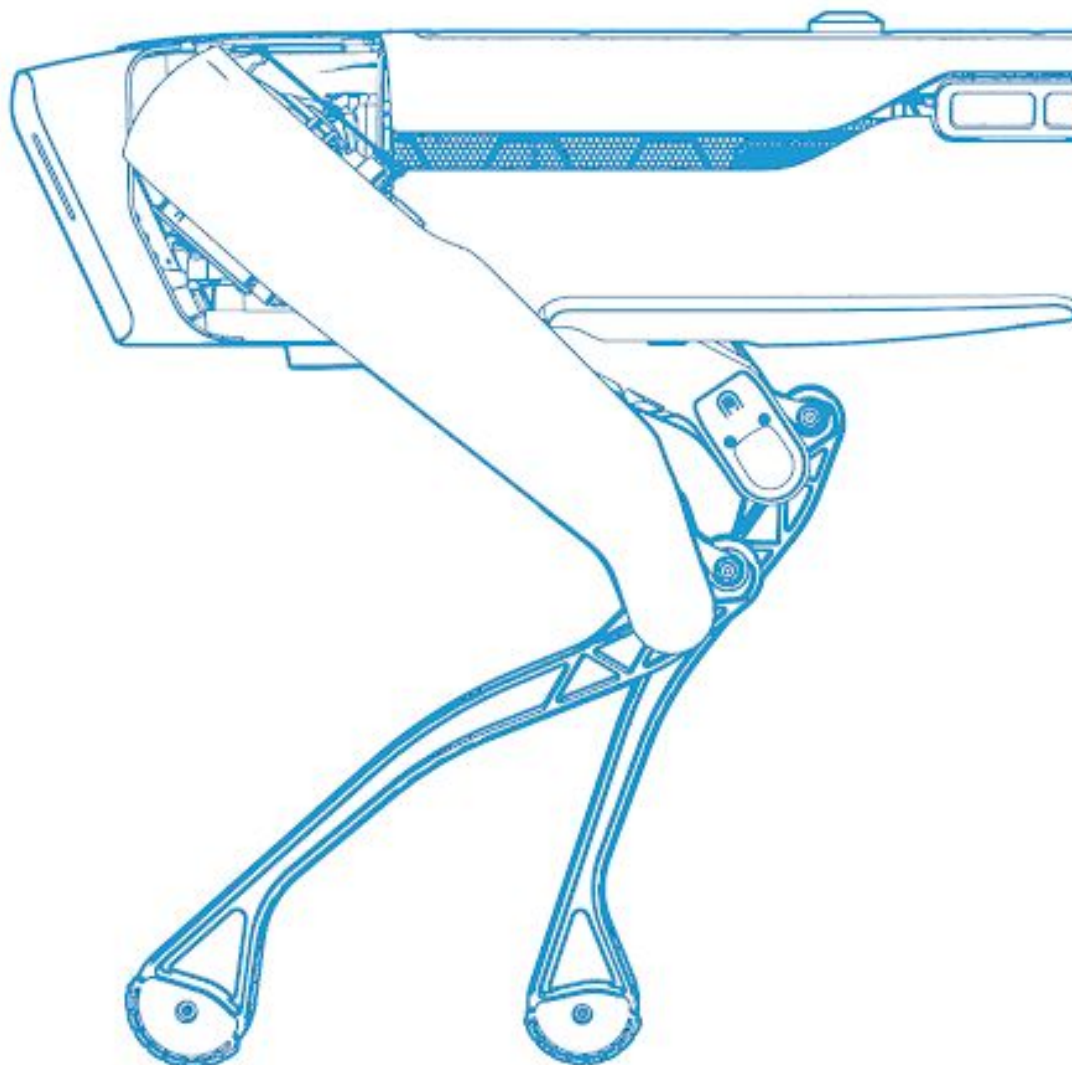


# SPOT SYSTEM ADMINISTRATION

SPOT 2.0.1



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D-0023-2.0.1

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## INTRODUCTION

Spot system administrators carry out software updates, configure network settings, and perform routine maintenance for Spot robots. Tools for recalibrating aspects of the robot's mobility and perception systems are available for administrators to use to help keep the robot operating as designed.

The primary tools available to the robot administrator include:

- The robot's web-based admin console
- SpotCheck diagnostic and calibration tools using the tablet controller

## ADMIN CONSOLE

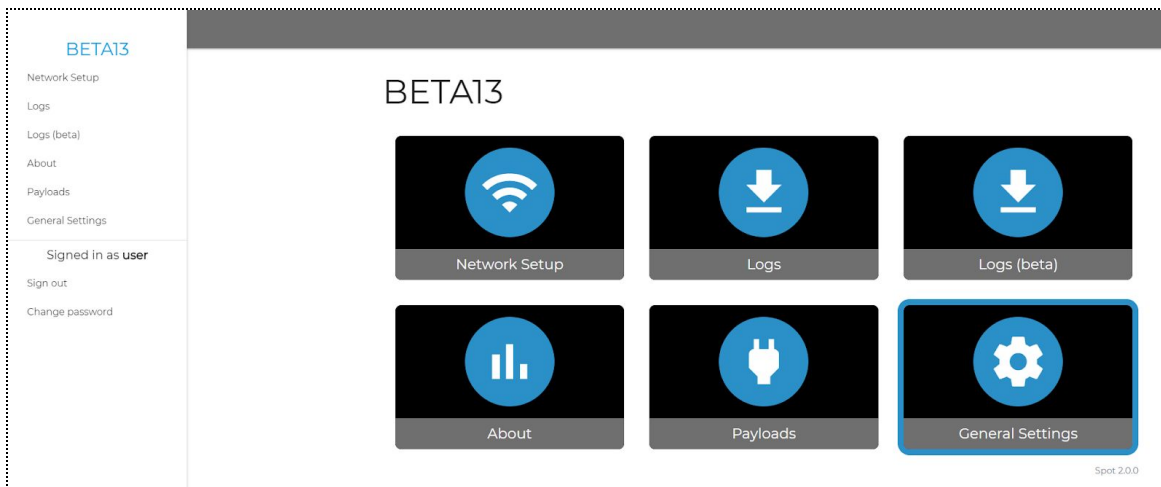
Spot robots are equipped with a web server that provides access to an administrative console that can be accessed by robot operators and administrators.

Robot admins use the console to perform software updates, manage users and accounts, configure network settings, and configure payloads.

The admin console provides access to a range of configuration options, including:

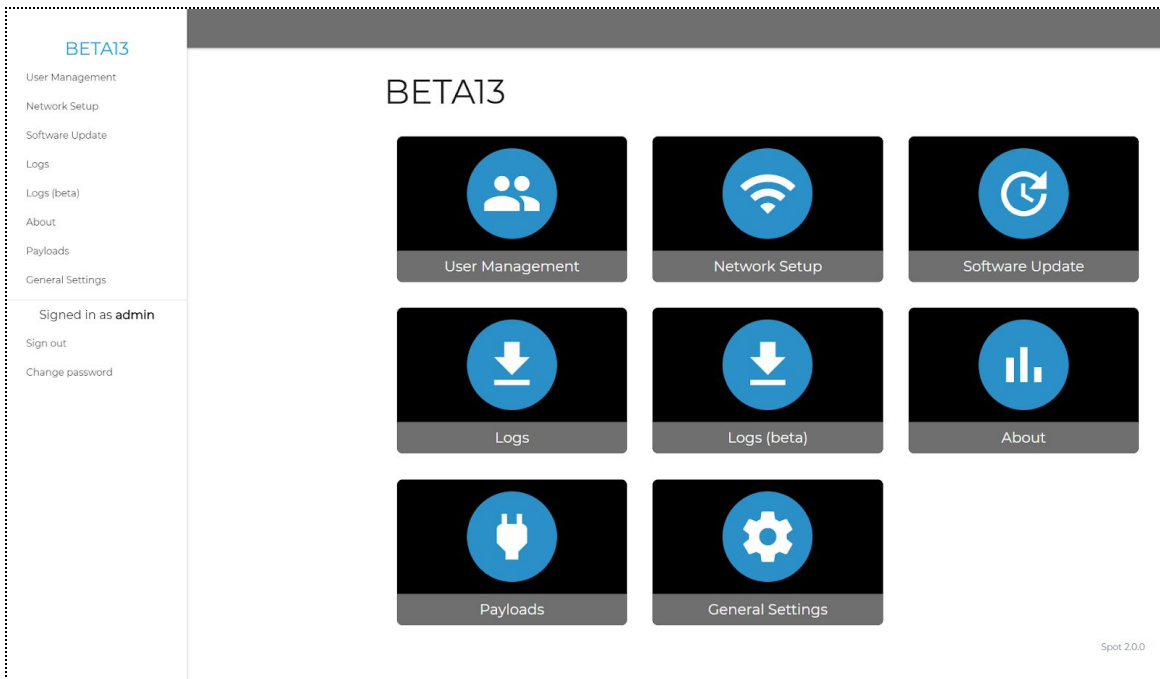
- Payload configurations
- Network settings
- User & account management
- Logs
- Software updates

Operators have access to a subset of these functions.



Robot administrators have access to additional features in the the admin console:

- User management
- Software update



## ADMIN CONSOLE SECTIONS

User management*	Create and manage operator and admin accounts.
Network setup	Configure robot wifi and ethernet settings.
Software update*	Review current software version information. Upload and install new robot software and monitor update progress.
Logs	Review and download log data. Review time stamped operational comments.
About	Rename the robot, review software version, check cumulative runtime data. Legal information.
Payloads	Add and configure new payloads and review payload settings.
General settings	Enable/disable privacy mode to stop data capture by the robot.  Configure fiducial image size and applicable ranges.

\*Admin users only

Default user and admin credentials are printed on a label in the robot's battery compartment.

Note: Boston Dynamics recommends changing the robot's default passwords.

## ACCESSING THE ADMIN CONSOLE

Use the admin console to configure Spot's network:

- **Wired:** Spot can connect to a wired network through ethernet. Change default settings as needed to allow Spot to operate on an existing wired network.
- **Hosted WiFi (default):** Spot broadcasts its own wireless network. Best for short distances between the controller (or control computer) and robot.
- **Shared WiFi:** Spot can join an existing wireless network such as the company network.

NOTE: Operators are responsible for Spot's network security. Place Spot behind a firewall, preferably on a private network.

The Spot robot's default usernames and passwords are printed on a label in the battery compartment.

Note: These instructions only apply if the robot's default network settings have not been changed.

1. Power on the robot.
2. Connect the Spot robot to your network using wifi or an ethernet cable from Spot to your computer.
3. Configure a static IP address for your computer to use an address within the range 10.0.0.\*
4. By default, the Spot robot IP address is 10.0.0.3. If you have more than one Spot robot, use the admin console to change the default IP of additional robots to avoid address conflicts.
5. Open the admin console page referencing the robot IP address. For example:  
`https://10.0.0.3`
6. Enter a valid admin or operator username and password.

# NETWORK SETUP

The Spot Robot is designed to operate in a variety of environments and conditions. As a result, communications requirements will differ as well. Matching communications with environmental other requirements is essential to successful robot operations.

The Spot robot is designed to be comms agnostic. We've performed testing with the following:

- Ethernet
- Wfi
- LTE (additional hardware required)
- Mesh radio (additional hardware required)

Whatever communications technology is chosen, the following minimum networking conditions must be met for the robot to function.

<p>&lt; 300ms latency - teleoperation only</p>	<p>The robot is designed to accept and execute control commands within a 300ms time span.</p> <p>If there are multiple nodes covering an operating environment (any wireless network where the robot roams between more than one access point) and the radio takes more than 300ms to swap from one node to the next, the robot performance will be noticeably affected.</p>
<p>Capable of at least 5Mbps bandwidth</p>	<p>The robot automatically throttles data transmission when bandwidth drops below 5Mbps.</p> <p>It is possible to lose connection with the robot's emergency stop function under these conditions, which will cause the robot to immediately stop, sit, and shut down its motors.</p>

## ETHERNET

A wired connection should be used for updating robot software, accessing logs, and modifying network settings.

When uploading audio files to a Spot robot equipped with a Spot CAM payload, a wired connection is also recommended.

NOTE: These instructions only apply if the robot's default wired network settings have not been changed

1. Connect an ethernet cable from Spot to a computer.
2. Manually set the computer IP address. Spot's default requirements for a computer's IP address is in the range of 10.0.0.\* (For example, 10.0.0.100).
3. Apply settings.
4. Use a web browser to navigate to Spot's static IP address. The factory default address is: `https://10.0.0.3`
5. The login page for the console should appear. If it does not, check the laptop's network settings before contacting support.
6. Log in with default username and password.

## CONNECTING SPOT TO A SHARED WIFI NETWORK

NOTE: Settings in advanced sections should be modified by users with experience in networking and system administration.

Spot wifi operates only at 2.4GHz.

This is useful for joining company or site-specific WiFi networks, for example, when operating Spot around a large office building. If using a controller to operate a robot on a shared WiFi network, be sure to also configure the controller to join that network.

On a computer:

1. Connect to the admin console over ethernet.
2. Go to the Network page.
3. Switch robot to "client" mode.
4. Enter network name and password for the desired network.
5. Enter desired static IP address for robot. IP address must be valid on the network.
6. Apply settings.
7. A green confirmation box at the top of the page should appear indicating that settings have applied.
8. Spot's WiFi access point will no longer be available.



On the controller:

1. On the Select Network page, join the desired WiFi network.
2. Click Add robot by IP address and enter robot's static IP address.

## SWITCHING TO HOSTED WIFI

This is necessary if you have modified the robot's settings to join a shared WiFi network and now want to change it back to broadcasting an access point. This is useful if operating a robot away from the company network.

On a computer:

1. Connect to the admin console.
2. Go to the Network page.
3. Switch the robot to Access Point mode.
4. Apply settings.

On the controller Select network page, join Spot's hosted WiFi network.

## CONNECTING TO SPOT DIRECTLY

A computer can be connected directly to the robot's WiFi access point. To connect to a robot that has default factory settings:

1. Join Spot's hosted WiFi network.
2. The robot WiFi network will automatically assign the computer an IP address. Make sure the computer is configured to use DHCP for this WiFi network.
3. Use a web browser to navigate to Spot's IP address: <https://192.168.80.3>
4. The login page for the console should appear. If it does not, check the computer's network settings before contacting support.
5. Log in with the default username and password.

# SETTING UP MULTICAST DNS

Spot v2.0 includes support for multicast DNS (mDNS). This enables users to access a robot's admin console using the robot's name in the browser URL instead of the robot's IP number.

For example, to open the URL for a robot named "spot\_1:"

```
https://spot_1.local
```

mDNS is supported natively on Windows 10 and macOS.

## CONFIGURE THE ROBOT

Update the robot's network settings to use mDNS.

1. Access the robot's admin console.
2. Open the Network section in the admin console.
3. Configure a static IP address for the robot.
4. Click save and exit.

## INSTALL MDNS ON LINUX

To install mDNS on Linux:

1. Get the packages.  

```
sudo apt-get install avahi-daemon libnss-mdns
```
2. Edit the hosts line in: `/etc/nsswitch.conf` as follows:  

```
hosts:          files mdns4_minimal [NOTFOUND=return] dns
```

This tells the laptop to look first at the hosts file, then at mDNS.

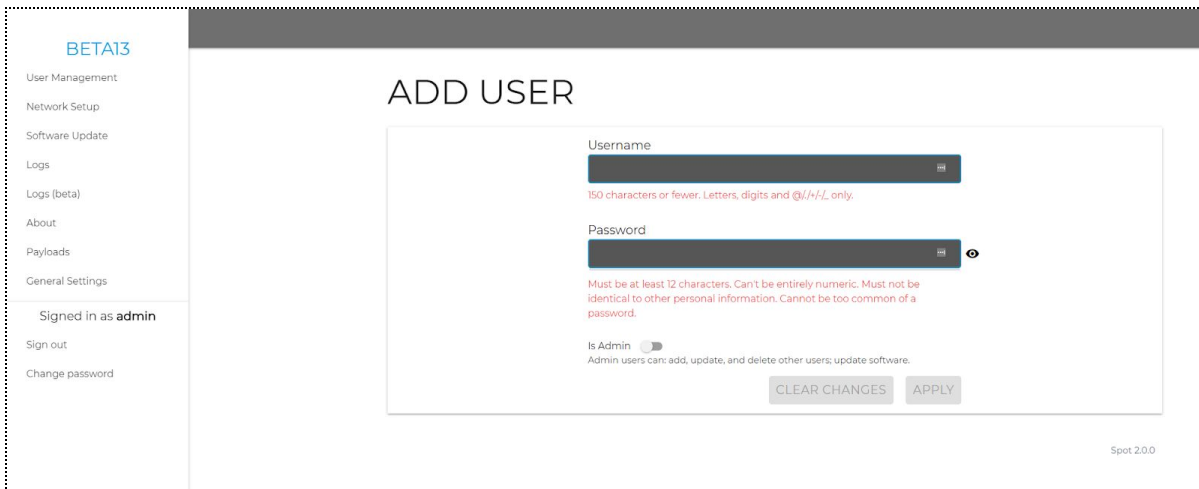
## CONNECTING TO THE SPOT API WITH MDNS

Developers creating client software for the Spot robot must set the `GRPC_DNS_RESOLVER` environment variable to "native" to access robot services. For example:

```
GRPC_DNS_RESOLVER=native python3 -m bosdyn.client --verbose <nickname>.local id
```

# USERS AND ACCOUNTS

The robot administrator is responsible for changing the robot’s passwords, updating software, and managing the user accounts associated with the robot.



## PERMISSIONS

- User: A user can drive the robot.
- Admin: An admin has all user rights and can also update software and modify the users associated with the robot.

## CHANGING DEFAULT PASSWORDS

Spot ships with default passwords for admin and user accounts. Change these passwords during robot setup.

## ADDING USERS

Each operator should have an individual user account defined on the Spot robot. Accounts can be managed through the admin console by a user with admin privileges.

## MANAGING LICENSES

The Spot robot requires a software license to operate. By default, licenses are valid for one year.

To obtain a new license file, contact Boston Dynamics Support to get a download link.

The robot's admin console provides information about the robot's license status and a means for uploading a new license.

### ABOUT SPOT LICENSES

The Spot license is a binary file that you upload to the robot using the web admin console. You update your license separately from the robot's software.

Some capabilities for the Spot robot are available only with specific licenses. These capabilities may be premium features or special Beta features provided for initial evaluation. The capabilities available in a given license are displayed on the Spot License webpage.

### Spot License section of the admin console

The **Spot license** section of the admin console provides the following details and options:

- Current license status, robot serial number, and license ID
- Valid license period
- Robot time
- License-enabled robot features
- Option to install a new license

License ID	168da9ca-cab4-44fe-b91c-c7ec0ae9ad90
Robot Serial Number	beta-BD-91750004
Status	VALID
License expires on	2020-09-12T08:40:00Z
License not valid before	2020-05-19T20:26:40Z
Robot time	2020-06-11T21:06:37Z
License features	<ul style="list-style-type: none"> <li>Model: Enterprise</li> <li>Support Maps &gt;500 Waypoints</li> <li>Opt-Out of Metrics Collection</li> </ul>

### INSTALL NEW LICENSE FILE

Drag and drop a license file here, or click 'Choose File' and select your license in the browser.

[CHOOSE FILE](#)

---

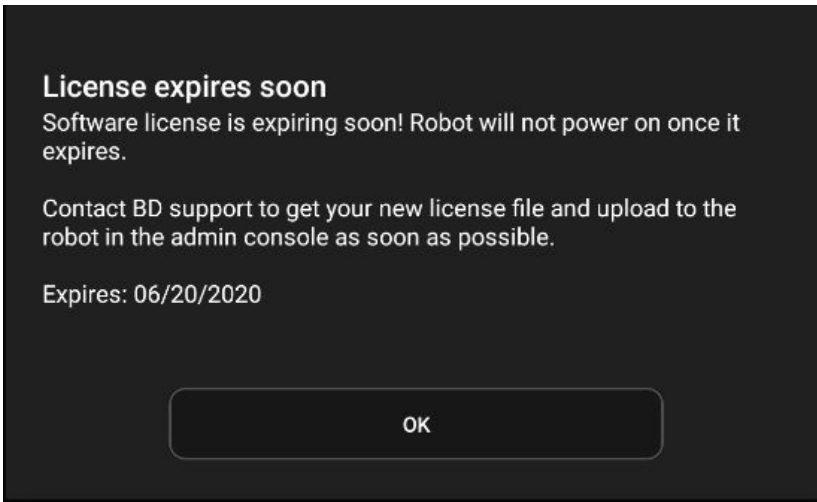
File Size 0

[UPLOAD](#)

Any user can view license information. Only admin users can update a license.

### Expiring license message on the tablet controller

When your robot license nears its expiration date, the controller tablet displays a warning when you log in. The warning appears two weeks before the license expires.



Once the license has expired, the robot will no longer power on. You can still access the web console, run software against the API, view the payload, and connect the tablet. However, the robot itself cannot be operated until the license is refreshed.

All robots shipping from the factory have a one year license period by default.

### New with Spot version 2.0.1

When you update your robot to version 2.0.1, your initial license is automatically created. It is valid for one year as an Explorer Model Spot robot. This license gives your robot all the capabilities you had before upgrading to version 2.0.1.

Note that reverting from a later release back to 2.0.1 will not extend the period of the initial license.

### LICENSE TYPES

Type	Description
Explorer	Autowalk map creation and replay limited to 1km total map size Default metrics collection enabled
Enterprise	Autowalk map creation and replay of maps larger than 1km Opt out of metrics collection

Total map size refers to the sum of all edge lengths within the map.

## LICENSE DETAILS ON THE ADMIN CONSOLE

The Spot License section of the admin console shows the following information about your robot's license:

Item	Description
License ID	A unique ID corresponding to the installed license. Used by Boston Dynamics Support to identify the installed license.
Robot Serial Number	Each license will authorize a single robot, identified by the robot's unique serial number.
Status	STATUS_VALID if the license is up to date. The robot can be operated normally. STATUS_INVALID if the license has expired or invalidated for other reasons.
License expires on	Date and time of license expiration. All times are relative to the robot's time, which is shown in the <b>Robot time</b> section. Note that the built-in clock may not match wall time. These times display in UTC.
License not valid before	Licenses cannot be used prior to their initial creation. If the Robot time is before this date, the license will be considered invalid. If this happens, please contact Boston Dynamics Support.
Robot time	The robot's date and time setting.
License features	Robot features associated with the robot's license.

### Expiring license message in the admin console

If the robot's license has expired, a warning message appears in the Spot License section of the admin console page:

## SPOT LICENSE

All Spot robots require an active license in order to operate. This page provides information about the license installed on this robot. You can also upload a new license. Some features require special licenses to access. For questions, please contact [support@bostondynamics.com](mailto:support@bostondynamics.com).

### Robot License is Expired!

Robot motor power on is disabled. Please contact [support@bostondynamics.com](mailto:support@bostondynamics.com) to obtain a new license.

License ID	415234923
Robot Model	Enterprise Spot
License expires at	Sat Dec 08 17:41:19 2021 -0500
License issued at	Sat Dec 08 17:41:19 2020 -0500

### Robot metrics collection

Spot 2.0.1 collects basic metrics about how the robot operates. The Enterprise Spot licenses allow users to opt out of this metrics collection. Please refer to Spot documentation about metrics collection and for more information the data that is collected, and for details about opting out.

### OBTAINING AND INSTALLING A LICENSE

Only admin users can upload and install a license.

To install a new license, first contact Boston Dynamics Support to download a new license file. Once you have the license file, follow these steps:

1. Log in to the admin console with administrator credentials.
2. Open the admin console > Spot License page.
3. At the bottom of the page in the section to install a new license, select **CHOOSE FILE**.
4. Select and upload the license file you downloaded.
5. When the upload completes, a message indicates a successful operation and the robot's new license information is shown.
6. Reboot the robot to activate the new license.



License ID	168da9ca-cab4-44fe-b91c-c7ec0ae9ad90
Robot Serial Number	beta-BD-91750004
Status	VALID
License expires on	2020-09-12T08:40:00Z
License not valid before	2020-05-19T20:26:40Z
Robot time	2020-06-11T21:06:37Z
License features	<ul style="list-style-type: none"> <li>Model: Enterprise</li> <li>Support Maps &gt;500 Waypoints</li> <li>Opt-Out of Metrics Collection</li> </ul>

## INSTALL NEW LICENSE FILE

Drag and drop a license file here, or click 'Choose File' and select your license in the browser.

CHOOSE FILE

File Size 0

UPLOAD

If the license uploaded is not from Boston Dynamics, does not correspond to your robot, or is invalid or out of date, an error message is displayed. The license will not be installed and any previous valid license will be retained.

Note: If you have multiple license files, you can freely switch between them. Nothing prevents the installation of an older license file so long as that file is still valid.

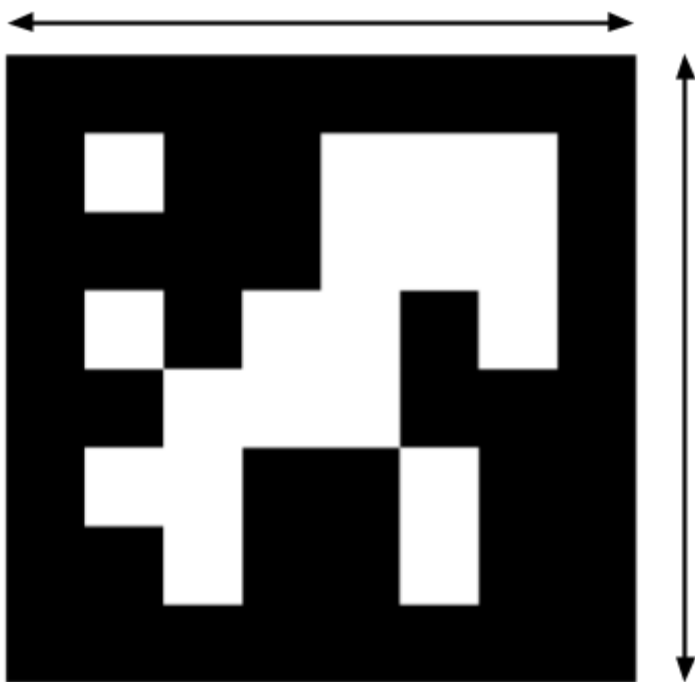
## SPECIFYING FIDUCIAL SIZE

With Spot v2.0.1, you have the option to specify the dimensions of the fiducials for Spot to use to record and play back Autowalk missions.

You can define a custom dimension for a range of AprilTag fiducials. For example, you may want the robot to use fiducials 200-250 at 146mm square and fiducials 251-276 at 200mm square.

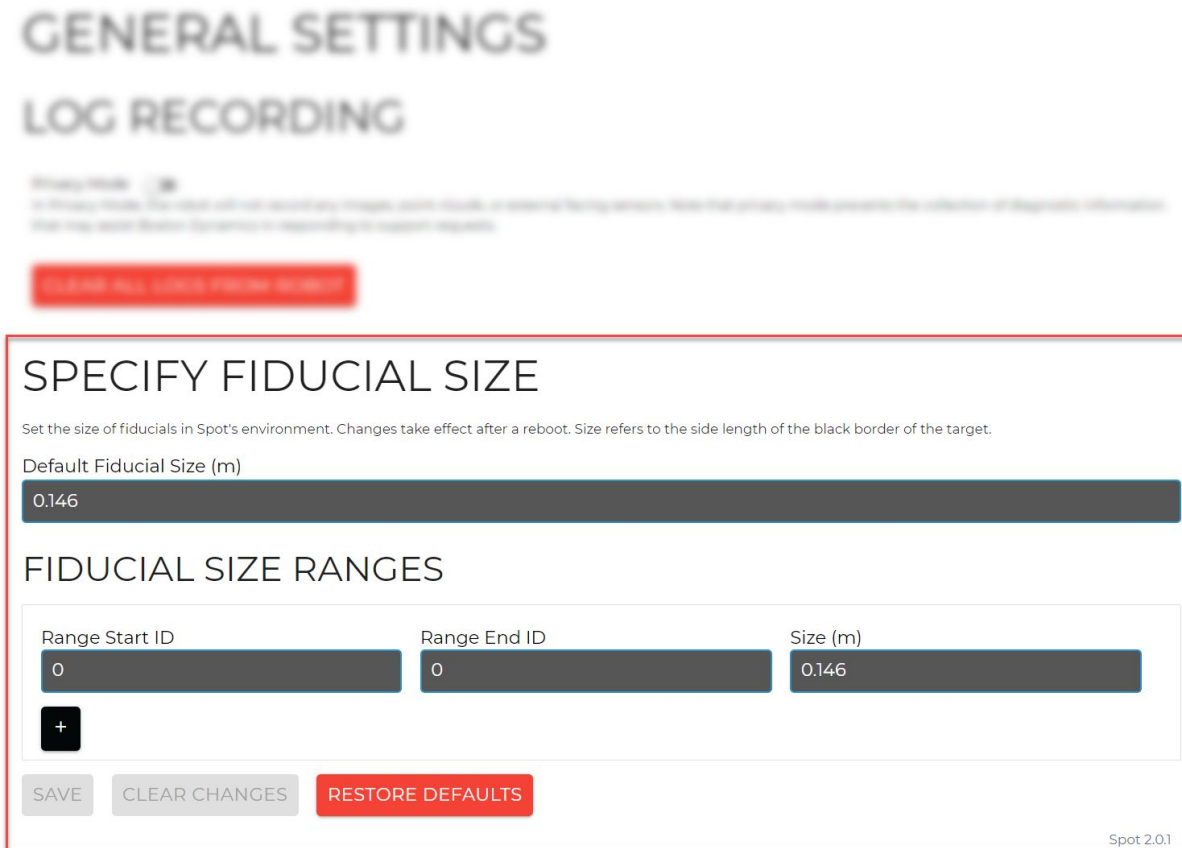
By default, Spot uses fiducial images of 146 mm x 146 mm square.

Note that the dimension of a fiducial image refers to the dimension of the fiducial image itself and not the sheet it may be printed on.



## CONFIGURING FIDUCIAL SIZES AND RANGES

1. Open the robot's admin console and navigate to the Specify Fiducial Size section of the General Settings page:



**GENERAL SETTINGS**

**LOG RECORDING**

**SPECIFY FIDUCIAL SIZE**

Set the size of fiducials in Spot's environment. Changes take effect after a reboot. Size refers to the side length of the black border of the target.

Default Fiducial Size (m)

0.146

**FIDUCIAL SIZE RANGES**

Range Start ID	Range End ID	Size (m)
0	0	0.146

+

SAVE CLEAR CHANGES RESTORE DEFAULTS

Spot 2.0.1

2. Edit the start and end range fiducial IDs, if needed.
3. Specify the default fiducial size in meters.
4. Click Save and then reboot the robot to apply these changes.

To add another fiducial range and size configuration, click the plus sign.

## SOFTWARE UPDATES

The robot's key software systems must be running the same version of software. When updating the robot's software the following components must also be updated:

- The robot's software
- The tablet controller app
- The Spot SDK
- Spot CAM (if present)
- Spot CORE (if present)

### UPDATING ROBOT SOFTWARE

Updated software for the Spot robot is downloaded from Boston Dynamics to a computer and then uploaded from the computer to the Spot robot. A link to the robot software update is emailed by Boston Dynamics.

1. Download the .BDE file for the latest release by following the link provided by Boston Dynamics.
2. Power on Spot and plug it into shore power.
3. Connect your computer to Spot via Ethernet and log into the admin console as an administrator. The default URL for the robot interface is <https://10.0.0.3/>.
4. Navigate to the Software Update page.
5. Upload and install the .BDE file using the buttons on the page.

### UPDATING CONTROLLER SOFTWARE

Updates to the robot controller software are managed by App Center. If you have not received an App Center invitation from Boston Dynamics, please email [support@bostondynamics.com](mailto:support@bostondynamics.com) to request one.

Create an account (first time setup):

1. Open the email from Boston Dynamics (via App Center) and click **Show Invitation**.
2. Register for a new account or sign in to an existing account.
3. When prompted to register the device, tap **Skip step** in the popup window that appears.

Update the controller:

1. Connect the tablet to the Internet.
2. Open the App Center and sign in.
3. Tap Spot Controller.
4. Download the latest release (2.0) and allow App Center to complete the installation process.

## UPDATING THE SPOT ROBOT SDK

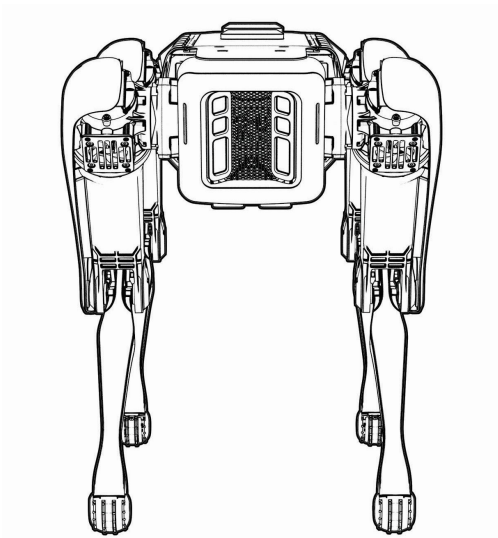
1. Access the spot-sdk GitHub repo at:  
<https://github.com/boston-dynamics/spot-sdk>
2. If you haven't already cloned the repo you can do a local git clone using SSH or HTTPS, depending on how your GitHub account is configured:  
SSH:  
`git clone git@github.com:boston-dynamics/spot-sdk.git`  
HTTPS:  
`git clone https://github.com/boston-dynamics/spot-sdk.git`
2. If you have already cloned the directory, run `git fetch` to grab any recent changes.
3. The 2.0 release is indicated by the `v2.0` tag. Do `git checkout` or `git reset` to get the repo to that state.
4. If you just want the files, go to:  
<https://github.com/boston-dynamics/spot-sdk/releases>
5. Select a `.zip` or `.tar.gz` download file for the latest release.

# ROBOT MAINTENANCE

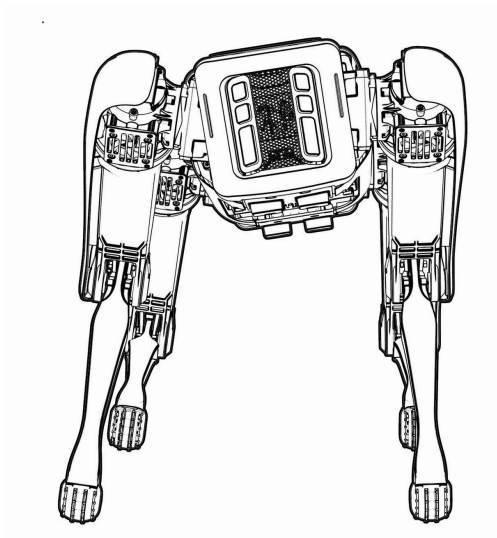
## PHYSICAL INSPECTION

Inspect Spot before use:

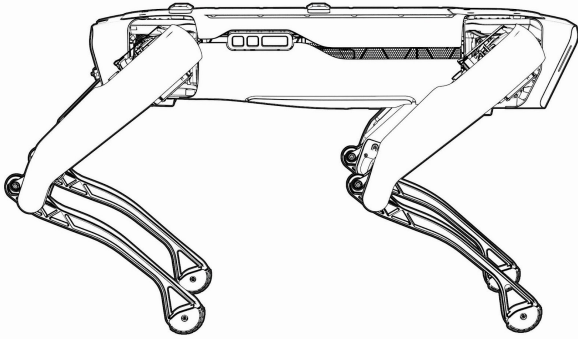
- Inspect camera windows for cracks or any obstruction that could occlude lenses, such as tape or debris.
- Check for broken plastic pieces, especially the yellow crash protection shell.
- Check that the robot's fans spin quietly. See [ROBOT BODY FAN CLEANING](#) for details.
- Check for loose fasteners or other items. Head and tail frame mountings should be rigid.
- Inspect foot tread. If tread is worn, the surface will be smooth. New treads have firm ridges.
- Check that visible structural components appear intact (upper and lower legs are solid, no fractures, etc.)
- When powered on and standing or walking, the robot's body should be parallel to ground.



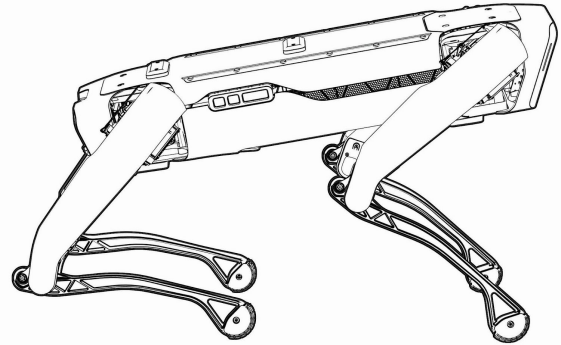
Good robot stance



Bad robot stance



Good robot stance



Bad robot stance

## CLEANING

Use mild detergent to clean Spot. Do not use strong solvents.

Note: Do not submerge Spot. Spot is resistant to light sprays of water but should not be sprayed forcibly with water jets or submerged in water. Submerging Spot will permanently damage the robot.

## CLEANING THE ROBOT'S COOLING FANS

Periodic inspection of the robot's condition may indicate that the cooling fans on the robot's underside need to be cleaned. If the fans are clogged with dirt, an overheating fault may be generated.

Tools Required:

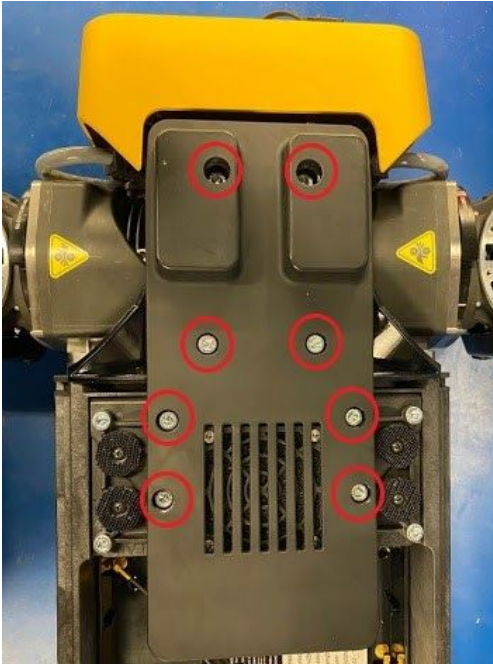
- M4 hex driver
- Torque wrench set to 4.0Nm
- Vacuum cleaner with hose

Instructions:

1. Remove the 8x M5x18 screws from the Rear Sit Plate and remove the panel. You do not need to remove the Rear Plate Cap.
2. Remove the 4x M5x10 screws and 2x M5x18 screws Front Sit Plate and remove the panel. You do not need to remove the Front Plate Cap.

- Use a vacuum cleaner hose to clean out the fan filters.

The screws to be removed and reinstalled are circled in red:



Rear sit plate (8x M5x18 screws)



Front sit plate (4x M5x10, 2x M5x18)

- Reinstall Rear Sit Plate on the Rear Plate Cap and secure to the chassis with 8x M5x18 screws. Torque the screws down to 4.0Nm.
- Reinstall Front Sit Plate on the Front Plate Cap and secure to the chassis with 4x M5x10 screws and 2x M5x18 screws in their designated locations\*. Torque the screws down to 4.0Nm.

Note the locations of the 4x M5x10 screws. If longer screws are installed where the M5x10 screws are supposed to be, this may cause damage to the chassis.



## RECALIBRATION WITH SPOTCHECK

SpotCheck is a feature that improves Spot’s mobility with joint and vision calibration. SpotCheck can resolve problems with the robot’s gait, such as stumbling on stairs or limping, by evaluating current settings and recalibrating, if needed.

Robot falls and ordinary usage over time can cause the robot’s onboard cameras to lose calibration. If the robot starts running into obstacles that it had previously avoided, SpotCheck can evaluate and resolve camera calibration issues to restore perception accuracy.

SpotCheck offers two modes:

1. Joint calibration and camera check
2. Camera calibration

The joint calibration and camera check mode tests and recalibrates (as needed):

- Load cell sensor for hip and knee joints
- Joint position sensor for hip and knee
- Performs basic check (not calibration) of all onboard cameras, excluding Spot CAM, if installed.

The camera calibration mode:

- Determines if stereo intrinsics or extrinsics are out of calibration.
- Requires the use of the calibration panel shipped with the robot.

### WHEN TO RUN SPOTCHECK

If you notice any of the following, that may be a sign that the joints and/or camera have fallen out of calibration:

- The robot limps or stumbles more than usual.
- The robot runs into obstacles it has successfully avoided in the past.
- The robot has more difficulty on stairs than usual.

To return the robot to normal operation, run SpotCheck.

## JOINT CALIBRATION AND CAMERA CHECK

To prepare for the calibration process:

- Put Spot in the sit pose on a flat manufactured surface with at least 1.5 m of clearance all around. Level ground is essential.
- Avoid sitting the robot on surfaces that are very shiny or transparent, as well as matte black floors that absorb IR light.
- Ensure that all of the robot's feet are in contact with the same kind of surface.
- With the exception of attached and configured payloads, ensure nothing is resting or lying on top of the robot.
- Confirm the robot's payload configuration information is correct.

The joint calibration and camera check process takes a few minutes to complete.

To start the calibration process:

1. Make sure the robot is placed according to the above guidelines.
2. Tap SpotCheck on the controller Settings menu.
3. Tap "Joint Calibration & Camera Check" to start the process.
4. When the process is complete, view the load cell and joint offset calibration settings and results of the camera check test.

Setup errors during SpotCheck could cause mis-calibration. If Spot's mobility is still impaired after running SpotCheck, you can follow the preparation guidelines and redo the calibration or revert to the previous joint calibration.

To revert to the previous calibration, click the "Revert" button on the SpotCheck panel.

NOTE: Only the last calibration settings are saved. If you run SpotCheck in quick succession you may not have a good recalibration to revert to. After a calibration, if you notice that the robot's performance has degraded, either revert to the previous calibration or run SpotCheck again.

## CAMERA CALIBRATION

The camera calibration process tests and recalibrates the robot's cameras. The process takes about 15 minutes as the robot cycles through a variety of poses, moving side-to-side and forward-and-back as needed.

The camera calibration process requires the use of the calibration panel shipped with the robot. The calibration panel is a flat panel approximately 118.5 cm x 50 cm that shows a set of 18

fiducials spaced evenly on a black background. The panel is used by the robot to calibrate its five onboard stereo cameras.

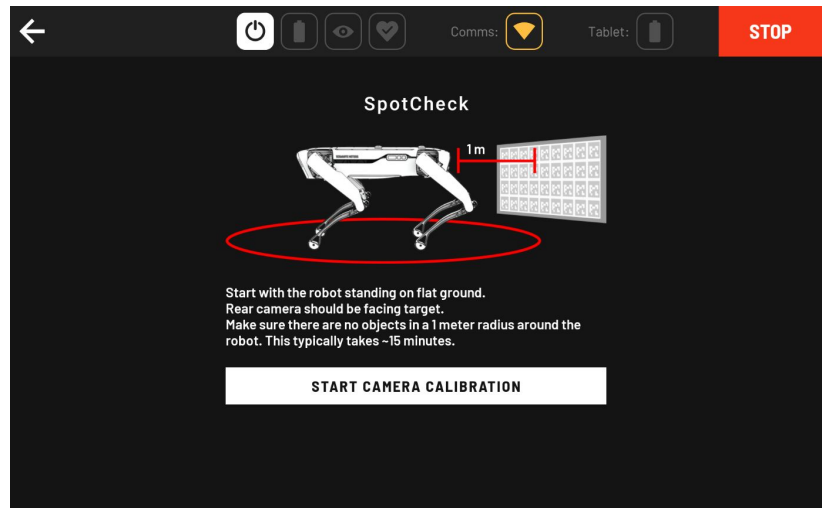
NOTE: Treat the panel with care. Folds, creases, or damage to the panel can cause the calibration operation to fail or produce unexpected results. Do not store or use the target in a way that would cause it to warp over time.

### Positioning the calibration panel

Before you run the recalibration operation, the calibration panel and the robot must be positioned correctly. Be sure that other calibration panels are not visible to the robot.

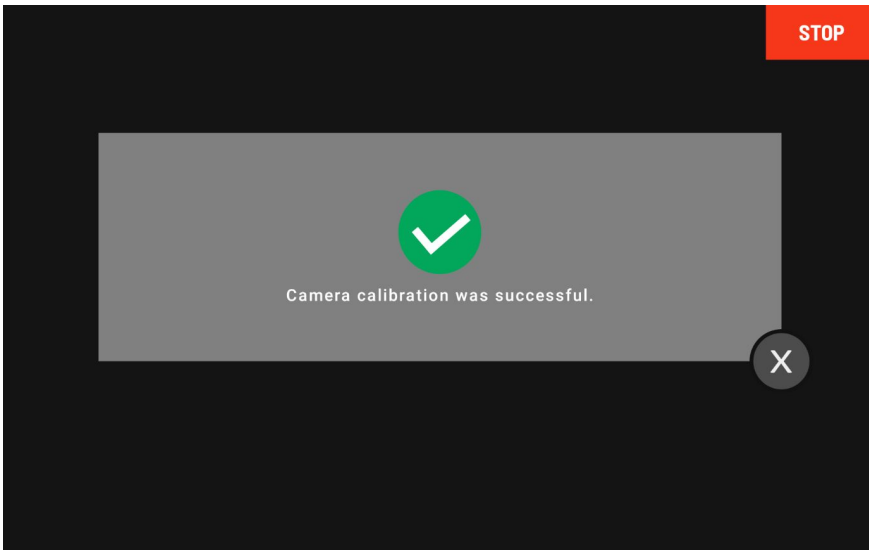
To prepare for the calibration process:

1. Mount the calibration panel on a vertical surface, or lean it against a wall so that the panel is positioned within 5 degrees of vertical.
2. Position the panel right-side-up with the bottom edge no more than 2 inches from the floor surface.
3. Make sure that the panel is evenly and adequately lit for the duration of the calibration process (approx. 15 minutes).
4. Stand Spot on a flat manufactured surface so that the rear faces the calibration panel at a distance of 1m with at least 1m of clearance all around. Level ground is essential.
5. Avoid placing the robot on surfaces that are very shiny or transparent, as well as matte black floors that absorb IR light.
6. Ensure that all of the robot's feet are in contact with the same kind of surface.
7. With the exception of attached and configured payloads, ensure nothing is resting or lying on top of the robot.
8. Confirm the robot's payload configuration information is correct.



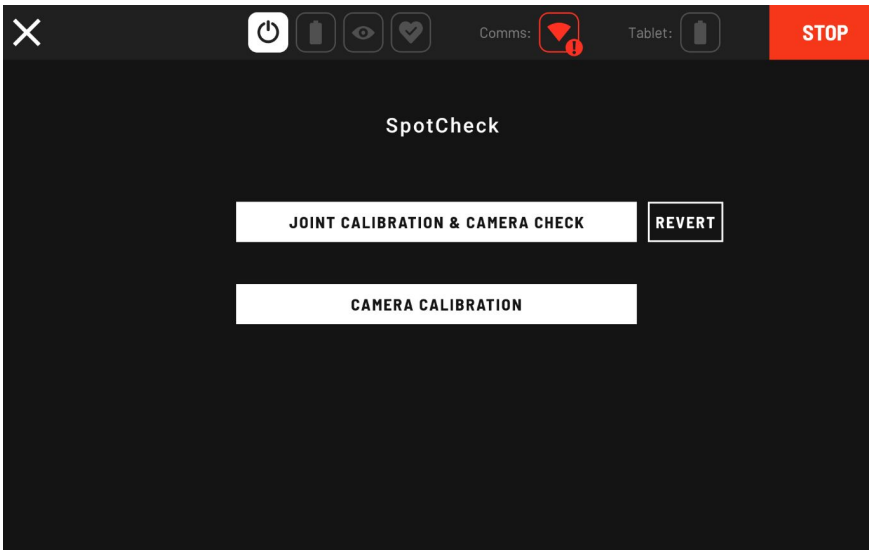
To start the camera calibration process:

1. Make sure the robot and calibration panel are placed according to the above guidelines.
2. Tap SpotCheck on the controller Settings menu.
3. Tap Camera calibration to start the process.



After camera calibration is complete, run the joint calibration and camera check again to verify that the cameras are in working order.

To revert to the previous calibration, click the “Revert” button on the SpotCheck panel.



**NOTE:** Only the last calibration settings are saved. If you run SpotCheck in quick succession you may not have a good recalibration to revert to. After a calibration, if you notice that the robot’s performance has degraded, either revert to the previous calibration or run SpotCheck again.

**WARNING:** If the camera check identifies onboard cameras that are not functioning, the robot might have difficulty navigating stairs, which could cause the robot to fall. For example, if camera check results show that the rear-facing camera is not functioning, do not attempt to drive the robot down stairs until the camera issue is resolved.

## ROBOT LOGGING

Spot records sensor and program data logs while operating. Logs help diagnose bugs and support feature development. If required by Boston Dynamics Support, please download these logs and upload them to Boston Dynamics, using the following steps:

1. Open the robot's admin console.
2. Navigate to the Logs section of the admin console page.
3. Download log files to a computer. Encrypted logs can be large; download them via wired Ethernet.
4. Delete downloaded logs from Spot to make space for new ones. If desired, lock log files to prevent deletion.
5. Contact a Boston Dynamics support representative for a secure upload link.

### VIEWING LOG MESSAGES

The admin console Logs section provides a UI for filtering log data by date range and category. Events in the log data are shown on a timeline widget you can manipulate by clicking and dragging to narrow and expand or move the date/time range.

User log comments are collected during robot operations to help troubleshoot problems. The robot operator taps the hamburger menu in the tablet UI and selects Log comment log a robot hit (collision), slip or fall, or to enter text about a potential bug.

To select log data:

1. Narrow down the list of comments to the one or more comments you care about. For example: "Robot fell"
2. Click on a comment to narrow the log timeline around that comment.
3. Refine the log types to download.
4. Click to Download the log you have selected.

# LOGS

Start Date  
2020-3-9

Start Time

---





End Date  
2020-3-14

End Time

Auto Log Comments  User Log Comments

**CLEAR FILTERS**

## SELECT COMMENT

Time	Message	
Thu, Mar 12, 2020 15:05:25 -04:00	[FailDetector] Mobility fall has been detected.	
Thu, Mar 12, 2020 15:04:38 -04:00	[Auto log comment] An e-stop was requested.	
Thu, Mar 12, 2020 15:04:38 -04:00	[FailDetector] Mobility fall has been detected.	
Mon, Mar 9, 2020 15:21:43 -04:00	[Auto log comment] The e-stop is timed-out.	

### Refining log selection

- Click and drag the edges of the date range gray box to expand or contract the range
- Click inside the gray box to move the date range forward or backward

Select or deselect from the log categories to filter event data:

- Perception & Autonomy
- Body & Gait
- Operating System Logs

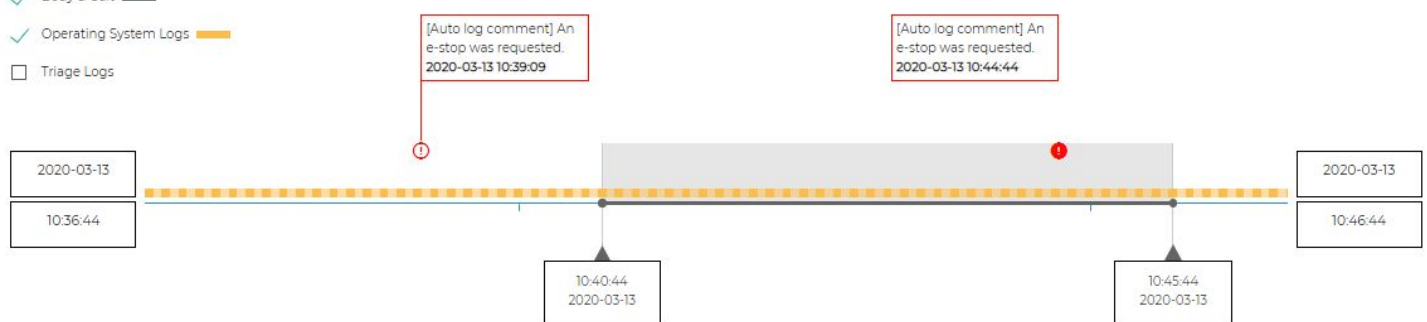
Select the **Triage Logs** option to filter data used by Boston Dynamics Support to help troubleshoot problems. Enable this option to capture log data to send to Support.

### Preserve logs

The robot periodically overwrites log data to save storage space. To preserve logs, click the Preserve button. Preserved are indicated by striping. A solid log in the timeline widget indicates the log is not preserved.

## SELECT LOGS (~45.77 MB)

- Perception & Autonomy █
- Body & Gait █
- Operating System Logs █
- Triage Logs



Scroll to zoom in or out on mouse location.

Click comments to select them.

Drag to reposition the selected area or drag the sides of the gray selection box to resize it.

## DOWNLOADING LOGS

Downloaded log data is encrypted and can only be viewed by Boston Dynamics Support.

Once you have selected the log data you want to download based on date range, type, and category, click the download button to start the download process.

PRESERVED

**DOWNLOAD SELECTED LOGS**

**UNPRESERVE SELECTED LOGS**

**DELETE ALL UNPRESERVED LOGS** (~376.53 MB)

[Clear All Logs from Robot](#)

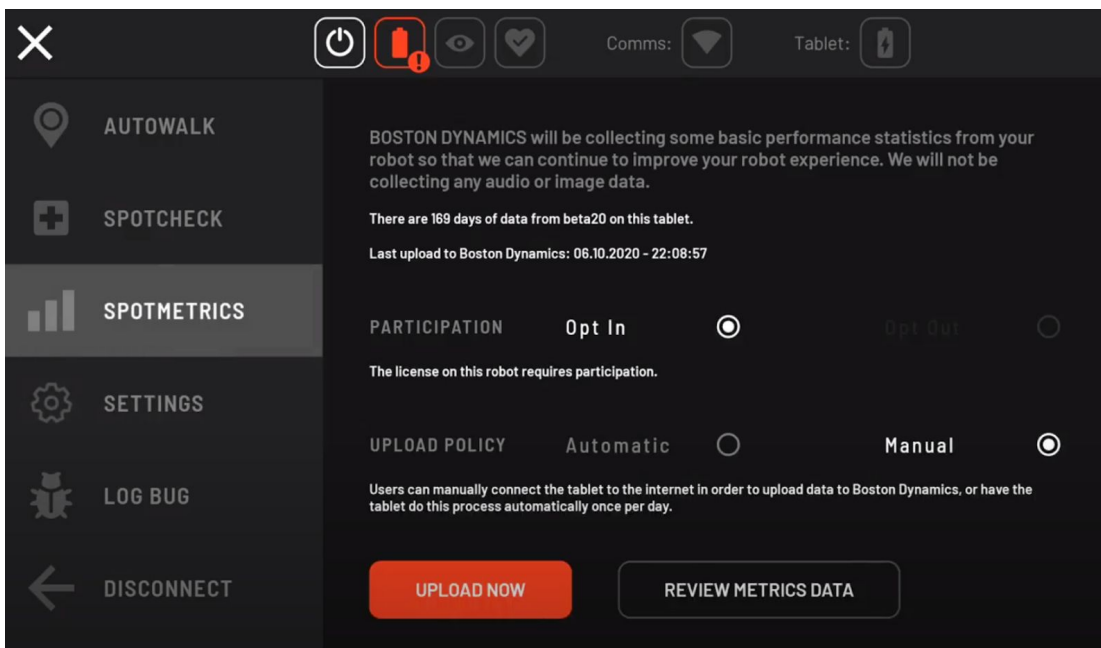
## DELETING LOG DATA

Older log data is periodically cleared out to save storage space. You can free up storage space by deleting unpreserved log data or all log data. Deleted log data cannot be recovered, so use this feature carefully.

Click **Clear All Logs from Robot** to start the process of clearing all of the robot's logs (both preserved and unpreserved logs). Clicking the link takes you to a confirmation page before carrying out the log deletion. This action cannot be undone.

# DIAGNOSTIC DATA LOGGING WITH SPOTMETRICS

As part of a longer term plan to adapt to the needs of our customers, a pipeline designed to feed robot and tablet data back to Boston Dynamics Support has been implemented in Spot 2.0.1. SpotMetrics is visible in the controller tablet UI main menu:



This system aggregates internal operation and usability metrics to help Boston Dynamics improve performance and user experience. All data can be reviewed and approved by customers prior to upload to Boston Dynamics.

## OPTING OUT

Customers with a Spot Enterprise license have the option to opt out. Spot Explorer licenses do not offer the opt out option.

## SPOTMETRICS OPTIONS

The controller tablet allows you to review the data collected before it is uploaded to Boston Dynamics host systems.



You can also enable automatic or manual data collection. The automatic collection option requires Internet access to enable a weekly data transmission to Boston Dynamics host systems.

### Data collected by SpotMetrics

The following data is gathered and transmitted back to Boston Dynamics each week.

Category	Description
GraphNav data	<ul style="list-style-type: none"> <li>● How many times a new recording is made</li> <li>● Waypoints and Edges generated</li> <li>● Identification of features like flat ground or stairs</li> <li>● Error statistics for mission playback</li> </ul>
Robot operation	<ul style="list-style-type: none"> <li>● Faults</li> <li>● Gaits used / Gait cycles / distance traveled</li> <li>● Temperature</li> <li>● Operation time</li> <li>● Estops</li> </ul>

## CONTACTING SUPPORT

How to contact support and get help.

### REPORTING BUGS

Reporting bugs helps Boston Dynamics improve Spot. Bugs can be logged during robot operation as follows:

1. Tap the hamburger menu in the tablet UI and select Log comment.
2. To log a potential bug, choose **Record Bug**.
3. Enter text describing the bug. The data is logged for review later using the admin console Log section.

Bugs reported on the controller are logged on Spot and must be downloaded from the robot and manually transmitted.

Contact [support@bostondynamics.com](mailto:support@bostondynamics.com) to initiate a bug report.

## CHANGE HISTORY

Document version	Date	Change description
2.0	April 2020	Initial release with Spot v2.0
2.0.1	July 2020	Updated to include information about new licensing policy, diagnostic logging, and other management features for the Spot 2.0.1 release.