Magic Mirror

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User Guide:

Non-Technical Users

MagicMirror is an internet-connected mirror that displays your weather forecast. It comes with a compatible iOS application that you can use to set your current Zip Code, toggle views (simple, advanced) and dictate units to display.

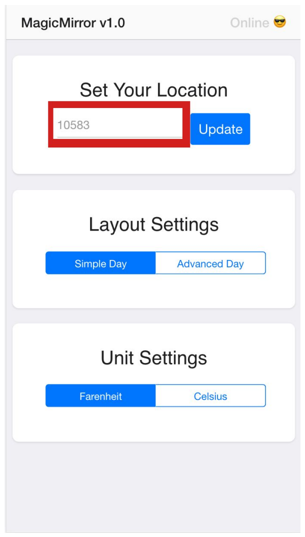
To get set up, simply power on your mirror (via usb connection) and power on your PhoneGap application. Never used PhoneGap?

Simply download from app store and enter this url: ask us on demo day for the current link

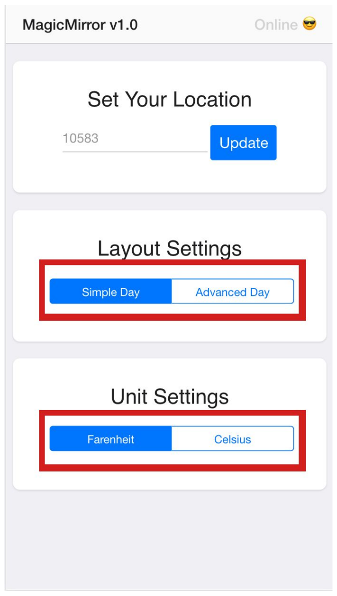
From there, you can login to your device's account. For our sample, we are using the account associated with justinfriedman22@gmail.com.

Once inside, the UI is very intuitive as you can very easily input and update your zip code, switch views, and units.

To get weather for a specific US location, enter the zip code in the box highlighted in the image below.



To swap between simple and advanced views or to change reporting units, select the corresponding option, highlighted in the image below.



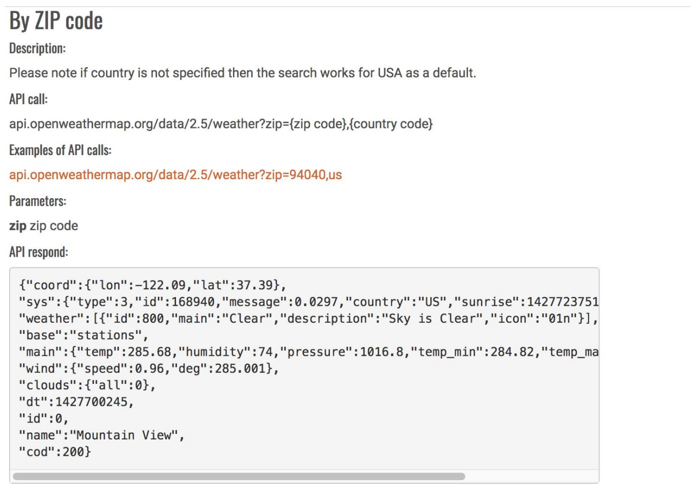
Student Tutorial:

A guide for how another student could set it up and things they'd need to know to update / modify it.

There are three moving parts to this build: front end, particle cloud and particle photon. There is a phonegap IOS application for the settings panel and zip code setter. We ensure that when you log on to the application, you wait for the particle to come online so that you can push updates accurately.

There is no knowledge outside of the 222 curriculum required to implement this section of the build.

he second part is the integration feature on particle cloud, specifically web hooks. We have briefly explored webhooks in class and this project builds upon that learning. To implement a webhook inspired by those used in our build, students must first sign up for a free openweathermap.org API account.



By ZIP code

Description:

Please note if country is not specified then the search works for USA as a default.

API call:

api.openweathermap.org/data/2.5/weather?zip={zip code},{country code}

Examples of API calls:

api.openweathermap.org/data/2.5/weather?zip=94040,us

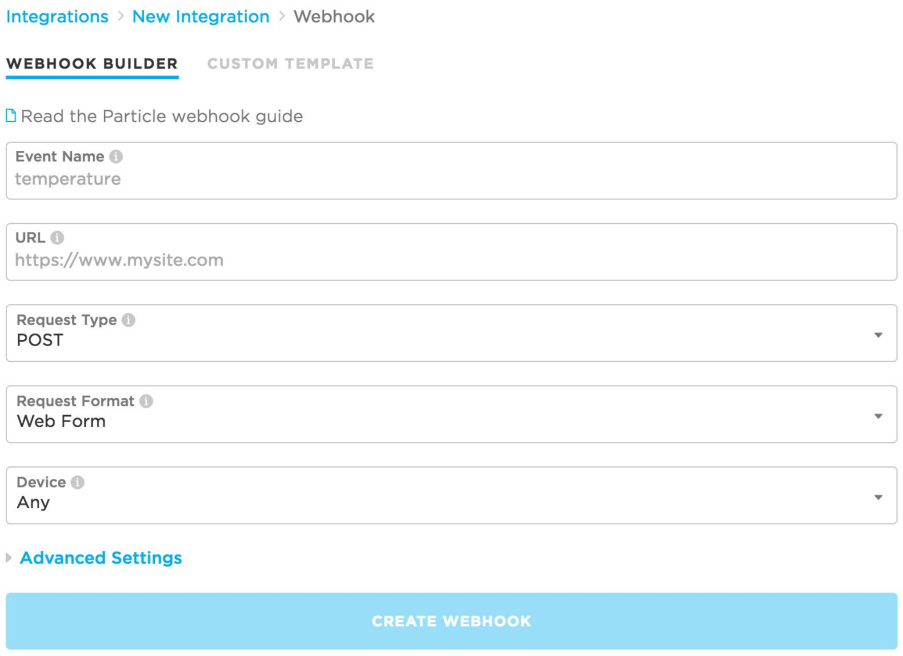
Parameters:

zip zip code

API respond:

```
{"coord":{"lon":-122.09,"lat":37.39},
"sys":{"type":3,"id":168940,"message":0.0297,"country":"US","sunrise":1427723751
"weather":[{"id":800,"main":"Clear","description":"Sky is Clear","icon":"01n"}],
"base":"stations",
"main":{"temp":285.68,"humidity":74,"pressure":1016.8,"temp_min":284.82,"temp_ma
"wind":{"speed":0.96,"deg":285.001},
"clouds":{"all":0},
"dt":1427700245,
"id":0,
"name":"Mountain View",
"cod":200}
```

From the particle console website, navigate to the integrations view on the lower left corner and then select new integration. The integration type should be set as a webhook.


Integrations > New Integration > Webhook

WEBHOOK BUILDER   CUSTOM TEMPLATE

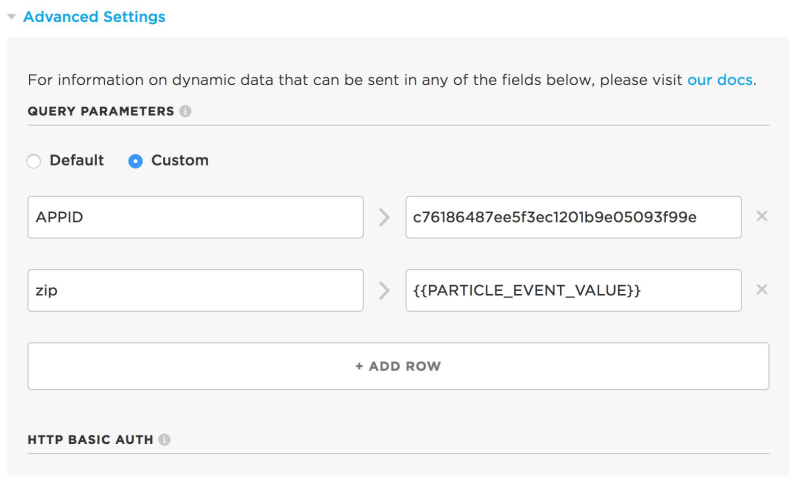
Read the Particle webhook guide

Event Name	temperature
URL	https://www.mysite.com
Request Type	POST
Request Format	Web Form
Device	Any

Advanced Settings

CREATE WEBHOOK

The above form will then appear. Enter your desired event name that will trigger the webhook. For our case we used getCurrentWeather. For the URL enter "http://api.openweathermap.org/data/2.5/weather" for the current weather. The request format should be GET and the request format should be query parameters. Then click on advanced settings.


Advanced Settings

For information on dynamic data that can be sent in any of the fields below, please visit our docs.

QUERY PARAMETERS

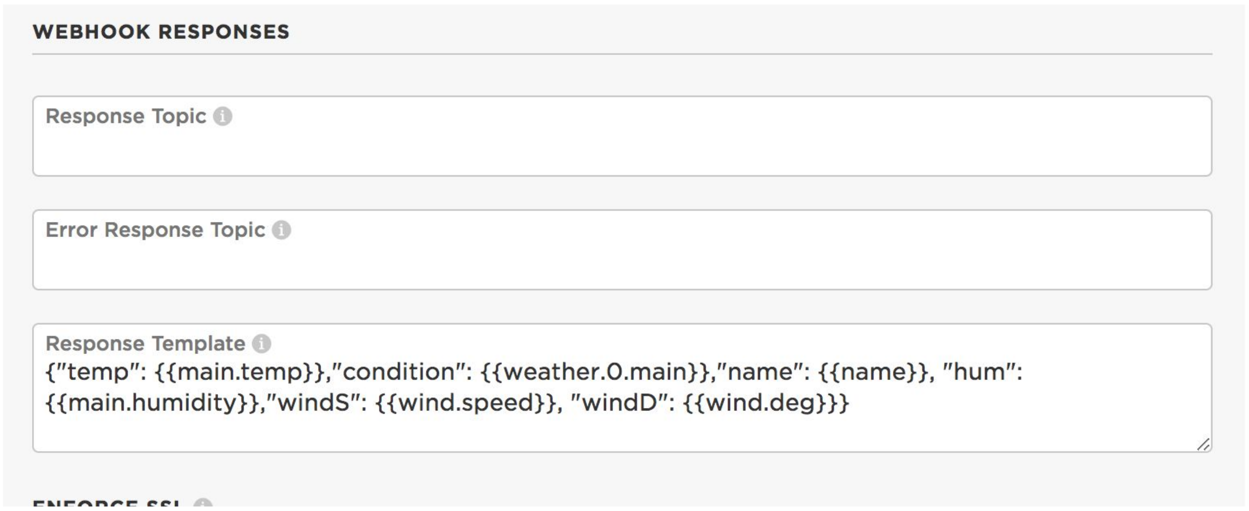
Default [✓ Custom]

APPID	c76186487ee5f3ec1201b9e05093f99e
zip	{{PARTICLE_EVENT_VALUE}}

+ ADD ROW

HTTP BASIC AUTH

The above form will appear. Select the custom radio button if it is not defaultly selected. The first GET parameter we will send is our APPID, this is what openweathermap.com calls an api key. The second parameter is zip as we are retrieving data by zip code. This value is something that comes from the event that triggers the webhook so rather than hard coding it we can use mustache case to define that zip should equal the event data sent over. In our case the correct name was {{PARTICLE_EVENT_VALUE}}. Then scroll down the page until you see the form area illustrated below.



{"temp": {{main.temp}},"condition": {{weather.0.main}},"name": {{name}}, "hum": {{main.humidity}},"windS": {{wind.speed}}, "windD": {{wind.deg}}}

The response template can be thought of as a filter that allows the webhook to only transmit the data you want from the API and omit the rest from the response. For our application, this was essential as the object coming back from the weather API is complex and has significant superfluous data that would increase parsing complexity on the particle side. Response templates utilize mustache case and custom delimiters. In our case, we wanted to reconstruct the response as a json like object when it was received by the particle so we used commas as delimiters and added “{}” around the whole message to make parsing easier. To define the value of a specific feature in the response object an object traversal syntax that is common throughout most programming languages can be user ie. object.subobject.value. The only difference is that to access the ith index of the object you treat that index like a sub object and not like an array ie. object.0.value vs object[0].value.

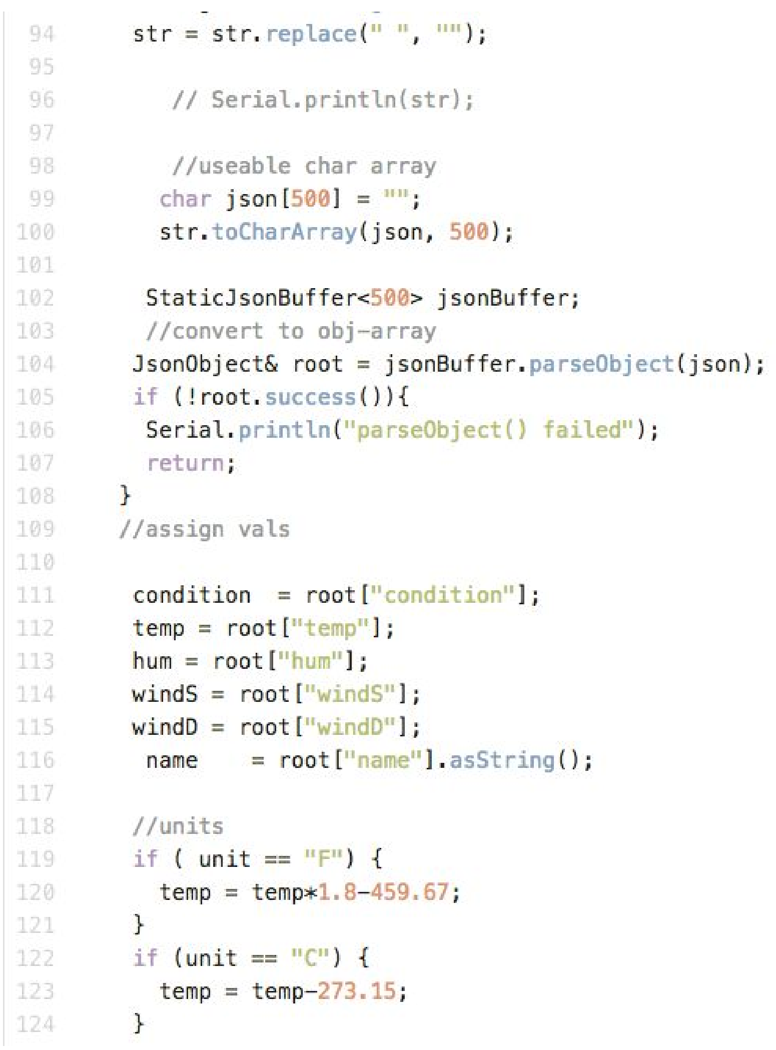
Once you have defined the response template, navigate to the bottom of the form and create your new webhook. Testing within the webhook info page will always fail because we defined the webhook to require a parameter zip that the test function does not provide. Instead, to test, go to the events console and publish a new public event with the same event name that will trigger the webhook and compare the response to your desired return. Common reasons that GET webhooks with parameters will fail are incorrectly ordered parameters and over requesting.

The third component of our build is the particle photon. The wiring is described in the below table.

Adafruit_HX8357 3.5” TFT Breakout (SPI)	Particle Photon
CS	A2
CLK	A3
MISO	A4
MOSI	A5
D/C	DAC
GND	GND
3v	3v

The main functionality that our particle build has that is outside of the scope of the 222 curriculum is webhook parsing/object reconstruction. The webhook detailed earlier sends a const char array with the json object content. We utilized the standard string methods to convert the webhook const char to a dysfunctional string which was then inserted into an array of chars allowing the data to become functional again. At that point we used the static json buffer functionality in the ArduinoJson library to read the json into an object like array. At that point we were able to transfer the data to individual, local, variables. Our final parsing implementation is quite light at about 15 lines but multiple hours and countless other methods were utilized and tested in development of our final solution.

Illustrated below is the code used to parse the response template data utilized in the webhook portion of this tutorial.



```
 str = str.replace(" ", "");

    // Serial.println(str);

    //useable char array
   char json[500] = "";
   str.toCharArray(json, 500);

  StaticJsonBuffer<500> jsonBuffer;
  //convert to obj-array
 JsonObject& root = jsonBuffer.parseObject(json);
 if (!root.success()){
  Serial.println("parseObject() failed");
  return;
}
//assign vals

 condition  = root["condition"];
 temp = root["temp"];
 hum = root["hum"];
 windS = root["windS"];
 windD = root["windD"];
  name    = root["name"].asString();

 //units
 if ( unit == "F") {
   temp = temp*1.8-459.67;
 }
 if (unit == "C") {
   temp = temp-273.15;
 }
```

There are a few things you can do to expand upon the product features. A few ideas we had on our roadmap that could be implemented if validated by user demand:

- Battery pack attached to the mirror so it did not need to be plugged in
- Integrations with more relevant services to show more data to the user (stocks, traffic, etc.)
- Launch iOS application on the Apple Store
- Upgrade the screen to be a higher quality and display more detailed pictures of the weather