CART In-Home Installation Process

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Overview

The installation process for CART equipment should take 2-3 hours. Arrange a date and time with the research participant where they will be home during those 2-3 hours. If the participant drives, ask them to ensure they have driven their car within a few days prior to your appointment in order to insure that the car battery is fully charged. During the appointment remind the research participant(s) to refrain from unplugging any of the equipment we install.

Please use the ORCATECH Device Packing List as a guide when preparing the equipment to bring to a home. It includes images and descriptions of which devices to bring along.

Pre-Home Installation Guide

Assigning Items to a Home

After inventorying equipment, make sure it's assigned to a home before it's installed. Assign each and every device that you plan on installing to a home.

Which ID to Use when Assigning Items

Hub computer, NYCE sensors, Scale, Dongles,	Home ID
Watch, TimerCap pillbox, Car sensor	Subject ID

How to find the HOME or SUBJECT ID in Console

- **Subject ID**: Search for a participant in Console (Console > Subject > View All). Double-click on their name.
- **Home ID**: Search for a participant in Console (Console > Homes > View All). Double-click on their name. Click on the "Home History" tab to find their latest home. The Home ID is listed in the first column.

There are two ways to assign equipment to a home: **Manually** and with a **QR Code Reader**.

Manually

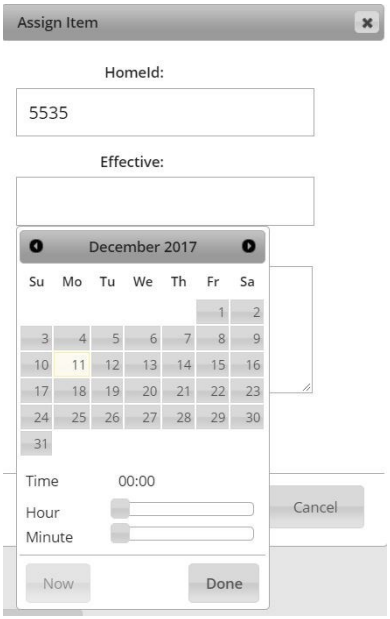
1. **NOTE**: If you need to assign items for a different project site, click on the "Lend" button on the item's Console page. (A lent item can only be assigned to a Subject or Home if the assigned time is at least one

minute later than the lent time.) As the default research project is ORCATECH, lending an item allows other research sites to use it. Fill out the following sections.

a. Effective: Click on the "Now" button to use the current time.
b. Project: Find the project to transfer to in the pop-up list.

After assigning the item, wait for a confirmation to pop up before proceeding.

2. Open Console and search for the item you want to assign. (Inventory > View All > Search for an item using the Assigned Name or MAC Address located on the device label.)
3. Double-click on the item's row in Console to open the item's Console page.
4. Click on the "Assign" button.



5. Enter the Home ID or Subject ID. Set the date/time by clicking on the "Effective" section. Click on the "Now" button to select the current date and time. Then click "Done".
6. Click "Assign" and wait for a confirmation notice to pop-up.

Using the QR Code

1. Open a QR code reader app on your iPad.
2. Scan the QR code that's located on the item's label. This links you to the item's Console page.
3. Enter the Home ID or SUBJECT ID. The date/time will already be automatically set.
4. Click "Assign" and wait for a confirmation notice to pop-up.

NOTE: We recommend this **QR Reader for iPad**, available on iOS: (Made by TapMedia Ltd, the non-premium version). When a security message appears on the screen, click on the "More Information" button. Then, click on the "I Understand the Risks" button.

A device cannot be "lent" to another project using the QR App. It must be "lent" manually.

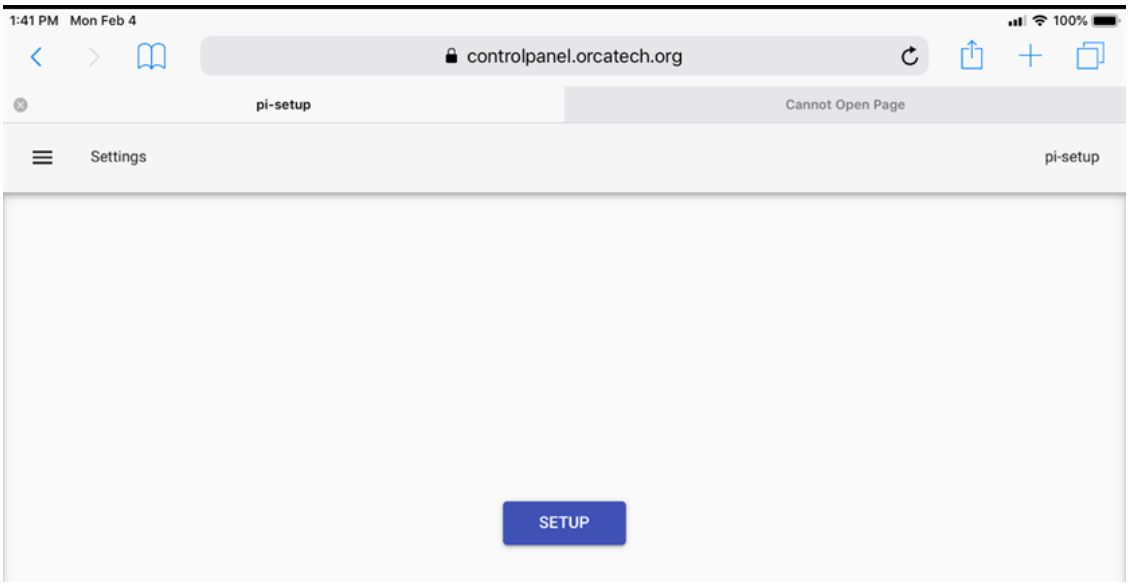
Pre-Setup of Home Equipment

Raspberry Pi Hub Computer

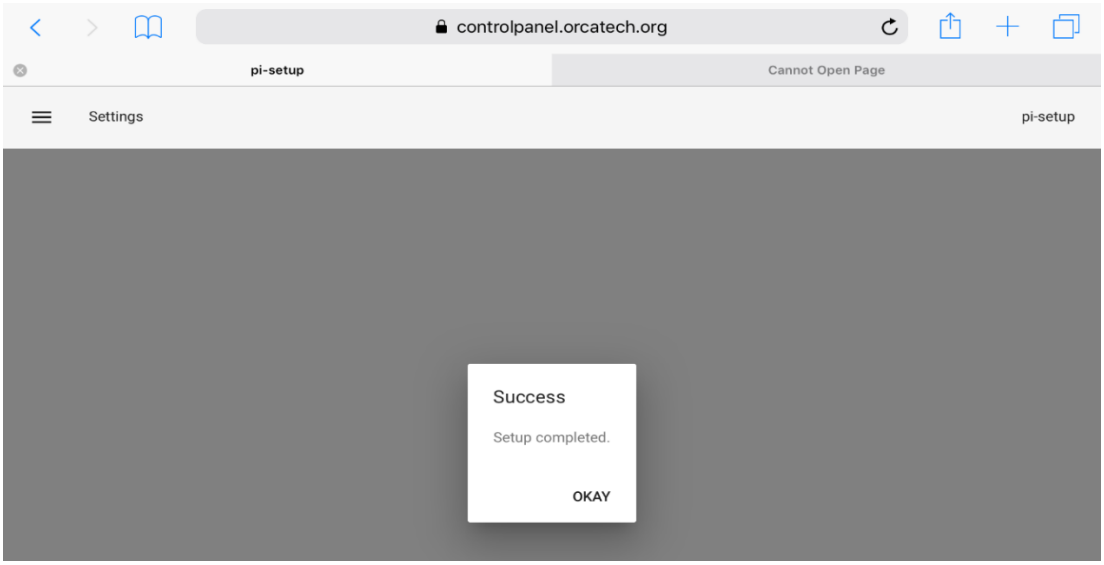
In this step, you are making sure that the Raspberry Pi can run the software configuration program that allows it to communicate to the other devices to be installed in the participant's home.

1. Plug the **Wi-Fi dongle** and **Ethernet cable** into the raspberry pi. Then, plug in the **power cord**.

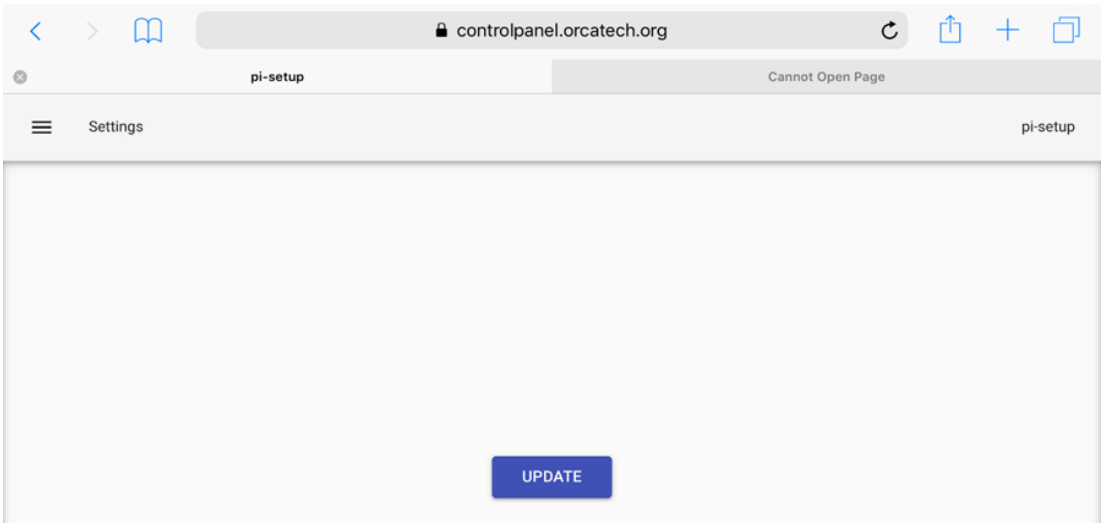
2. Once the Raspberry Pi powers on, connect your wireless device to the Raspberry Pi's **Wi-Fi** (pi-XXX). Find it under the Wi-Fi options list on your computer or tablet. Then, type in the password.
3. Type in this address into any Internet browser's address bar, which will lead you to the Hub Control Panel: **https://controlpanel.orcatech.org/**



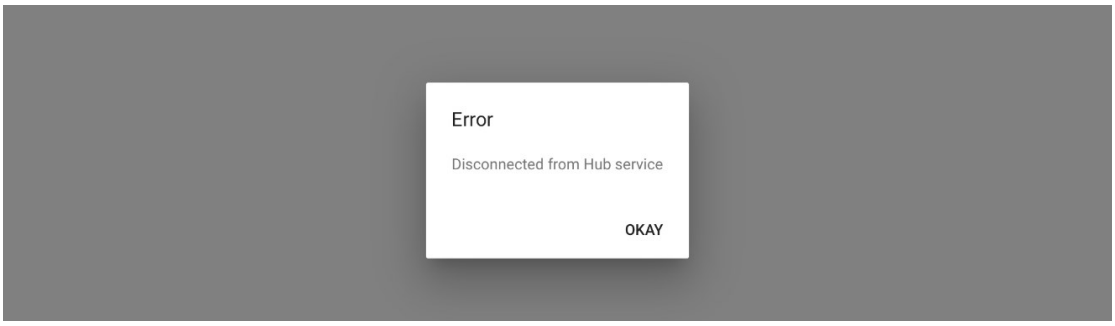
4. When the Pi first boots it will need to be set up. Press the "**SETUP**" button, and wait for a successful completion to the setup step. This should take approximately 5 minutes.



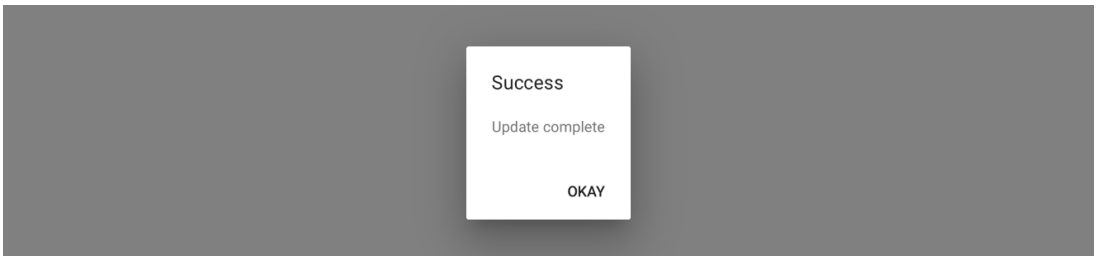
5. Go to Menu Bar > Settings > STATUS tab > Click on the "**UPDATE**" button.



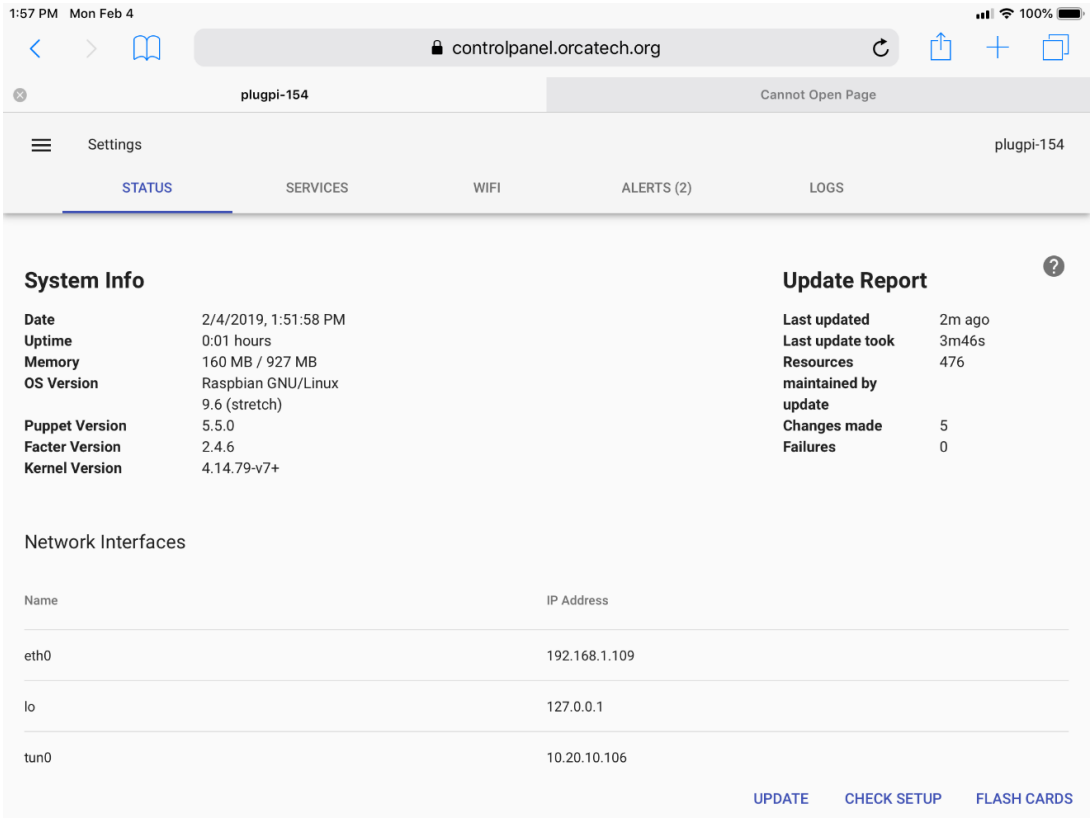
6. After the update finishes then the hub computer will disconnect. You will need to reconnect to the hub computer's WiFi.



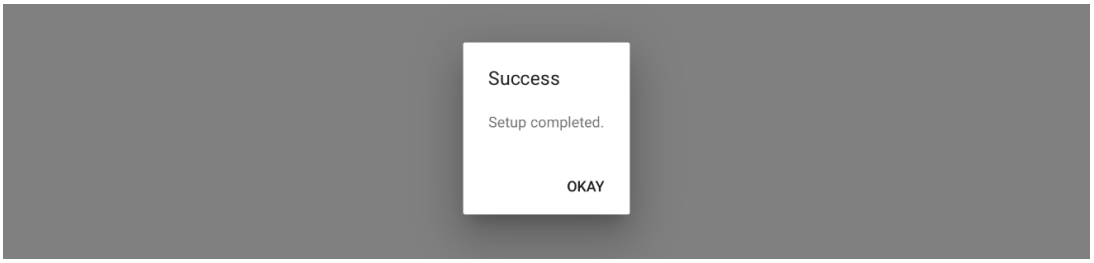
When you reconnect to the WiFi and reload the control panel web page, then you should receive a notification about a completed and successful update.



7. Click the "**Okay**" button. The System Info and Update Report will appear on the Settings page.



8. Click on the "**CHECK SETUP**" button. Once the process is complete, you will receive a notification stating "Success. Setup completed."



Preparing the Watch and Scale for a Home

The watch and scale can be setup before heading to the home if you know the participant's height and weight and if they have a pacemaker or not. If this is unknown, complete the setup process on-site. For directions on how to setup and sync both devices, read the *In Home Installation* section of this guide.

Scale (NOKIA Version)

Charge the scale fully before taking it to a participant's home. Take the accessory USB cable that was included in the packaging and plug it into the USB port on the scale. Charging takes 15-20 minutes.

Watch (Activité NOKIA Version)

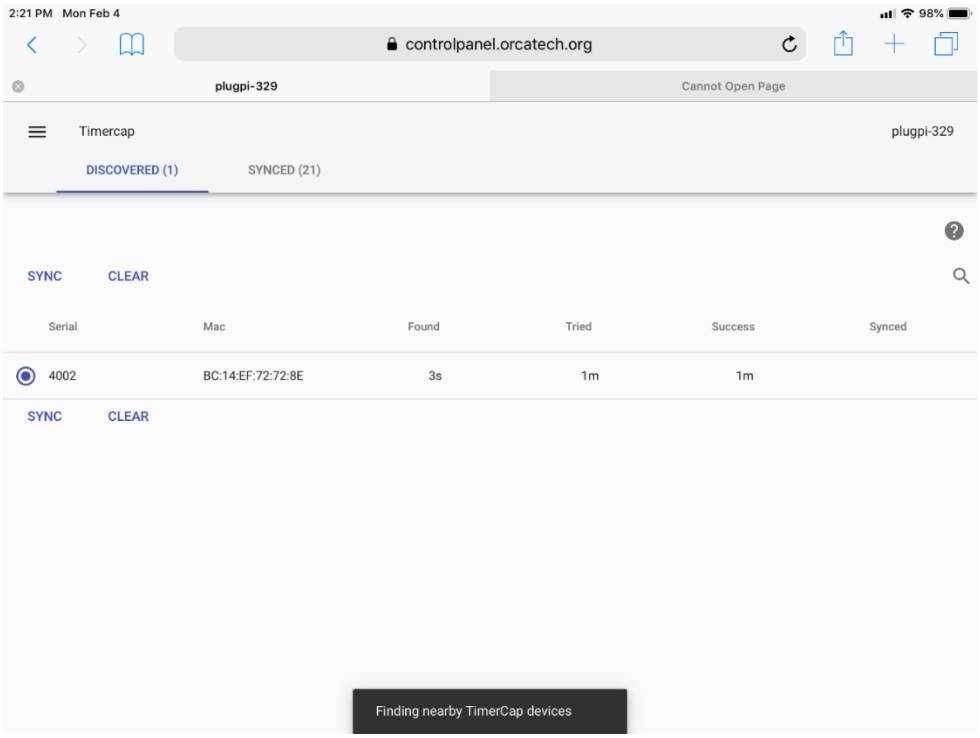
If the watch is new, no prep needed. If the watch has previously been used, ensure it has a fresh battery.

Preparing Other Devices for the Home

TimerCap Pillbox

Turn the TimerCap pillbox on by inserting two AAA batteries into the battery slot. Then, test if the TimerCap can transmit data.

1. Navigate to the Control Panel and go to Menu Bar > Devices > TimerCap. This leads you to the **TimerCap's Setup page / Discover tab**.
2. Open and close at least one pillbox lid several times. This activates the sensor located on the edge of the lid.
3. A green light on the front-side of the pillbox will start flashing, notifying that the pillbox is communicating with the hub computer.



4. The TimerCap will appear on the Setup page. Check that the time and date correlate with the current time.

AutomaticPro Car Dongle

1. Assign the AutomaticPro unit to the primary driver at the home.

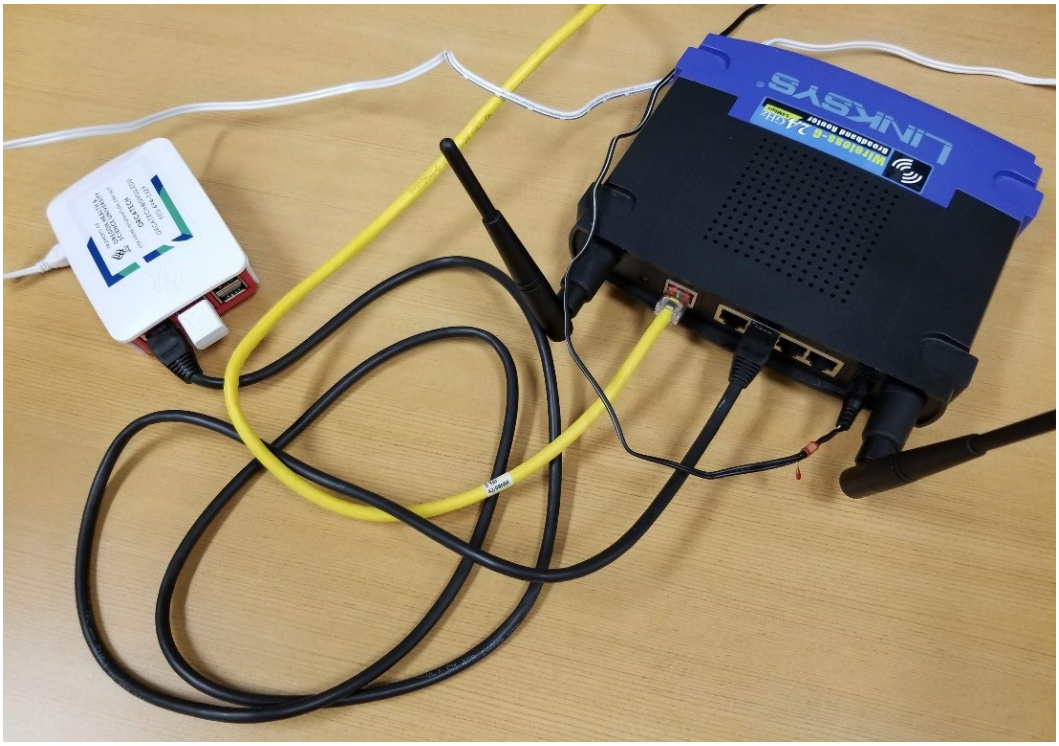
In-Home Installation

Installing the Hub Computer

Upon arriving to a home, the hub computer and all of its connections need to be set up. By following the *Pre-Installation Guide*, you'll ensure that the hub computer and its components are "assigned" to the home that you're completing the installation process in. The hub computer acts as the communication hub between all the devices installed in a research participant's home, as the interface to both OHSU and third party sites, e.g. Nokia (Withings). The hub computer should be installed in close proximity to a router.

1. Locate the **modem** and **router** upon arriving to the home. (This may be one device that combines both units or it may be two separate devices. Either will work for this installation process.).
    a. If the home does not already have a router, it's necessary to install one. Make sure to install it near the modem.
    b. A router is previously set up with the login credentials of the router's item name as the Wi-Fi network name, and the password as the MAC address without colons. The router's name is located on the side of the router and on the QR sticker, and the MAC address is located at the bottom of the QR sticker.
        i. Plug the router's power cord into the wall.
        ii. Connect an Ethernet cable from the home's modem to the port labeled "Internet" on the router. (There are four additional Ethernet ports - labeled 1, 2, 3 and 4 - next to the

port labeled “Internet.” These additional ports can be used to connect up to four devices to the wired internet network, including the Raspberry Pi.)



Here is a photo of a typical connection.

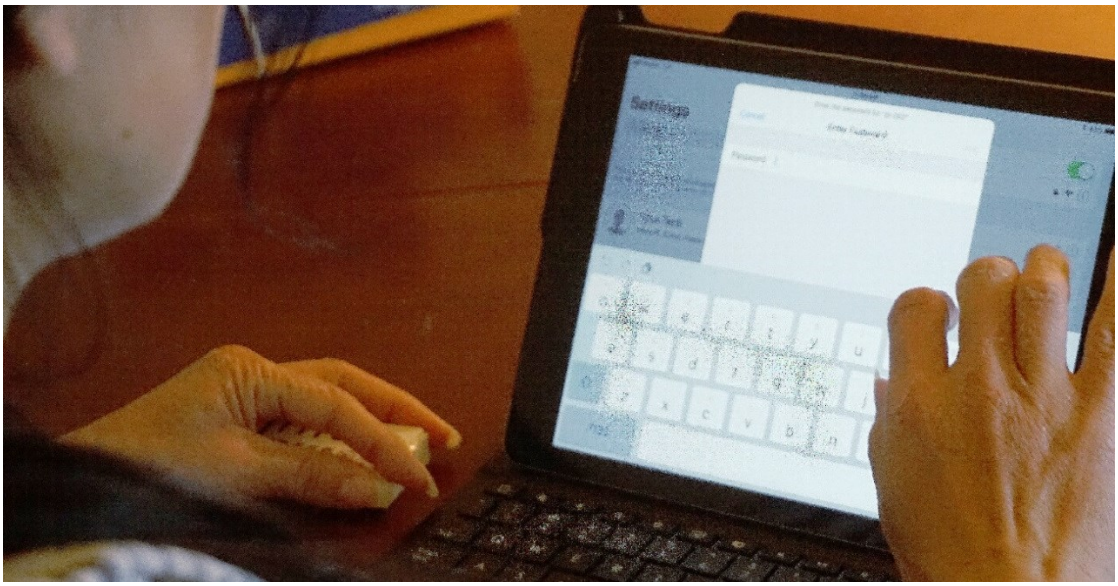
(**NOTE**: The tangle of wires is not preferred, and is just a result of trying to fit all connections into the photo.)

2. Connect the hub computer to the router using an Ethernet cable.
3. Connect a white Wi-Fi dongle to one of the hub computer’s USB ports.

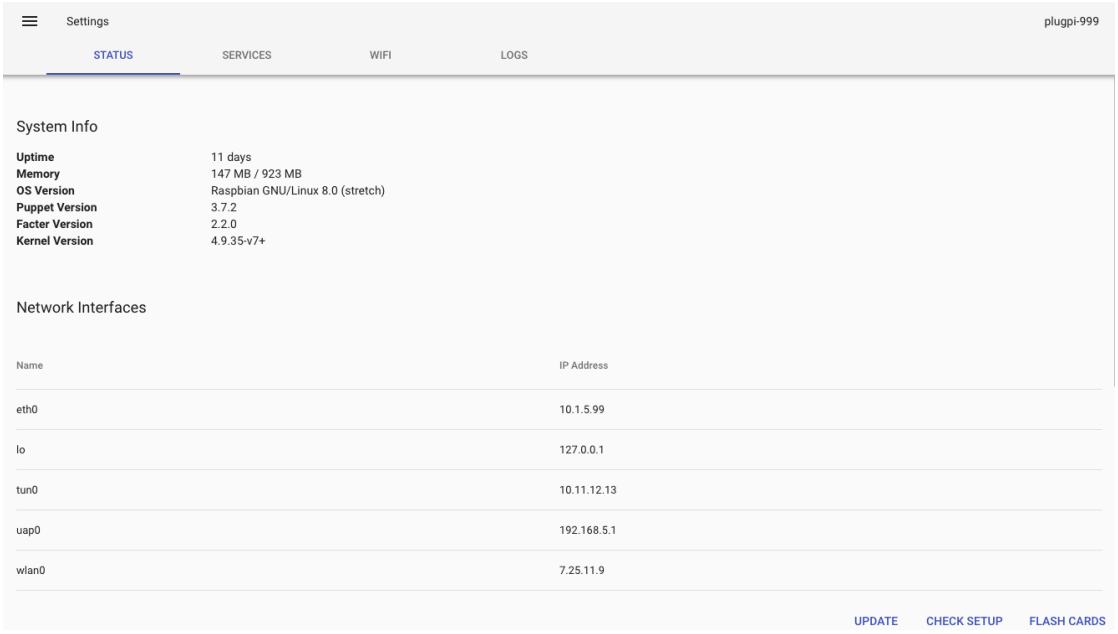
4. Connect the **Telegesis r310 dongle** to the hub computer, using one of the USB ports.

5. Connect the hub computer's power cord to an electrical outlet. Have everything connected *before* powering up the hub computer. The final set-up should look like this.

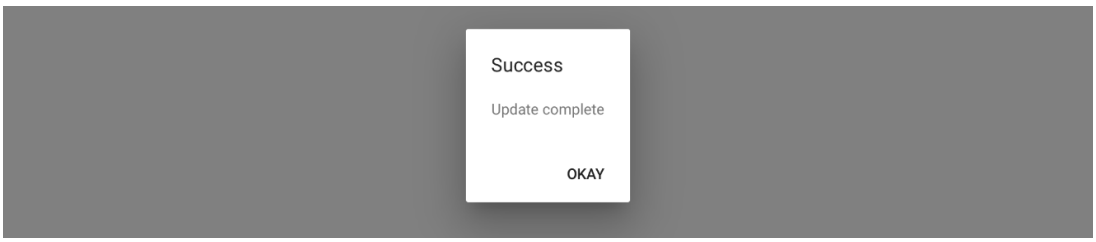
6. Connect your laptop/tablet to the hub computer's Wi-Fi network. Find the Wi-Fi account name within the list of available connection options. The name of the account name will be **pi-XXX** (the digits correspond to the hub computer's ID number.)



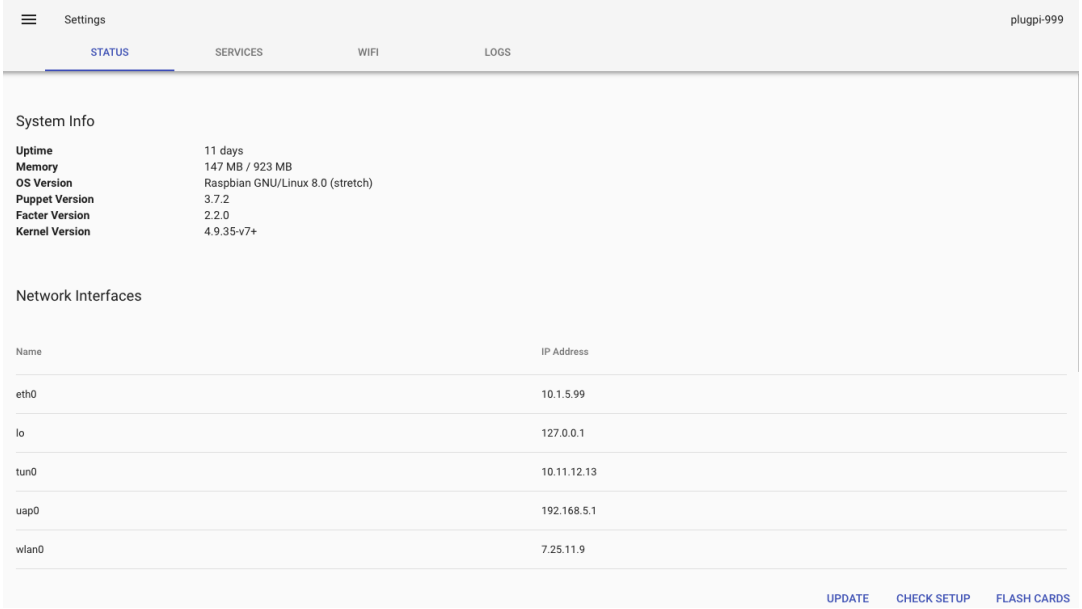
7. Open a web browser and type this web address: **https://controlpanel.orcatech.org/** This address leads you to the ORCATECH **Control Panel**.
8. Within the Control Panel, go to the Menu Bar > Settings > click on the "Status" tab > click on the "**Update**" button. This ensures that the software is up-to-date on the hub computer.



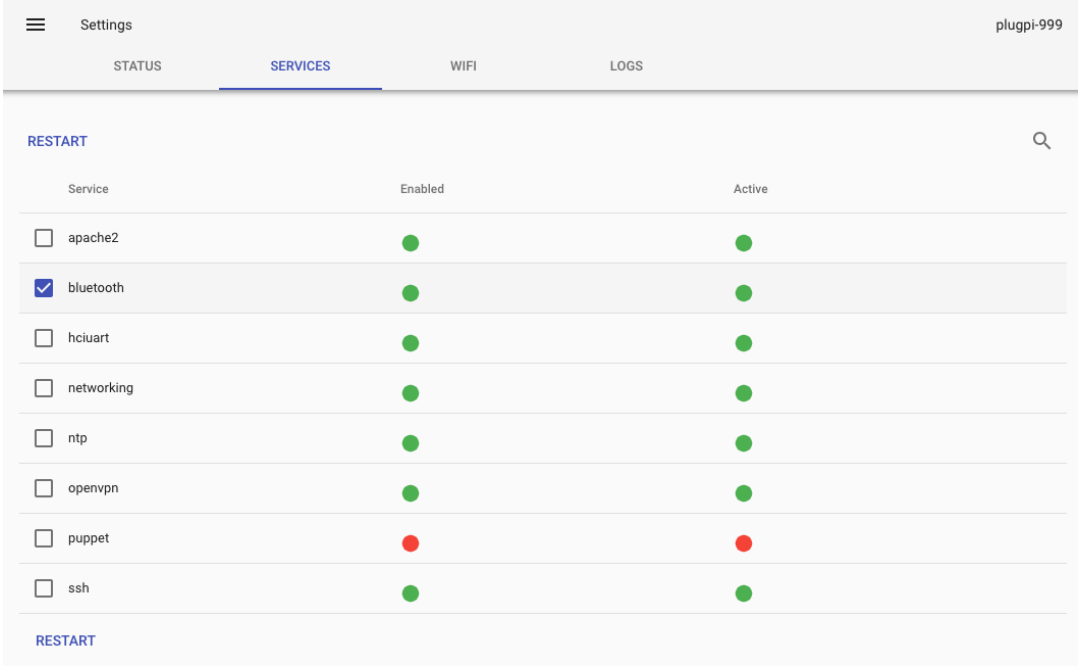
a. It can take up to 15 minutes to run Update. The process will be complete once this message appears on the screen: "Success, Update complete."



9. Check if the hub computer is communicating with the ORCATECH main servers and if the services that allow for data collection are active.
    a. Go to Control Panel > Settings > Status page. This brings you to the **Systems Info page**. Click the following buttons on the bottom of the page:
    b. Click on the "**Check Setup**" button. This checks the network hardware. Click the "Okay" button once the "Successful Setup Complete" notification appears.



    c. Navigate to the "**Services**" tab. The services should be Enabled and Active.
        i. Green dots represent an Enabled and Active service. Red dots represent a disabled and inactive service.



Installing the Activité Watch

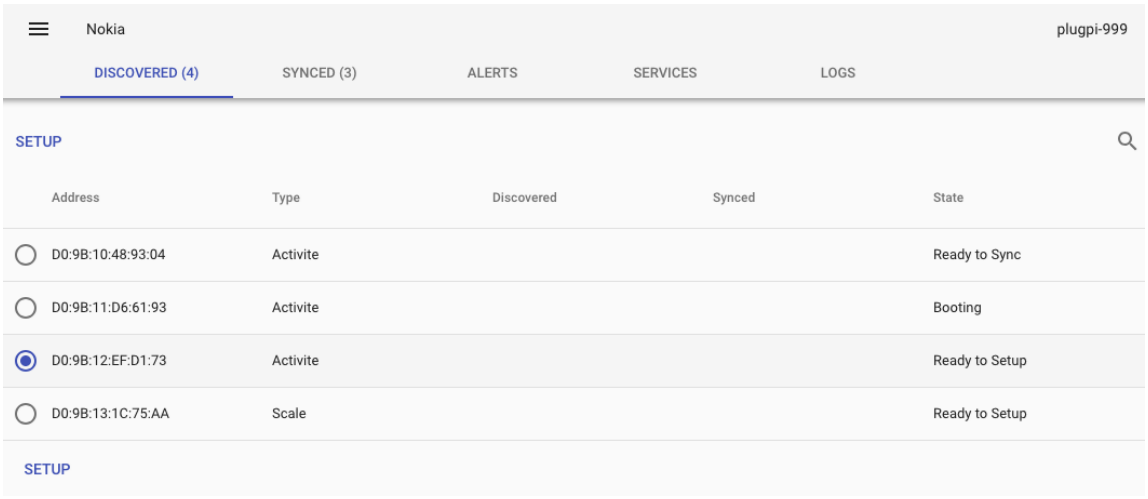
The watch measures a participant's level of activity, including sleep patterns. Before setting up the watch, ask the participant which version they prefer (the watch face can be either black or white).

Ask the participant their height, weight and if they have a pacemaker. Setup the watch before the scale.

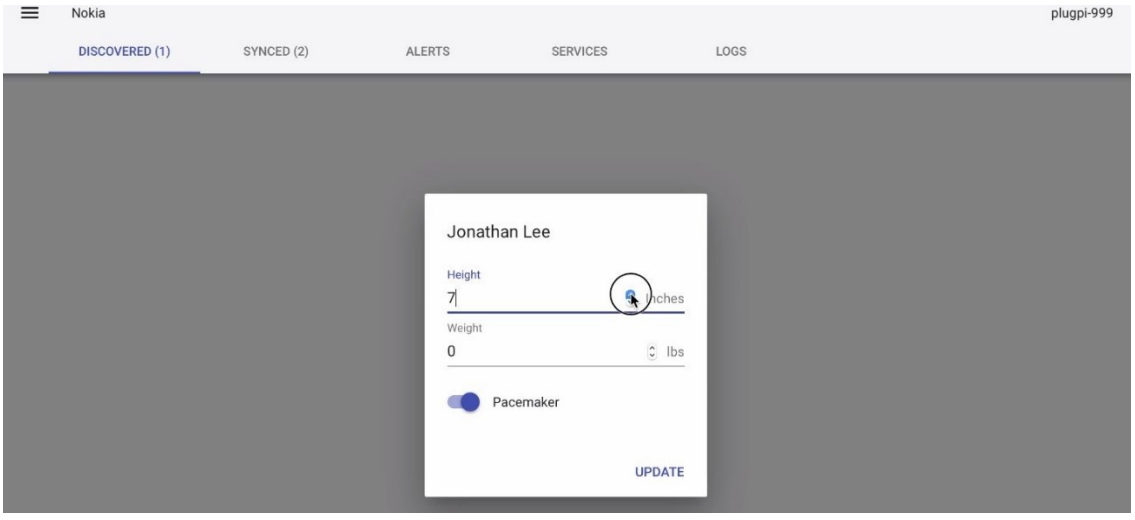
1. Go to the Control Panel and then navigate to Menu Bar > Devices > NOKIA.
2. To activate the watch, press the button located near the battery 5 times; wait briefly for the watch to vibrate after each button press. On the 5th button press the watch vibrates twice. This starts a Bluetooth broadcast by the watch which the hub computer will discover.

3. Find the Activité watch on the list of devices featured on the Control Panel page.

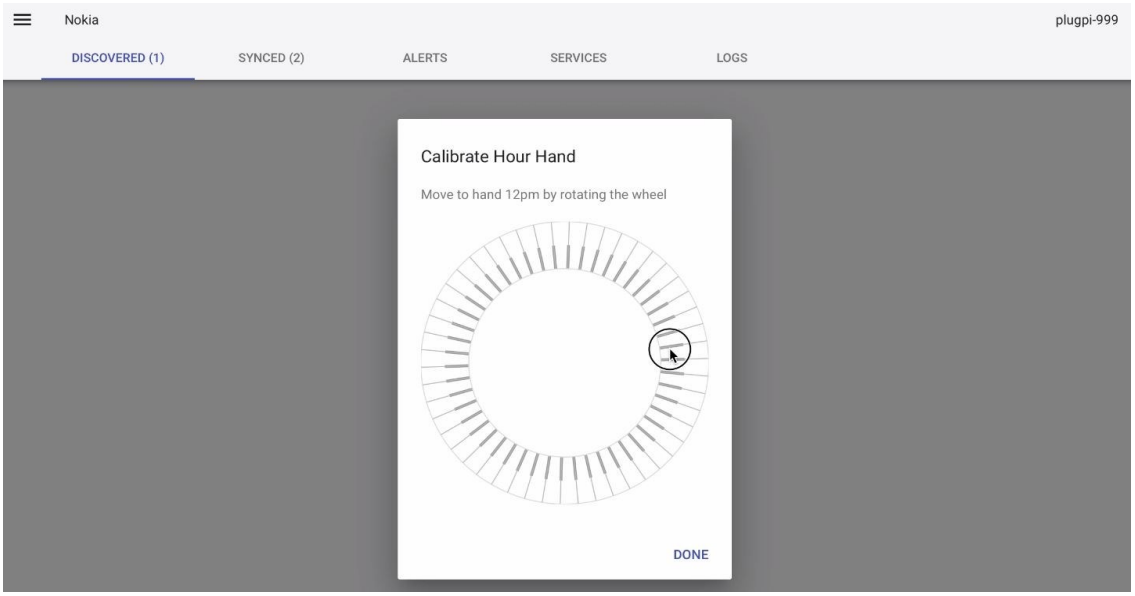
4. Check the **checkbox** next to the watch and click the "**Setup**" button. This starts the Setup process. The watch will automatically undergo a series of Setup steps.



5. Once the participant's **user profile** appears on the screen, fill it out. This information is necessary for the watch and the scale. Click the "Update" button when you're done.
    a. Input the participant's height (in inches)
    b. Input the participant's weight (in pounds)
    c. If the participant does not have a pacemaker, toggle the Pacemaker button to the left. (The default setting assumes the participant does have a pacemaker).



6. Once the watch's virtual dial appears on the screen, **calibrate the time**.
    d. Calibrate the hour hand by rotating the wheel. Set it to 12. Click "Done".
    e. Calibrate the minute hand by rotating the wheel. Set it to 12. Click "Done".
    f. Calibrate the Goal hand by rotating the wheel. Set it to 0. Click "Done".



7. Once a notification appears stating the setup was a success, click the “Okay” button.

NOTE: The hour and minute hands need to be initially calibrated to 12:00, even though this may not reflect the current time. Once the watch is sync’d, it will automatically reset to reflect the current time (by updating the time in Control Panel and spinning the minute and hour hands on the watch).

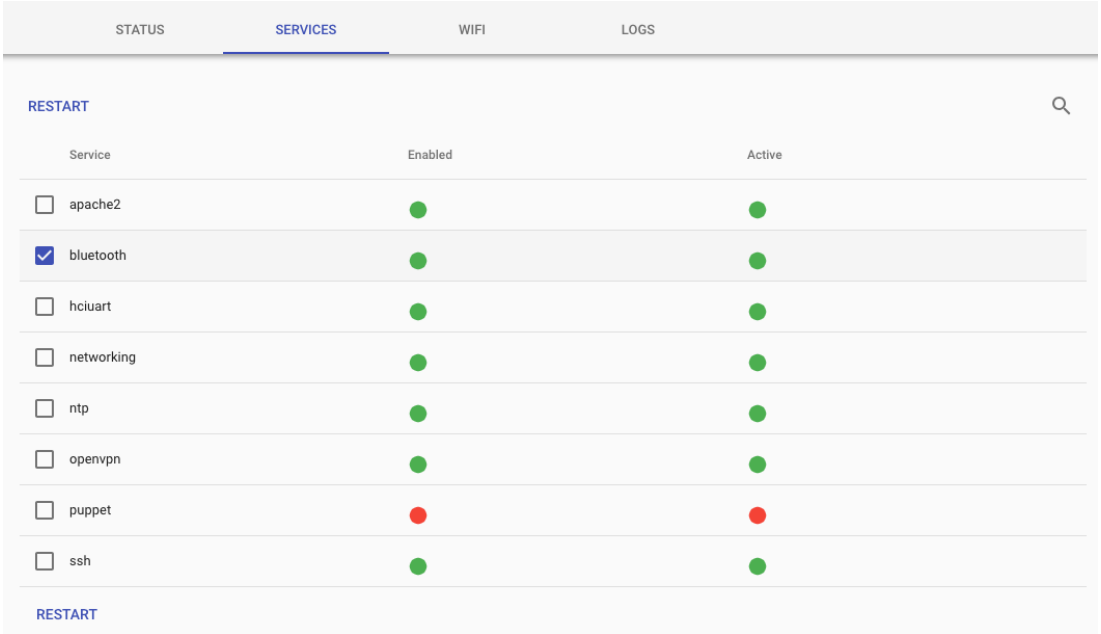
NOTE: The Goal hand represents the watch’s pedometer progress for the current day. An especially active person might reach 100% on the activity dial. In that case the dial physically resets and resumes activity tracking.

Synching the Activité Watch

The Activité Watch needs to be sync’d in order to confirm that it’s Nokia (Withings) account is set up and accessible by the watch and by the hub computer.

NOTE: Once the watch’s battery is low – usually at the six month mark – the participant will receive a new watch in the mail. The watch will arrive with an instructions guide explaining the activation process.

1. Once the watch displays as “Ready to Sync” in the “State” column on the Setup page, click the **Sync button**.
2. Navigate to the Services tab to view the latest Sync times.
3. If the watch did not sync successfully, make sure that the **Bluetooth** is activated. Go to Control Panel > Settings > Services and view the list of services.
    a. If the Bluetooth is displayed as inactive or turned off (represented with a Red Dot), select the **Checkbox** next to Bluetooth and click on the **Restart** button.



4. Have the participant wear the watch on the wrist of their choice. Go over the watch care techniques, using the *Watch Care Reminders* guide.

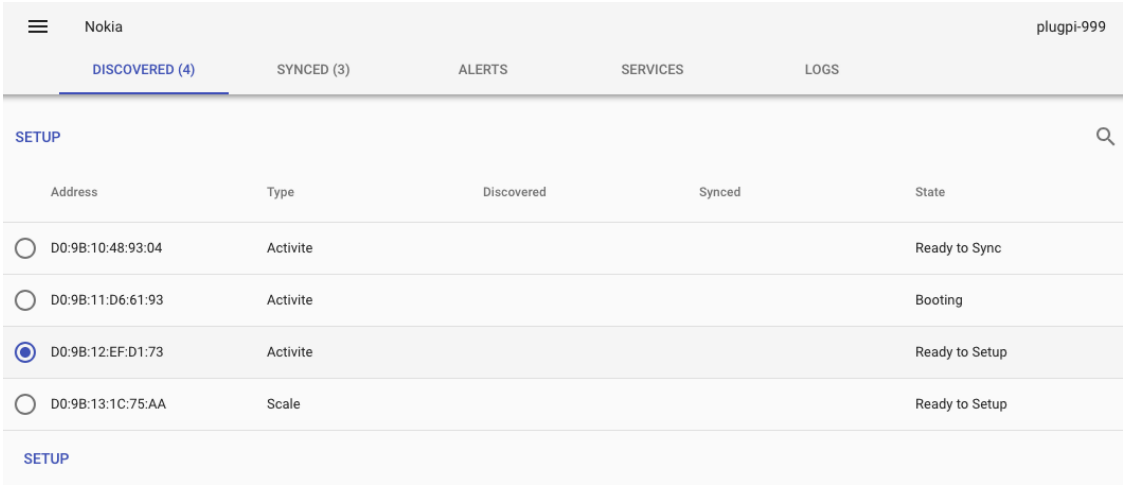
Installing the Scale –Nokia Body Scale Version

The Nokia scale transmits data related to a participant's heart rate, weight and other health statistics. Make sure the scale is placed in an area with hard floors – like wood or tile, not carpet – where the participant can easily access it and will not have to move it regularly. Remind the research participant to charge the scale every few months. Setup the scale after the watch.

1. Unpack the scale and its USB cable (and the accessory USB charging adapter).
2. Go to the Control Panel and go to Menu Bar > Devices > NOKIA. This leads you to the Control Panel **NOKIA Set Up page** (otherwise known as the Discovered page).

3. Turn on the scale by pressing the Power button (located on its side) for several seconds. The scale will turn on, displaying a startup message on its screen.

4. Find the scale on the list of devices featured on the page. (It will appear on the page once this message appears on the screen: “Finding nearby Nokia devices.”)
5. Select the Checkbox next to the Scale. Click on the **Setup** button. This starts the Setup process.



6. Once a notification appears stating the setup was a success, click the “Okay” button.
    a. The scale’s screen will display a final message stating that the process is finished.

7. Have the participant step on the scale to confirm their weight.

NOTE: The participant's height, weight and pacemaker status would be input into Control Panel during the watch's setup process.

NOTE: Show the participant how to charge the scale using the USB cable.

Installing the TimerCap Pillbox

The iSort/TimerCap Pillbox tracks how the times at which a participant takes their medication. The participant can use the pillbox as their primary medication holder. If they feel uncomfortable doing that, the participant can also use the pillbox to hold Vitamin C tablets. The divider slots can be removed from each compartment, if need be.

1. Navigate to the Control Panel and go to Menu Bar > Devices > TimerCap. This leads you to the TimerCap's Setup page / Discover tab.

2. Open and close at least one pillbox lid several times. This activates the sensor located on the edge of the lid.
3. A light on the front-side of the pillbox will start flashing, notifying that the pillbox is communicating with the hub computer.

4. The TimerCap will appear on the Setup page. View the time and date and see if it correlates to the current time.

Installing NYCE Sensors – On the Walls and Ceilings

NYCE sensors monitor activity – such as walking or openings doors - within the participant's home. Each home will have one motion sensor per room, 4 placed in a series along the ceiling in a hallway or hallway-like area, and contact sensors placed on any egress doors. While installing the sensors, remind the research participant to refrain from taking them off the ceiling or walls. Before physically attaching the NYCE sensors to the walls and ceiling, first create a virtual sensor map of the home and the sensors to be installed inside.

NOTE: Walk around the home before creating the sensor map in order to identify how many rooms and egress doors the home has and the layout of the rooms. The number of rooms varies according to the layout and size of the home.

Creating the sensor map

1. Login to Console and go to the Hub Control Panel. Then go to Menu Bar > Home > Sensor Placement. This brings you to the sensor placement management page.

Adding Areas to the Map

a. Click on the "**Add Area**" button located on the bottom of the page.

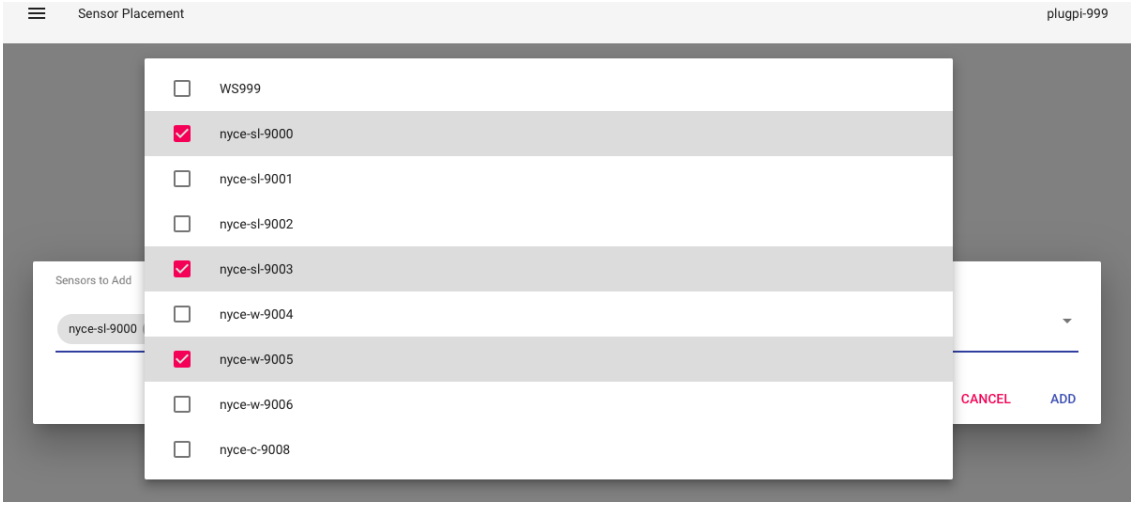
i. Select the rooms and egress doors in the home that will have sensors placed in them. Make sure to also select the one labeled "Sensor Line".
ii. Next, click on any area outside of the room selection element. The selected rooms and egress doors will now appear on a list.

iii. Double-check that the appropriate number and types of rooms have been selected and then click the “Add” button. Each room will now appear on the virtual map, depicted as a blue rectangle.

NOTE: Egress doors are represented on the virtual sensor map. Make sure to include all entrances to the outside, such as front doors, patio doors and doors that lead to the garage. Exclude internal doors, such as a bathroom door.

Adding Sensors to the Map

a. Click on the “**Add Sensor**” button.
   i. Select the sensors you want to add to the map. All of the sensors that have previously been assigned to the home will be shown, including the sensors for the sensor line (NYCE-SL), sensors for egress doors (NYCE-C) and sensors for room walls (NYCE-W).



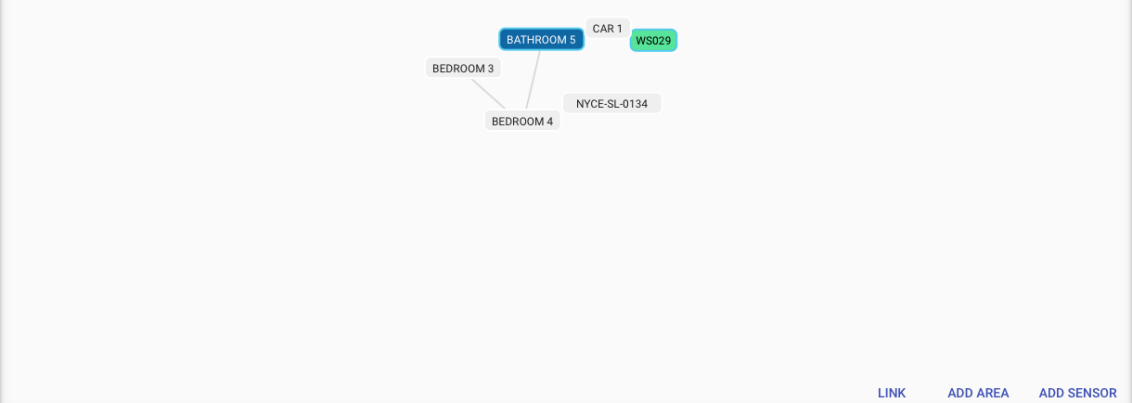
ii. Next, click on any area outside of the room selection element. The sensors you’ve selected will now appear on a list.
iii. Double-check that you’ve selected the appropriate sensors and then click the “Add” button. Each sensor will now appear on the virtual map, depicted as a green rectangle.

NOTE: If you make a mistake, remove an area or sensor from the map. They can only be removed one at a time.

Linking Areas

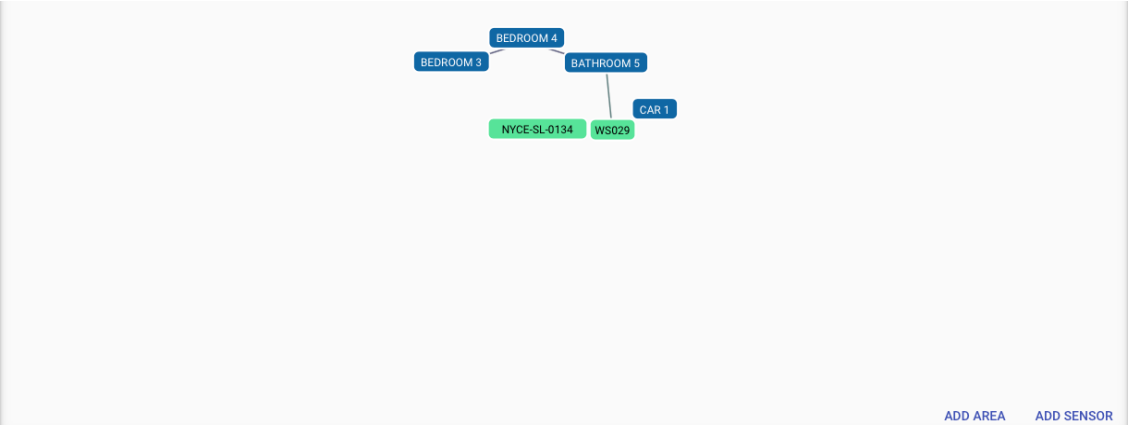
b. The third step in creating the virtual map is linking the rooms to each other, in a way that represents the layout of the home. For example, if a front door is connected to the living room, create a link between those two areas.
   i. Click on two rooms – depicted as blue rectangles – that you want to link.
   ii. A "**Link" button** will appear on the Sensor Placement page. Click on it.

   iii. A link – depicted as a grey line – now connects the two rooms. The map automatically refreshes as you continue linking rooms.



Linking Sensors to Areas and Creating the Sensor Line

c. Link the sensors to their respective rooms. First link the wall sensors to their rooms and the contact sensors to their egress doors and then lastly create the sensor line.
   i. Click on a sensor (green rectangle) and then an area (blue rectangle).
   ii. A "**Link**" button will appear on the Sensor Placement page. Click on it.
   iii. A link – depicted as a grey line – now connects the sensor to the room. The map automatically refreshes. Make sure to link the door / contact sensors (represented as NYCE-C) to their respective egress doors.

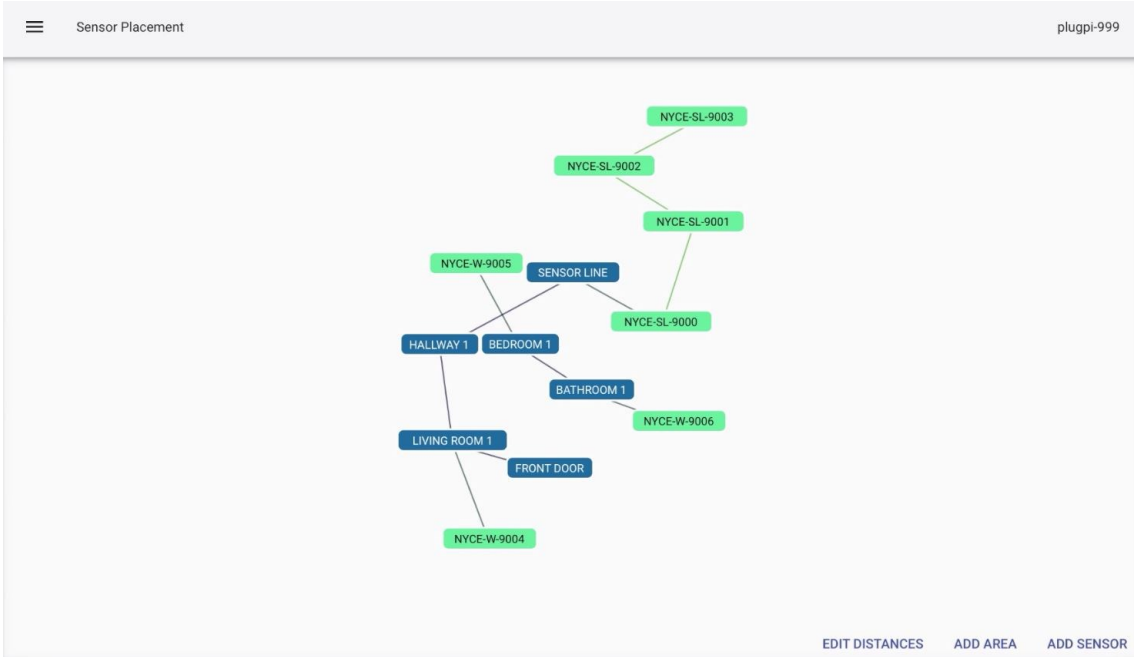


d. Create the sensor line on the virtual map.
   i. Link the four sensor line sensors (NYCE-SL) to each other, one at a time.
   ii. Link the first sensor line sensor to the area – depicted as a blue rectangle – labeled **Sensor Line**. The map will automatically refresh.

NOTE: The default distance between two sensors on the sensor line is 2 feet (24 inches). The platform automatically assumes the distances as such.

If you're unable to space the sensors two feet apart from each other on a ceiling, make sure to update the distances you used by clicking the "**Edit Distances**" button. Update the distances, in inches, on the **Update Sensor Line Distances** screen. Click the "**Update**" button when done.

b. The final virtual map should look similar to the one below:



Creating the Virtual Map – if a Home Has More than 16 Sensors

The limit for a home using just the r310 dongle is 16 NYCE sensors (wall, ceiling and door sensors included). If a larger home needs more than 16 sensors, add an r308 or r309 dongle. The r308/r309 dongle extends the PAN (personal area network) within the home and increases the sensor limit to 32.

1. Insert an extender cable into an available USB port on the hub computer. Don't unplug the r310 dongle – it remains plugged in at all times.
2. Insert an **r308 or r309 dongle** into the extender cable.

3. Go to Control Panel to access the sensor setup page. (Menu Bar > Devices > NYCE and navigate to the Discovered tab.)

4. After a few seconds, the r308 dongle will appear on the list of devices with the PAN. Look for "**Router**" to appear in the "Type" column.

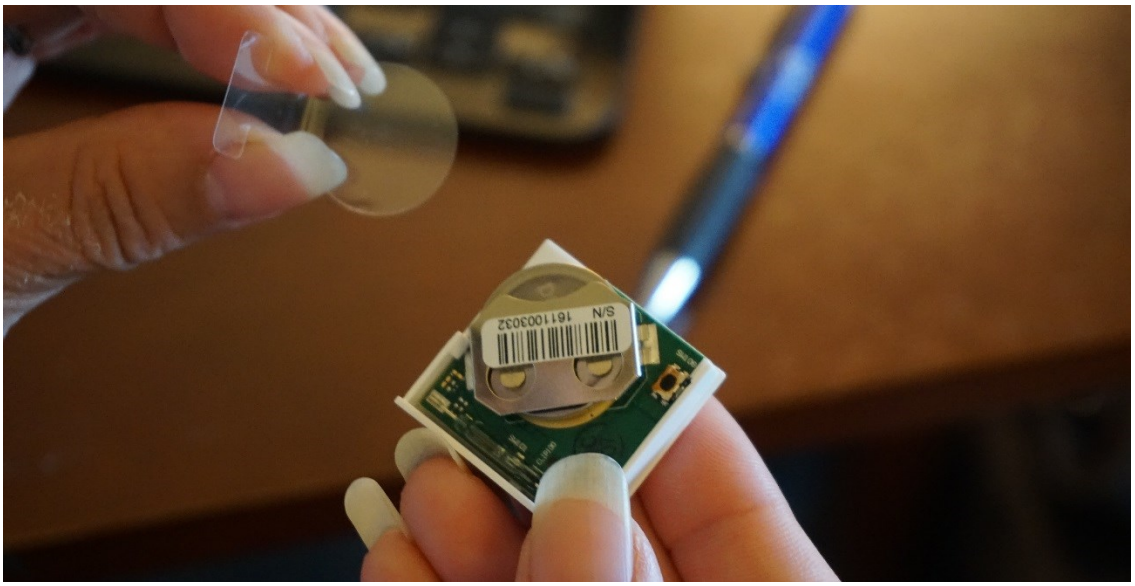
5. Once it's connected to the PAN, remove the r308/r309 dongle from the hub computer's USB port. Connect the r308/r309 dongle through a USB charger to an unused electrical outlet in the home.

6. Now there are an extra 16 sensors available. Continue adding these sensors to the map.

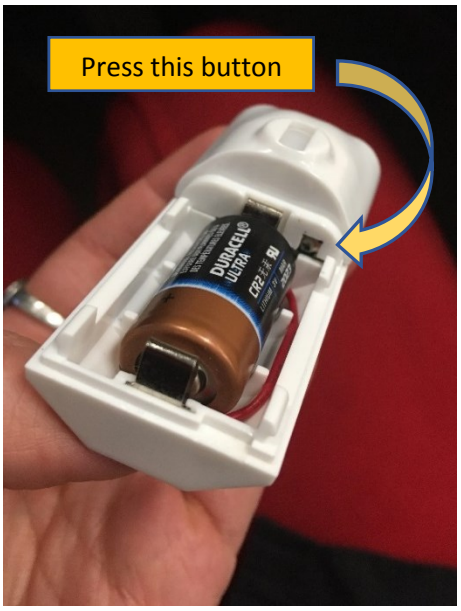
Creating the PAN for the NYCE Sensors and Attaching them to the Walls

7. Input each sensor into the **PAN (Personal Area Network)**. This is a two-part process.
    a. Use a flathead screwdriver – or a similar device – to remove the battery cover from the backside of each sensor. Organize the sensors by area of the home or in numerical fashion – whatever is easier – near your workspace.

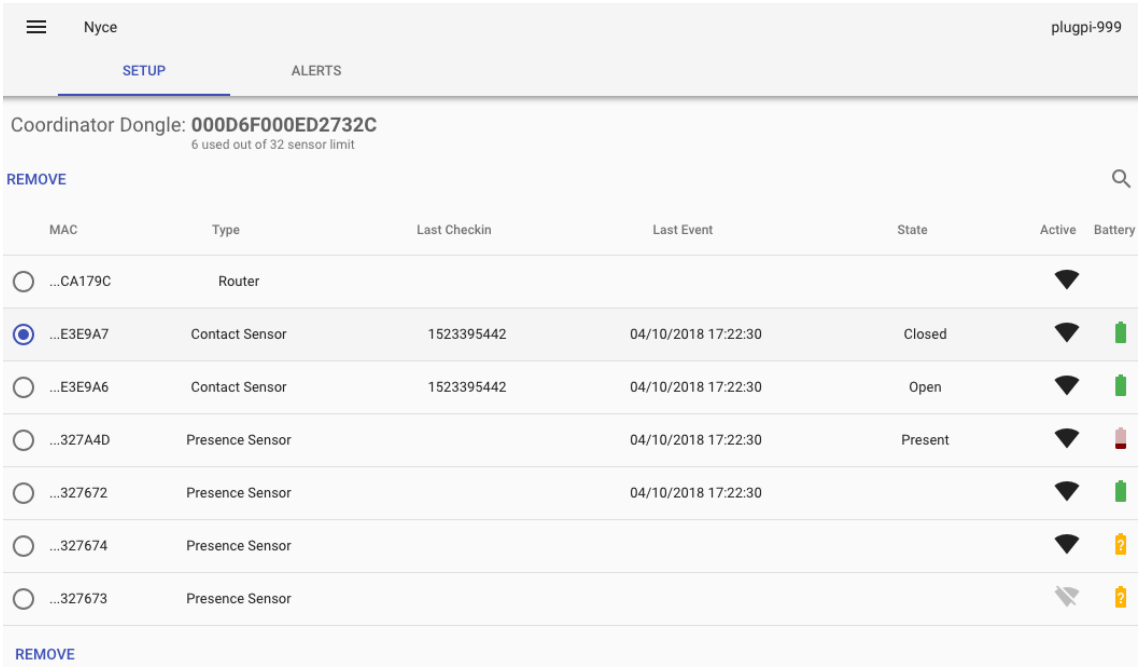
b. Remove the plastic film that covers the sensor's battery.

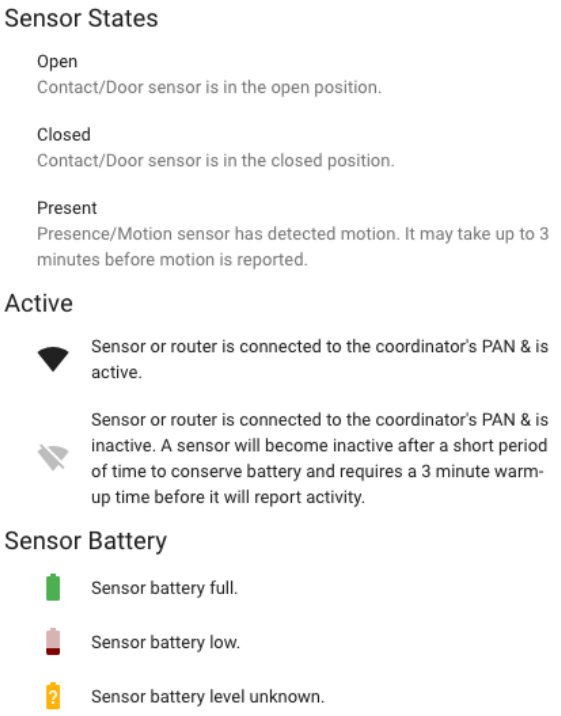


c. Navigate to the Control Panel > Menu Bar > Devices > NYCE > Setup page.
d. Locate the small button situated next to the sensor's battery. Using a pen or a small screwdriver, **press this button** 10 times. The sensor light on the front-side will start flashing a green light 3 times. This means the sensor has been activated.



e. After several seconds, the sensor will appear on the NYCE Setup page. A notification stating "Sensor has joined the PAN" will appear on the screen too.
f. Repeat steps D-E for each sensor.
g. Put the battery cover back on the sensor.



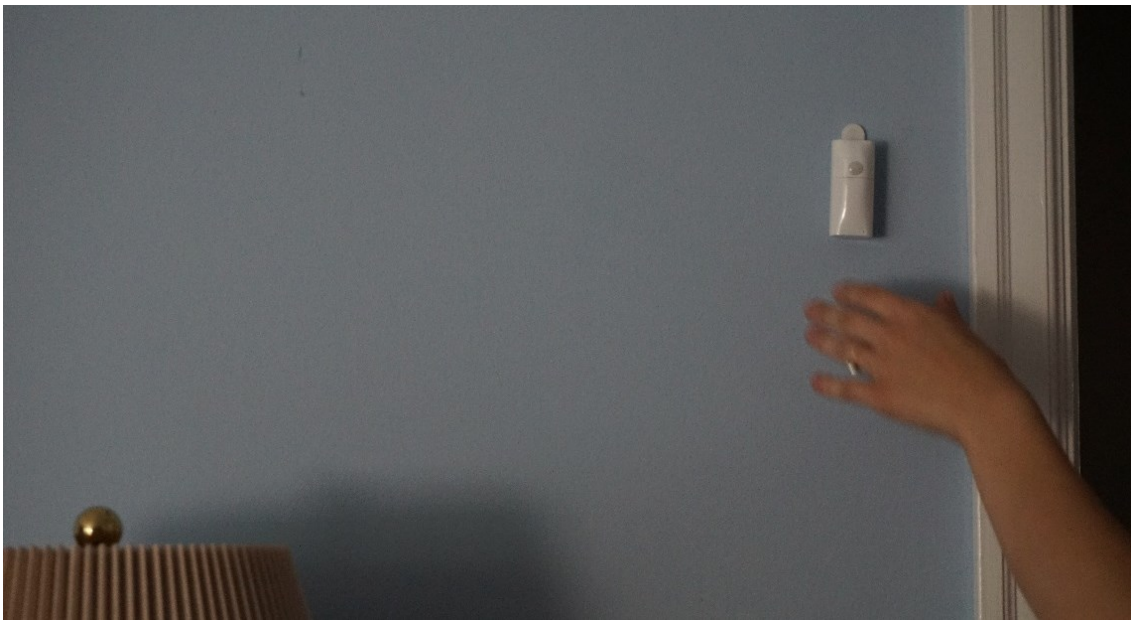


NOTE: Under the column labeled "Status", the icons representing Wi-Fi Connectivity and Battery Life should be represented as "active" and "full" (meaning connectivity is strong and the battery is full). The graphic explains what each device status icon and each sensor state represents.

NOTE: IF the sensor's light flashes red 6x repeatedly, this means the sensor has failed to join the PAN. If this occurs, refer to the *Troubleshooting Guide.*

NOTE: Only the NYCE sensors need to be added to the PAN. Do not add the watch, scale, TimerCap or car sensor to the PAN.

8. Attach the sensors to the walls and ceilings of the home, using two-sided Velcro tape. Attach them to a non-metal surface and in a dry location.



a. **Wall Sensors (NYCE-W):** Attach these midway between the floor and ceiling in a room. Try to place them close to a doorway that faces into the room, in order to measure entrances and exits. Since each sensor is designated for only one room, sensors shouldn't be visible from other rooms. (For example, the living room sensor shouldn't be able to measure activity happening in the kitchen).

b. **Egress Door Sensors / Contact Sensors (NYCE-C):** Place these near the top of an egress door. See *How to Property Set up Contact Door Sensors* for more details.

c. **Sensor Line (NYCE-SL)**: Attach the four sensors to the ceiling of a hallway or another area in the home that receives regular activity and movement. Make sure the surface area is level (no ceiling inclines). Place the sensors two feet apart from each other in a straight line. Use a step stool and tape measure.

9. Once all of the sensors are physically installed in the home and connected to the PAN, they'll start transmitting data.

Installing the AutomaticPro Car Sensor Device

The AutomaticPro car sensor monitors driving activity. The car sensor is attached to a car's on-board computer. Once it's installed, remind the research participant to refrain from unplugging it. To set up

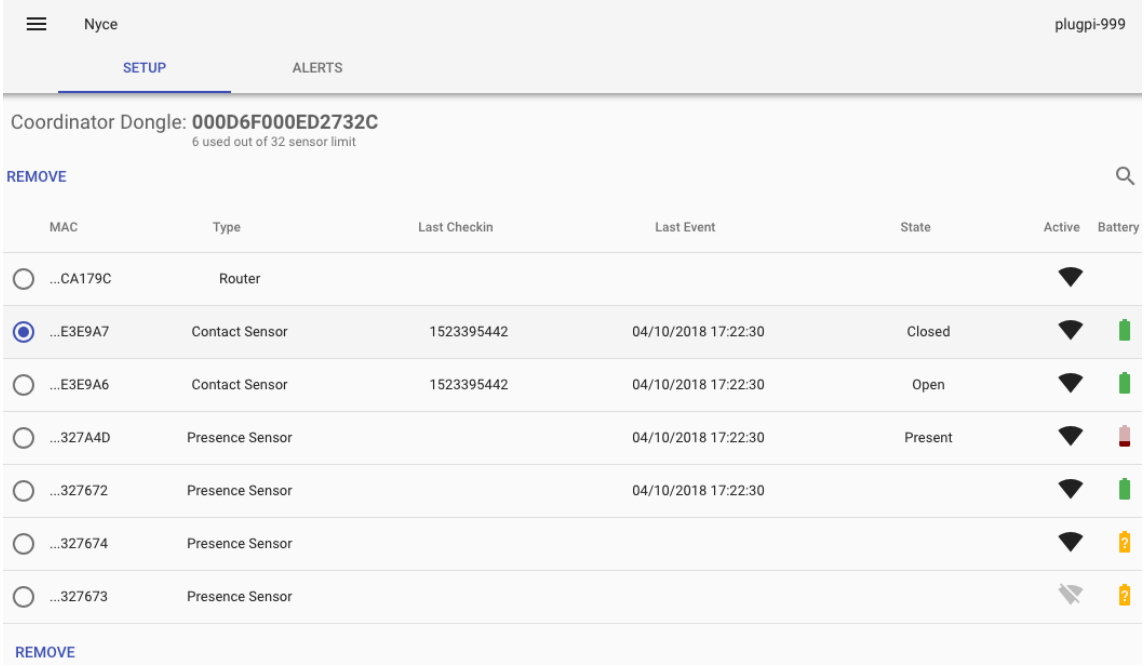
an AutomaticPro car sensor, plug the sensor into the car's OBD (on-board diagnostics) port and listen for two beeps. Setup is complete after the unit beeps twice.

Reviewing the Sensors and Devices after Installation

Once the sensors and devices have been installed in the home, make sure they are synching properly and collecting data. Fix any issues before departing the home.

NYCE Sensors

1. Test if the wall, ceiling and door sensors are transmitting data accurately.
    a. Walk around the home and check if the sensors picked up your activity. Walk down the hallway or sensor line, walk in and out of the rooms and open and close the exterior doors several times.
    b. View the most recent data in Control Panel. Go to Menu Bar > Devices > **NYCE** and then view the **data chart** on the page. The **Last Event** column lists the date and time of the latest data collection. The **State** column explains if a sensor is Present or Closed.



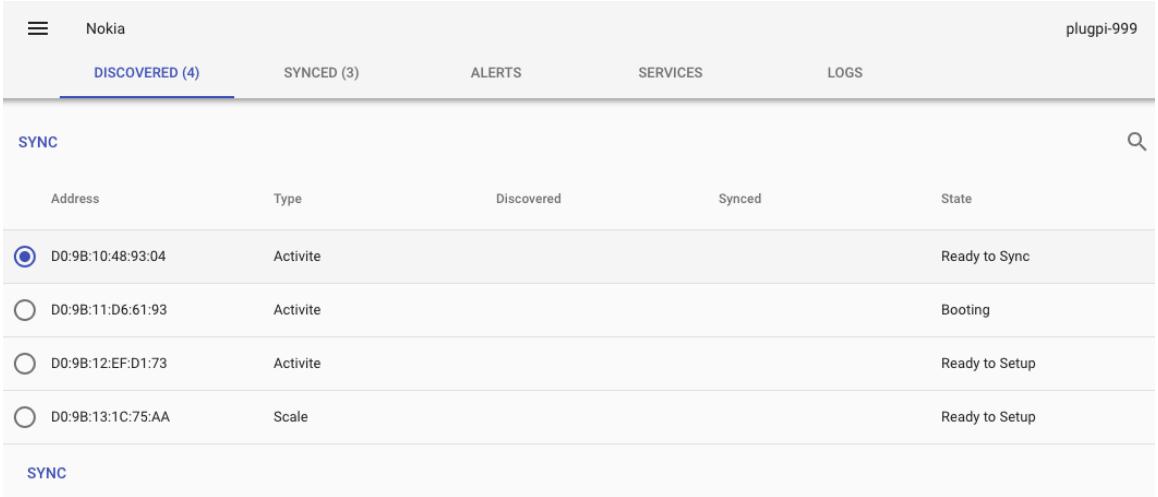
    c. If you notice that one or more of the sensors isn't transmitting data, double-check if it is linked to PAN and listed as active. If it is not, re-connect and re-active it by repeating the steps detailed in the *In-Home Installation Guide*.

NOTE: To test if one sensor is sensing another room's activity, walk near the sensor in question and then view the activity on the sensor placement management page in the Control Panel. Doing this is especially useful in small homes, like studio apartments.

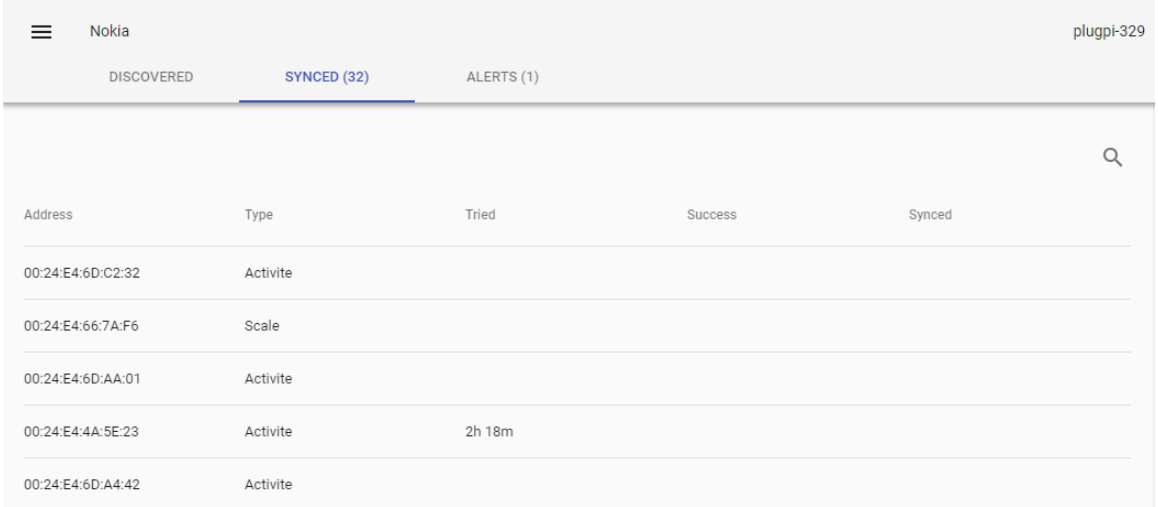
Watch

Check if the Activité Watch is properly sync'd and is transmitting data.

1. Go to Control Panel > Devices > **NOKIA** and view the Discovered tab.
    a. Check the Checkbox next to the watch and click on the **Sync** button.



    b. Once a notification appears stating that the sync was successful, click the “Okay” button.
    c. Click on the SYNCED tab, which will look similar to below. The “Tried” column lists the time since the pi tried to upload data to the server. The “Success” column lists the time since the pi succeeded in uploading data to the server. The “Synced” column lists relative age of the last data that was uploaded. For instance, if the entry in the column was 2d 5h, that means the newest uploaded data was collected 2 days and 5 hours ago. Each time the device sync’s newer and newer data will be uploaded.



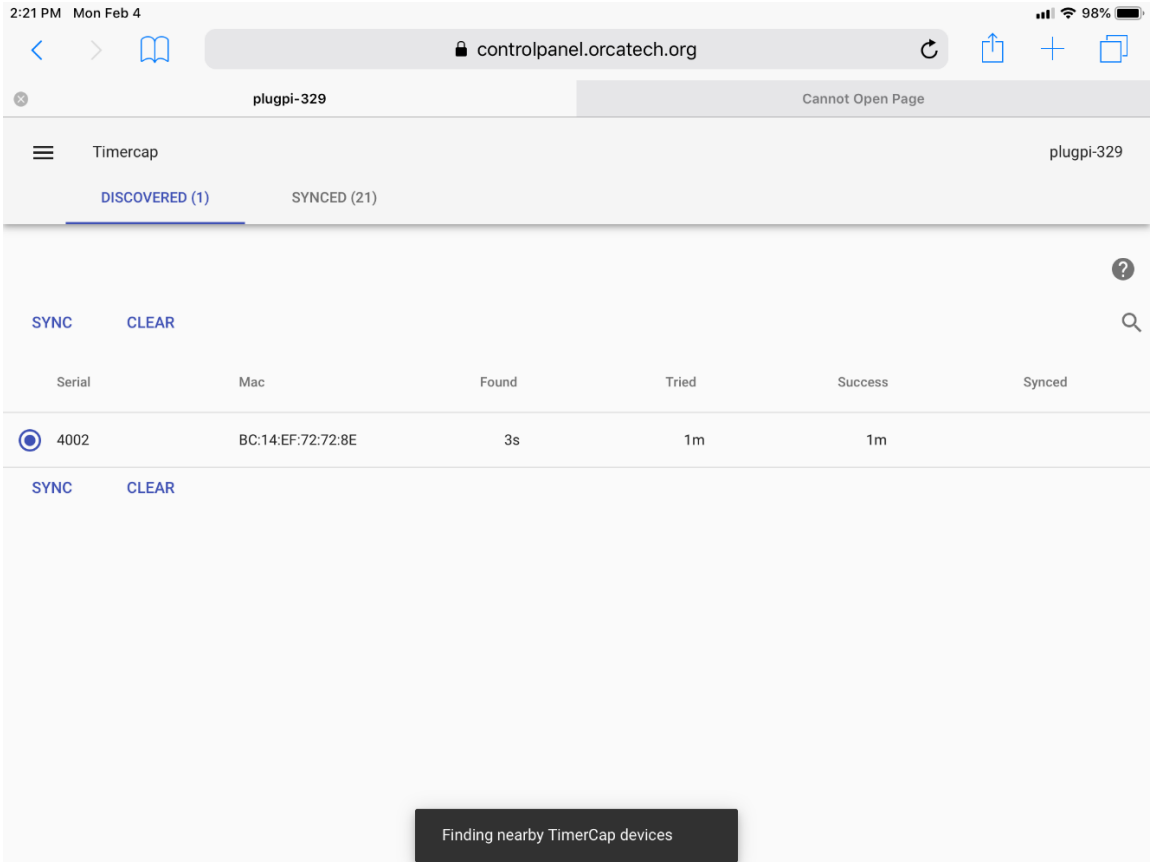
NOTE: Unlike the watch, the scale does not need to be sync’d.

Pillbox

Check if the pillbox is properly sync’d and is transmitting data.

1. Open and close several of the pillbox lids a few times. This activates the sensors on the edge of the lid.
2. Go to Control Panel > Devices > **TimerCap** and navigate to the Discovered tab.
    a. Click the **Sync** button. This allows the pillbox to sync with the hub computer and with the ORCATECH servers.

b. The meanings of the columns is as follows. “Found” indicates how long ago the pi was able to contact the TimerCap. “Tried” indicates how long ago since the pi tried to contact the data server. “Success” indicates how long it’s been since the pi was able to contact the data server. “Synced” indicates the age of the data that the pi was able to upload to the server.



c. Once a notification appears stating that the sync was successful, click the “Okay” button.