AWS DeepRacer and Sensor Kit Getting Started Guide

The AWS Sensor Kit is intended for use only with the AWS DeepRacer

Getting started guide

Get rolling in approximately 60-90 minutes

Contents

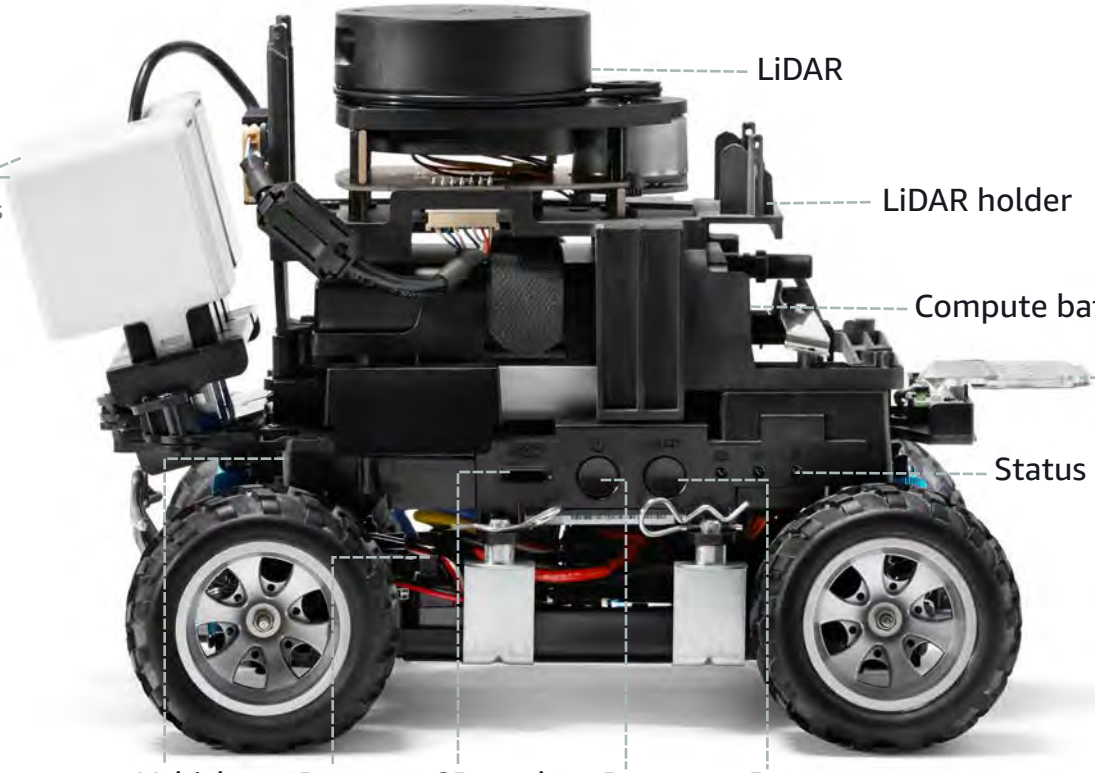
AWS DeepRacer: In the box

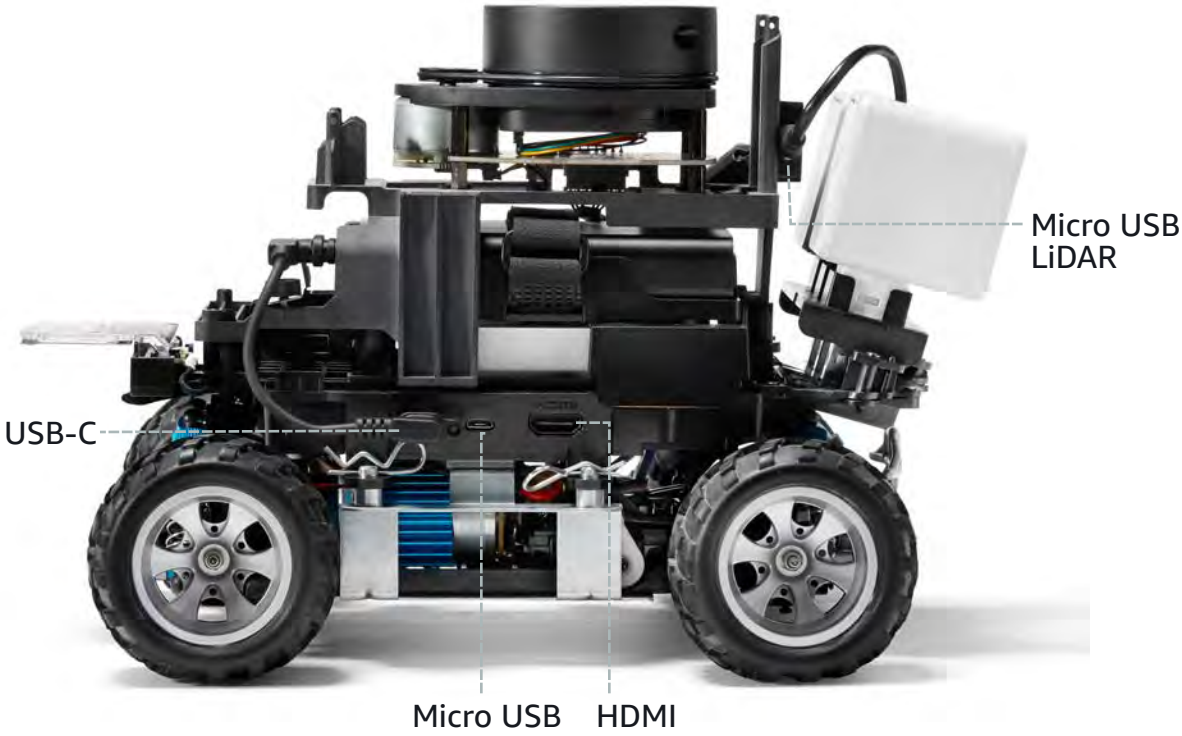
1. Vehicle chassis
2. Micro-USB to USB-A cable
3. Pins
4. Compute battery connector cable (USB-C)
5a. Vehicle battery charging adapter
5b. Vehicle battery charging cable
6. Compute battery
7. Vehicle battery unlock cable
8. Vehicle battery
9a. Power cable
9b. Power adapter
10. Vehicle body shell
11. White marking tape (not shown)

Sensor kit: In the box

1. Vehicle body shell
2. LiDAR
3. Camera
4. Pins
5. LiDAR screws
6. USB-A extender cable
7. LiDAR to USB port connector cable
8. Phillips screwdriver

Assembled vehicle at a glance





Preparation

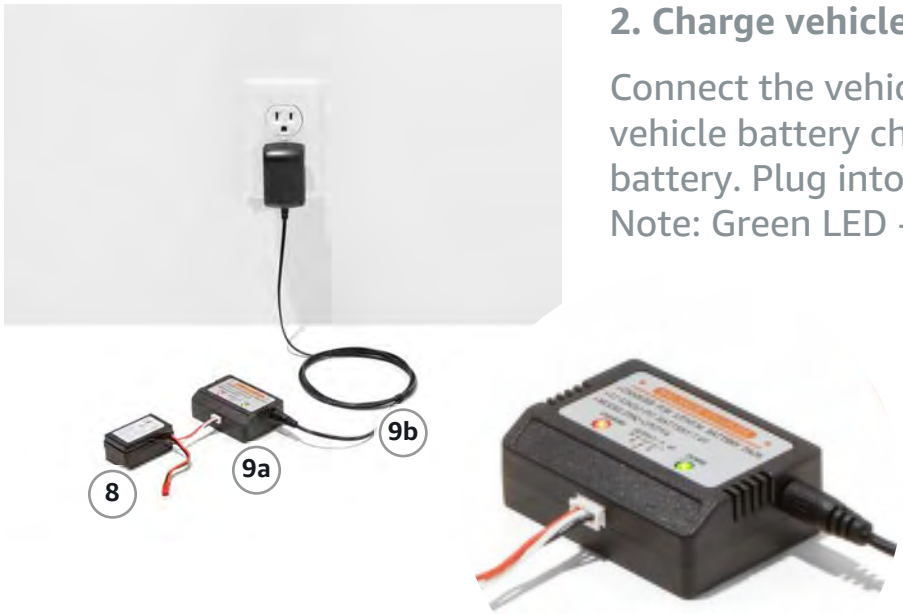
Charge batteries

Approximately 2 hours

1. Charge compute battery

Connect the power cable, power adapter and the compute battery. Plug into a power outlet to charge.

Note: Press button to power on. Battery indicator LEDs glow when battery is charged or at capacity.



2. Charge vehicle battery

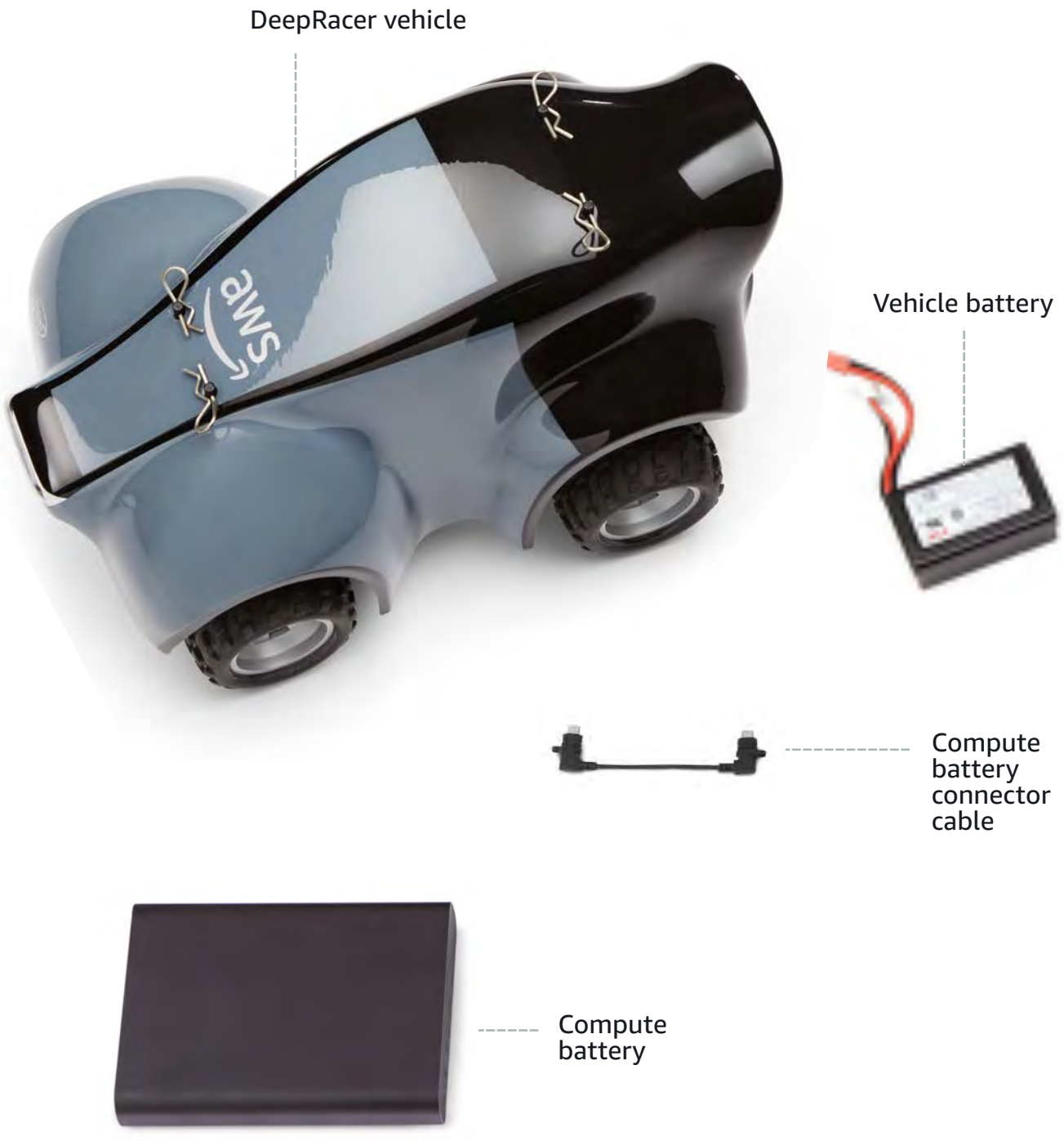
Connect the vehicle battery charge adapter, the vehicle battery charge cable and the vehicle battery. Plug into an power outlet.
Note: Green LED - full charge and ready

Red and green LED indicates vehicle battery is charging

Next: Preparation continued

Preparation

Gather these items



Next: Setup vehicle

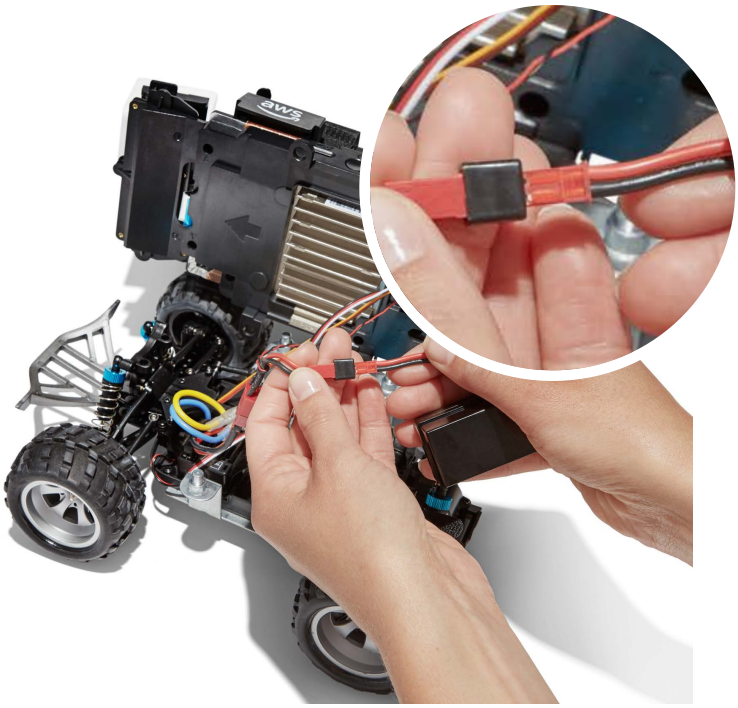
Setup your vehicle

1. Unpin and remove vehicle shell

2. Unpin chassis by removing four pins

3. Lift compute module

Note: wires attached

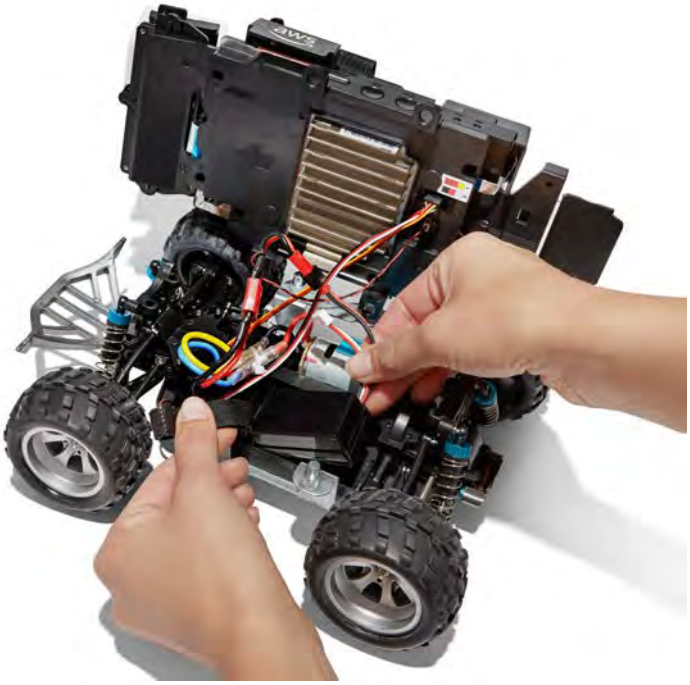


4. Connect vehicle battery

Use the red connector cable, the white connector is for charging

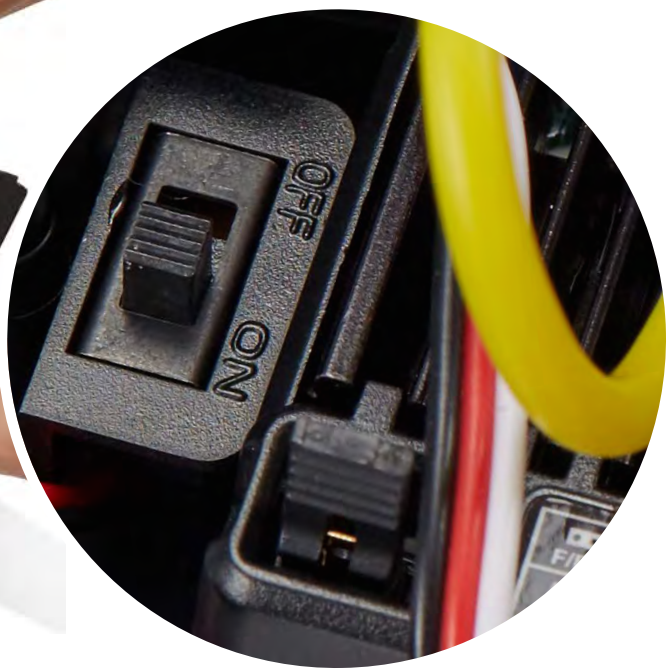
Next: Setup vehicle continued

Setup your vehicle



5. Insert vehicle battery in the cradle

6. Secure vehicle battery with velcro strap



7. Turn switch on, then off

Listen for an indicator sound, then **switch off**
Note: Sound indicates the vehicle battery has charge and everything is working

Next: Install sensors

Setup your vehicle

8. Secure vehicle with four pins
Hold rounded side to insert

9. Secure compute battery and cable velcro strap

Next: Sensor preparation

Preparation

Gather these items

Next: Install LiDAR sensor

Install LiDAR sensor

1. Pull out camera from USB port

Grab the camera module firmly and pull upward to remove it from the USB port.

2. Unplug USB-C cable from compute battery

Note: Dell battery cable is longer

3. Place LiDAR on vehicle chassis

Next: Install LiDAR sensor continued

Install LiDAR sensor

Fasten LiDAR - front and back

4. Fasten front screw

Note: Use screws from shell bracket

5. Fasten back screw

Next: Install LiDAR sensor continued

Install LiDAR sensor

6. Plug USB-A cable in middle USB-A port

USB-A

7. Plug the USB Micro-B cable into the LiDAR

USB Micro-B

Next: Install stereo cameras

Install stereo cameras

Plug camera into the left and right USB-A ports

USB-A

Next: Connect battery

Connect battery

Connect compute battery with USB-C

USB-C

Next: *Connect Dell battery

Connect Dell battery

**ONLY for customers with a Dell compute battery. If you do not have a Dell compute battery, skip these instructions.*

1. Plug cable in Dell compute battery

2. Slide cable under LiDAR frame

3. Wrap cable around base of liDAR

4. Plug in USB-C

Next: Turn on power

Turn on power

1. Turn on compute battery

13. Turn on vehicle compute and wait for blue LED

Approximately 2 minute for connection

See LED Tips on pages 30-31 for additional information

Next: Connect to Wi-Fi

Connect to Wi-Fi

Let's get your vehicle connected to a Wi-Fi network and use the **vehicle's IP address** to drive your vehicle manually and autonomously.

If you use macOS Catalina or later (10.15.5 +):

You will need a USB drive the first time you connect your vehicle to W-Fi. After you connect and your vehicle's software updates, you can set up connections to new Wi-Fi networks using the USB cable in the box.

How to use a USB Flash Drive to Connect your AWS DeepRacer

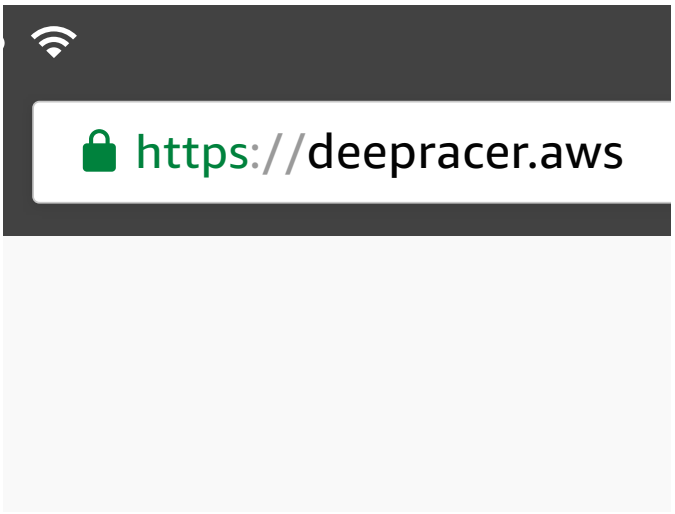
Use a Firefox browser to connect to deepracer.aws or the device's wireless IP (Chrome is not supported).

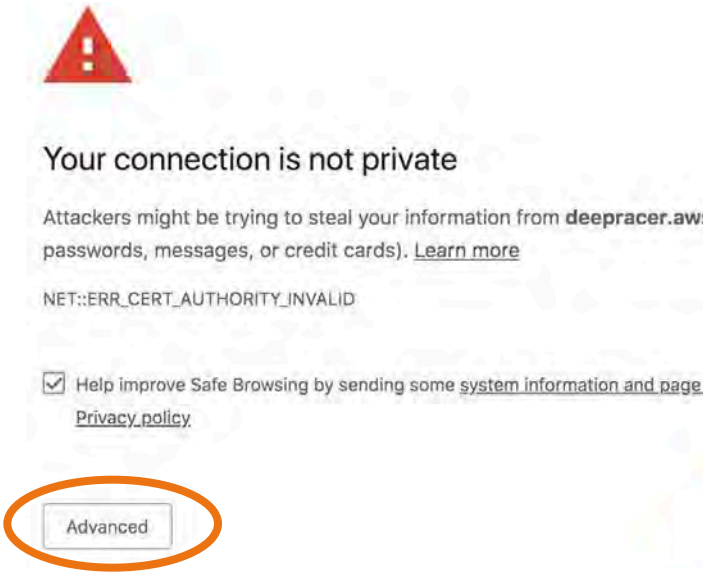
1. Connect vehicle to computer with micro-USB

USB Micro B

Next: Connect to WiFi continued

Connect to Wi-Fi





2. Open browser, enter **deepracer.aws**

Note: **Disable Wi-Fi on your computer** and disconnect ethernet cable.
Note: Trouble connecting, see **Wi-Fi Tips on page 32**

3. Proceed with a non-private connection

Select advanced and 'Proceed to deepracer.aws' to get to unlock your AWS DeepRacer
Note: Firefox requires a trust certificate, 'accept and proceed'

4. Turn over vehicle

Vehicle access password is found printed at the bottom of the vehicle.

Next: Connect to WiFi continued

Connect to Wi-Fi

5. Find password and write it down

Write down the password, you will need to use it later.

Note: Some letters in the password might be hard to recognize. Try '**l/I, o/O/0 and i/l**' if your password doesn't work.

6. Enter password to control vehicle

Next: Turn on vehicle

Turn on vehicle

1. Confirm compute battery is on by checking LED lights

2. Wait for LEDs to light

Two blue LED lights indicate battery is charged and Wi-Fi connected.
See Tips on page 30-31 for LED behavior.

3. Switch on vehicle

Listen for two short beeps and one long beep

Next: Lights and action!

Lights and action!

Check for visual cues that your sensors are ready: Is your LiDAR spinning? Is its LED lit?

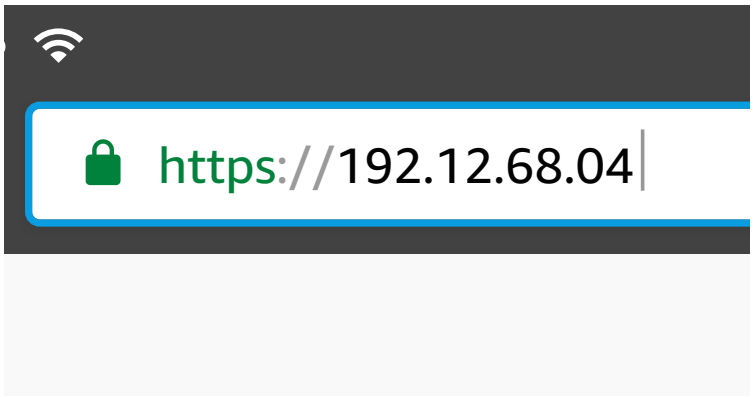
Next: Test drive

Test Drive

Use any device with a browser to drive your AWS DeepRacer. Connect your device to the same Wi-Fi network as your AWS DeepRacer.

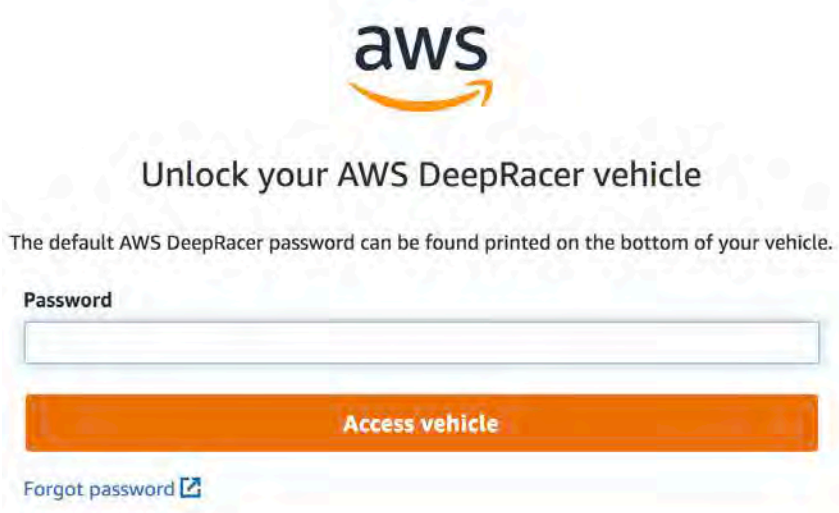
1. Enter vehicle IP address to access your vehicle on an internet browser

Note: This is an example, not your vehicle IP address.



2. Enter password

Note: Found printed on the bottom of your vehicle

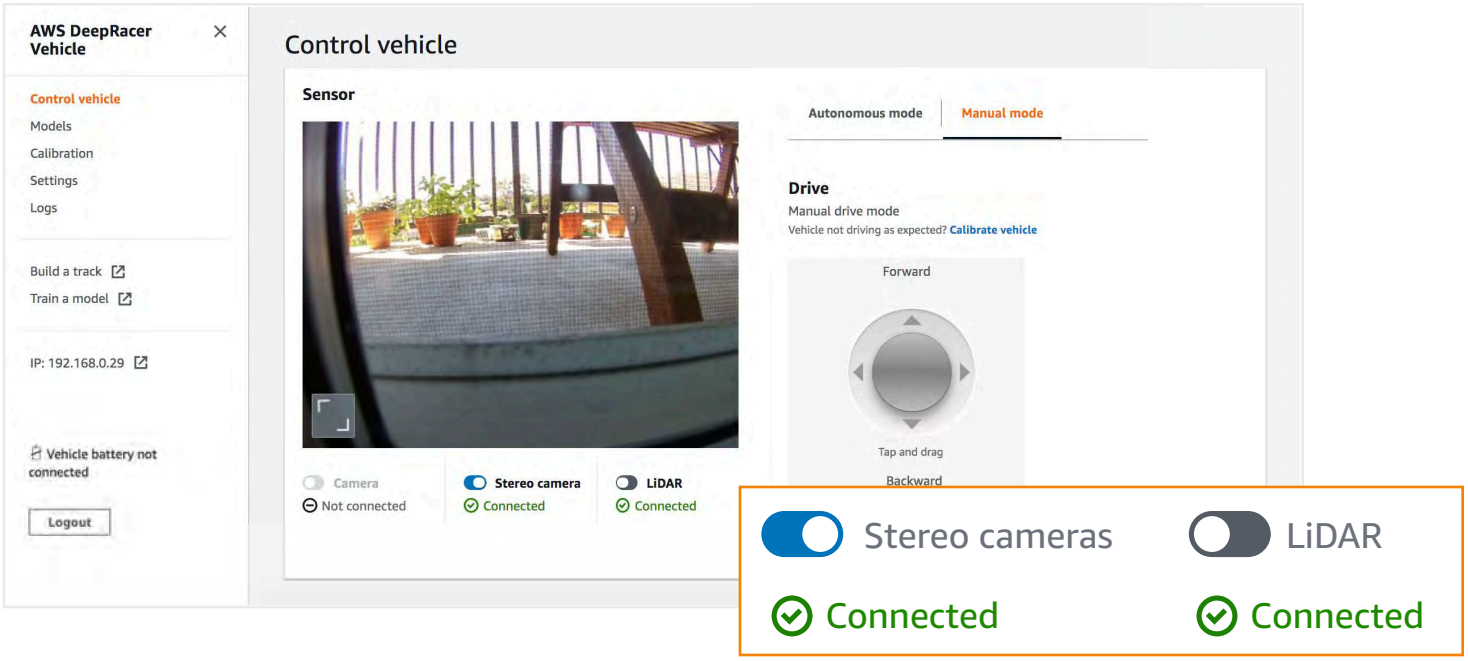


Next: Test drive continued

Test drive

1. Check the sensors

Look beneath the camera viewfinder to find your sensor connection status. The connection is successful if you see green check marks. The LiDAR view finder is switched off by default. Switch it on to verify that it's connected.



2. Put the vehicle in manual mode

Move the joystick in the forward direction and watch how the vehicle responds. Does the vehicle move in the forward direction?

Next: Test drive continued

Test drive

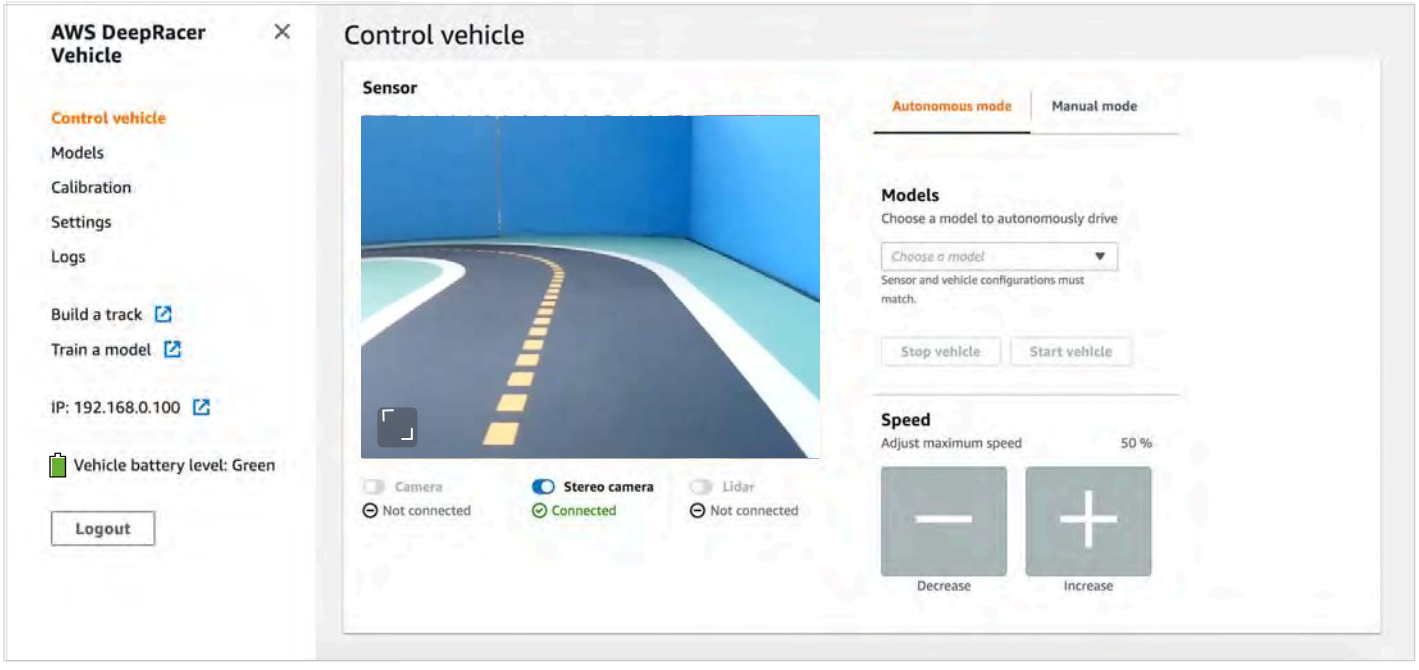
3. Try autonomous mode

1. Choose the **Autonomous driving** mode. Load a sample model using the drop down and load your own trained model.

2. Press **Start vehicle** button

3. Gradually increase the **Maximum speed %** until model begins to move

Optimizing a trained model for transfer to a physical AWS DeepRacer vehicle can be a challenging learning process. It requires iterations through trial and error.
For more tips, see **Optimize Training AWS DeepRacer Models for Real Environments**



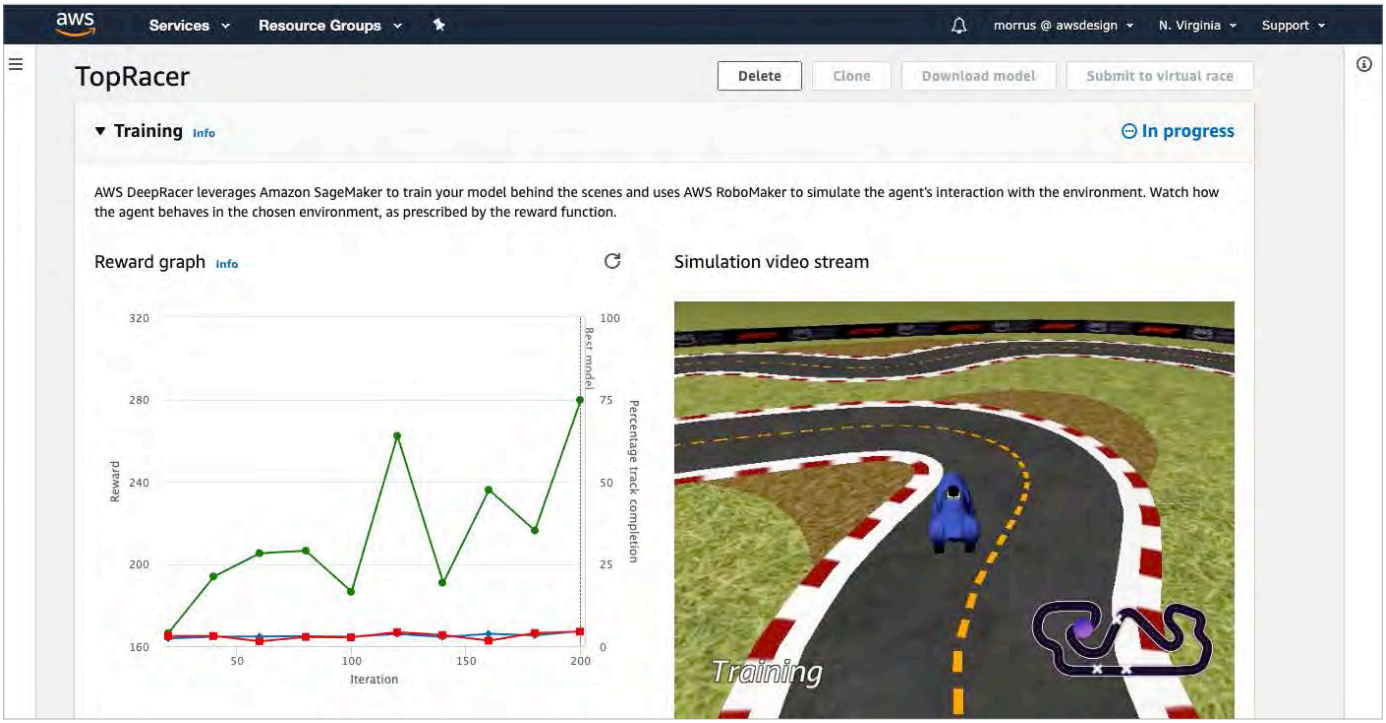
Next: Drive and experiment

Drive and experiment

Train reinforcement learning (RL) models

Train your own RL models and watch training in simulation. Evaluate models and download models to your AWS DeepRacer to test on tracks.

Visit https://www.aws.amazon.com/deepracer



When loading models on your vehicle make sure the sensor configurations match. Models trained with LiDAR and stereo camera need to run on vehicles with LiDAR and stereo camera.

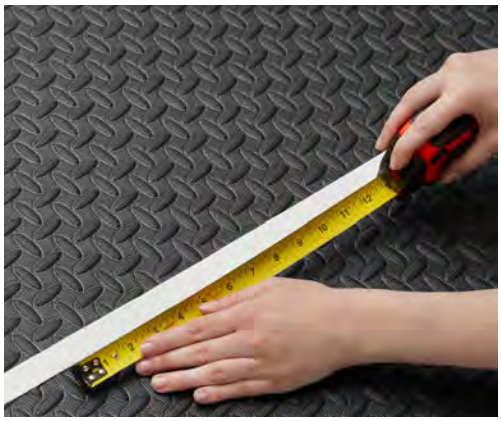
Next: Track building

Track building

Build a straight track

Build a straight track segment to experiment with pre-loaded reinforcement learning (RL) sample_model. The model has been optimized to stay within boundaries.

Track design templates



1. Lay down tape on one border of the straight line. Length varies on available space.

2. Measure a width of approx. 24”, excluding tape borders. Lay down a parrallel line and match the length.

3. Place the vehicle and watch your vehicle begin its Machine Learning journey.

Next: Race

Race

Join the DeepRacer League

Welcome to the world's first global autonomous racing league, open to anyone.

Summit Circuit: Find a Race

Join the community

DeepRacer forum

DeepRacer Slack channel

DeepRacer Github issues

DeepRacer documentation

Next: Tips

Tips

Battery level and recharging

Compute battery charge

Press the power button to turn on/off.

Note: LED represents battery level

Charge compute battery

Connect charger and charger cable to an outlet.

Tips

Battery level and recharging

Vehicle battery

Use the cable with white connector end and insert in vehicle battery charger.

Green/Red LEDs - charge required
Green: fully charged battery
Red: battery needs recharging

Battery troubleshooting

Check 1. Ensure battery is fully charged

Green only LED indicates a fully charged vehicle battery

Check 2. Check vehicle power switch

Turn the vehicle switch on by moving the button away from the wheels. Listen for an indicator sound (two short beeps, and one long beep if the compute is on) confirming the vehicle is ready.

Check 3. Drive your vehicle

Connect your vehicle to Wi-Fi, enter vehicle IP address on a browser (Firefox with MacOS Catalina users) and manually drive with the joystick.

If the problem persists, contact **AWSDeepRacer-Help@amazon.com.**

Note: When not using the DeepRacer, please make sure the vehicle is either turned off or the battery disconnected.

Tips

Understanding LED behavior

Battery LED Guide

- **Solid blue**: Battery charged, application running
- **Blinking blue:** updating software
- **Yellow**: Device booted to OS
- **Blinking Yellow:** Loading BIOS and OS
- **Red**: Error in system when rebooting or starting application

Tips

Understanding LED behavior

Wi-Fi LED Guide

- **Solid blue**: Wi-Fi connected
- **Blinking blue**: Connecting to Wi-Fi
- **Solid red then off**: Failed to connect to Wi-Fi

  Troubleshooting

  - Check your Wi-Fi network password
  - Public Wi-Fi that requires CAPTCHA-enabled sign-in commonly found in hotels, gyms, and cafes is not supported

Tips

Wi-Fi connection troubleshooting

Having trouble connecting, try these tips

Step 1. Wait, the application may take up to 2minutes to be ready

If waiting doesn't work, then try step 2

Step 2. Turn off/disable computer's Wi-Fi and unplug ethernet connections

If disabling the Wi-Fi doesn't work, then try step 3

3. Push the reset button and wait for blue battery LED

Once the LED turns solid blue, refresh the deepracer.aws page. If it doesn't work, then try step 4.

4. Visit advanced troubleshooting

https://docs.aws.amazon.com/deepracer/latest/developerguide/deepracer-troubleshooting.html