

SwitchDoc Labs



WeatherSTEM Configuration

May 2019
Version 1.1

Table of Contents

Errata	3
What is WeatherSTEM?	4
Empowering teachers to create STEM lessons, activities, and assessments from real-world weather	4
Experience The Data	4
How will SkyWeather Integrate with WeatherSTEM?	4
What is SkyWeather?	5
SkyWeather Features	5
Versions of SkyWeather	7
SkyWeather	7
SkyWeather Lite	7
SkyWeather Solar	7
SkyWeather Plus Solar WXLink Remote	7
Finding your SkyWeather Serial Number	7
Putting your Serial Number into the SkyWeather Software	8
Setting up your WeatherSTEM Account	9
Testing the Connection. Looking at your Station Results.....	11
Other WeatherSTEM Features	13
The Science and Education Goals Behind SkyWeather.....	13
Support.....	14
Disclaimer	15

Errata

What is WeatherSTEM?

Empowering teachers to create STEM lessons, activities, and assessments from real-world weather

More than ever in our history, schools across the United States face the challenge of better preparing students to enter careers where competency in STEM-related subject areas (Science, Technology, Engineering, and Mathematics) is a requirement.

We believe weather provides an excellent foundation for STEM education. It also provides myriad opportunities for exposing students to topics from a plethora of disciplines in the scope of a single activity. Any weather situation, from the most benign scenario where a few cumulus humilus clouds dot the sky to the most intense Category 5 hurricane, can turn into a discussion covering everything from algebra to zoology.

WeatherSTEM is a platform built by Ucompass CEO Edward Mansouri who has a Bachelors degree (Penn State) and Masters degree (Florida State) in Meteorology. Fascinated by weather since childhood, Mansouri created the WeatherSTEM platform to infuse K-12 STEM curriculum with live data collected by weather instruments, cloud cameras, agricultural probes, and other sensors.

Experience The Data

The WeatherSTEM platform consumes live information to create and deliver interactive activities and assessments. The platform combines data from weather instruments, agricultural probes, Web cameras and other sensors to create immersive science education experiences and an introduction to "Big Data" and computer programming.

How will SkyWeather Integrate with WeatherSTEM?

Each SkyWeather station will:

- Publish data and images to its own WeatherSTEM website once per minute
- Store data and images permanently that are accessible via the WeatherSTEM Data Mining Tool
- Integrate data and images into WeatherSTEM's education repository that you and your stakeholders will have access to
- Publish data and images to the WeatherSTEM SkyWeather social media platform integrated with Twitter, Facebook, and YouTube
- Create daily time-lapse "sky movies"
- Integrate data into WeatherSTEM's Safety Platform featuring lightning alerts and other important situational awareness notifications
- Offer the capability for real-time, moment by moment data streaming
- Enable real-time access to the data via WeatherSTEM's [API](#)
- So much more!

The SkyWeather station will offer numerous power and connectivity options including solar panels for power and cellular and WiFi for connectivity.

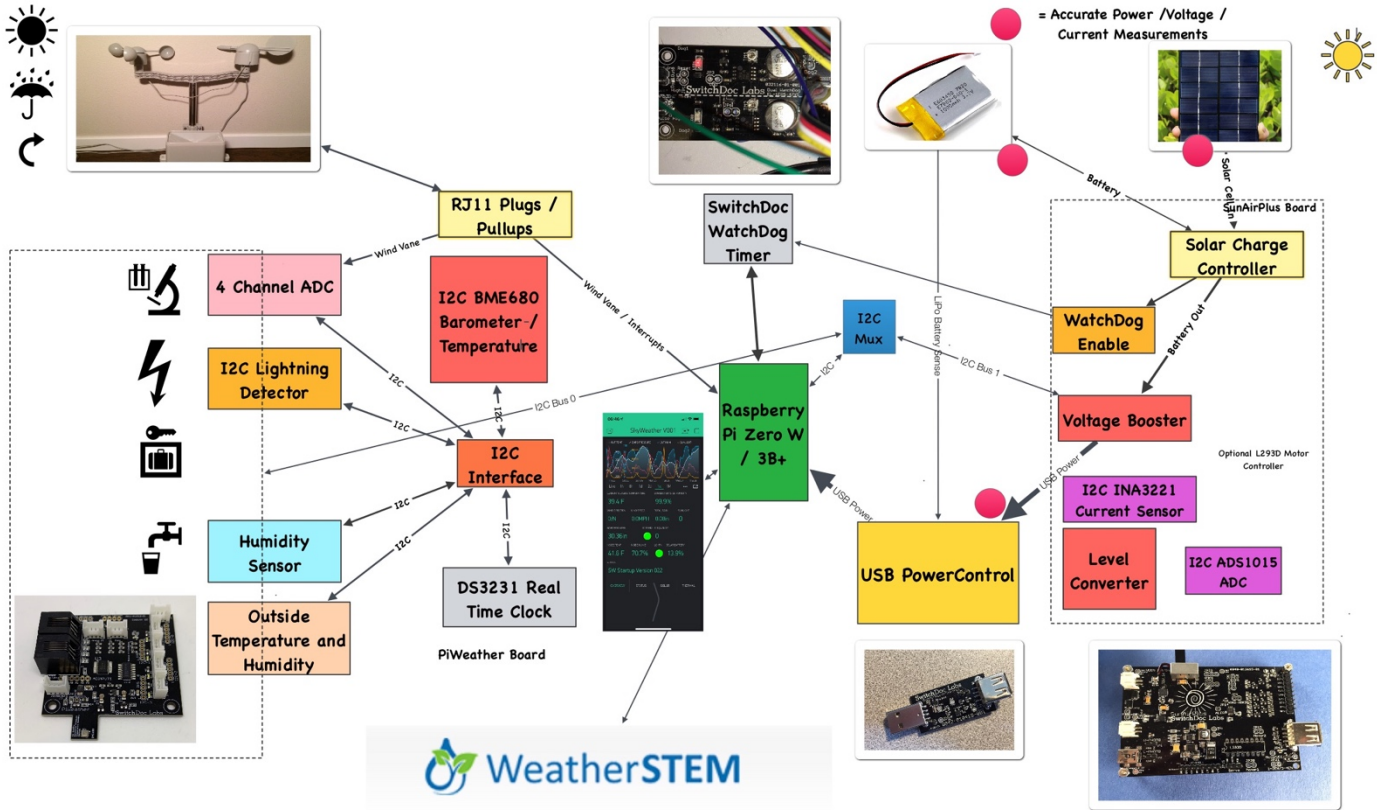
What is SkyWeather?

This is a perfect project kit for kids with some help from the adults and for adults trying to learn some new things. We have done this before with our successful OurWeather KickStarter so we know what we are talking about. People all over the world have built the OurWeather weather station with great success. This project has **no soldering** involved and uses Grove connectors to wire everything up! You can't reverse them and blow things up. [Here is our tutorial on the Grove system.](#)

SkyWeather Features

- Barometric Pressure
- LIGHTNING!
- Outside Temperature
- Outside Humidity
- Altitude
- Inside Temperature (in box)
- Inside Humidity (in box)
- Air Quality - AQI (your own local Air Quality Sensor)
- Sunlight
- Wind Speed
- Wind Direction
- Rain
- All your weather information on the Cloud including history

Easy to build. Easy to learn about the IOT (Internet Of Things) and the Raspberry Pi.



Versions of SkyWeather

SkyWeather

The full SkyWeather kit including the Lightning and Wind Direction, Speed and Rain sensors. Includes: Rain, Wind Speed / Direction, Lighting Detection, Outside Temperature and Humidity, Barometric Pressure, Internal Temperature/Humidity, Sunlight Strength, and Outside Air Quality.

SkyWeather Lite

SkyWeather Lite does not contain the Lightning Detector and the WeatherRack wind and rain sensors. Because of that, do not drill the holes for the Lightning Detector Pylon and you do not need to have the RJ11 box connectors for the WeatherRack

SkyWeather Solar

SkyWeather Solar adds a set of solar panels on the top of the SkyWeather Box. We have a special assembly manual for that add on to the SkyWeather kit. Note that you have to think about where and how to orient your solar panels versus the orientation you want for your Sky Camera. Solar Panels should generally point south (in the northern hemisphere) and north (in the southern hemisphere – right Topher?).

SkyWeather Plus Solar WXLink Remote

This SkyWeather package places the WeatherRack wind / rain sensors and the outside temperature and humidity sensor, along with a solar system in an external box connected by wireless LoRa. See the weatherproofing manual for the WXLink Box. Basically, you place the WeatherRack and the outside temperature / humidity sensors outside and the rest of SkyWeather can either be inside or outside. There are no wires between the WXLink remote box and the SkyWeather system. You may still want to place the Sky Camera and SkyWeather system outside and in that case you do not need to have the RJ11 box connectors for the WeatherRack or the hole AM2315 Outside Temperature and Humidity Sensor.

This manual is for the base SkyWeather kit.

Finding your SkyWeather Serial Number

When you buy a SkyWeather kit, you will receive an 8 character serial number that you will use to link your weather station with WeatherSTEM. This 8 character code (also known as the **device key**) will be entered into both the SkyWeather software and into the WeatherSTEM website. Your code will look something like this: **X7d3dkkk**. **Don't use this example code in your configuration file. It will not work. Do not use the serial number in the picture below. It will not work.**

SkyWeather

Your Weather On The Cloud

0011-WPIRDD0DSBT	PiWeather Board
0015-WR-DSBT	WeatherRack
0020-GRVOTH-DSBT	AM2315 Temp/Humid Sensor
0027-TSL2591GRV-DSBT	Sunlight Sensor (TSL2591)
0075-GRV20C-DSBT	5/pk 20 cm Cables
0079-GRV50C-DSBT	2 single 50 cm Cables
0100-GRV2PIA-DSBT	Pi2Grover Board
0121-USBAM-DSBT	USB Cable from USB Type A to Micro
0203-GRV6I2CH-DSBT	6 Port i2C Hub
0232-GPOWERSAVE-DSBT	Grove PowerSave for AM2315
0232-GPOWERSAVE-DSBT	Grove PowerSave for AQI
0240-THNDRBRD-DSBT	ThunderBoard
0270-GRVDUST-DSBT	GRV Dust Sensor - Air Quality Sensor
0675-RPSDCARD-DSBT	SD Card
0800-CAMIRCUT-DSBT	Sky Camera
0820-50CAMPI3CAM-DSBT	50cm Pi3 Camera Cable
0830-PIZEROCAMCAB-DSBT	PiZero Cable

SkyWeather Serial Number:
ex5vB-7D

[SkyWeather Assembly and Testing Manual](https://www.switchdoc.com/wp-content/uploads/2019/04/SkyWeatherAssemblyAndTesting.pdf)

<https://www.switchdoc.com/wp-content/uploads/2019/04/SkyWeatherAssemblyAndTesting.pdf>

SwitchDoc Labs ● 919 S Shelley Lane ● Spokane Valley ● WA 99039
www.switchdoc.com

Putting your Serial Number into the SkyWeather Software

The first thing you need to do is setup your SkyWeather software configuration file. This should be done as shown in the **SkyWeather Configuration and Operations Manual**. Come back here after you have completed the configuration in the configuration manual.

Once you have completed the configuration in the above manual, perform the following steps:

Step 1) Open up a terminal window on your Raspberry Pi.

Step 2) `cd SDL_Pi_SkyWeather`

Step 3) Using your favorite editor, (nano or vi for example) open up the `conflocal.py` file and locate the following lines:

```
# WeatherSTEM configuration  
  
USEWEATHERSTEM = False  
INTERVAL_CAM_PICS_SECONDS = 60  
STATIONMAC = MACADDRESS  
STATIONKEY="XXXXXXXX"  
STATIONHARDWARE=""
```

Step 4) Change `USEWEATHERSTEM = False` to `USERWEATHERSTEM = True`

Step 5) Leave `INTERVAL_CAM_PICS_SECONDS` as it is. If you are using a solar version of SkyWeather you may want to move this 500 seconds. The camera uses a significant amount of power.

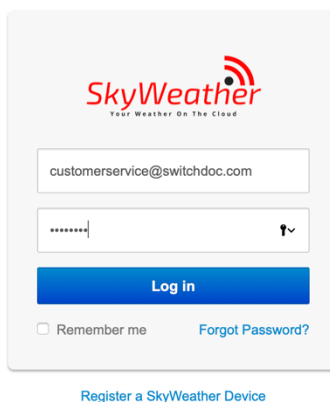
Step 6) Replace "XXXXXXXX" in the `STATIONKEY` line with your serial number from the SkyWeather Serial Number Sticker. It will have 8 characters.

Save the file. You have now configured SkyWeather to work with WeatherSTEM. Next we set up WeatherSTEM to receive your data.

Setting up your WeatherSTEM Account

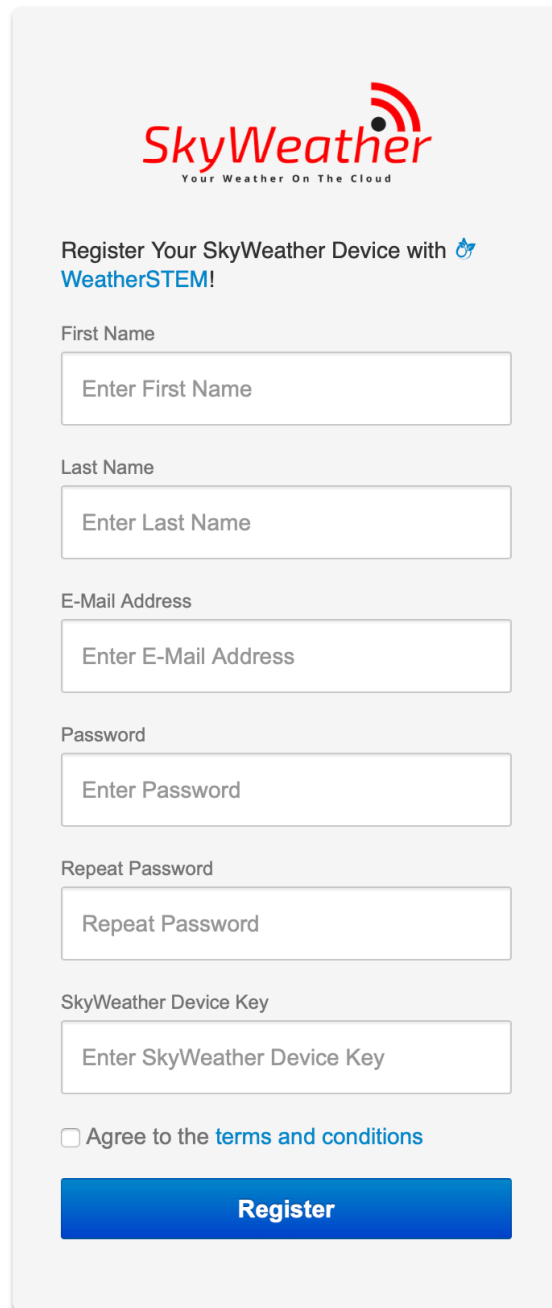
Your WeatherSTEM account is where you register your SkyWeather station for the WeatherSTEM cloud data storage and display. This is a free service provided by WeatherSTEM to SkyWeather users.

Go to "skyweather.weatherstem.com" and you will see the screen below:



The screenshot shows the SkyWeather login interface. At the top is the SkyWeather logo with the tagline "Your Weather On The Cloud". Below the logo is a login form with two input fields: one for an email address (containing "customerservice@switchdoc.com") and one for a password (masked with dots). A blue "Log In" button is positioned below the password field. Underneath the button are two options: a checkbox for "Remember me" and a link for "Forgot Password?". At the bottom of the form is a link that says "Register a SkyWeather Device".

Click on “Register a SkyWeather Device” Fill out the form, paying special attention to the SkyWeather device key (your serial number from the SkyWeather sticker in Step 6) above.



The registration form features the SkyWeather logo at the top, which includes a red Wi-Fi symbol and the tagline "Your Weather On The Cloud". Below the logo, the text reads "Register Your SkyWeather Device with WeatherSTEM!". The form contains several input fields: "First Name", "Last Name", "E-Mail Address", "Password", "Repeat Password", and "SkyWeather Device Key". Each field has a placeholder text "Enter [Field Name]". At the bottom of the form, there is a checkbox labeled "Agree to the terms and conditions" and a prominent blue "Register" button.

[Return to Login Screen](#)

Respond to the email from skyweather@weatherstem.com to complete linking your account.

Click on the link in the email and then login to your account.

Add the name of your station (Xandadu, Palm Springs, CA – Paris, France or something like that) and then the handle of the station. The handle is what your station is called in URLs.

Select your location on the map on the right.



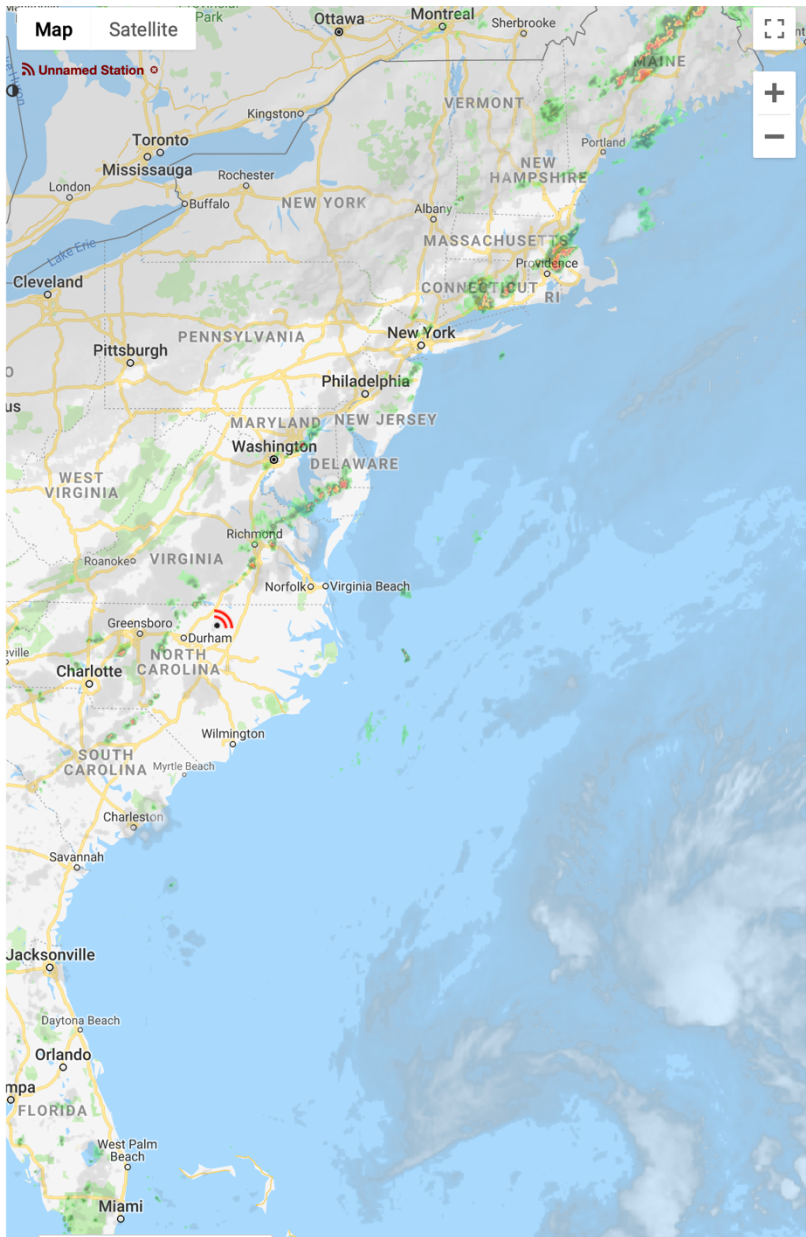
Add Station

Device Key: eZ-Xm3il

Station Name
Name your station ✓ ✕

Handle
Add a handle

Location
36.1532353°, -78.0682932°
1578 Collins Mill Rd, Castalia, NC 27816, USA



You can add additional SkyWeather stations from the add station links if you want to have more than one SkyWeather station on your account

Testing the Connection. Looking at your Station Results

Step 1) Open up “conflocal.py” and change:

SWDEBUG = False

to:

SWDEBUG = True

Step 2) Start SkyWeather.py
sudo python SkyWeather.py

After about a minute of messages scrolling by, you will see something like this:

```
-----  
SkyCam Picture Taken  
-----
```

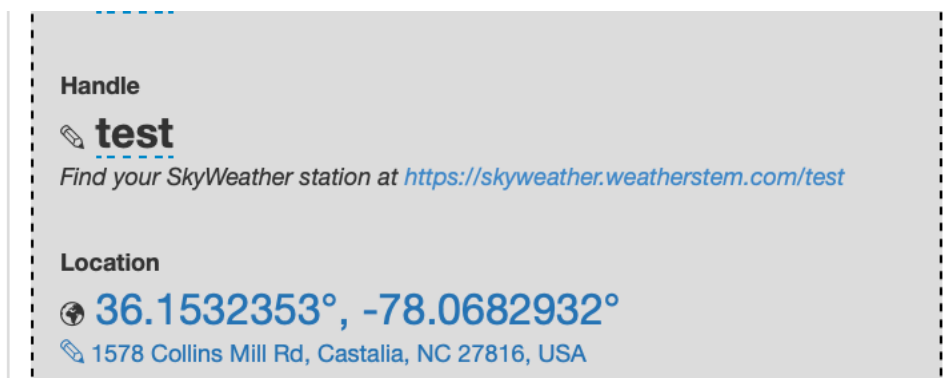
And after another couple of dozen lines or so, something like this:

```
-----  
SkyCam Package Sending  
-----
```

```
The pastebin URL is (r.text): {"internal": {"record": "28206", "image": "28650", "readings": [{"sensor": "1", "id": "639729", "value": "25.500"}, {"value": "24.400", "sensor": "4", "id": "639732"}, {"sensor": "7", "id": "639735", "value": "28.740"}, {"id": "639738", "sensor": "10", "value": "18.995"}, {"value": null, "sensor": "13", "id": "639741"}, {"id": "639744", "sensor": "16", "value": "4664.256"}, {"value": "820.000", "sensor": "19", "id": "639747"}, {"id": "639750", "sensor": "22", "value": null}, {"id": "639753", "sensor": "25", "value": "8.157"}, {"id": "639756", "sensor": "28", "value": "12.075"}, {"sensor": "31", "id": "639759", "value": "225.000"}, {"value": "0.140", "id": "639762", "sensor": "34"}, {"id": "639765", "sensor": "37", "value": "1002.864"}, {"value": "328.000", "sensor": "40", "id": "639768"}, {"id": "639771", "sensor": "43", "value": "1002.864"}, {"value": "0.000", "sensor": "46", "id": "639774"}, {"sensor": "49", "id": "639777", "value": null}, {"sensor": "52", "id": "639780", "value": null}, {"value": null, "sensor": "55", "id": "639783"}, {"sensor": "58", "id": "639786", "value": null}]]}, {"jpg": "https://cdn.weatherstem.com/user_generated/skyweather/xanadu/2019/05/20/23/03/46.jpg"}, {"json": "https://cdn.weatherstem.com/user_generated/skyweather/xanadu/2019/05/20/23/03/46.json"}
```

You are now connected to WeatherSTEM!

Go to the link shown on your control page (see below – yours will be a different link) and you are now connected to WeatherSTEM.



At the link you will see a display like this:

SwitchDoc Labs
WeatherSTEM SkyWeather
Your Weather On The Cloud

> Get SkyWeather at Your Site > API

DATA SCHOLAR DASHBOARD

Current conditions at Xanadu, Palm Springs, CA as of Monday, May 20 2019 4:15 PM

Radar & Satellite Station Map ZapMap Sky Video

78°F
Sunny/Wind
Visibility 10 km
54°F Low @ 3:03 AM
83°F High @ 3:03 PM

Key details (updated 47 seconds ago)

Wind	9 mph with gusts to 29 mph	Storm Rainfall	0 in
Humidity	24%	Rain in Last Hour	0 in
Closest ⚡	281 mi. N (10:00 ago) (in Last 30m)	MSLP	29.61 in. Hg
		Next Hour	Sunny/Wind

Sensor	Reading
Altitude	328 m
Barometric Pressure	29.61 in. Hg
Barometric Trend	Rising
Closest Lightning	0 km
Closest Lightning Time	Wed 4:04 pm
Indoor Air Quality	0 AQI
Inside Humidity	20 %
Inside Temperature	80.3 °F
IR Sunlight	891 lux
Outdoor Air Quality	0 AQI
Outside Humidity	24 %
Outside Temperature	77.7 °F
Rain in Last Hour	0 in
Sea Level Pressure	29.61 in. Hg
Total Rain Accumulation	0 in
UV Sunlight	0 lux
Visible Sunlight	4728 lux
Wind Direction	270 degrees
Wind Gust	18.3 mph
Wind Speed	6.9 mph

Other WeatherSTEM Features

WeatherSTEM has a number of different features. It keeps historical information, generates graphs, generates a daily time lapse and has a complete API (Application Programming Interface) for more advanced programmers. Explore the WeatherSTEM system!

EDUCATORS: WeatherSTEM.com has a tremendous amount of curriculum material available about using WeatherSTEM (and SkyWeather) in your classroom.

The Science and Education Goals Behind SkyWeather

Everything we build for the Maker market is designed for education and learning. Making is education. Making is learning. Building your own projects allows you to innovate around a framework and do wonderful things that of which we have never even thought.

The educational goals for SkyWeather are:

- Learn about the Raspberry Pi and installing software on the Pi
- Connecting up sensors to the Raspberry Pi
- Learning about Feedback loops
- Understand your indoor environment and what affects it
- Learn about the new technology called the Internet of Things

SkyWeather designed to be the hub to which you connect everything to turn your Raspberry Pi into a complete Weather Station that talks to the Cloud. Just ready to be customized to your project and usage. It is designed to be a great way of learning to hook up hardware to the Raspberry Pi. And you have all the source code to modify to work the way you want it to do.

EDUCATORS: WeatherSTEM.com has a tremendous amount of curriculum material available about using WeatherSTEM (and SkyWeather) in your classroom.

Our partnership with WeatherSTEM brings this kickstarter into the realm of cloud based data mining, great graphics displays and even time lapse photography. SkyWeather and WeatherSTEM together rock. This is a great kit in which to learn about weather sensing, data sharing in the cloud and the Raspberry Pi.

Support

As with all SwitchDoc Labs products, technical support is given through the forums on Forum.switchdoc.com. If you have issues that can be solved by our fabulous customer service department, please go to www.switchdoc.com and send your issues through our Contact page on the top menu.

Disclaimer

SwitchDoc Labs, LLC takes no responsibility for any physical injuries and possession loss caused by those reasons which are not related to product quality, such as operating without following the operating manual and cautions, natural disasters or force majeure.

SwitchDoc Labs, LLC has compiled and published this manual which covers the latest product description and specification. The contents of this manual are subject to change without notice.