Quick, cheap, and easy home weather station

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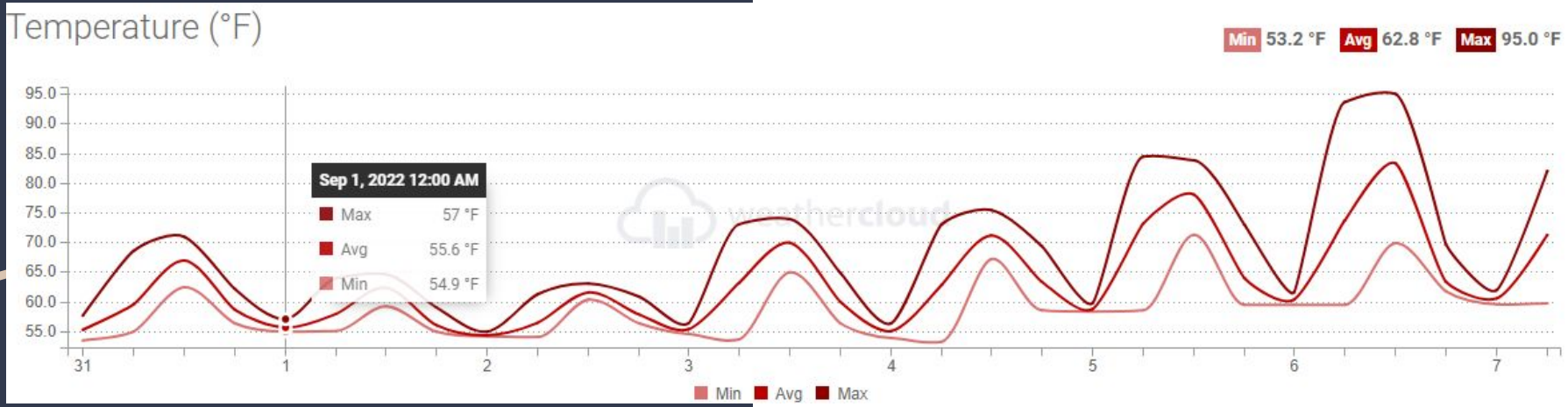
Why?

Why track your home weather?

- See your home microclimates
- Gather trends on chill and heat hours
- Help fine tune your watering schedule
- Be able to do zone comparisons and make more educated plant decisions
- View your station on sites like WeatherCloud and WeatherUnderground
- It’s easy and fun!



Explored paths...

- Top of the line for home weather - Davis Vantage Pro2 system $600+
  - Too expensive!!!!!
- I went to the Santa Cruz flea market and happened to find a new in box Acurite 5 in 1 station for $25 (normally ~$150)
- This provided temperate, humidity, rainfall, wind, etc. - BUT no way to get it online
- I built a Raspberry Pi system (x2 eventually) that connected up to the receiver and used WeeWx to transmit weather to WeatherUnderground
- This worked decently and was very cheap but was super ugly, very technical and required frequent maintenance to keep it going.
- Eventually it pretty much UV eroded and fell apart

- I wanted something new, something cheap and more elegant...

What?

- Ecowitt modular system (https://www.ecowitt.com/)

What?

Cost

Weather station ($50 - $169)

- GW1000 sensor gateway ($34)
- WH32 Outdoor temperature and humidity sensor ($16)
  - Don’t accidentally buy the indoor version like I did, it will work but won’t report temperature to weather services
- WS68 wind and UV sensor ($69) - optional!
- WH40 rain sensor ($50) - optional!

Cost – other options

- They make a bunch of other sensors that might be fun depending on your setup:

- More temperature gauges (indoor, outdoor)
- multi-channel thermo-hygrometer (up to 8)
- soil moisture sensors (up to 8)
- air particle sensors (PM2.5)
- NDIR Co2
- Leakage sensor (up to 4)
- lightning detector sensor
- leaf wetness sensor
- pool thermometer
- 7in1 sensor array
- solar radiation sensor
- ETC….

Cost

Mounting ($0 - $20)

- I used a spare 8’ 2x4 as the ‘pole’ and another scrap piece to aid in mounting
- They suggest using metal poles
- Either works!

Other

- AA Batteries (preferably Lithium)
- Powered USB port
- Home WiFi

Where?

- The GW1100 gateway
  - It's essentially a mini PC running some software to upload weather data
  - It needs to be USB powered
  - It needs to connect to your home WiFi
  - It also needs to be able to communicate with all of your sensors so choose a location
- WH32 temp sensor
  - Shaded, out of direct sunlight, other weather
  - Beware radiated heat if near a structure
  - At least 4-5' off the ground with good air flow
- WS68 wind and UV sensor / WH40 rain sensor
  - About 6' off the ground (or more for wind)
  - No obstructions nearby
  - Needs to be level
  - Needs to face north (WS68 only)

Setup

- Hardware (30-90 minutes)
  - Determine location of the outdoor pieces and the indoor gateway
  - Make sure you have appropriate mounting hardware (i.e. screws)
  - Set up your mounting pole
  - **After** powering and pairing everything mount your outdoor equipment
- Software (30-120 minutes)
  - Time depends on how tech savvy you are
  - I recommend using two devices (i.e. phone & PC) during setup to make the process easiest
  - Make sure you know your WiFi password
  - First, setup your external accounts (WeatherUnderground / Weathercloud)
  - Second, setup your gateway
  - Third, one by one, power your sensors and make sure they pair
  - **Most of this is in more detail in the manual!**

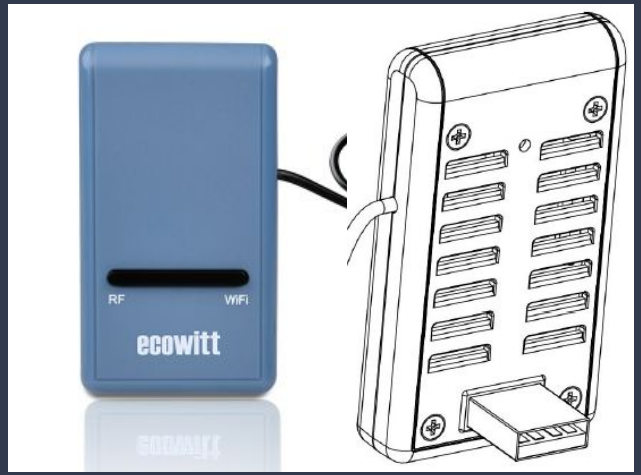
Setup - hardware location

- These are best practices, some are harder to meet at home
- Temperature sensor should above level ground ~ 5’-6’ off the ground. It should be away from paved surfaces and other sources of artificial heat
- The anemometer (wind) should be 33’ above the ground and a distance of 10x the height of any nearby obstructions
    - Not really practical at home unless you mount on a roof
- The rain gauge should be mounted 4’-6’ above the ground and a distance of at least four times the height of any nearby obstructions
    - Hard to meet in a back yard, just keep it as far away from trees as you can

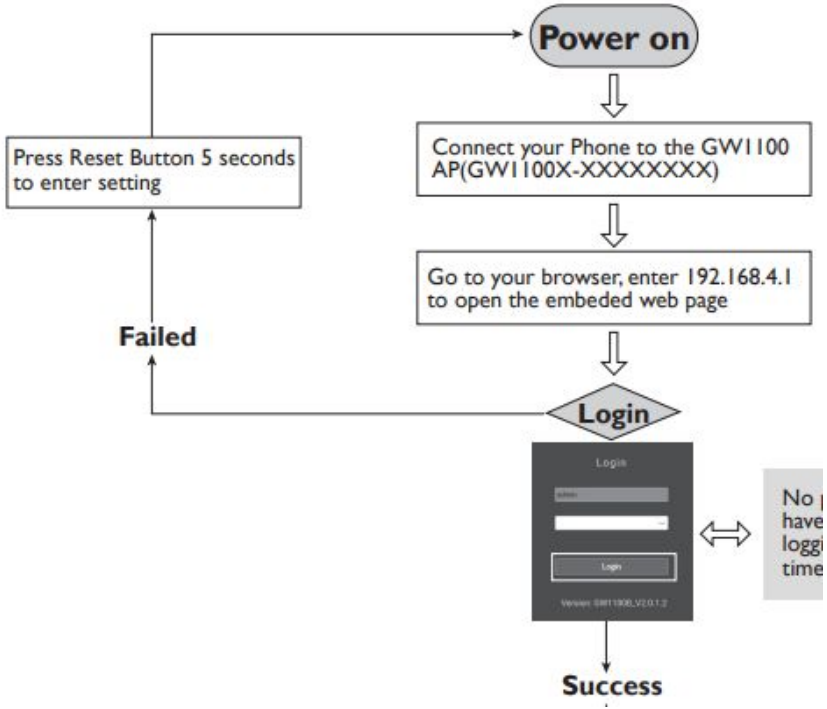
Setup - hardware location

- My setup ‘mistakes’:
  - Large pine tree ~10’ away
  - Wind sensor way too low (~6’)
  - After installation, added a ‘heat wall’ ~10’ away to slow wind and increase temperature
  - BUT - tall trees everywhere! There aren’t many better locations in my yard
- Results:
  - Temperatures probably higher than ambient outside my yard
  - Wind speeds likely lower
  - Rain (if we get any) totals may be lower

Setup - software

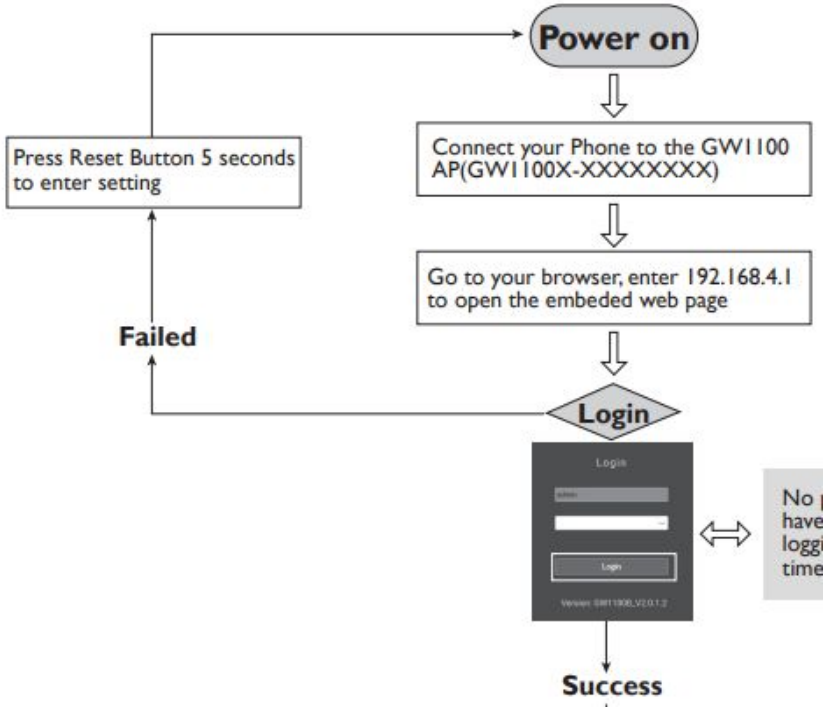


- Plug in your GW1100 (USB on back of unit) to power it on.
- Using your phone WiFi connect to the access point it has



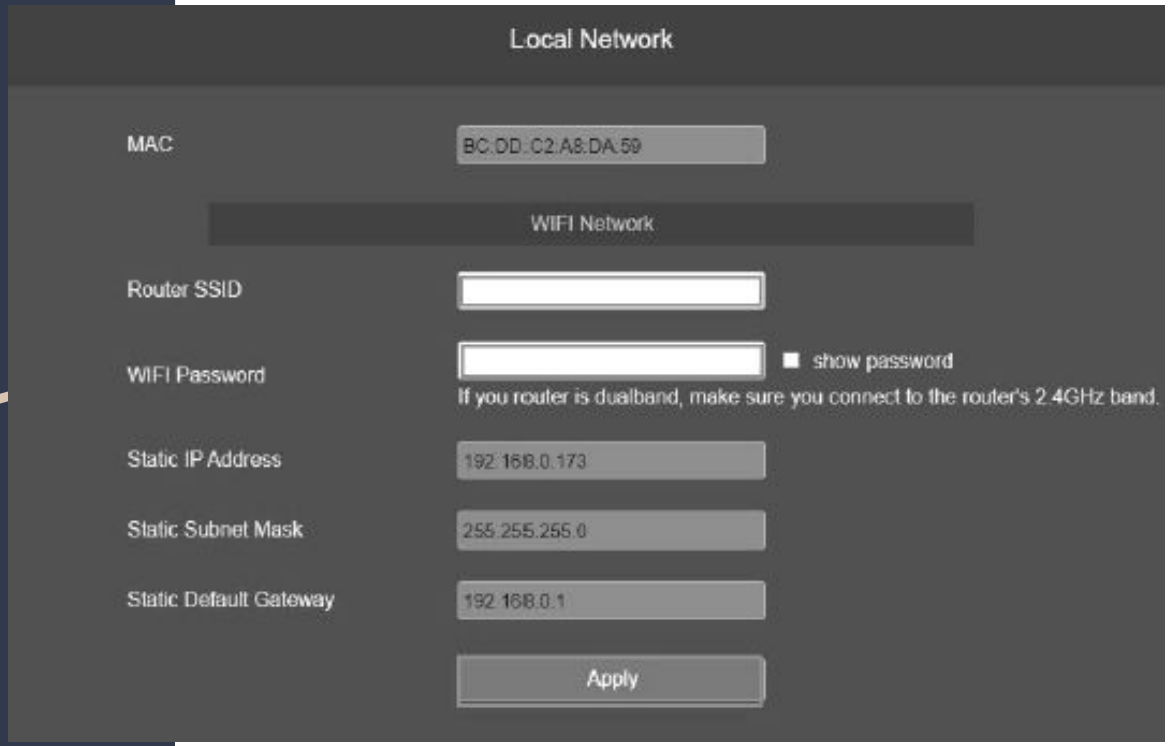
Setup – software

- Your phone may report that it doesn't have Internet access - this is expected and ok.
- Open your browser and go to '192.168.4.1'
- Login, no password required



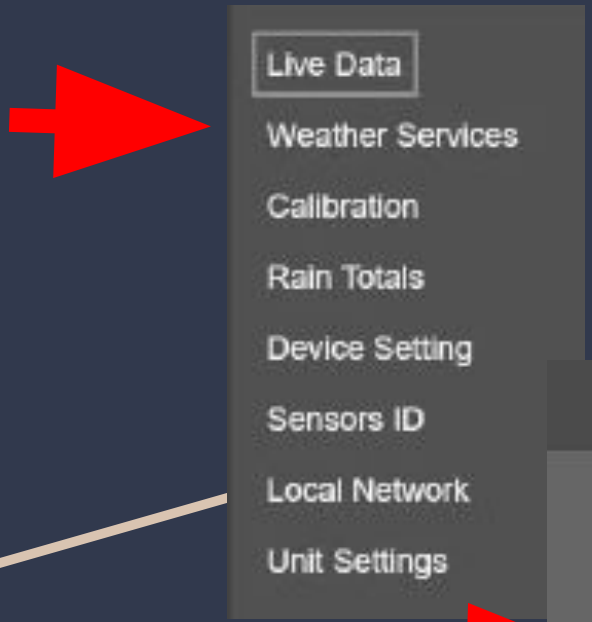
Setup – software

- Enter your homeWiFi SSID (the name it shows up as) and password
- Press ‘Apply’ and verify it connects and an IP address shows up



Setup – software

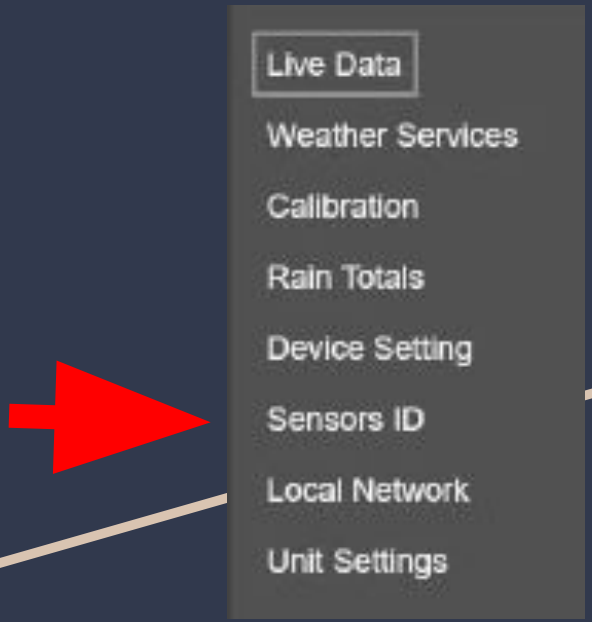
- Go to Weather Services from the menu
- Write down the MAC address shown - we'll be using it shortly



Setup - software

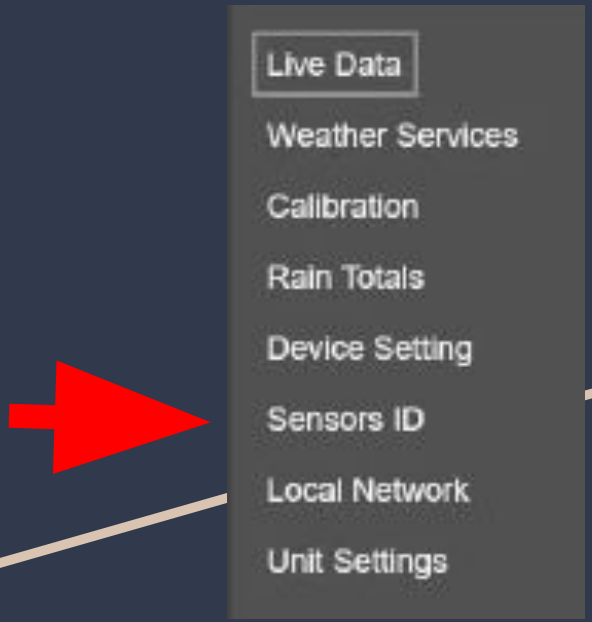
- On your other device (not the one connected to the gateway) go to www.ecowitt.net and register for an account.
- Under your account add your device by entering in the MAC address you just wrote down and fill in other setup information.
- You should be able to now see your weather station - though there aren't any sensors yet

Setup - software



- Now it's time to power on your sensors!
- Make sure they're nearby (not mounted)
- Put the batteries in.
- Back on your first device…
  Navigate to the Sensors ID tab
- Make sure your sensors show up here
- Then - on your second device, make sure they are showing up on the Ecowitt site

Setup - software



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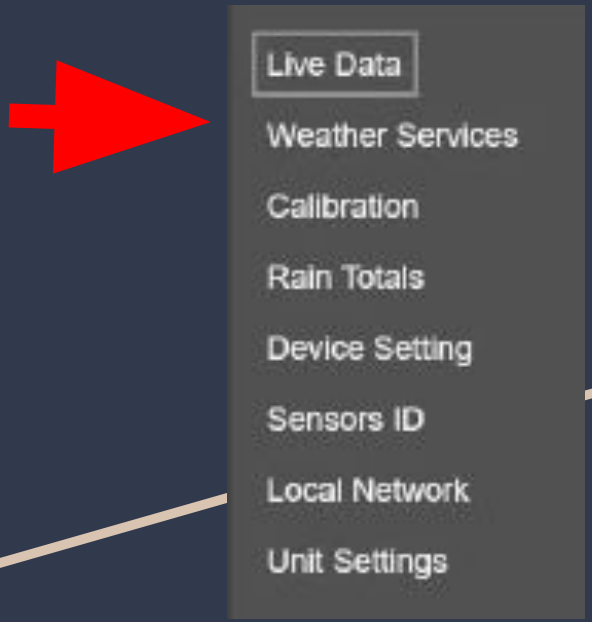
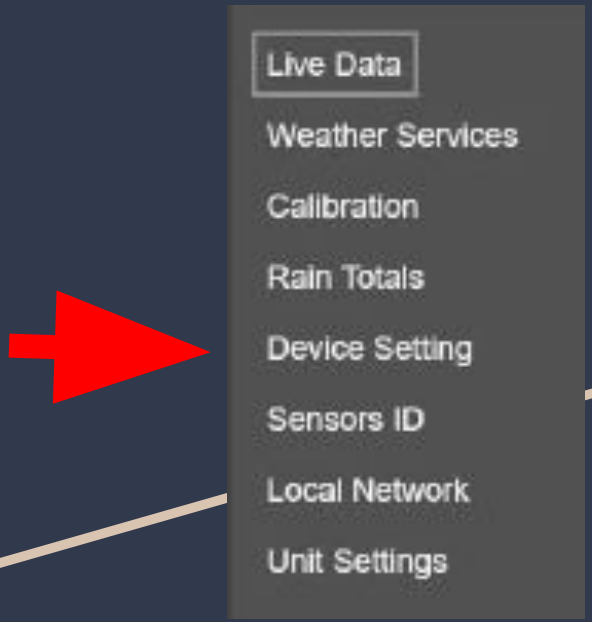


- Now you can add other external services.
- Go to the Weather Services tab to do so.
- WeatherUnderground is specifically covered in the user manual.
- WeatherCloud is a similar process

Setup – software

- Time to wrap up the install
-
- On Device Setting
  - Make sure you are set to Automatically upgrade firmware
  - Enter a **strong** password, don't get hacked!
  - Press Apply
- Once you press apply the system will reboot and take a minute or two to be accessible again
- Make sure you can still login
- Disconnect your phone from the gateway Wifi



My station!

- https://app.weathercloud.net/d1777087519
- https://www.wunderground.com/dashboard/pws/KCAPACIF117