

Energy Dashboard Project with a Layered-resolution Time-series Database

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Overview

- Current Market Need:
 - A simplified dashboard (UI design)
 - A resourceful portal to overview energy consumption (easy to access data, strong and well structured database)
 - Accurate and actionable information (high resolution at all levels)

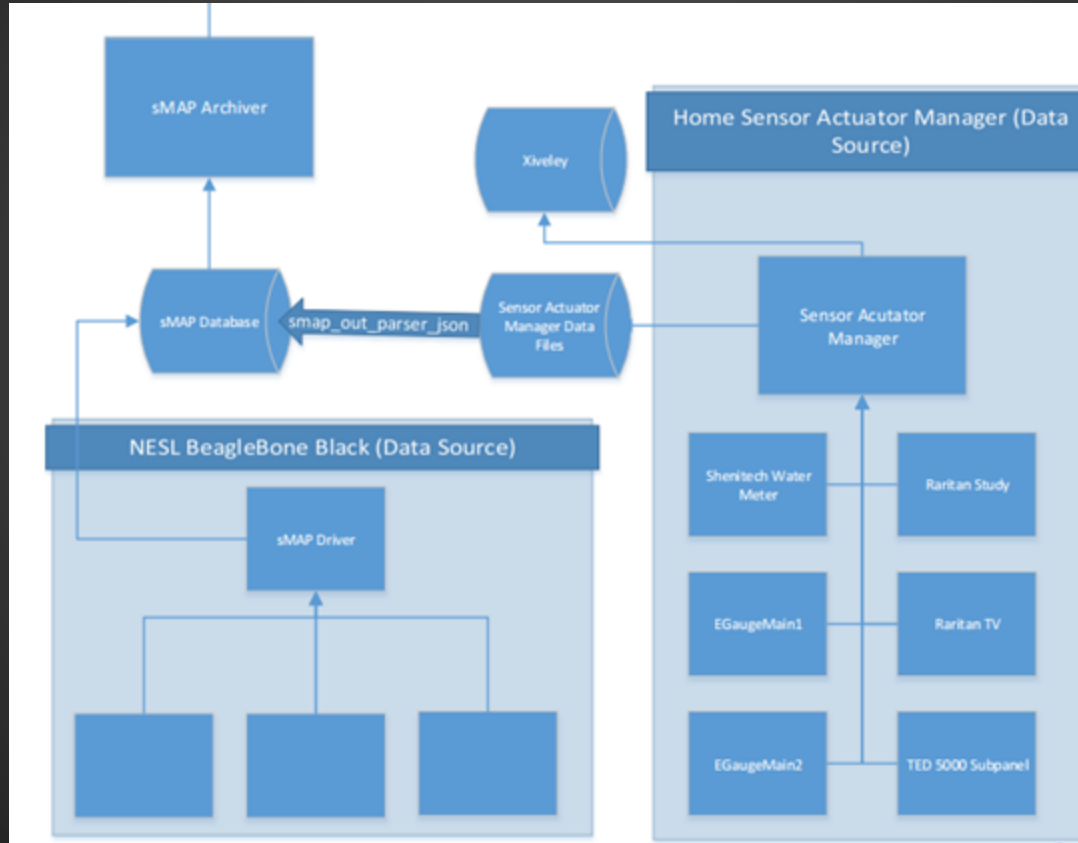
Current State of Art

- Forecast of the future
- Multi-level resolution practice for geospatial database and processing
- Actionable suggestions

Our Solution

- Multi-level resolution database
 - sMAP
 - Relational databases
- A clean looking energy dashboard
 - Only display relevant information to the users.
 - Color Coded Home Heatmap visualizes energy usage hotspots

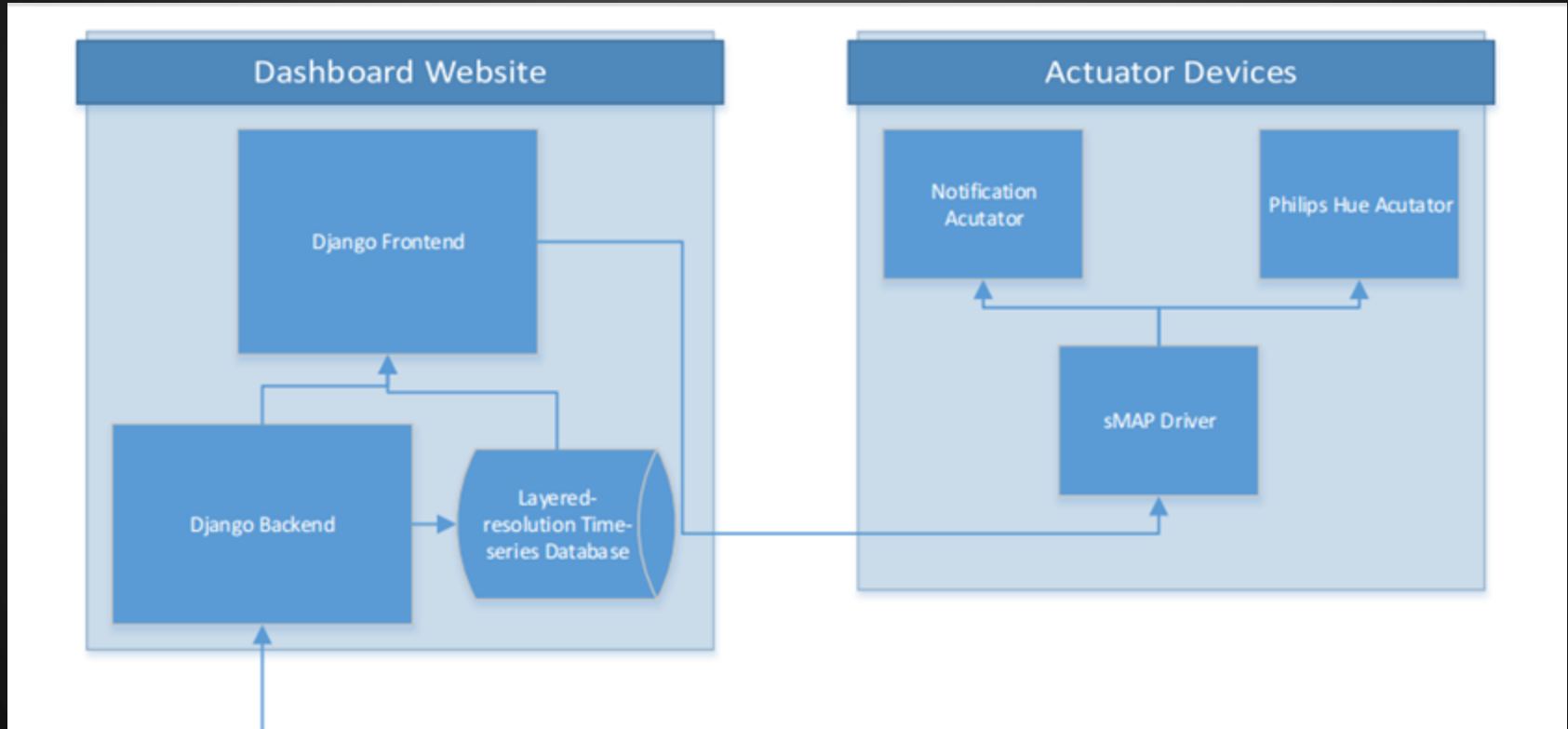
System Overview (Data Collection)



Data Collection

- Data collection handled from a Mac Mini at the site of the home
- Sensor readings are sent to an sMAP driver module which sends the data to an sMAP server at an off-site location.

System Overview (Actuation)



High Res. Time Series databases

- sMAP
 - Can store time series data from many streams (sensors)
 - Has a RESTful API for queries and data insertion
 - Has a limited interface for advanced queries
 - Mean
 - Total
 - Windowed mean/total
 - Only looks at 10,000 datapoints

Layered-resolution Database

Low Res

60									58									56																	
14			25			21			20			22			16			15			24			17											
7	1	0	6	4	9	4	8	4	4	6	7	2	3	7	8	2	4	9	7	8	3	2	3	8	0	4	3	3	6	9	6	8	1	2	6

High Res

Layered-resolution Database

(Daily)

(Hourly)

(Seconds)

60									58									56																	
14			25			21			20			22			16			15			24			17											
7	1	0	6	4	9	4	8	4	4	6	7	2	3	7	8	2	4	9	7	8	3	2	3	8	0	4	3	3	6	9	6	8	1	2	6

Layered-resolution Database

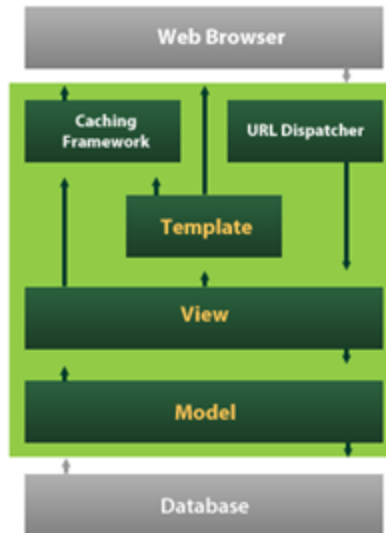
Example Query

60						58						56																							
14		25		21		20		22		16		15		24		17																			
7	1	0	6	4	9	4	8	4	4	6	7	2	3	7	8	2	4	9	7	8	3	2	3	8	0	4	3	3	6	9	6	8	1	2	6

Django

django

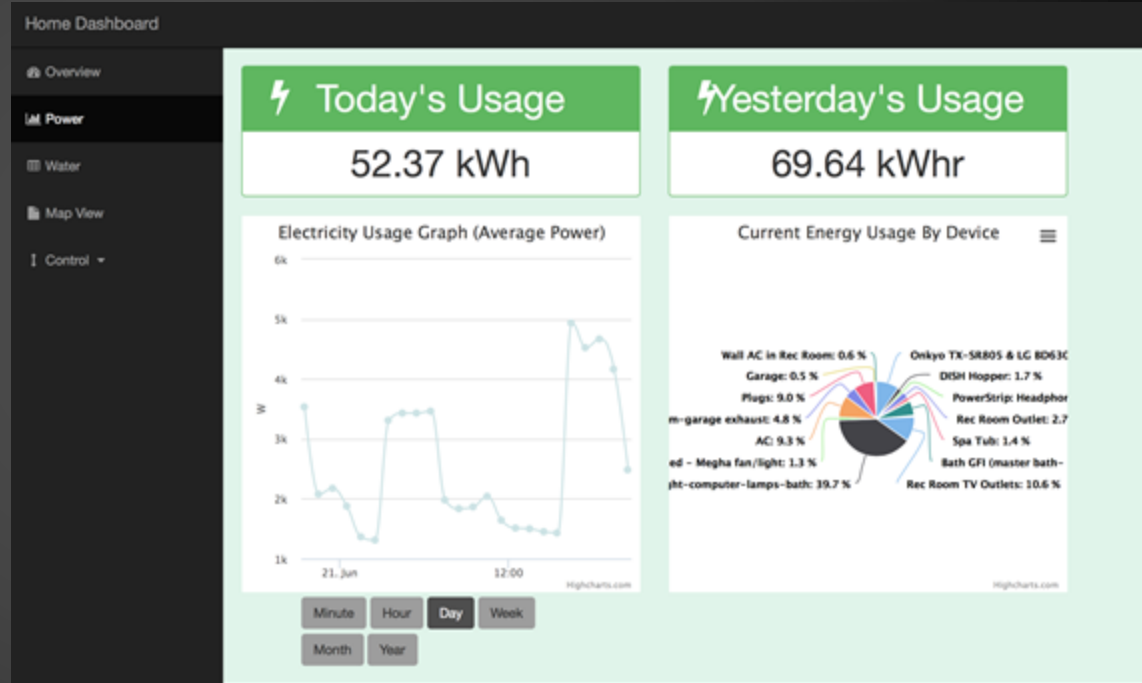
5. Templates typically return HTML pages. The Django template language offers HTML authors a simple-to-learn syntax while providing all the power needed for presentation logic.
4. After performing any requested tasks, the view returns an HTTP response object (usually after passing the data through a template) to the web browser. Optionally, the view can save a version of the HTTP response object in the caching system for a specified length of time.



1. The URL dispatcher (`urls.py`) maps the requested URL to a view function and calls it. If caching is enabled, the view function can check to see if a cached version of the page exists and bypass all further steps, returning the cached version, instead. Note that this page-level caching is only one available caching option in Django. You can cache more granularly, as well.
2. The view function (usually in `views.py`) performs the requested action, which typically involves reading or writing to the database. It may include other tasks, as well.
3. The model (usually in `models.py`) defines the data in Python and interacts with it. Although typically contained in a relational database (MySQL, PostgreSQL, SQLite, etc.), other data storage mechanisms are possible as well (XML, text files, LDAP, etc.).

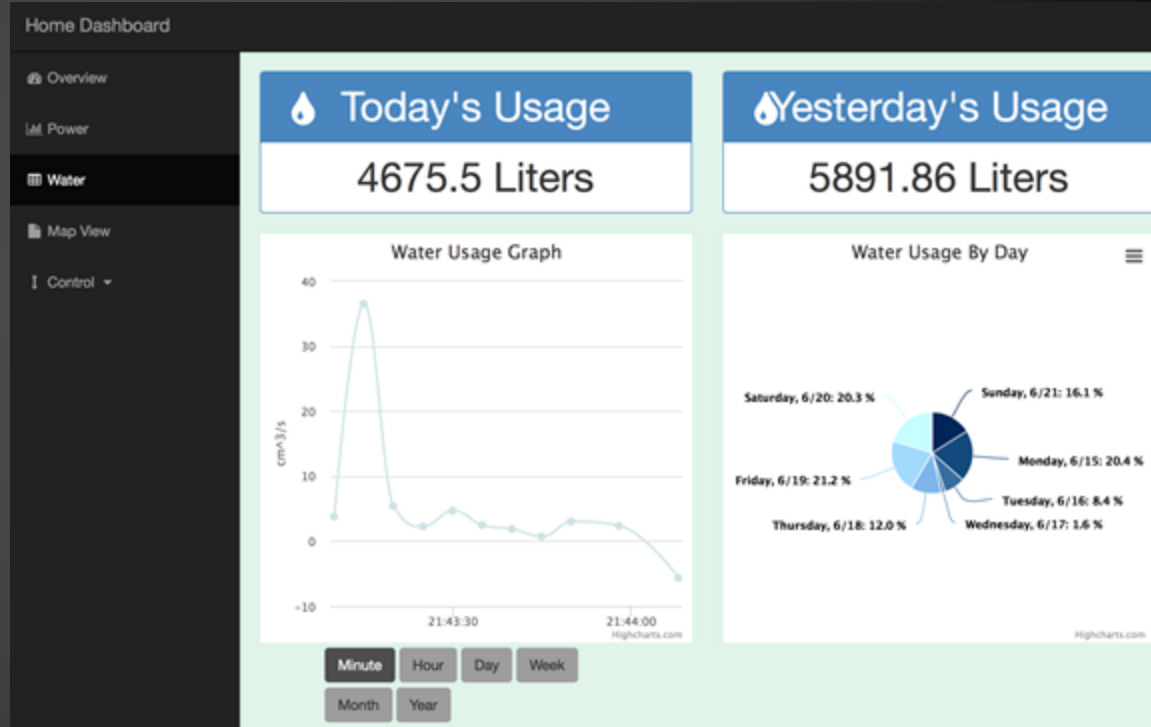
Front End -- Live Data

- Pulling live data from sMAP
- Historical data from sqlite3 database



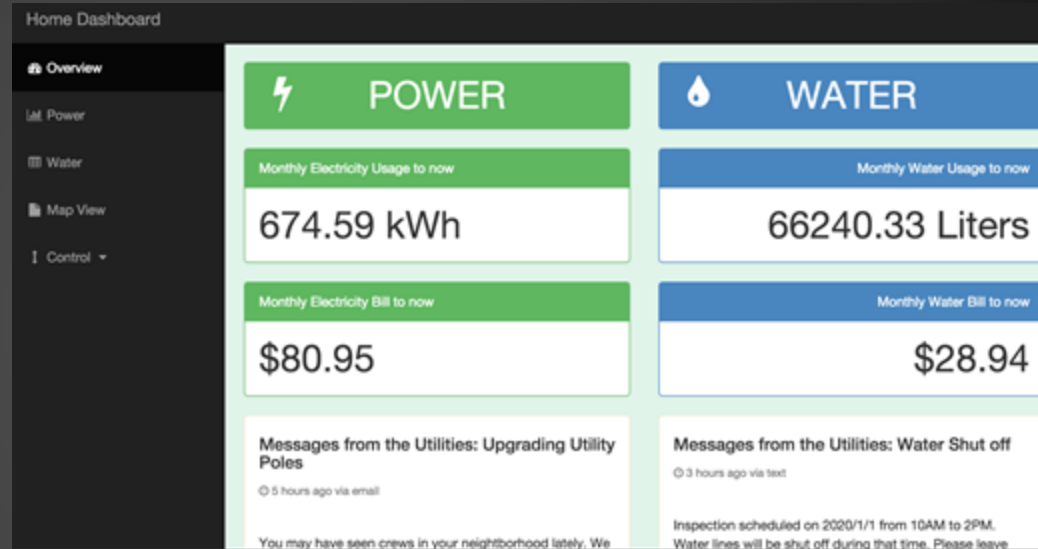
Live Data cont.

- Water usage data view



Front End -- Page Layout

- Bootstrap
- SB-admin
- HighCharts

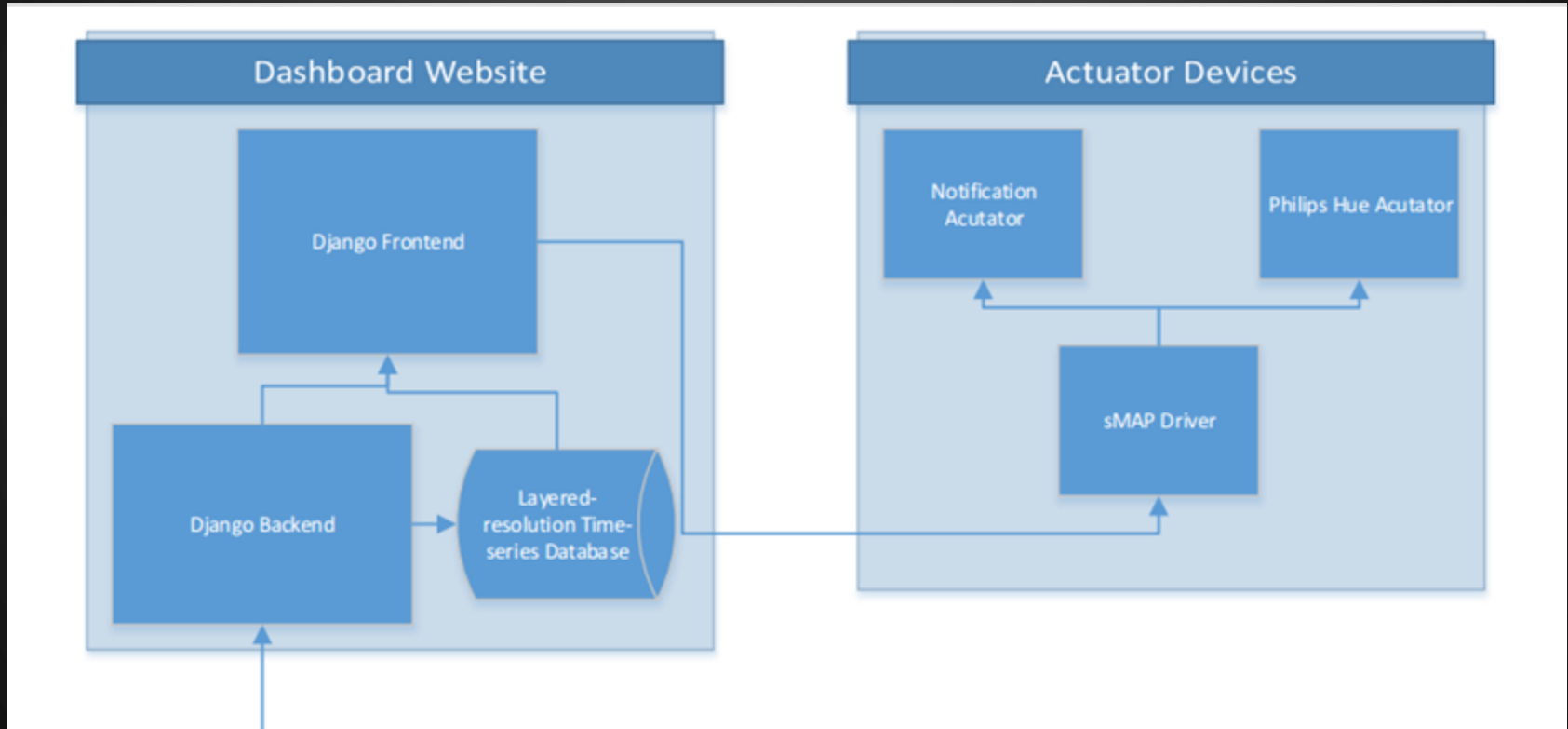


Interactive Map View

- Color coded
- Linear related



System Overview (Actuation)




Actuation

Home Dashboard

- Overview
- Power
- Water
- Map View
- Control ▾

Manual Light Control



Living Room Master Bedroom Kitchen Guest Bedroom Garage

☒ Light is On ☐ Light is Off

hue_color_hue hue_color_sat hue_color_bri

0 - 65000 0 - 255 0 - 255

Submit

Actuation

Home Dashboard

Overview

Power

Water

Map View

Control ▾

Usage Notification Scheduler



Power



Water

Power Notifications

☐ Enable Notifications ☐ Disable Notifications

Notification Frequency

Type of Notifications

☐ Text Message
☐ Email

Submit

Water Notifications

☐ Enable Notifications ☐ Disable Notifications

Notification Frequency

Type of Notifications

☐ Text Message
☐ Email

Submit

Demonstration

Dash Board location:

http://128.97.93.240:7000/data_visualization/dashboard/homeview/

Conclusion

Thank you