

# AirBeam2 Quick Start Guide

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This guide is designed to help a user learn to connect, operate, and view air quality data collected by the Airbeam2 fine particulate matter (PM<sub>2.5</sub>) air sensor. This written guide is supplemented by a set of presentation slides that cover similar materials but were designed to support classroom and/or group program instruction.

This guide supplements additional resources which are compatible with the use of Airbeam2 sensors including three hands-on lesson plans to explore outdoor air quality, indoor air quality, and personal exposure to air pollution. These additional resources can be found on the Air Sensor Toolbox website: <https://www.epa.gov/air-sensor-toolbox/educational-resources-related-air-sensor-technology>

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This guide is compatible with AirCasting Application Version 1.5.19  
and Android Operating System 8.1 (Android only—will not work with iOS)

## Safety Precautions

- Minors should be accompanied by a guardian
- If using the AirBeam2 along roads, please use sidewalks and follow common safety practices near roads
- Use caution while walking around with the AirBeam2 to avoid tripping or colliding with others
- Don't cover the sensor air inlet or exit
- The AirBeam2 is water-resistant, not waterproof – make sure to protect the sensor in the rain by using an umbrella
- To use the belt clip to carry the AirBeam2, use the screw provided
- Make sure your AirCasting session name is descriptive and appropriate! The name will be online and visible to the entire AirCasting community
- Keep the phone and sensor within 10 feet of each other

## Important Notes

- The AirBeam2 only measures particulate matter – it does not measure gaseous pollutants.
- The AirBeam2 does not measure airborne viruses like the flu or COVID-19.

This guide contains instructions for:

- Operating the AirBeam2 sensor using the AirCasting application on a paired Android phone
- Collecting, viewing, and downloading the collected data
- Troubleshooting issues

### **Important Note**

Make sure that the phone and AirBeam2 have matching labels! If the labels do not match, see a Librarian.

**Note for Librarians:** The AirCasting application and Android operating system (OS) are periodically updated. This living document may need to be updated as new versions of the AirCasting app and Android OS are released. For best results, it is important to keep your AirCasting application and Android OS up to date. Instructions on updating your AirCasting app are located in [Appendix A](#).

## **Step 1. Setting up the AirBeam2 and Phone**

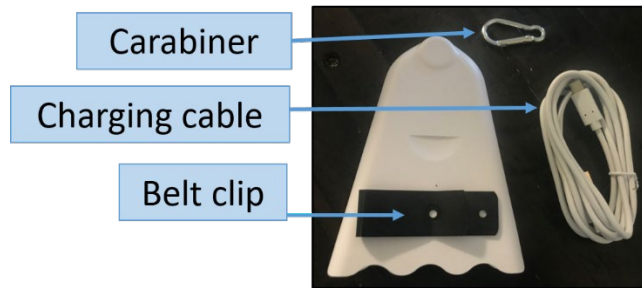
Each AirBeam2 has been paired with an Android phone. All of the paired equipment, including boxes, are labeled with the AirBeam2 serial number (see the orange circles in **Figure 1**). If the phone and AirBeam2 ever become un-paired or need replacing, see a Librarian.



**Figure 1.** Phone and AirBeam2 with their boxes have matching labels.

**Note for Librarians:** If the phone and AirBeam2 ever become un-paired, follow the pairing and configuration instructions in [Appendix B](#).

The phone comes with a charger and charging cord. The AirBeam2 comes with a USB-C charging cord, a belt clip, a screw to attach the belt clip to the AirBeam2, and a carabiner clip (See **Figure 2**).

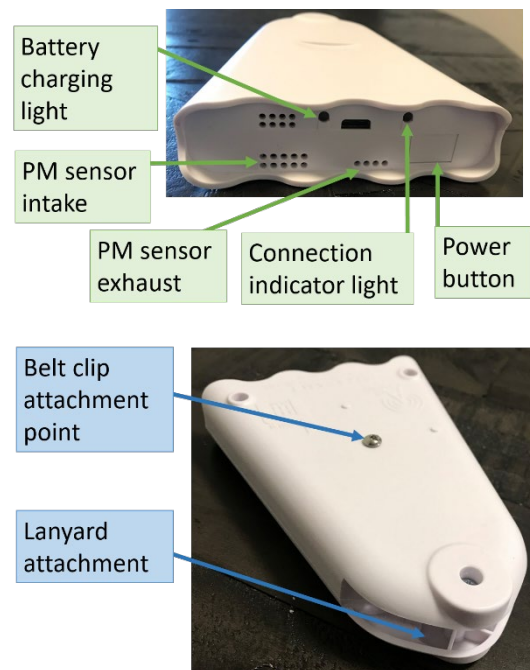


**Figure 2.** AirBeam2 and the accessories that come in the box.

To turn on/off the AirBeam2:

- The AirBeam2 can be turned on and off by pressing the white power button on the bottom. (See **Figure 3** for the different parts of the AirBeam2.)
- After turning on the AirBeam2, you will hear a fan on the inside and the Connection Indicator light will turn red.
- Throughout your measurements, if you are unsure if the AirBeam2 unit is on or off, you can listen to hear if the fan is running. When the AirBeam2 is off, the fan will not run.

If the AirBeam2 does not turn on, it may need to be charged! To charge the AirBeam2, use the USB-C charging cord and charger included in the box. The Battery Charging light turns green when the AirBeam2 is charging and turns off when the AirBeam2 is either fully charged or unplugged.



**Figure 3.** Different parts of the AirBeam2.

To turn on/off the phone:

- The phone can be turned on and off by holding down the smaller button on the right side. See **Figure 4**.

If the phone does not turn on, it may need to be charged!  
To charge the phone, use the charging cord and charger included in the box.



**Figure 4.** Location of the phone's power button.

## Step 2. Create an AirCasting Profile and Log In

Before you start using the AirBeam2 for the first time, you need to create an AirCasting Profile on the phone.

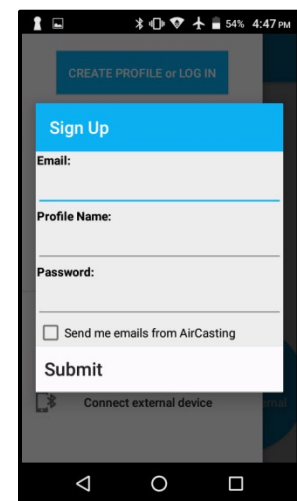


### Important Note AirCasting Profile

Note that your library may already have an AirCasting Profile that participants can use for data collection (see a Librarian for the profile name and password); however, you can also choose to create your own AirCasting Profile.

To create an AirCasting Profile:

1. Swipe up to unlock the phone (no password is needed).
2. Connect your phone to Wi-Fi. Select the **Settings** icon (⚙️) on the home screen, select **Network & Internet**, and then **Wi-Fi**. Select the appropriate Wi-Fi connection and enter the password. Press the circle icon (○) at the bottom of the phone to return to the home screen.
3. Open the **AirCasting app** (📶).
4. Select Menu (≡) in the upper-left corner, then select **Create Profile or Log in**, and then **Create Profile**.
5. **Figure 5** shows where you will enter the email address, profile name, and password you want to use. Type your password carefully, because you will not have a chance to review it. Select **Submit**.
  - Passwords must be a minimum of 8 characters, must contain both uppercase and lowercase characters, and can (but are not required to) include special characters and numbers.



**Figure 5.** Screen you will see to create your AirCasting profile

- Record your AirCasting **Email**, **Profile Name**, and **Password** in a secure location. If you forget your password, you can reset it by selecting **Create Profile** or **Log in** and then selecting **Forgot Password**.

**Troubleshooting:** Make sure your phone is connected to Wi-Fi when creating or logging in to an AirCasting Profile. If you are not connected to Wi-Fi, you will get an “Unknown error”

After you’ve created an AirCasting Profile, log in to the profile on the phone:

1. Open the **AirCasting** app (📶).
2. Select **Menu** (≡), then select **Log In**, and then **Sign In**. Enter your Profile Name or email (either will work), as well as your password, and then select **OK**.
3. If you do not plan to use the phone immediately, turn it off to preserve battery life by holding down the power button.

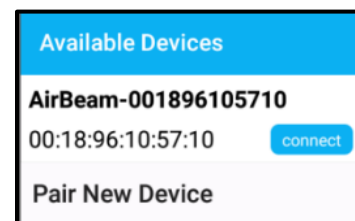
### Step 3. Connecting the Phone and the AirBeam2

#### Important Note

Before you use the phone and AirBeam2, make sure they are fully charged.  
When the devices are not in use, turn them off.

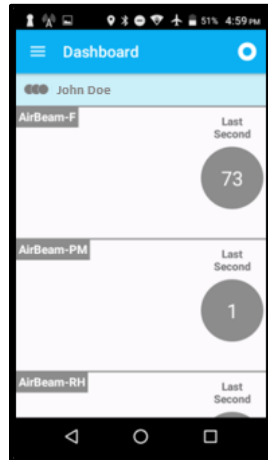
To prepare the phone for an AirCasting session:

1. Make sure the phone is connected to Wi-Fi and that Bluetooth is on. If either is turned off, these connections can be accessed through the **Settings** icon (⚙️).
2. Open the **AirCasting** app (📶).
3. Confirm you are signed in to your AirCasting Profile. On the Dashboard screen of the AirCasting app, select **Menu** (≡). If you see your profile name listed at the top of the screen, you are logged in.
4. Turn on the AirBeam2 (if turned off) by following Step 1. Make sure the AirBeam2 and phone are within a few feet of each other so that the Bluetooth connection will work. Wait until the red **Connection Indicator** light on the bottom of the AirBeam2 turns green.
5. Select **Configure AirBeam2**. In the screen that pops up on the phone (similar to the one shown in **Figure 6**), make sure that the AirBeam2 number matches the number on the phone, then select the **Connect** button. For Session Type, select **Mobile**.

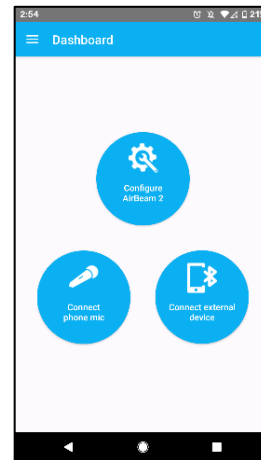


**Figure 6.** A screen similar to this will show up once you select Configure

- Once the phone and AirBeam2 are connected, the Connection Indicator light on the bottom of the AirBeam2 will turn white. Gray circles will appear on the main screen of the AirCasting app, as seen in **Figure 7**. Note that the white light on the bottom of the AirBeam2 will eventually turn off; this is normal and does not mean your AirBeam2 is off. If the AirBeam2 and the phone disconnect, the AirCasting app will return to the Dashboard screen, as shown in **Figure 8**.



**Figure 7.** The AirCasting app screen should look like this (notice the gray circles) once the AirBeam2 and phone are connected.



**Figure 8.** The AirCasting app will return to this screen if the phone and AirBeam2 disconnect.

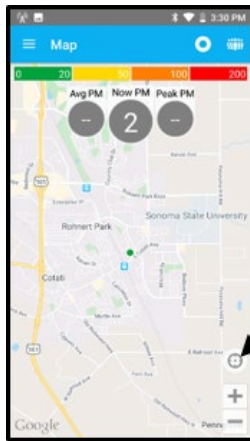
**Troubleshooting:** If the phone registers an error with the AirCasting app, or if the phone and AirBeam2 do not successfully connect, turn off the AirBeam2. If the AirCasting app is still open, press the square icon (□) on the bottom of your screen, and select Clear All; this will force close the app. Turn off the phone, and retry Steps 3.1 through 3.6.

## Step 4. Start AirCasting!

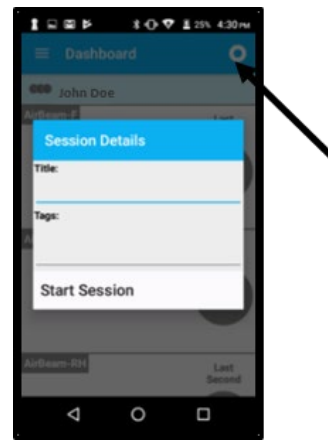
- Ok, just one more step before you actually start AirCasting! To make sure that the map will appear on the phone as you walk around with the AirBeam2, on the AirCasting app's dashboard, press the three circle icons next to your **Profile Name** (☰), and then select **Map**. After the map has loaded, press the bullseye icon (⊙) in the lower right of the screen to center the map on your location (see **Figure 9**). It is important to load the map while still connected to Wi-Fi; however, Wi-Fi is not required to see your location on the map as you walk around.



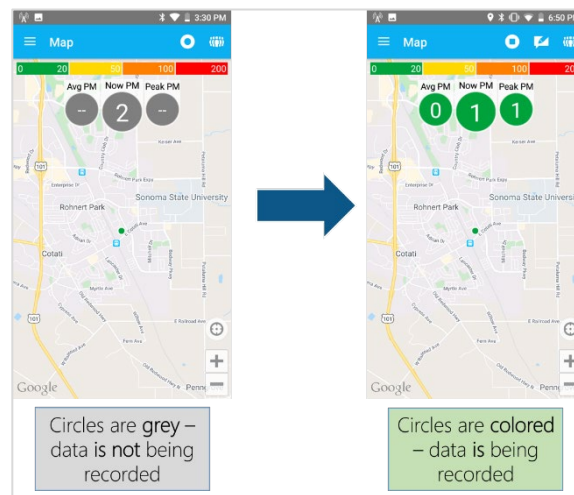
- As shown in **Figure 10**, Press the **Recording** button (📍) at the top of the Dashboard page. Add a title for your session (this title will be publicly viewable on the AirCasting website) and tags (descriptive words or phrases that can help you find your AirCasting session on the website). Press the triangle icon (◀) at the bottom of the phone to collapse the keyboard. Press **Start Session**. The gray circles in the AirCasting app will become colored (green, yellow, orange, or red), which indicates that you are recording a session (see **Figure 11**).



**Figure 9.** Click this button to center the map.



**Figure 10.** The recording button and where you type in your session name and tags.



**Figure 11.** The circles on the map change from gray to colored once the session is being recorded.

### **Important Note**

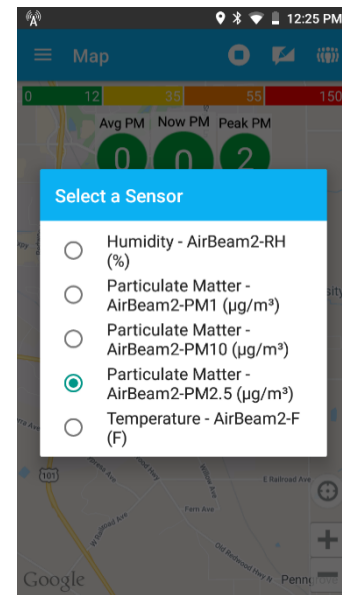
It is important to load the map while still connected to Wi-Fi. During an AirCasting session, the AirBeam2 and AirCasting app communicate via Bluetooth, so Wi-Fi is not needed during data collection.

**Troubleshooting:** If an error indicates that your phone cannot get a GPS signal, try repeating Step 4.1 outside or near a window (while still connected to Wi-Fi).

- The map only displays one parameter at a time (PM<sub>1</sub>, PM<sub>10</sub>, or PM<sub>2.5</sub>), but will record all parameters in the background. Change the display to PM<sub>2.5</sub> by pressing one of the three circles (**Avg**, **Now**, or **Peak**), scroll between the options, and select **Particulate Matter – AirBeam2-PM2.5** as shown in **Figure 12**.

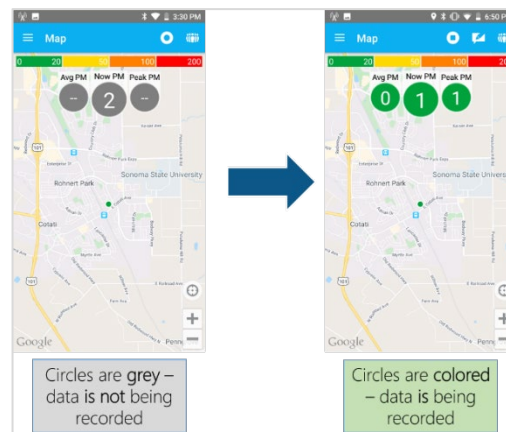
- **Avg:** shows the average of all PM<sub>2.5</sub> measurements you have taken
- **Now:** shows the current PM<sub>2.5</sub> value. This is the best one to look at to see what PM<sub>2.5</sub> you are currently measuring
- **Peak:** shows the highest value measured during your session so far

- As you walk around, you can use the app to make notes and add photos of what you're seeing by pressing the **Notepad icon** (📝) at the top of the screen. These notes and photos are geocoded to the location where they are captured and will be viewable on the website. You can add a photo to your note by selecting **Attach a photo**.
  - The notes and photos you add here will be **automatically** uploaded to the HabitatMap website and available for anyone to see. The photos are also saved to the phone. After your session is uploaded to the HabitatMap site, you can delete them from the phone.



**Figure 12.** Change the selection to PM<sub>2.5</sub>

- At the end of your session, press the **Circle icon** (⦿) to stop recording. The colored circles should become gray again (**Figure 13**).
- Turn off your AirBeam2 to preserve its battery life. Leave your phone on until you have confirmed that your session has synced with the map on [aircasting.habitatmap.org/mobile\\_map](http://aircasting.habitatmap.org/mobile_map) (see instructions in Step 5).



**Figure 13.** Data not recorded and data recorded

## Important Note

**Units of Concentration:** PM<sub>1</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> are measured in micrograms per cubic meter (µg/m<sup>3</sup>), a unit of concentration that reports the mass of particles in a cubic meter of air.

A few tips as you walk around with the AirBeam2 and phone:

- Do not cover the AirBeam2 air intake or exhaust, which are located at the bottom of the device (see **Figure 3** above).
- Keep the phone and AirBeam2 within 10 feet of each other.
- Pay attention to traffic!
- Observe your surroundings and make notes when you see high PM values.
- If the AirCasting app and AirBeam2 are disconnected or if the AirCasting app crashes in the middle of an AirCasting session, the app will return to the home screen. To start a new AirCasting session, close and re-open the app, turn the AirBeam2 off, and retry Steps 3.5 through 4.2. See the **Troubleshooting** instructions in Step 3 if this does not work.


## What Do the Colors in the AirCasting App Mean?

The colorful circles and data points you see in the AirCasting app aren't just cool to look at – they mean something too! The colors used in the app are based on the U.S. Environmental Protection Agency's (EPA) Air Quality Index (AQI) color scale and show the AQI level based on measurements that were made over 24 hours. The AQI explains how air quality impacts your health. You can visit [airnow.gov/index.cfm?action=aqibasics.aqi](https://airnow.gov/index.cfm?action=aqibasics.aqi) to learn more about AQI.

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects.
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

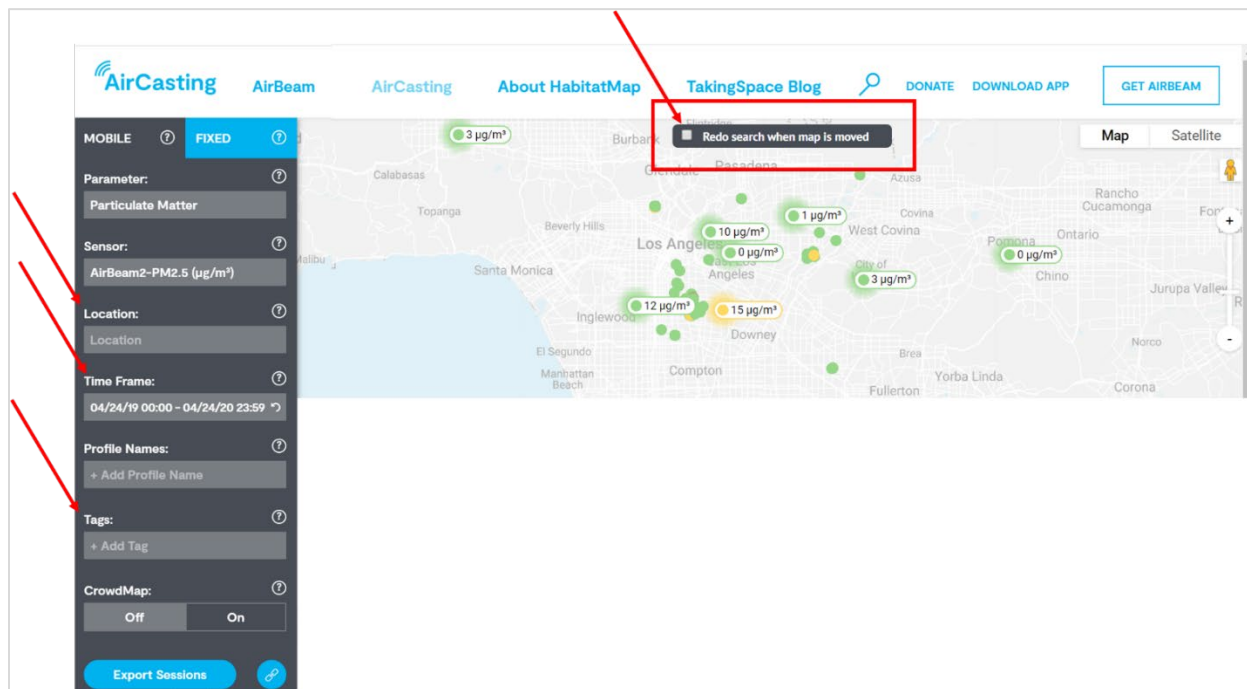
Credit: [airnow.gov/index.cfm?action=aqibasics.aqi](https://airnow.gov/index.cfm?action=aqibasics.aqi)

## Step 5. View Your Session Map

After you are done recording your session, make sure the phone has reconnected to Wi-Fi (connect to Wi-Fi through the phone's **Settings** menu ). **The session(s) you recorded will only sync to the website when the phone is connected to Wi-Fi.** The syncing process should take a few minutes, but may take up to 20 minutes depending on your Wi-Fi strength.

- As a reminder, all data, including any notes or photos you took with the app during your session, will **automatically** upload to the website.

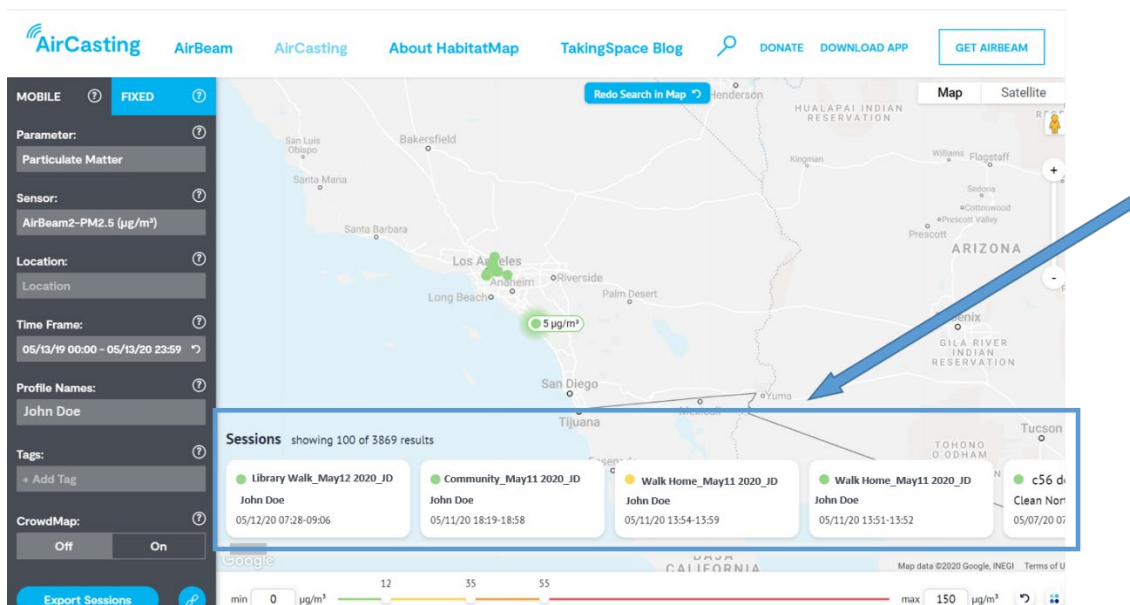
1. Go to [aircasting.habitatmap.org/mobile\\_map](http://aircasting.habitatmap.org/mobile_map).
2. Enter your AirCasting Profile name under **Profile Names** to find your AirCasting session(s). See **Figure 14**.
  - If the map does not show your location, select the **"Redo search if map is moved"** box and drag the map to your location. Your session should then be listed at the bottom of the screen.
  - You can use the **Location, Time Frame, and Tags** functionality to search for your AirCasting session(s) as well.



**Figure 14.** An example of the map you will see on [aircasting.habitatmap.org/mobile\\_map](http://aircasting.habitatmap.org/mobile_map). Highlighted are the boxes where you can type in your location, the time frame, and tags you used during your session. Also highlighted is the Redo search if map is moved box.

3. Click in the **Parameter** menu and select **Particulate Matter**.
4. Click in the **Sensor** menu and select **Particulate Matter – AirBeam2-PM<sub>2.5</sub>**.

5. Based on the search criteria, the parameter, and sensor selections you have made, your AirCasting session(s) should appear at the bottom of the AirCasting website, as shown in Figure 15.

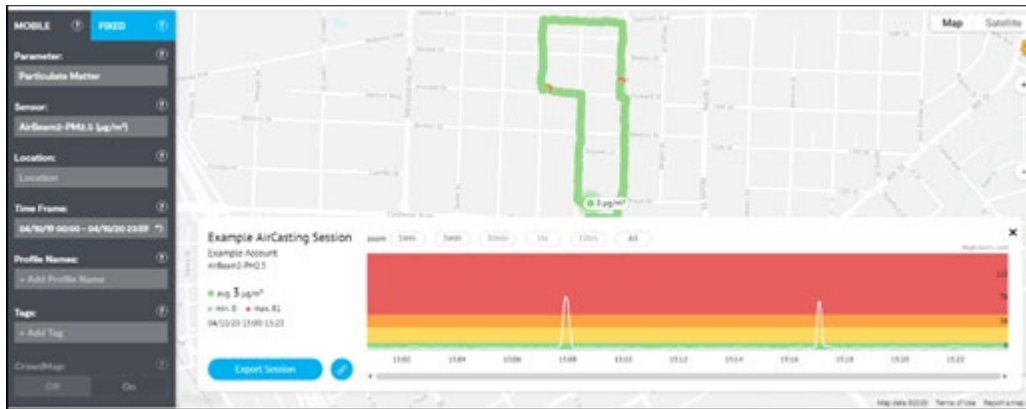


**Figure 15.** A screenshot highlighting where the list of sessions appears.

**Troubleshooting:** If you've followed the instructions above and still can't find your AirCasting session on the map, make sure the phone is connected to Wi-Fi and then follow these steps to force sync your AirCasting session(s) with the map:

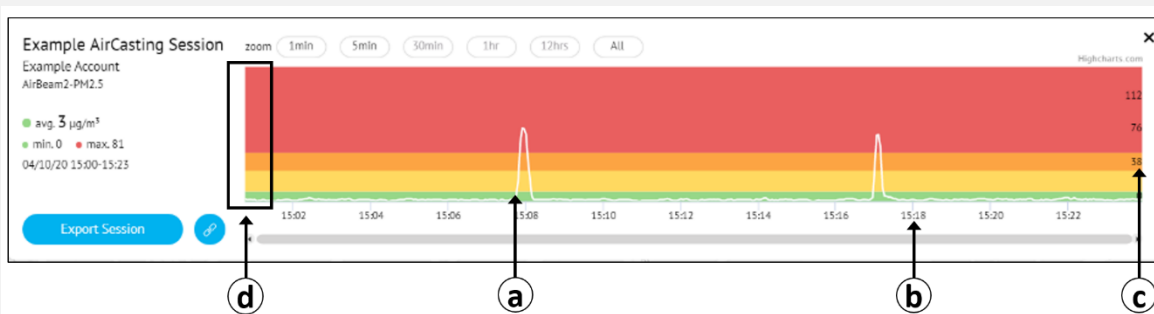
- In the **AirCasting** app, select **Menu** (≡) and then select **Sessions**
  - Your latest session should be listed at the top of the page
- Click on **the session** and pull it down the page
  - If done correctly, this will cause a rotating circle to appear
  - This means the app is syncing with the AirCasting map, which may take up to 20 minutes depending on Wi-Fi strength

Click on the AirCasting session you would like to view (only one session can be viewed at a time), and your data will appear on the map (similar to **Figure 16**). If your AirCasting session was outside, you will see your measurements (color coded to the AQI color scale) along the route you walked. Notes or pictures recorded during your session will also appear on the map where they were taken. Measurements made indoors are better viewed on the time series graph, which shows measurements at the time they were taken.



**Figure 16.** An example of what the map may look like for your session.

## Interpreting the Time Series Graph



- The white line in the graph shows your measurements, in this case  $PM_{2.5}$  concentration, as a function of time. Click the "All" button to show the full graph of your measurements
- The x-axis on the graph is the time the measurement was taken (hour:minute)
- The y-axis shows  $PM_{2.5}$  concentration level
- The colors in the background correspond to the EPA Air Quality Index (AQI) color scale, which explains how air quality impacts your health. You can visit <https://www.airnow.gov/index.cfm?action=aqibasics.aqi>

## Step 6. After AirCasting

- If you are signed in to a personal AirCasting Profile, make sure to sign out before returning the AirBeam2 and phone to your library.
- If your session is uploaded to the HabitatMap site, delete any photos you have taken from the phone. The photos will remain available on the website.

3. Turn the AirBeam2 and phone off. Make sure that the phone and AirBeam2 go back in their boxes with the matching labels, and make sure all accessories (the charging cords, charger, carabiner clip, belt clip, and screw) are in the boxes they came in.

**Note for Librarians:** You may want to double-check that old photos have been deleted from the phone gallery and the previous user's AirCasting profile has been signed out after return and before re-distributing the kit.

## Optional Step 7. Retrieve AirCasting Session Data as a .csv File


Your AirCasting session data can be sent via email as a CSV file, allowing you to analyze your data outside of the AirCasting app. To export your AirCasting session data, visit [aircasting.habitatmap.org/mobile\\_map](http://aircasting.habitatmap.org/mobile_map) and locate your session using Steps 5.1 to 5.4. Once you have selected your session, select **Export Session**, enter your email address, and press **Export**. Your data will be sent to your email address as a CSV file in a ZIP folder.



# Appendix A. Updating the AirCasting App



HabitatMap periodically releases new versions of the AirCasting app. If you start encountering performance issues with the AirCasting app, the app may need to be updated. The instructions below describe how to update the AirCasting app on the phone. You will need a Wi-Fi connection and a **Google account**. Once the app has been updated, follows Steps 3 and 4 in this guide to prepare an AirCasting session.

## Step A1. Check the AirCasting App Version on the Phone


If the phone has already connected to Wi-Fi, it may have automatically downloaded and installed the latest version of the AirCasting app. To check that the AirCasting app is up-to-date, verify that the version on the phone matches the version available on the Google Play store (version information is available in the **Additional Information** section of [play.google.com/store/apps/details?id=pl.lip.aircasting](https://play.google.com/store/apps/details?id=pl.lip.aircasting)). To check the AirCasting app version on your phone, open the **AirCasting** app, tap the **Menu** icon () , select **About**, scroll down, and tap **Version**.

If the version numbers match, you have the latest version of the AirCasting app installed on the phone and you do not need to do anything. If not, update manually by following Steps A2 through A5.

## Step A2. Connect the Phone to Wi-Fi and Create a Google Account

1. Select the **Settings** app icon () on the home screen, select **Network & Internet**, and then **Wi-Fi**. Select the appropriate Wi-Fi connection and enter the password (if any). Press the circle icon () at the bottom of the phone to return to the home screen.
2. If you have a Google account, skip to Step A3. If you do not have a Google account, create one by going to [google.com](https://google.com), select **Sign In**, and then **Create account**.

## Step A3. Sign in to the Google Play Store

1. Go to the phone's home screen and swipe up from the bottom of the screen. This brings up a list of all apps installed on your phone.
2. Scroll down and open the **Google Play Store** app () , and then press **Sign In**.
3. Enter your Google account email and password.
4. Google will offer you the chance to read the **Google Play Store Terms of Service**; when you are done, press **I Agree**.
5. Google Services will offer to back up data from the phone to your Google account; it is recommended that you leave this box unchecked and press the blue button next to **Back up to Google Drive**. When you are ready to proceed, select **Accept**.



## Step A4. Update the AirCasting App Version on the Phone

In the **Google Play Store** app, tap **Menu** (≡), select **My apps & games**, and select **Updates**. Scroll down until you find the **AirCasting** app, and press **Update**. Allow the app to download and install before you attempt to open it. Please note:

- Once you've connected the phone to Wi-Fi, the phone may attempt to update multiple apps automatically. Depending on your Wi-Fi strength and the number of apps that need to be updated, this process may take up to 20 minutes. If you want to skip downloading these other updates, scroll down to **Updates pending** and select **Stop**. Make sure to then scroll back to the **AirCasting** app and press **Update**.
- If the Google Play Store asks you to enter payment information, press **Skip**; the AirCasting app is a free application and does not require payment.

## Step A5. Confirm Your AirCasting App Update

After the Google Play Store has finished installing the **AirCasting** app update, go back to the phone's home screen and click the **AirCasting** app icon. Tap the **Menu** icon (≡), select **About**, scroll down, and tap **Version**. The version number should now match the version listed on the Google Play Store. If the numbers do not match, reboot the phone by holding down the power button and selecting **Reboot**. Once the phone has restarted, check the **AirCasting** app version again; if the version number still does not match the version listed on the Google Play Store, repeat Steps A2 through A5.

## Appendix B. Configure and Pair the AirBeam2 with an Android Phone

Each AirBeam2 is already configured and paired with a phone (and labeled with the AirBeam2's serial number). However, if a phone or AirBeam2 is ever replaced, it will need to be configured and paired again. Instructions on configuring and pairing an Android phone with the AirBeam2 are below:

1. Turn the phone on.
2. Open the **Settings** app (⚙️). Select **Network & Internet** and connect the phone to a Wi-Fi network.
3. Go back to the main screen of the **Settings** app. Select **Connected devices**, and then press **Bluetooth**.
4. Turn on the AirBeam2. Wait until the connection indicator light (Step 1, **Figure 3**) on the bottom of the AirBeam2 turns green.
5. On the phone, select **Pair new device**. The AirBeam2 should appear in the list of available devices.
6. Select the AirBeam2 number. When prompted, select **Pair**.
7. Close the **Settings** app and turn off the AirBeam2.
8. Open the AirCasting app.
9. Turn on the AirBeam2. Wait until the connection indicator light on the bottom of the AirBeam2 turns green.
10. Press **Configure AirBeam 2**, then press the blue **Connect** button. When prompted, select **Mobile**. The light on the bottom of the AirBeam2 should turn white if the pairing is successful; if the pairing is successful, you're done! Turn off the phone and AirBeam2, and resume normal use.
11. If the pairing is not successful, turn off the AirBeam2, close the AirCasting app (press the square button on the bottom right of your phone, and press **Clear All** – this action is used to close apps), and try again. If still not successful, go back to the **Settings** app, select **Connected devices**, and then press **Bluetooth**. Click the gear next to the AirBeam2 numbers and press **Forget**. Then repeat Steps 3 through 10 again.
12. If the pairing seems successful (the light will turn white) but the app says "Unfortunately, AirCasting has Crashed," turn off the AirBeam2, restart the AirCasting app (press the Square button and then press **Clear All** to close the app fully), and then restart at Step 7.

# AirBeam2 Quick Start Guide

## AirBeam2 Quick Start Guide Presentation Slides

# AirBeam2 Quick Start Guide Presentation

This guide is compatible with AirCasting Application  
Version 1.5.19 and Android Operating System 8.1

**\*Note: The Airbeam2 is not compatible with iOS Operating Systems**

*Disclaimer: Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.*

# Quick Start Guide Overview

- General safety precautions
- Step 1: Set up the AirBeam2 and Phone
- Step 2: Create an AirCasting Profile and Log In
- Step 3: Connect the Phone and AirBeam2
- Step 4: Start AirCasting!
- Step 5: View Your Session Map
- Step 6: After AirCasting
- Where Can You Find Additional Information?



Need Wi-Fi



Look for this box to know which steps require Wi-Fi to complete

No Wi-Fi needed



Look for this box to know when you can be outside of Wi-Fi range

# Safety Precautions

Minors should be accompanied by a guardian



If using the AirBeam2 along roads, please use sidewalks and follow common safety practices near roads



Use caution while walking around with the AirBeam2 to avoid tripping or colliding with others



Don't cover the sensor air inlet or exit



The AirBeam2 is water resistant, not waterproof – make sure to protect the sensor in the rain by using an umbrella



To use the belt clip to carry the AirBeam2, use the screw provided



Make sure your AirCasting session name is descriptive and appropriate! It will be online and visible to the entire AirCasting community



Keep the phone and sensor within 10 feet of each other



## **Additional Important Notes:**

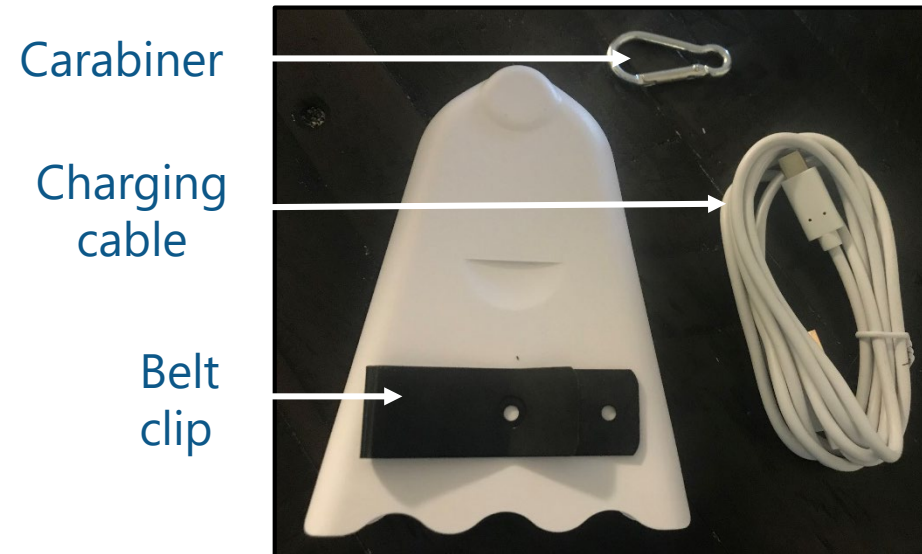
The AirBeam2 only measures particulate matter – it does not measure gaseous pollutants. The AirBeam2 does **NOT** measure airborne viruses like the flu or COVID-19.

# Step 1: Set up the AirBeam2 and Phone

1. You should have an AirBeam2 and a phone.  
**Check** to make sure the serial numbers match!

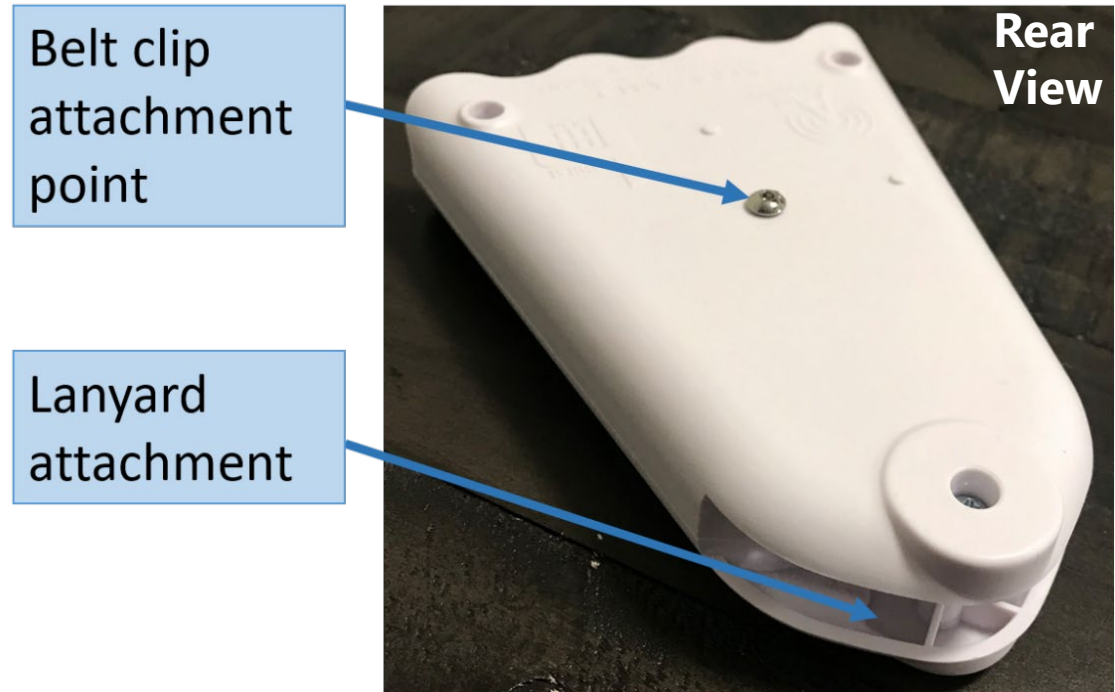
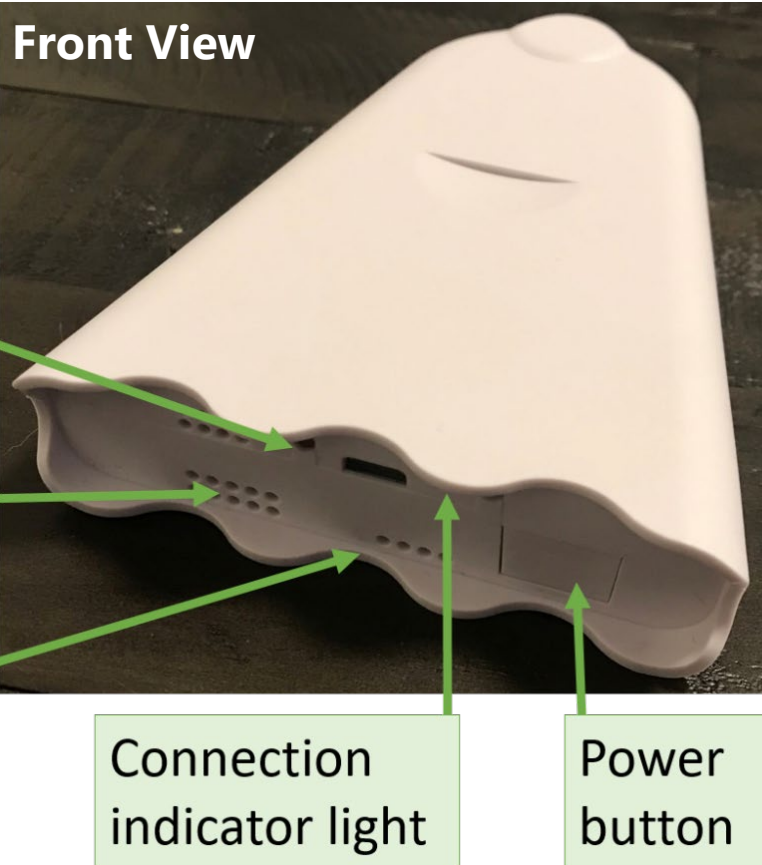


2. What else is in the box?  
**Check** for the included accessories



# Set up the AirBeam2 and Phone

## Get to know the AirBeam2





# How to Turn the Devices On

## Turning on the Phone

Hold down the smaller button on the right side



## Turning on the AirBeam2

Press the rectangular button on the bottom






Power Button

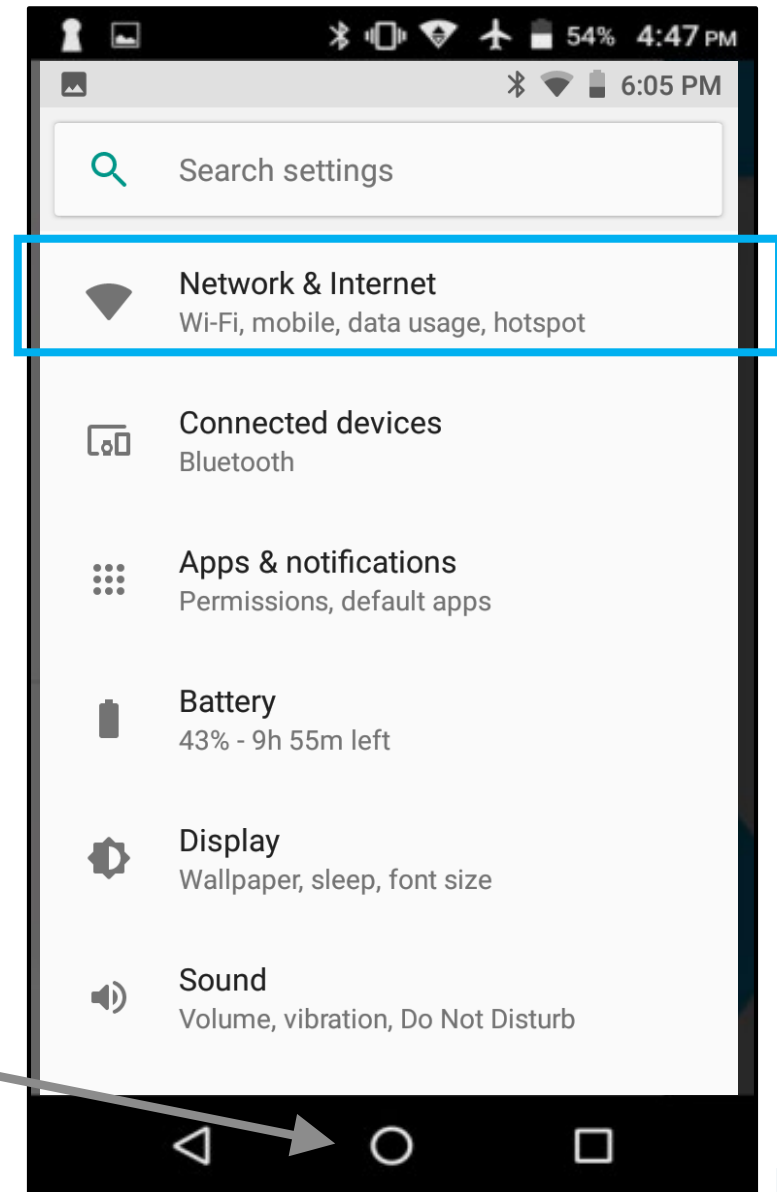
# Step 2: Create an AirCasting Profile and Log In

Before you start using the AirBeam2 for the first time, you need to create an AirCasting Profile on the phone. AirCasting is an app that records and visualizes the AirBeam2 data

1. Turn on the phone and swipe up to unlock the phone (no password needed)

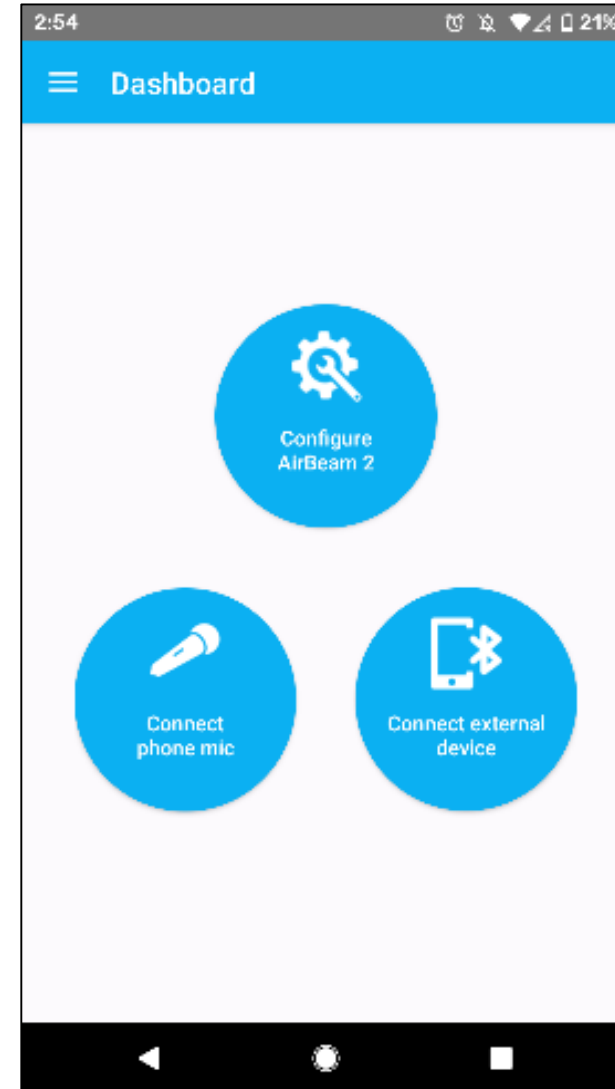
2. Connect your phone to Wi-Fi

- On the home screen, select the **Settings** icon (  )
- Select **Network & Internet**
- Select **Wi-Fi** (  )
- Select the appropriate network and enter the password
- Select the circle icon (  ) at the bottom of the screen to return to the home screen




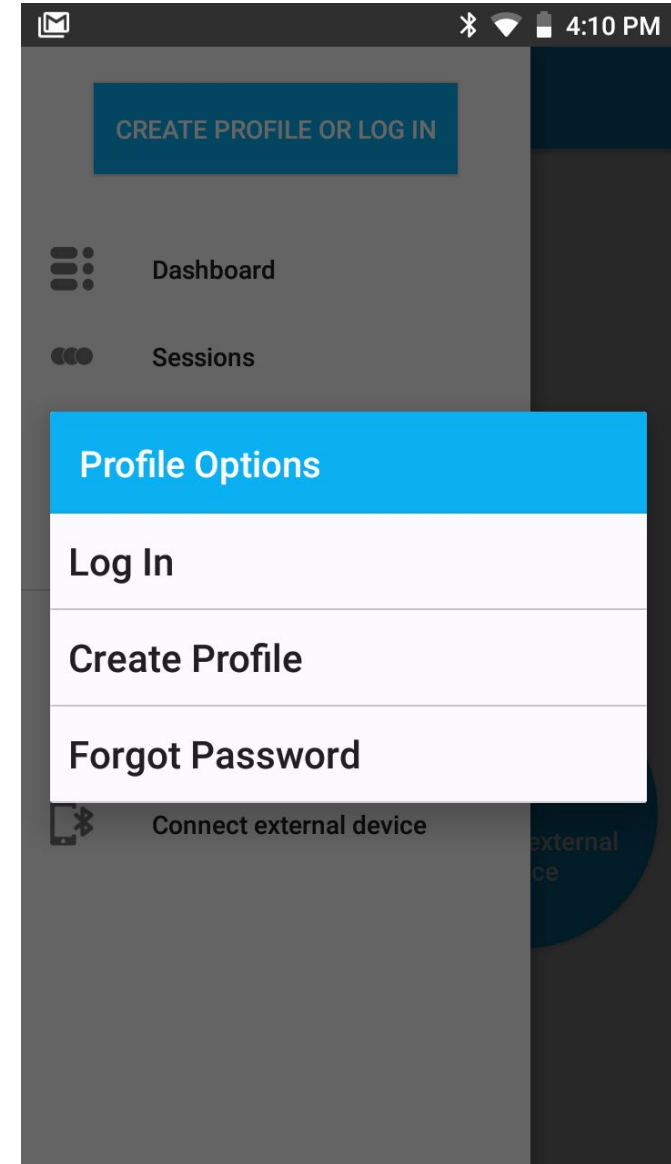
# Create an AirCasting Profile and Log In

3. Open the **AirCasting app** (  )



# Create an AirCasting Profile and Log In

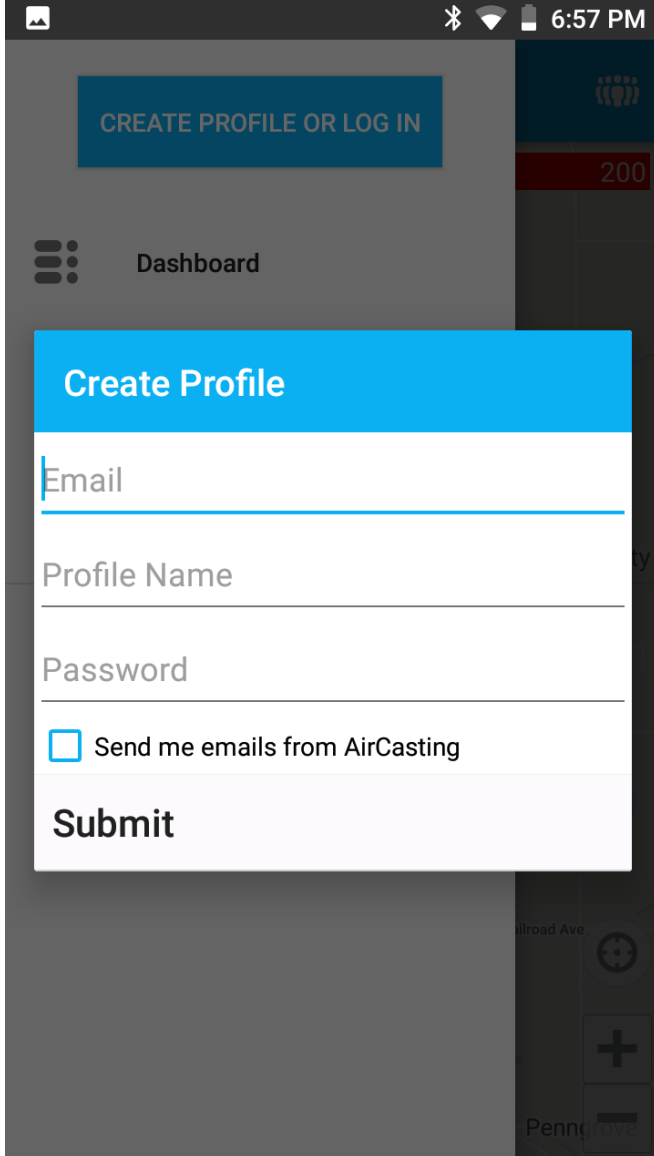
4. Select Menu () in the upper-left corner, select **Create Profile or Log in**, and then select **Create Profile**



# Create an AirCasting Profile and Log In



5. Enter the **Email**, **Profile Name**, and **Password** you want to use
- Passwords must contain both uppercase and lowercase characters

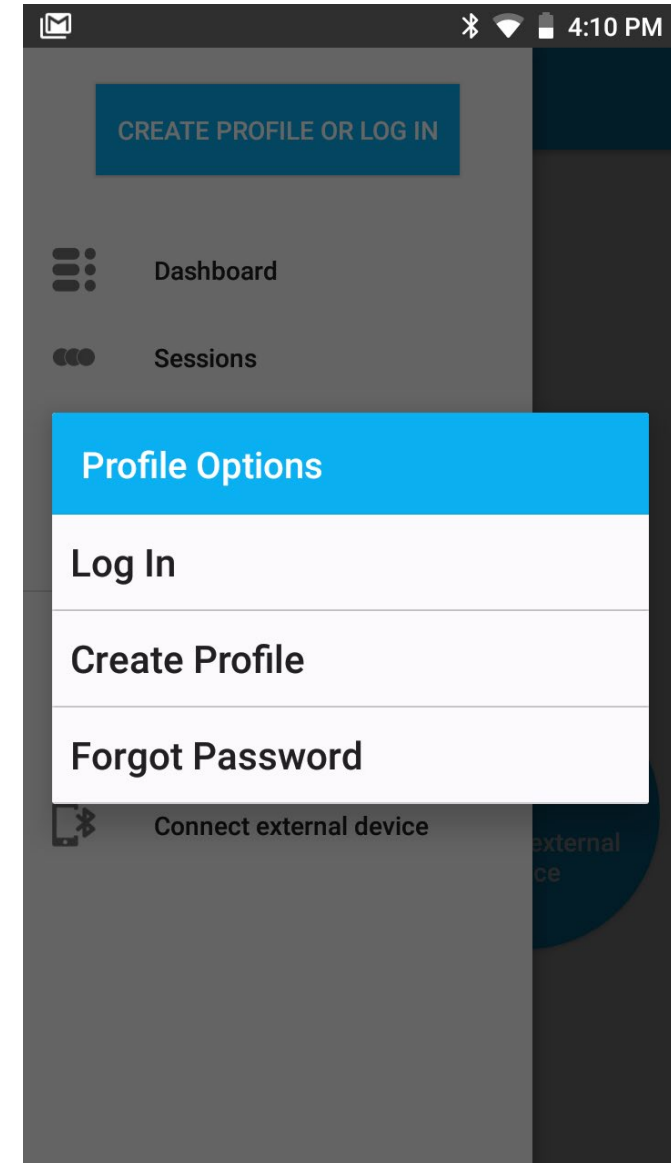
Record your AirCasting **Email**, **Profile Name**, and **Password** in a secure location. If you forget your password, you can reset it by selecting **Create Profile or Log in** and pressing **Forgot Password**



The screenshot shows a mobile app interface with a dark theme. At the top, there's a status bar with icons for signal, Wi-Fi, and battery, and the time 6:57 PM. Below the status bar, there's a blue button labeled "CREATE PROFILE OR LOG IN". Underneath, there's a "Dashboard" section with a hamburger menu icon. A "Create Profile" form is overlaid on the dashboard. The form has a blue header with the text "Create Profile". It contains three input fields: "Email", "Profile Name", and "Password". Below the "Password" field, there's a checkbox labeled "Send me emails from AirCasting". At the bottom of the form is a white button labeled "Submit".

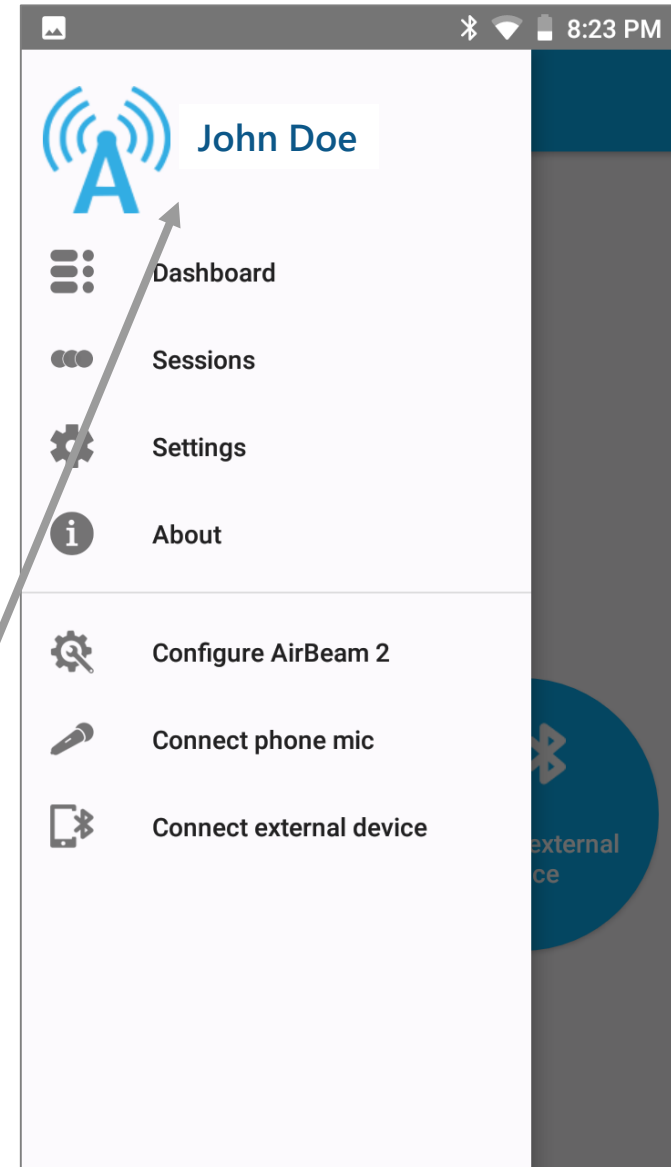
# Create an AirCasting Profile and Log In

6. Log in to the profile by opening the AirCasting app ()
7. Select Menu () , then Log in
  - Enter your **Profile Name** or email (either will work), as well as your **password**, and select OK



# Step 3: Connect the Phone and AirBeam2

1. Make sure the phone is connected to Wi-Fi and that Bluetooth is on
  - If either is turned off, these connections can be changed using the Settings icon (⚙️)
2. Open the AirCasting app (📶)
3. Confirm you are signed in on the dashboard
  - Select menu (☰)
  - If you see your profile name listed at the top of the screen, you are logged in

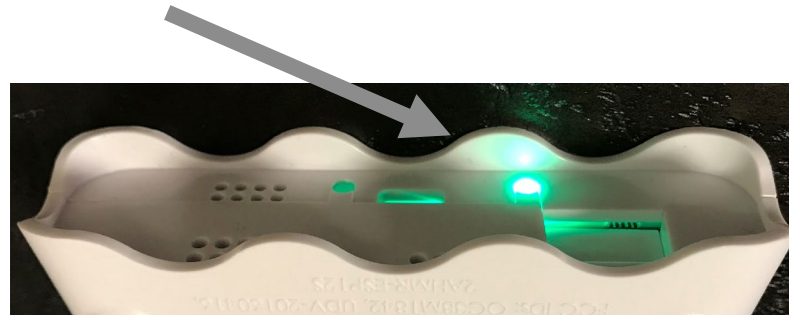


# Connect the Phone and AirBeam2

4. Turn on the AirBeam2 by pressing the **power button** on the bottom
  - Make sure the AirBeam2 and phone are within a few feet of each other so that the Bluetooth connection will work
  - Wait until the **connection indicator light** (initially red) on the bottom of the AirBeam2 turns green



**Power Button**

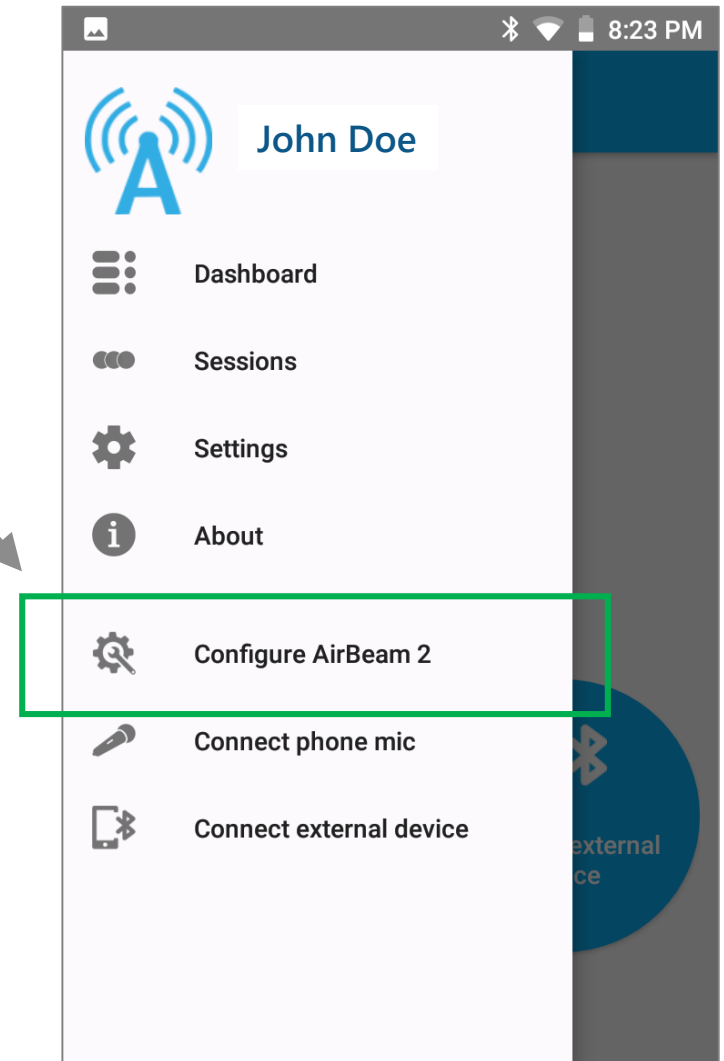
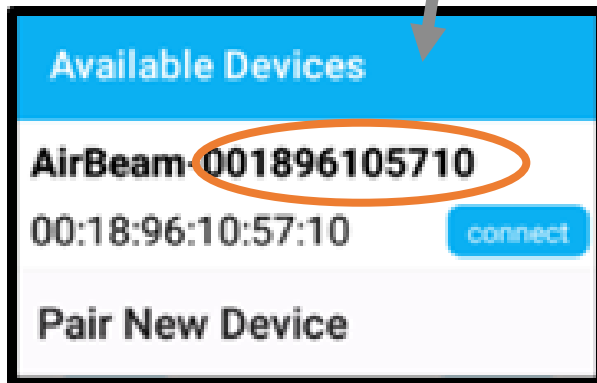




# Connect the Phone and AirBeam2

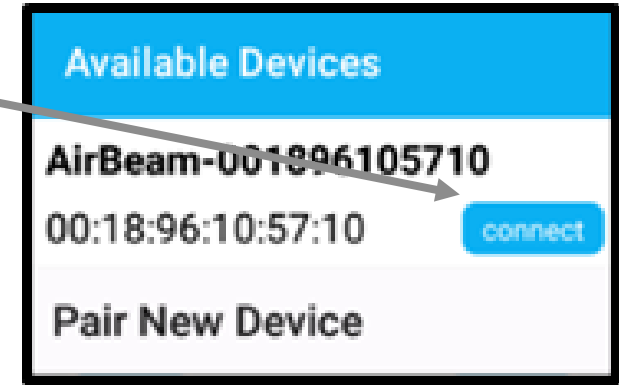
## 5. Select Configure AirBeam2

- Make sure that the AirBeam2 number on the screen matches the one on the labels on your phone and AirBeam2



# Connect the Phone and AirBeam2

- Select the **Connect** button. For Session Type, select **Mobile**



6. The **connection indicator light** (initially green) will turn **white** once the AirBeam2 and phone are connected



Note that the white **connection indicator** light will eventually turn off. This is normal!

# Connect the Phone and AirBeam2

- Gray circles will appear on the main screen of the AirCasting App when the phone and AirBeam2 are connected





## Step 4: Start AirCasting!

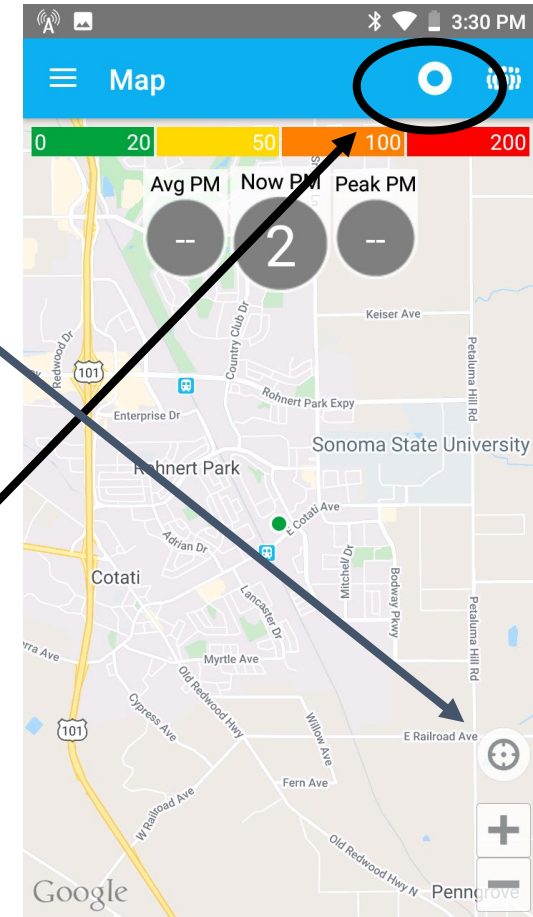
1. On the AirCasting dashboard, press the three circle icons () and then select **Map**



# Start AirCasting!

- After the map has loaded, press the bullseye icon () in the lower right of the screen to center the map on your location

2. Press the **Recording** button () at the top of the Dashboard page



# A Note About Wi-Fi

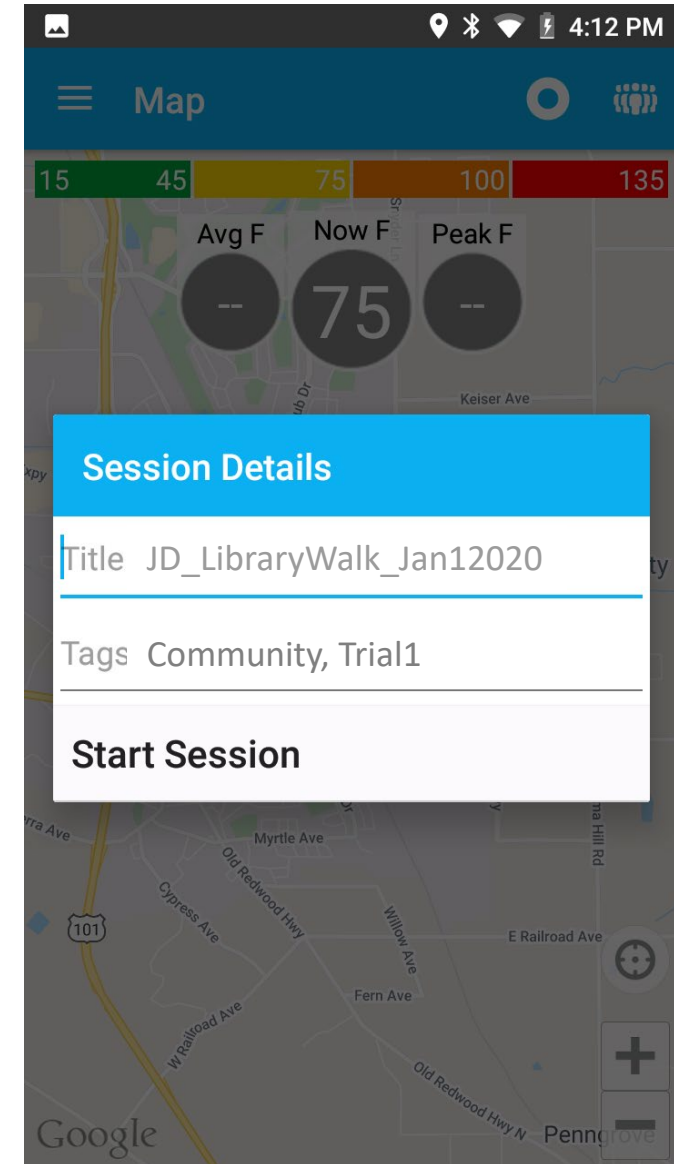
**Now that you have signed in to/created your AirCasting account, and the map has loaded, you are no longer required to be within Wi-Fi range**



**The next time you will need Wi-Fi is after you have performed your measurements (Step 5)**

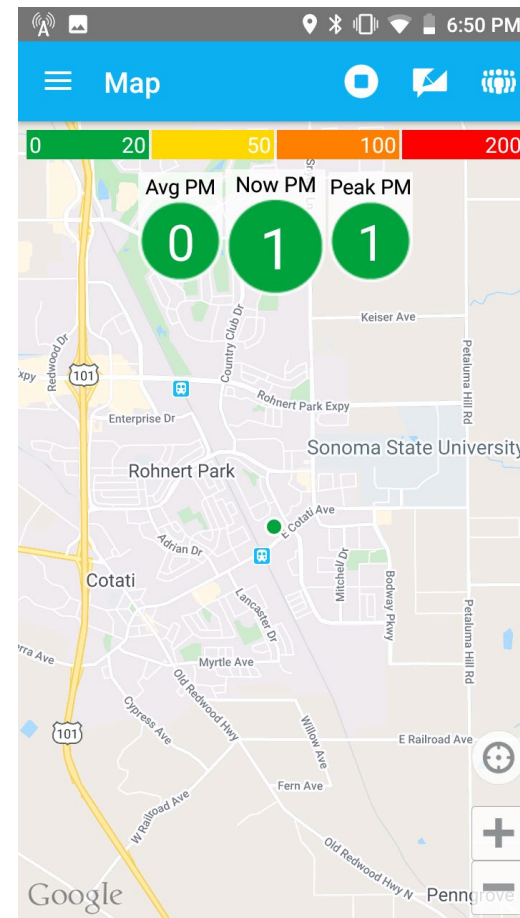
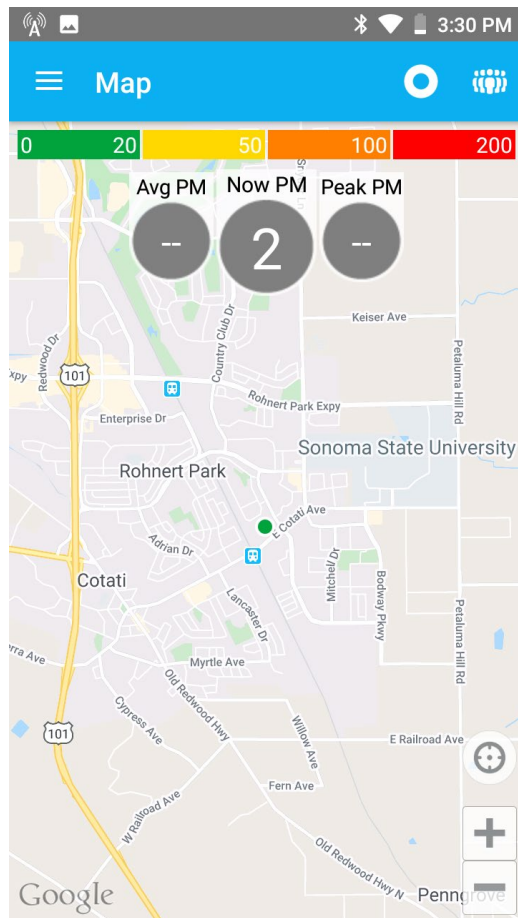
# Start AirCasting!

- Add a title for your session
  - You can also add tags to help you identify your session on the HabitatMap website
- Press the triangle icon (◀) at the bottom of the phone to collapse the keyboard
- Press **Start Session**



# Start AirCasting!

The gray circles in the AirCasting app become colored, which shows you're recording a session

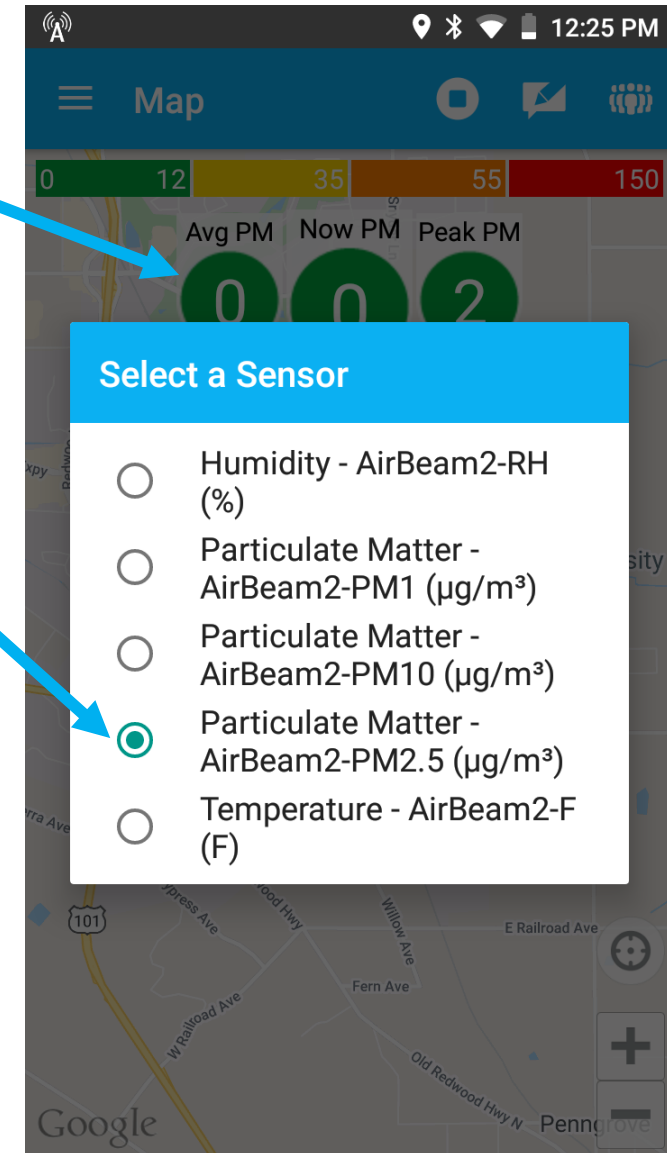




# Start AirCasting!

3. To change the measurement displayed to  $PM_{2.5}$ , press one of three circles (**Avg**, **Now**, or **Peak**) and scroll down to select  $PM_{2.5}$

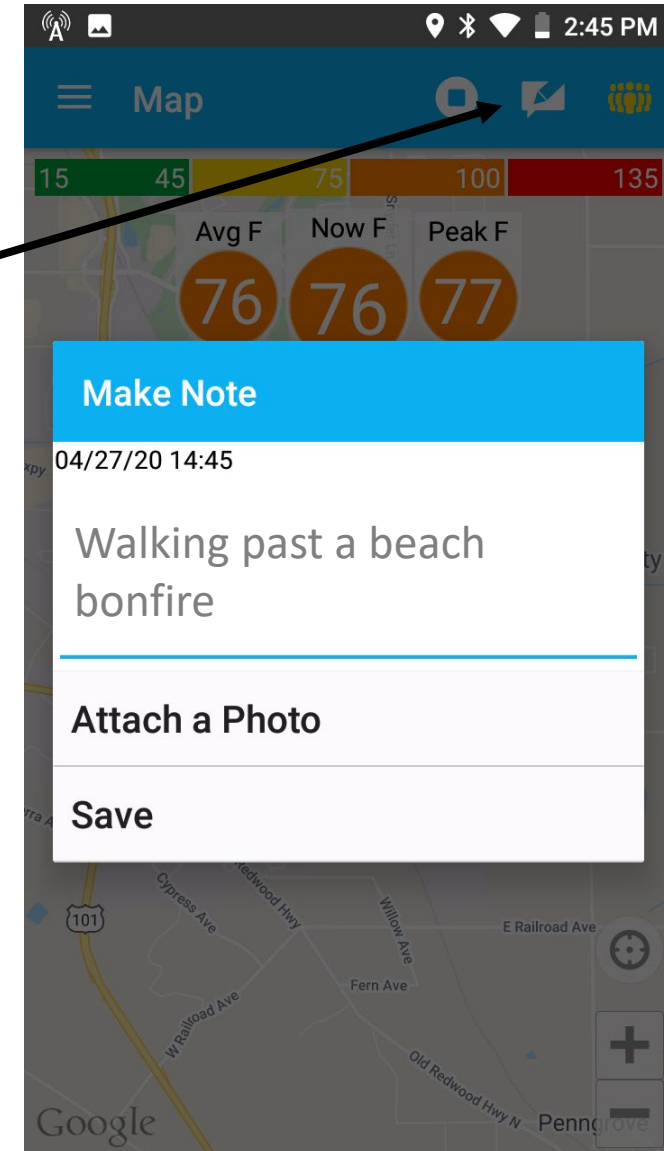
- **Avg**: shows the average of all  $PM_{2.5}$  measurements you have taken
- **Now**: shows the current  $PM_{2.5}$  value. This is the best one to look at to see what  $PM_{2.5}$  you are currently measuring
- **Peak**: shows the highest value measured during your session so far



# Start AirCasting!

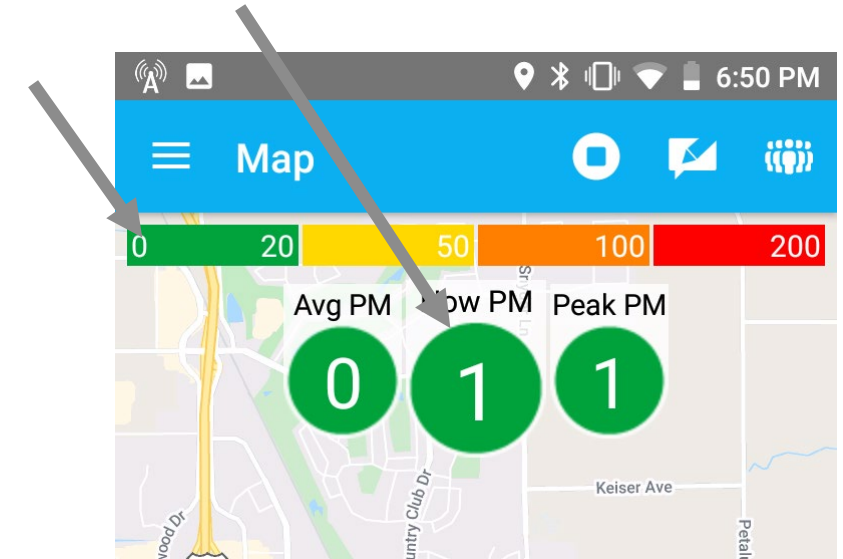
4. As you walk around, you can use the app to make notes and add photos of what you're seeing by pressing the **Notepad icon** (📝) at the top of the screen
  - You can add a photo to your note by selecting **Attach a photo**

The notes and photos you add here will be automatically uploaded to the HabitatMap website and available for anyone to see. The photos are also saved to the phone.



# What Do the Colors in the AirCasting App Mean?

1. The colors are based on the Environmental Protection Agency's (EPA's) Air Quality Index (AQI) color scale and display the AQI level that would result if measurements were made over a 24-hour period
2. The AQI provides information on how polluted the air is and things you can do to protect your health if you plan to go outdoors
3. You can visit [airnow.gov/index.cfm?action=aqibasics.aqi](http://airnow.gov/index.cfm?action=aqibasics.aqi) to learn more about the AQI



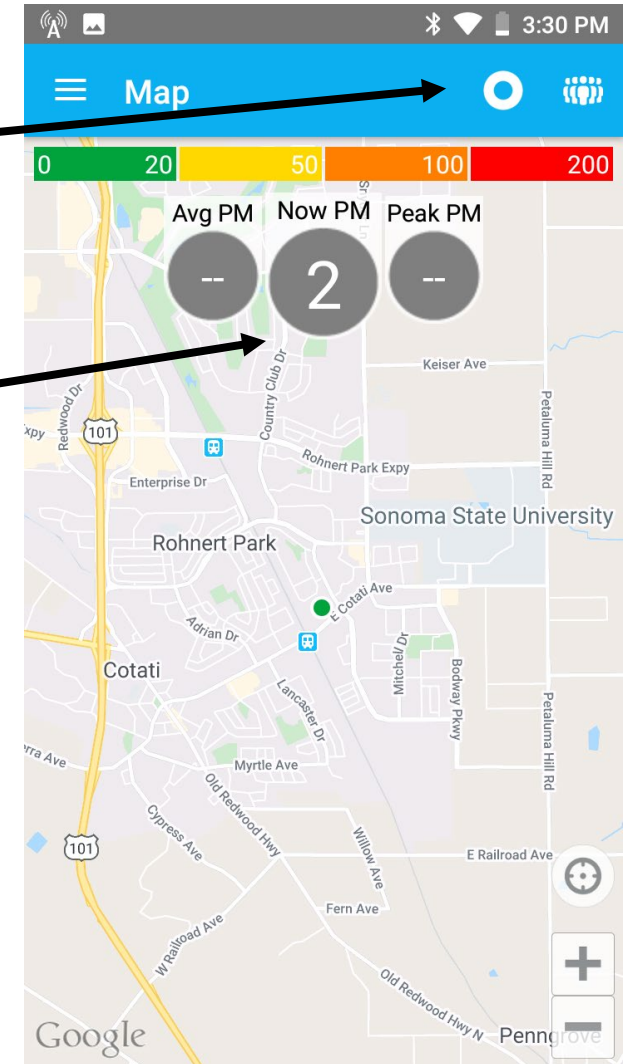
# What Do the Colors in the AirCasting App Mean?

Daily AQI Color	Levels of Concern	Description of Air Quality
Green	Good	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	Health warning of emergency conditions: everyone is more likely to be affected.

Source: [airnow.gov/index.cfm?action=aqibasics.aqi](https://airnow.gov/index.cfm?action=aqibasics.aqi)

# Start AirCasting!

5. At the end of your session, press the Circle icon (●) to stop recording
  - The colored circles should become gray again
6. Leave your phone on until you make sure that your session uploaded to the map at <http://aircasting.habitatmap.org/mobile> map (but you can turn off the AirBeam2 to save its battery)

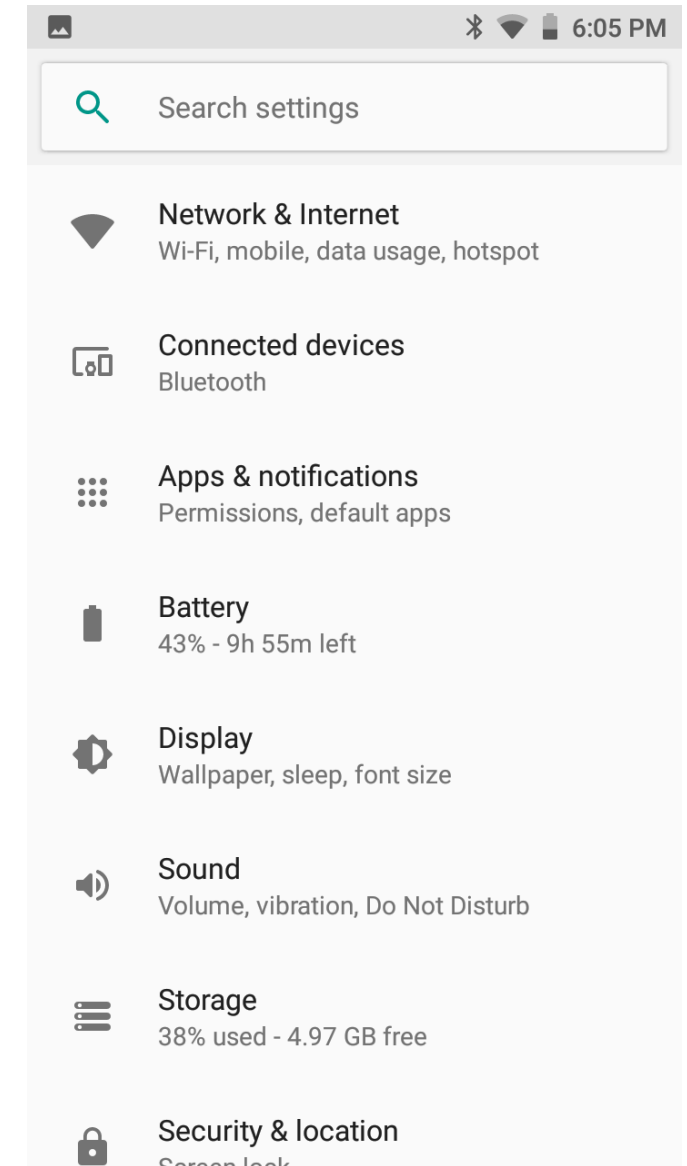


# Step 5: View Your Session Map

After you have finished recording your session, make sure the phone has reconnected to Wi-Fi in the phone's **Settings** menu (⚙️)

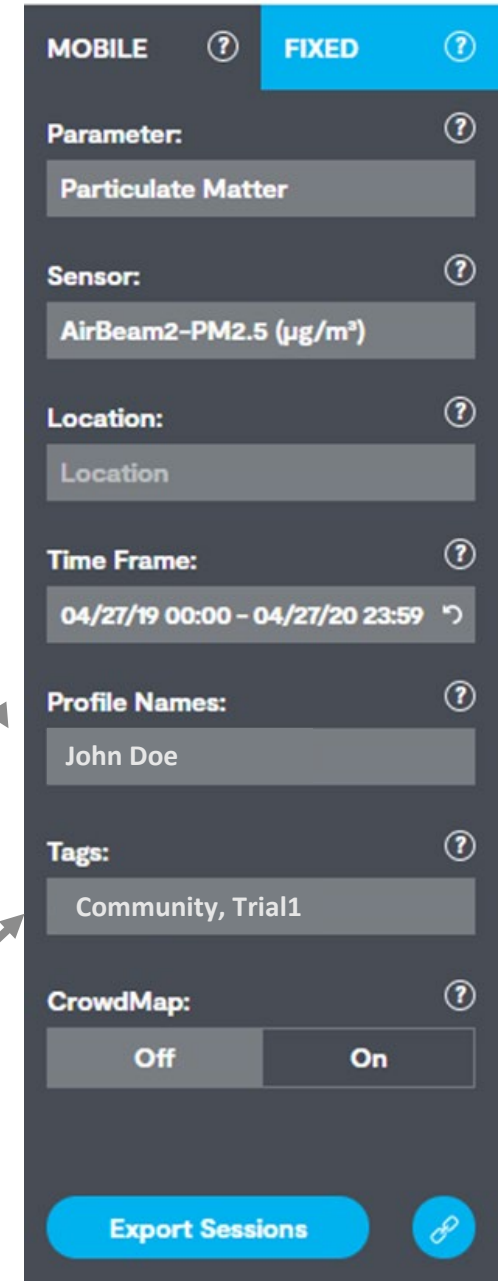
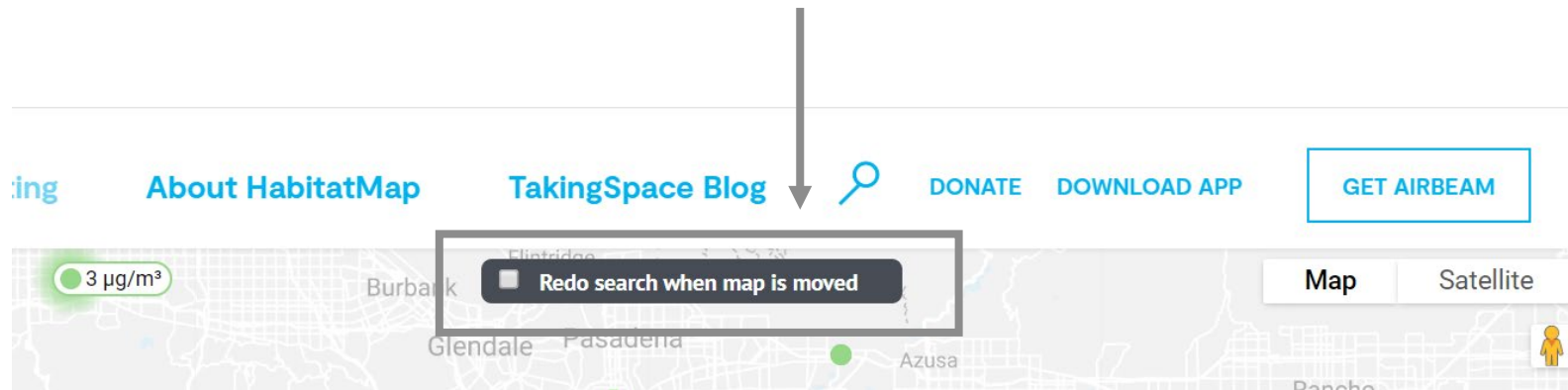
- The syncing process should take a few minutes, but may take up to 20 minutes depending on your Wi-Fi strength
- As a reminder, all data including any notes or photos you took with the app during your session will automatically upload to the website

1. On a computer, go to [aircasting.habitatmap.org/mobile\\_map](http://aircasting.habitatmap.org/mobile_map)



# View Your Session Map

2. Enter your AirCasting **Profile Name** under **Profile Names** to find your AirCasting sessions
  - Choose the **Mobile** tab
  - If the map does not show your location, click the **Redo search if map is moved** box and drag the map to your location





# View Your Session Map

3. Click in the **Parameter** menu and select **Particulate Matter**
4. Click in the **Sensor** menu and select **AirBeam2-PM2.5 ( $\mu\text{g}/\text{m}^3$ )**

MOBILE ? FIXED ?

Parameter: ?  
Particulate Matter

Sensor: ?  
AirBeam2-PM2.5 ( $\mu\text{g}/\text{m}^3$ )

Location: ?  
Location

Time Frame: ?  
04/27/19 00:00 - 04/27/20 23:59 ↻

Profile Names: ?  
John Doe

Tags: ?  
Community, Trial1

CrowdMap: ?  
Off On

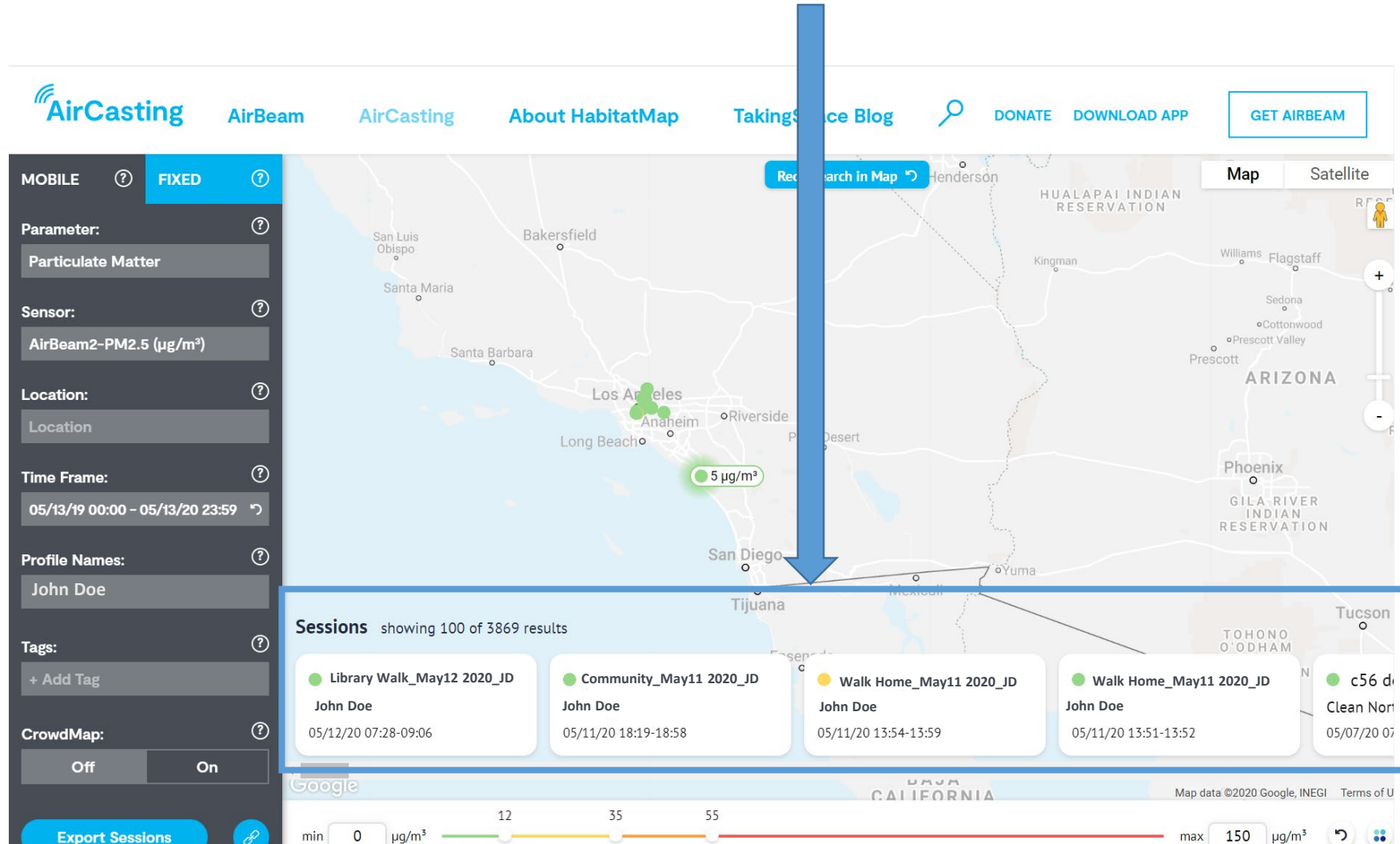
Export Sessions



# View Your Session Map

Step 5

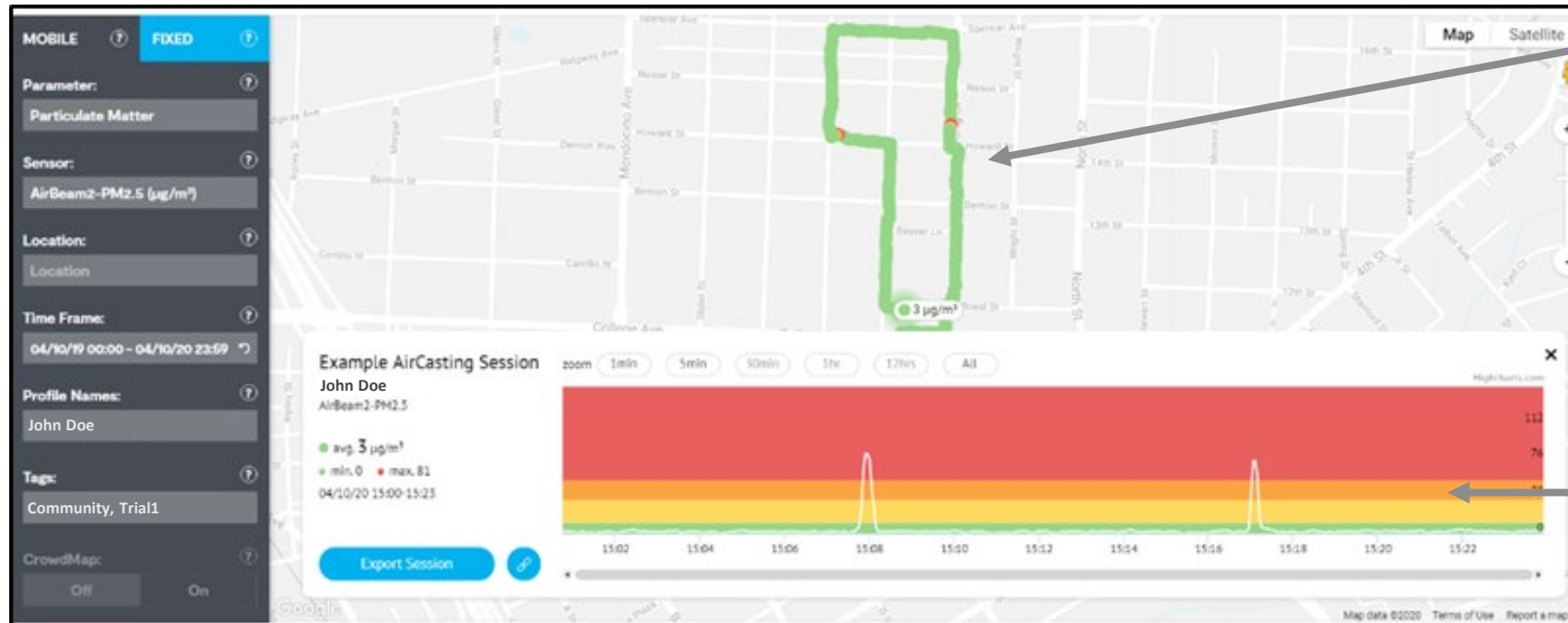
Your AirCasting session(s) will appear at the bottom of the AirCasting website



# View Your Session Map

Step 5

- Click on the AirCasting session you would like to view, and your data will appear on the map (example below)



On the map, you can see where you walked and what the PM<sub>2.5</sub> levels were

## Note:

The GPS works best for outdoor activities. If your activity was indoors, the GPS may not accurately represent your location – in this case, use the time series graph.

# Interpreting the Time Series Graph

## Plume Comparison Sonoma

John Doe

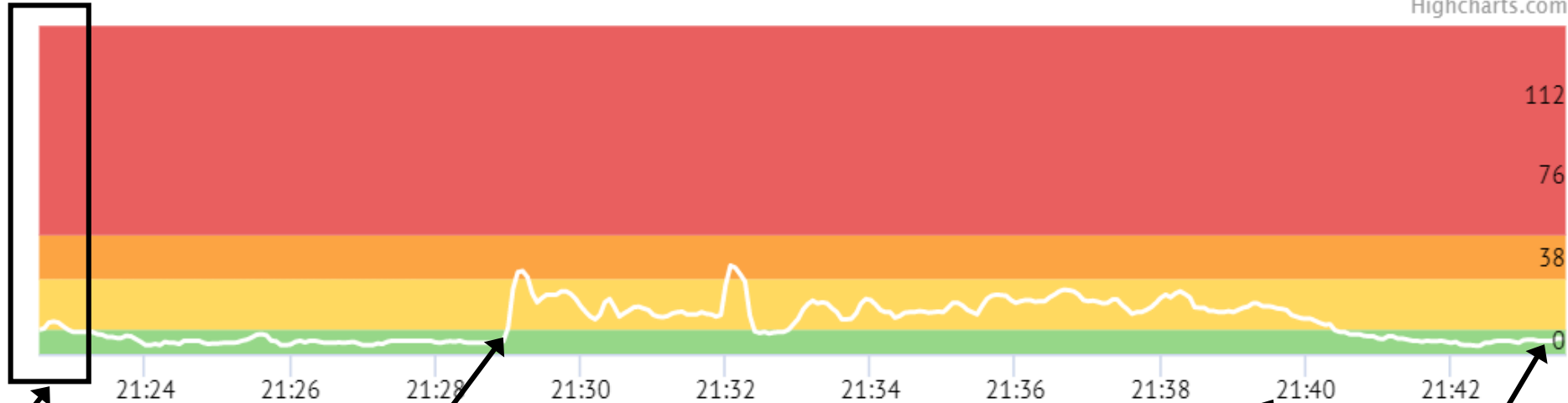
AirBeam2-PM2.5

● avg. 15  $\mu\text{g}/\text{m}^3$

● min. 3 ● max. 41

03/07/20 21:22-21:43

export session



The white line shows your  $\text{PM}_{2.5}$  measurements

x-axis = time of day

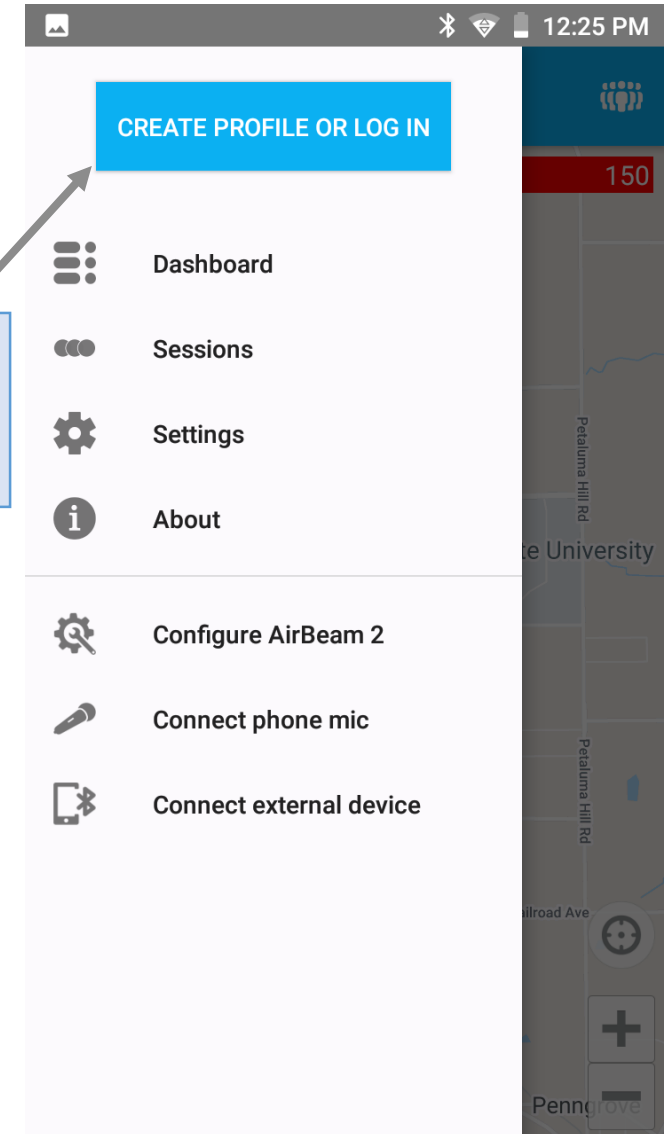
y-axis =  $\text{PM}_{2.5}$  concentration level (units are  $\mu\text{g}/\text{m}^3$ )

The colors in the background of the plot correspond to the U.S. EPA Air Quality Index color scale

# Step 6: After AirCasting

1. If you are signed in to your personal AirCasting Profile on the phone, make sure to sign out before returning the AirBeam2 and phone
2. If your session is uploaded to the HabitatMap site, delete any photos you have taken on the phone
  - The photos will remain available on the website
3. Make sure that the phone and AirBeam2 go back into the boxes with the matching labels, and make sure all accessories are in the boxes they came in

**This means you are no longer signed in**



# Where Can You Find Additional Information?

For further information on these topics and more, please refer to the Quick Start Guide, FAQ document, Resource Guide, and Activities 1-3

## AirBeam2 Quick Start Guide

This guide is compatible with AirCasting Application Version 1.5.19 and Android Operating System 8.1

This guide contains instructions for:

- Operating the AirBeam2 sensor using the AirCasting application on a paired Android phone.
- Collecting, viewing, and downloading the collected data, and
- Troubleshooting issues.


**Important Note!**

Make sure that the phone and AirBeam2 have matching labels! If the labels do not match, see a librarian.

**Note for Librarians:** The AirCasting application and Android operating system (OS) are periodically updated. This living document may need to be updated as new versions of the AirCasting app and Android OS are released. For best results, it's important to keep your AirCasting application and Android OS up to date. Instructions on updating your AirCasting app are located in [Appendix A](#).

### Step 1. Open your AirBeam2 and Phone

Each AirBeam2 has been paired with an Android phone. All of the paired equipment, including boxes, are labeled with the AirBeam2 serial number (see the orange circles on the image at right). If the phone and AirBeam2 ever become un-paired or need replacing, see a librarian.



**Note for Librarians:** The phone and AirBeam2 ever become un-paired, follow the pairing and configuration instructions in [Appendix B](#).

The phone comes with a charging black cord, and the AirBeam2 comes with a charging cord, a belt clip, a screw to attach the belt clip to the AirBeam2, and a carabiner clip. See the image below to identify the different parts of the AirBeam2.

## Frequently Asked Questions (FAQs)

### AirBeam2 Sensor

#### How does the AirBeam2 sensor work and what does it measure?

The AirBeam2 uses a light-scattering method to detect particulate matter (PM) in the air. Briefly, a small fan pulls air into the AirBeam2 where a laser light shines on the air. PM in the air scatters the laser light. The AirBeam2 measures the light scattered by the PM and uses math to count the number and size of the PM. The data is sent to the AirCasting app and available online to view.

You can read more about how the AirBeam2 works at the Habitat Map website, <https://www.habitatmap.org/blog/airbeam2-technical-specifications-operation-performance>, or consult the [Advanced Air Quality Topics](#) presentation for more information on how the AirBeam2 sensor works.

#### I want to use the AirBeam2 to learn about particulate matter! Where do I start?

To help you get started, this program has many materials on the AirBeam2 and particulate matter (PM) including:

- The [Quick Start Guide](#) which explains how to use the AirBeam2 sensor and AirCasting App.
- Three [Air Quality Lesson Plans](#) which will teach you about PM through hands-on activities with the AirBeam2 sensor.
- The [Resource Guide](#) which provides resources for more information on air quality, air quality sensors, and additional educational activities.
- The [Advanced Air Quality Topics](#) presentation which gives more information on air sensors and more complex air quality topics.

#### Is there anything the AirBeam2 can't do?

Yes, there are several things the AirBeam2 can't do! Some examples include:

- The AirBeam2 does not measure gaseous pollutants like ozone. The AirBeam2 only measures particulate matter (PM).

## Los Angeles Public Library Air Sensor Loan Program Resource Guide

### Deploying Air Sensors - Site Selection, Collocation, and Experimental Design

- Air Sensor Guidebook**
  - Guidance on using air sensors to collect measurements
    - <https://www.epa.gov/air-sensor-toolbox/how-use-air-sensors-air-sensor-guidebook>
- Sensor Collocation Guide**
  - Guidance on how to collocate air sensors with regulatory monitors
    - <https://www.epa.gov/air-research/instruction-guide-and-measure-analytic-tool-community-led-air-monitoring>
- Handbook for Citizen Science Quality Assurance and Documentation**
  - Quality assurance and best practices for individual/community projects
    - <https://www.epa.gov/citizen-science/quality-assurance-handbook-and-guidance-documents-citizen-science-projects>

### AirBeam2 Sensor Resources

- Manufacturer's Resource (HabitatMap)**
  - AirBeam2 Technical Specifications, Operation, and Performance
    - <https://www.habitatmap.org/blog/airbeam2-technical-specifications-operation-performance>
- South Coast Air Quality Management District AQ-SPEC**
  - Sensor details and evaluation of the AirBeam2
    - <https://www.scaqmd.gov/air-quality/monitoring/habitatmap-airbeam2>

### Other Information Related to Air Sensors

- Air Sensor Tool Box**
  - Information and resources for topics related to air sensors
    - <https://www.epa.gov/air-sensor-toolbox>
- Air Quality Sensor Performance Evaluation Center (AQ-SPEC)**
  - Field and laboratory evaluations on commercially available air sensors
    - <http://www.aqspec.gov/aq-spec>
- South Coast Air Quality Management District AQ-SPEC Hotline**
  - Hotline for air sensor related questions ONLY
    - Phone: 909-386-0713
    - Email: [info.aq-spec@scqmd.gov](mailto:info.aq-spec@scqmd.gov)

## Participant Guide

### Activity 1: What Is in the Outdoor Air? Exploring Particulate Matter (PM) Sources and Air Quality Outdoors

In this activity, you will learn about particulate matter (PM) in your community. Using a handheld AirBeam2 PM sensor, you will measure PM near your library. After collecting data, you will think of ways to reduce your exposure to PM.

Before starting this activity:

- Decide if you will do this activity independently or with a group led by your Librarian. This activity is designed to be done independently, but there are resources available if you need help. You can ask a Librarian for help if you have questions.
- Read the introductory material, [What Is in the Outdoor Air? Exploring Particulate Matter \(PM\) Sources and Air Quality Outdoors](#).
- Review the [Quick Start Guide](#) or attend a Librarian-led presentation on the [Quick Start Guide](#). The Quick Start Guide will teach you how to use the handheld AirBeam2 PM sensor.

#### Materials Needed for This Activity

- AirBeam2 PM sensor (a paired AirBeam2 and phone will have matching labels)
- Wi-Fi internet access
- Pen/pencil

## Participant Guide

### Activity 2: Hidden Particulate Matter Indoors! Explore your Environment

In this activity, you will learn about particulate matter (PM) indoors. Using a handheld AirBeam2 PM sensor, you will measure PM indoors. After collecting data, you will think of ways to reduce your exposure to PM indoors.

Before starting this activity:

- Decide if you will do this activity independently or with a group led by your Librarian. This activity is designed to be done independently, but there are resources available if you need help. You can ask a Librarian for help if you have questions.
- Read the introductory material or attend the introductory material, [Hidden Particulate Matter Indoors! Explore your Environment](#).
- Review the [Quick Start Guide](#) or attend a Librarian-led presentation on the [Quick Start Guide](#). The Quick Start Guide will teach you how to use the handheld AirBeam2 PM sensor.

#### Materials Needed for This Activity

- AirBeam2 PM sensor and paired Android phone (a paired AirBeam2 and phone will have matching labels)
- Wi-Fi internet access
- Pen/pencil

## Participant Guide

### Activity 3: My Pollution Bubble! Exploring My Personal Particulate Matter (PM) Exposure

Have you ever thought about how many activities and tasks you do throughout your day? You may get ready for work or school, you might like, drive in the car, walk, or take the bus. You might do chores or yard work, eat, sit quietly and read, play sports at recess, or many other things. Have you ever thought about your personal exposure to particulate matter (abbreviated as PM), or the amount of PM you personally experience, during these different tasks? In this activity, you will choose two tasks or actions you do during your day and you will measure the PM levels while you perform the tasks. After collecting data, you will learn how to interpret your PM measurements, compare the PM levels you measured during each task, and think of ways to reduce your personal exposure to PM indoors.

Before starting this activity:

- Decide if you will do this activity independently or with a group led by your Librarian.** This activity is designed to support both options, so either choice is okay! There are resources available if you plan to work independently, and you can ask a Librarian for help if you have questions.
- Read the introductory material or attend a Librarian-led presentation on the introductory material.** The introductory material for this activity (Activity 3: My Pollution Bubble! Exploring My Personal Particulate Matter (PM) Exposure) will teach you about PM and common sources of PM.
- Review the Quick Start Guide or attend a Librarian-led presentation on the Quick Start Guide.** The Quick Start Guide will teach you how to use the handheld AirBeam2 PM sensor.

#### Materials for this Activity

- AirBeam2 PM sensor and paired Android phone (a paired AirBeam2 and phone will have matching labels)