

UI Garden Probe User Manual



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Setup¹

1. Connect battery backup into pins closest to the [Buck-Boost converter](#) (refer to figure one below for location).
2. Make sure lights within the probe have been powered on.
3. Connect the [solar panel](#) to the set of pins next to the battery pins (refer to figure one below for location).²
4. Verify the panel is functioning correctly by briefly disconnecting the [battery backup](#) and pointing the solar panel towards the sun. If working properly, the lights in the probe will be active.³
5. Connect the [soil moisture probe](#) (refer to figure one below for location).
6. Tighten the [cable gland](#) on all cables exiting the box. Give cables a gentle tug. If there is no movement, the seal is airtight.
7. Screw the top and bottom of the probe tightly. If any screw is missing, replace it.
8. Bury the box up to where the lid connects
9. Insure the moisture probe is placed neatly into the ground, and the [sun sensor](#) is pointed up at the sky like a flower

¹ Components (highlighted blue) descriptions and visuals are available in the appendix

² Ensure Probe is facing due South

³ If either of these are not powering the probe, then unplug the source, turn it 180°, and plug back in.

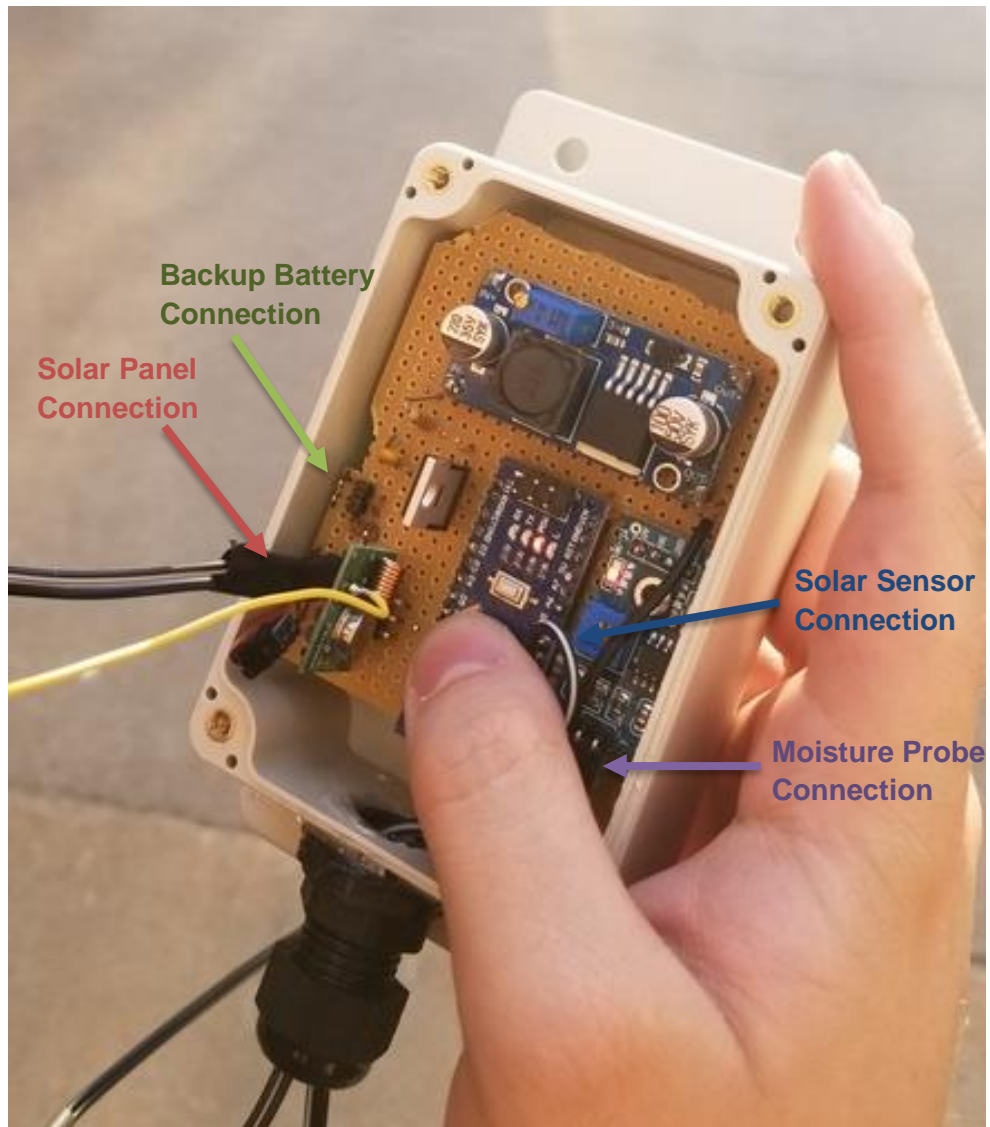


Figure 1: Open Probe with labeled connections

Maintenance

If a probe fails to transmit, refer to this troubleshooting section:

Battery or Solar Panel:

Over time, the backup batteries will run out of power. Replace it with a standard 3.6v battery pack (it looks like 3 AA batteries in a wrapping with a two-pin header.) If the solar panel becomes damaged, check the cables. Re-solder the cables if they are broken, or replace the panel otherwise.

Soil/sunlight sensors:

If the cable of either of our detectors becomes damaged, repair it with new cable and new detectors. These components are cheap to replace.

Circuit Damage:

If part or all of the circuit fails, have an electrical engineer extract and test it. From there, decide if a part of the board, or the entire board must be replaced. Refer to schematic in Appendix.

Water damage:

If the integrity of the waterproofing on a probe fails, consider replacing the rubber rings in the cable gland, replace the entire cable gland and/or re-apply waterproof adhesive around the antenna and screws. If a significant amount of moisture has found its way into the system, consider replacing the board by having one assembled using the schematic below. Test probe without components inside it by running it underwater to insure water tightness.

Website Tutorial

The website is available at dirtdata.herokuapp.com

When you initially visit the website, you will be directed to log in. Log in with the following information:

Log In: uiecstudentgarden@gmail.com

Password: garden

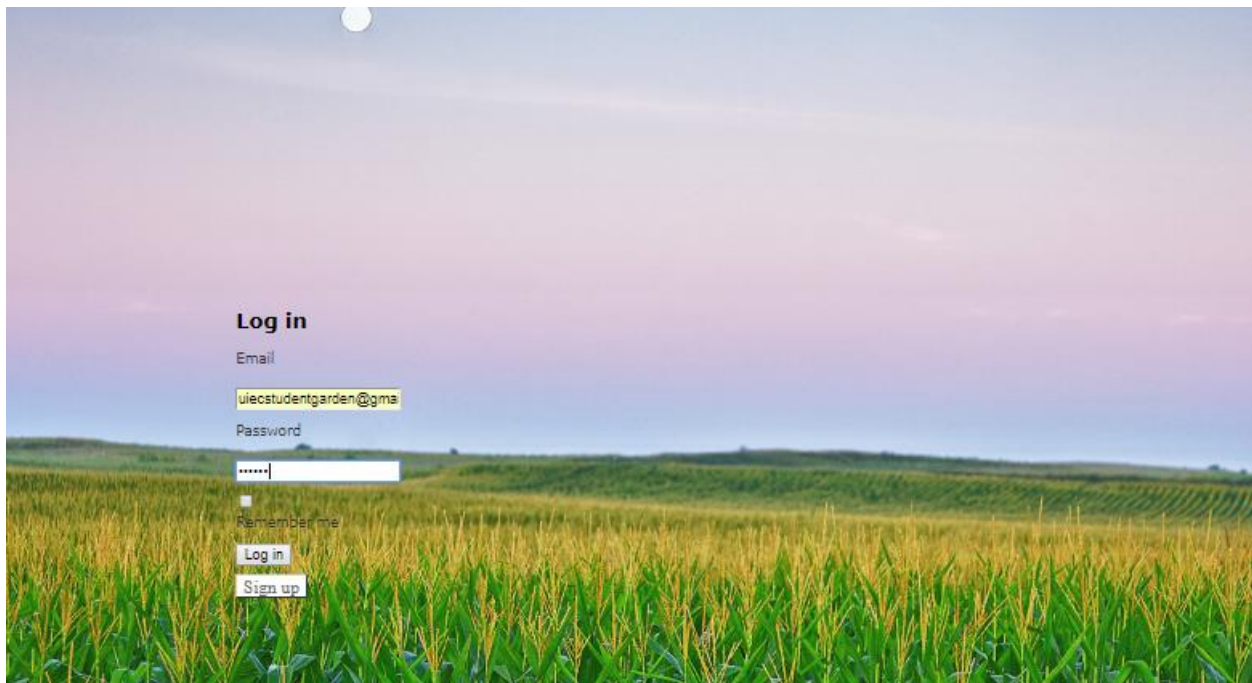


Figure 2: Website Login Screen

Once you have logged into the website, you will have access to all the data coming from your system. Data is scheduled to arrive every 20 minutes, however factors such as power to the system due to lighting conditions or signal strength weakness (worsened by humidity) may cause issues.

The following is a picture of the heatmap that you can view from the site.

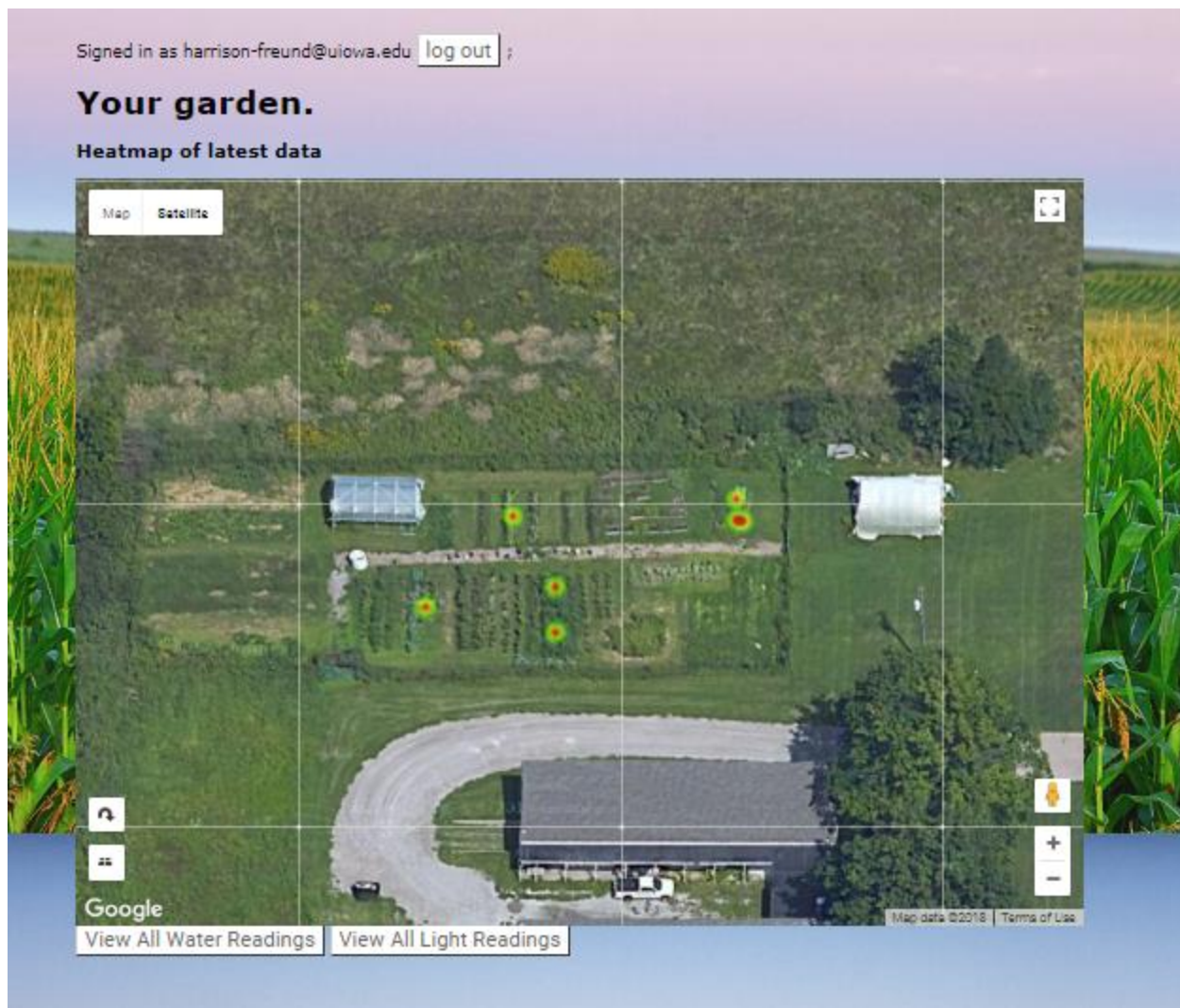


Figure 3: Home Screen of Website

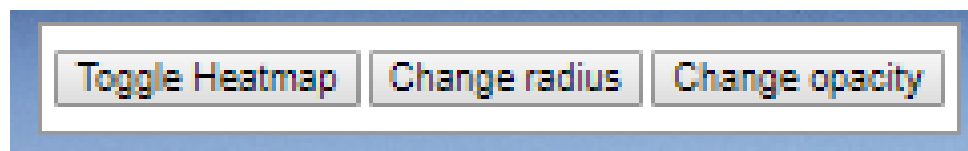
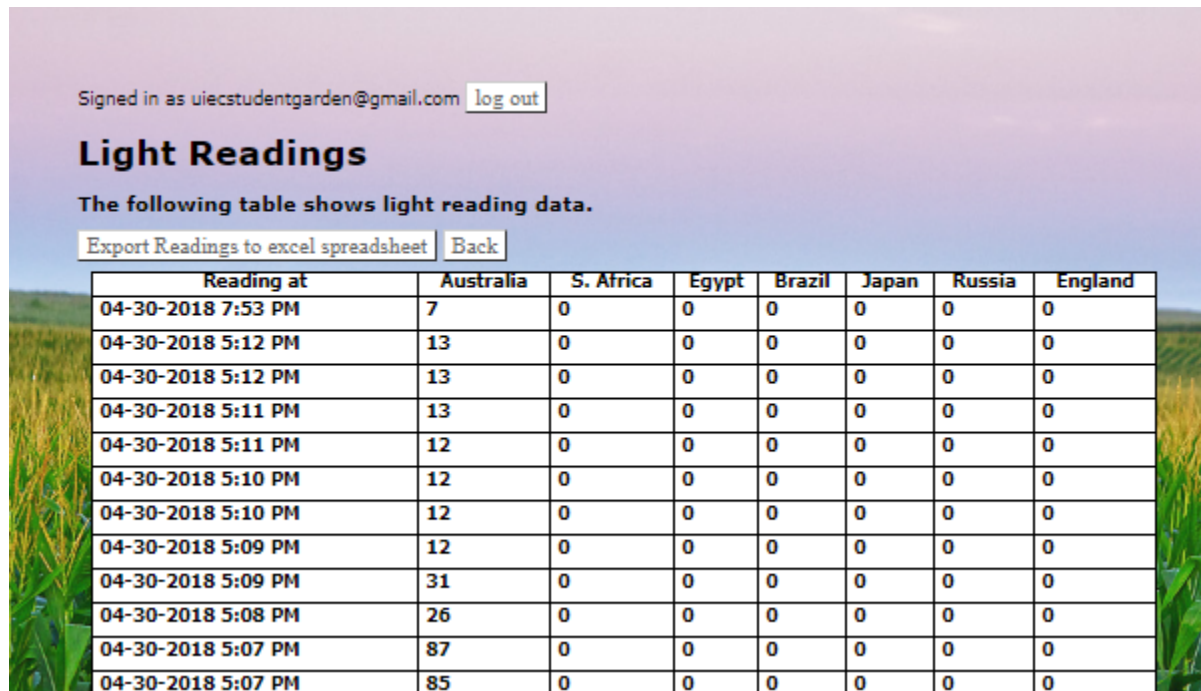


Figure 4: Website Control Panel

The toggle heatmap button will remove the color-coded layer. The change radius button will either make the circles on the map larger or smaller. The change opacity button will make the circles on the map transparent.

At the bottom of the map are two buttons that will redirect you to a detailed look of the data. Click on “View all Water Readings” or “View all Light Readings” to be redirected to these pages.

Once you click on one of these buttons, the page should look like this:



Reading at	Australia	S. Africa	Egypt	Brazil	Japan	Russia	England
04-30-2018 7:53 PM	7	0	0	0	0	0	0
04-30-2018 5:12 PM	13	0	0	0	0	0	0
04-30-2018 5:12 PM	13	0	0	0	0	0	0
04-30-2018 5:11 PM	13	0	0	0	0	0	0
04-30-2018 5:11 PM	12	0	0	0	0	0	0
04-30-2018 5:10 PM	12	0	0	0	0	0	0
04-30-2018 5:10 PM	12	0	0	0	0	0	0
04-30-2018 5:09 PM	12	0	0	0	0	0	0
04-30-2018 5:09 PM	31	0	0	0	0	0	0
04-30-2018 5:08 PM	26	0	0	0	0	0	0
04-30-2018 5:07 PM	87	0	0	0	0	0	0
04-30-2018 5:07 PM	85	0	0	0	0	0	0

Figure 5: Website Data Spreadsheet Page




The table is showing you the data from each node as well as the time the data arrived.

Click on the “Export Readings to Excel Spreadsheet” button to download the contents of the table.

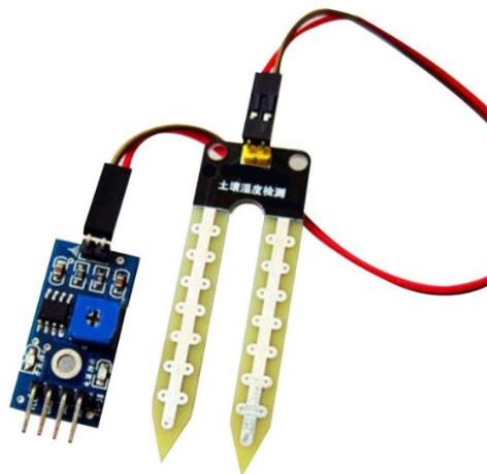
Note that your garden is imagined as a world map. For example, Australia refers to the device at the southern right corner of your garden.

Appendix:

Visual References:

<u>Component</u>	<u>Visual Aid</u>
<u>Buck-Boost Converter</u>	
<u>Solar panel</u>	
<u>Battery Backup</u>	

Soil Moisture Probe



Cable Gland



Sun Sensor



Component list (for 7 probes and transmitter station)

- 1x Raspberry Pi 3
- 1x Arduino ATmega 2560
- 1x 433 MHz Radio Receiver
- 7x 433 MHz Radio Receiver
- 7x Arduino Nano Microcontrollers
- 7x Solar Panel 3D Printed Stands
- 7x 9v Solar Panels
- 7x 3.6v Nickel Cadmium batteries
- 7x Buck-Boost Converters
- 7x 220 Ohm Resistors
- 7x 10k Resistors
- 14x 1n4001 Diodes
- 7x irf9540n MOSFETs
- 14x 100 nF capacitors
- 150x Male Pins
- 70x Female Pins
- 7x Medium breadboards
- 40 feet double Line Cable
- 10 feet Standard Cable
- Assorted Amounts of Copper Cable

Circuit Diagram

