SUTRA

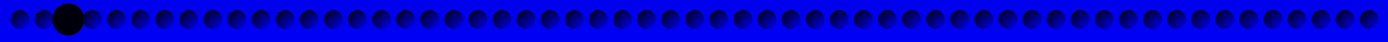
A Workflow for Documenting Signals

Pavneet Arora

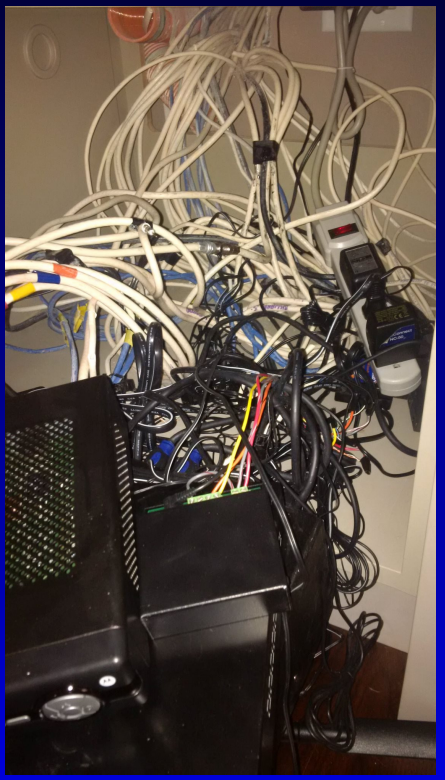
Portland calls out for signals documentation!

PART I

A Day in the Life of Pavan Signalovich



“My system has stopped working...”



"A customer is the most important visitor on our premises. He is not dependent on us. We are dependent on him. He is not an interruption in our work. He is the purpose of it. He is not an outsider in our business. He is part of it. We are not doing him a favor by serving him. He is doing us a favor by giving us an opportunity to do so."

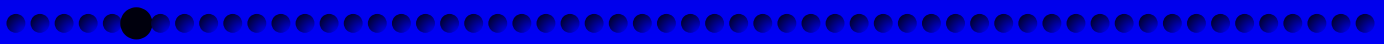
– Mahatma Gandhi

In the lament...

Ay-Ay-Ay-Ay-Ay

...lies a way to frame the problem

I-I-I-I-I



How do we make sense of signals?

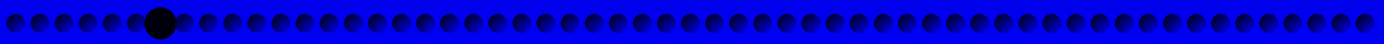
Identity

Interface

Intent

Implementation

Interaction

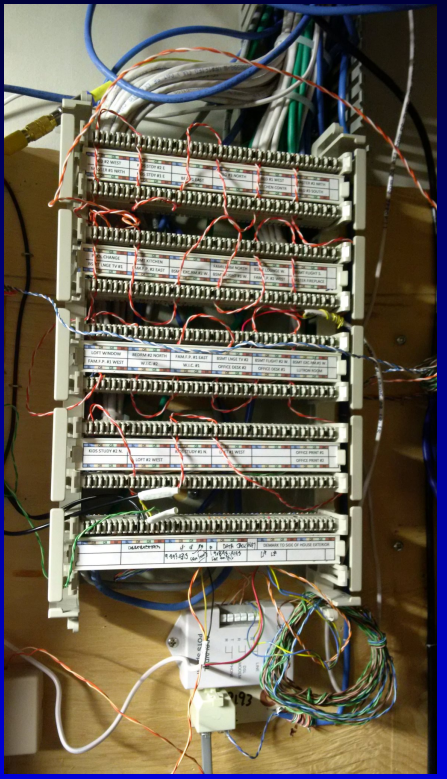


Even with a clean installation, we still need proper signals documentation

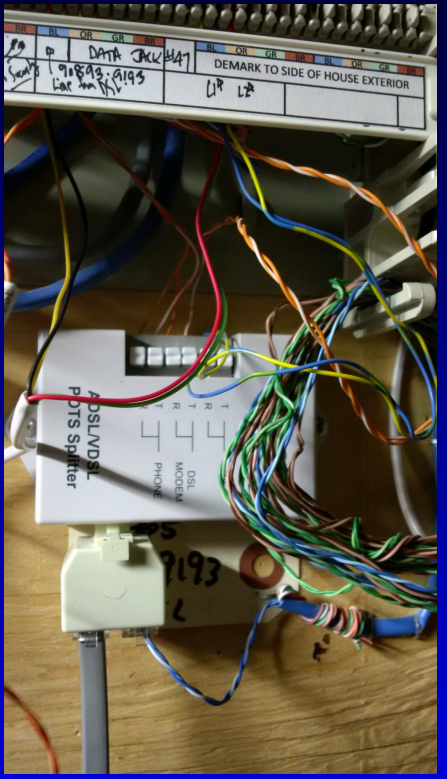
Another Day in the Life of Pavan Signalovich

"An excavator has taken out our house phone line..."

Another day in the Life of...

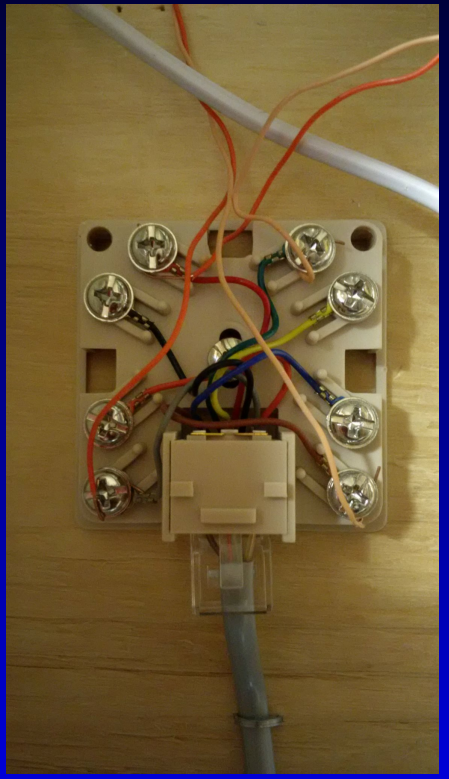


Another day in the Life of...



Another day in the Life of...

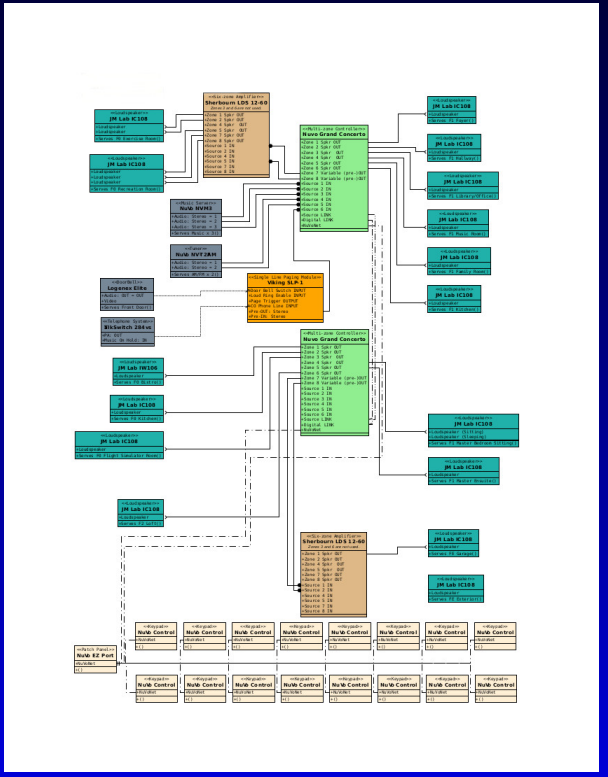
Another day in the Life of...



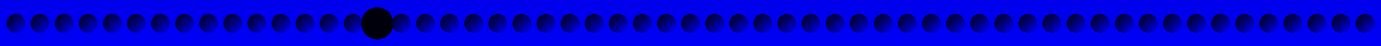
PART II

Schematics

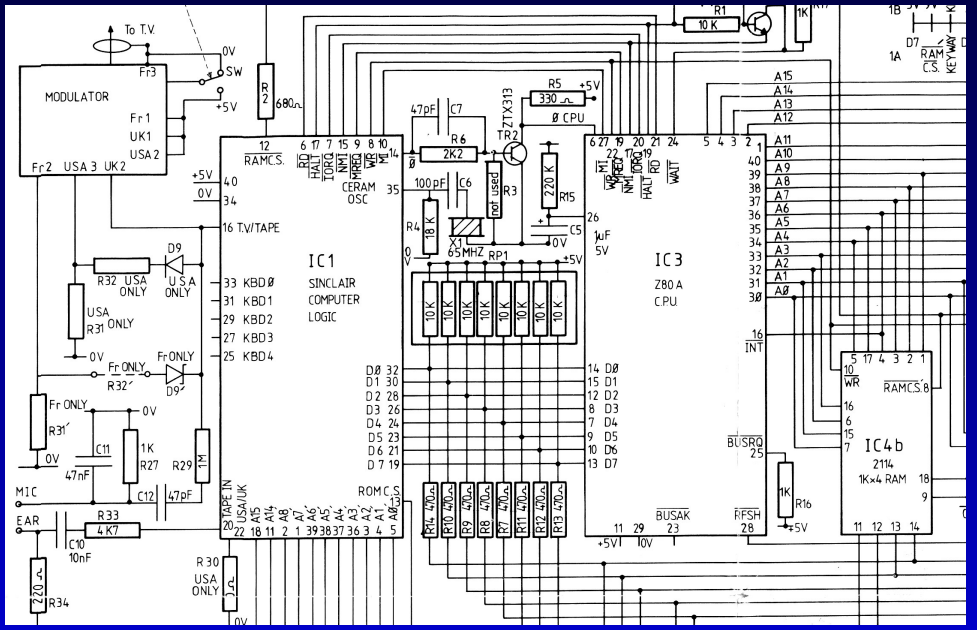
Using Dia/Visio



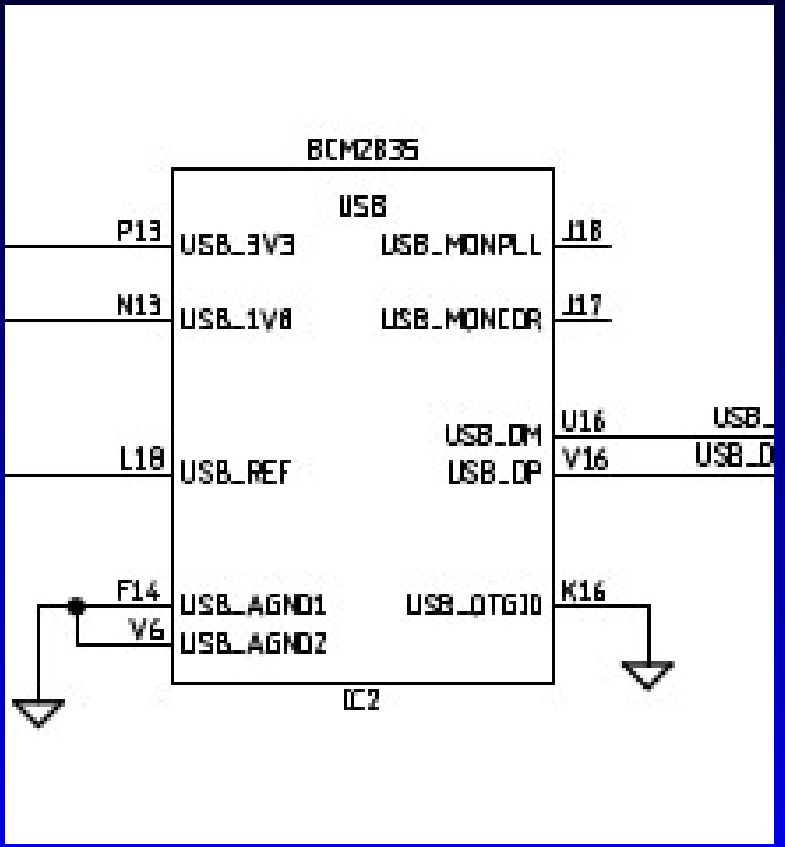
Either shrink the drawing, or increase the size of the paper



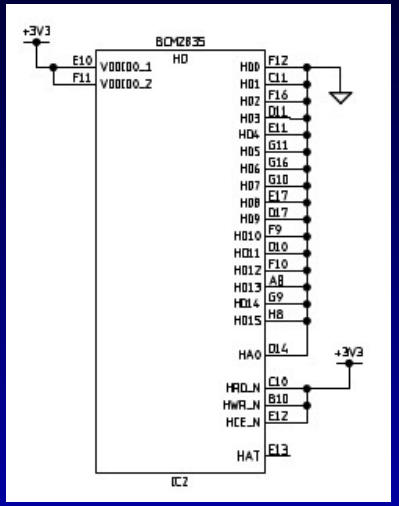
Sinclair ZX81

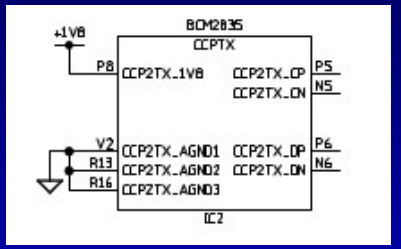


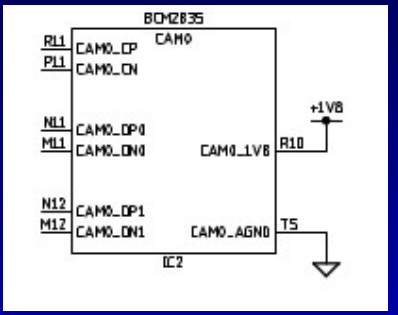
Raspberry Pi Model B SoC



Raspberry Pi Model B SoC



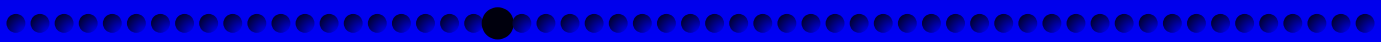




A Modern A/V Receiver

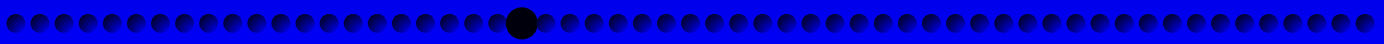
Layers

Sharing	Within the same layer
Traversal	Across different layers
Isolation	Standalone



Pros of schematics

- Help to visualize the circuit board or VLSI die.
- Good for designing the layout.
- Can show *src* and *dest* at a glance.
- Details can be pushed to the appendices so that they don't clutter up the visual representation.
- Puts everything on a single sheet of paper.

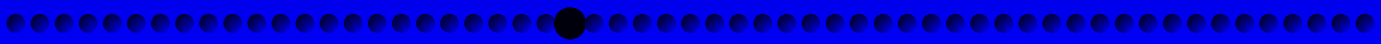


Cons of schematics

- The application may be electronic, but I am not working with a single circuit board. I am dealing with the physical plant of a building.
- But I am not designing the layout. I am either trying to understand the system as-built, or designing the connections needed for the system.
- At a glance? Are you serious? Have you taken a look at the example schematics? Does NOT allow one to see *src* and *dest* at a glance.
- Lots of details are left to appendices so you end up referring to both. My head hurts when I go back and forth so often, and I lose my train of thought.
- Sure, everything can be put on a single sheet of paper, as long as the piece of paper has infinite area. And when I have crawled into an equipment closet in the dark, contorted my back to get in, it isn't that easy to pull out Arch E size paper and start writing.

Some more cons of schematics

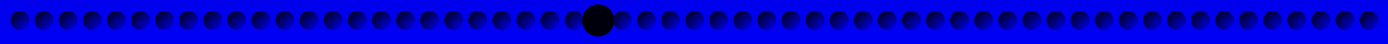
- Doesn't handle the distinctions of physical and notional location very well.
- Difficult to update. This the the word-processing of signals documentation. You end up spending most of your time on layout rather than capturing information about the signals.



Layout niceties

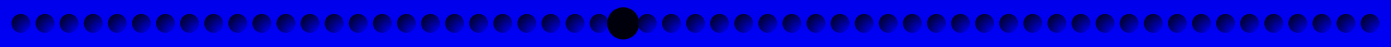
vs.

Connection Details



PART III

In Sanskrit, sutra means thread or string



Noguchi Filing System

A filing system credited to the Japanese economist, Yukio Noguchi.

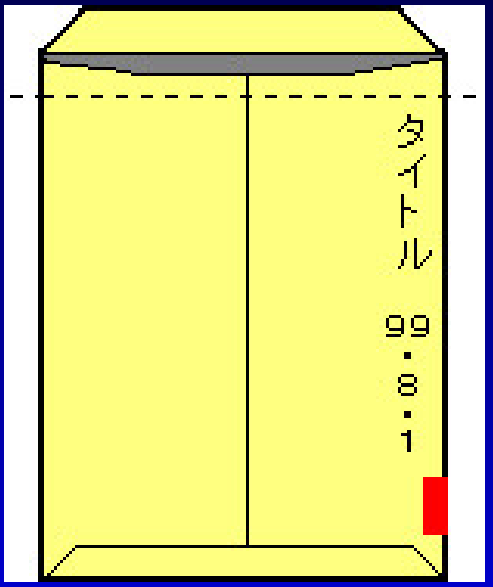
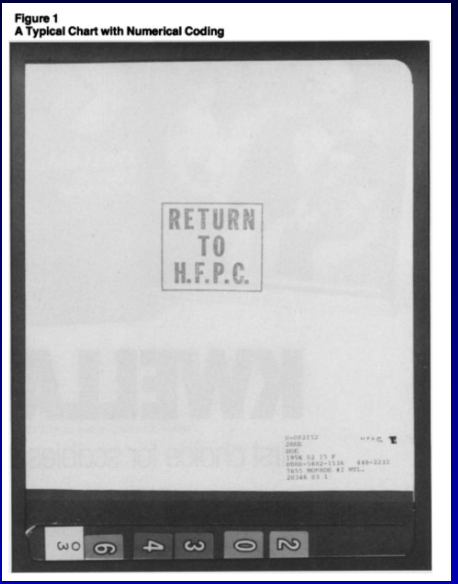


Image: Dave Gray, Communicationnation.blogspot.com

Medical Filing System for Family Practice



Canadian Family Physician Vol. 34, October 1988

Medical Filing System for Family Practice

Files are tagged by:

- Treatment Team
- Family
- Hospital
- Patient number

Useful properties to understand signals

Identity

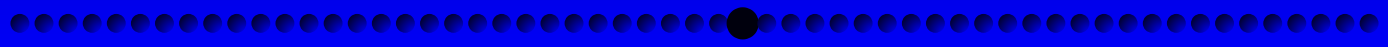
Interface

Intent

Implementation

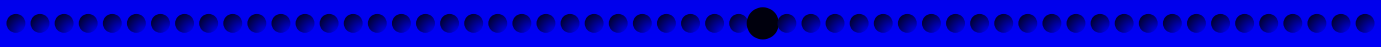
Interaction

#trendingyearsfromnow



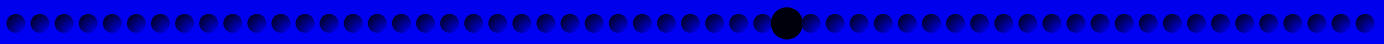
PART III

SUTRA's Implementation



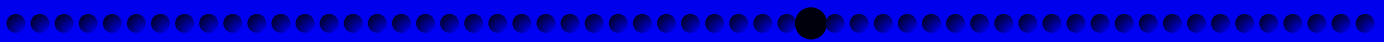
Components

- Physical location of the component
- Notional location of the component
- Signal layers that it operates on
- Input and output connections



Connections

- Ports
- *Src* and *dest* port details
- Intent



From TUG 2012 (Boston, MA)

YAWN—Sleep De(p)rived Typesetting

YAML

Algebra

Words

Numbers

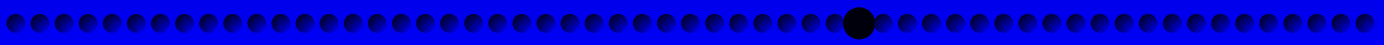
A LaTeX enabled workflow that decoupled the data, its processing, and subsequent typsetting by using YAML to store specification and catalogue data and Ruby to do the processing.

From TUG 2012 (Boston, MA)

A perfectly good framework already exists:

MODEL–VIEW–CONTROLLER

Model	YAML representations of the specification and price catalogue
View	LaTeX enabled shell script
Controller	Ruby program that contains the business logic



From TUG 2013 (Tokyo, Japan)

TEX and

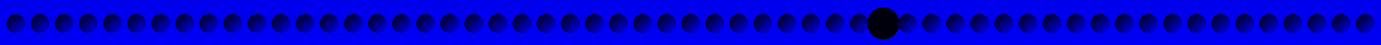
Aymptote driven

Nomenclature for

Storage

Unit layout.

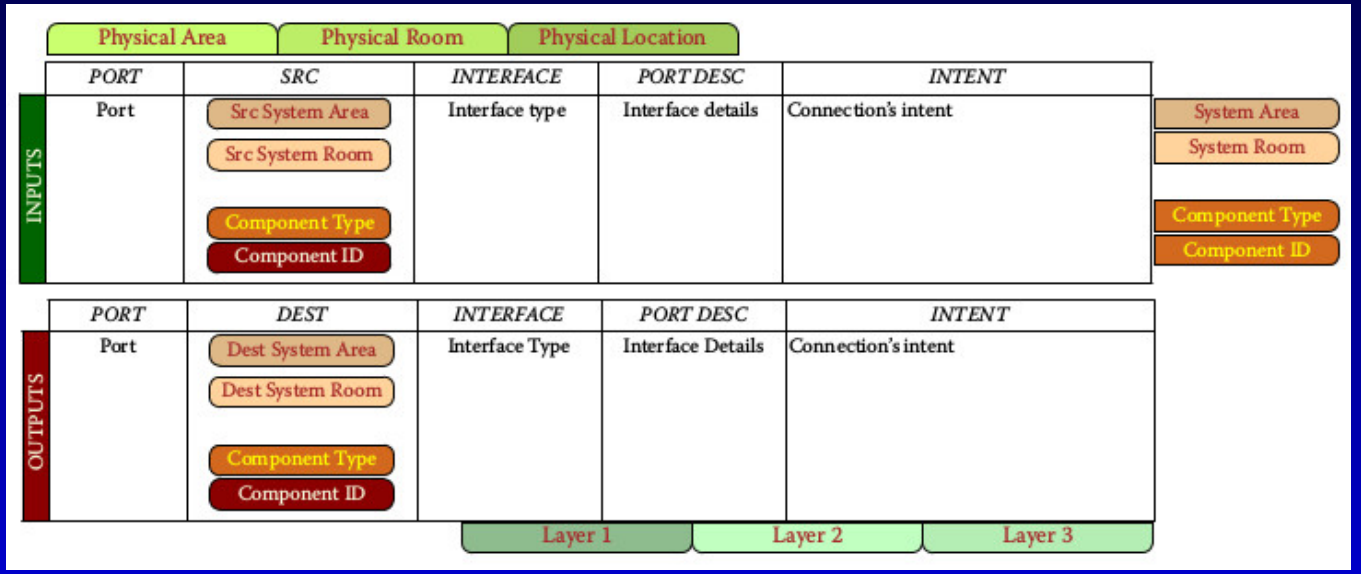
A workflow to quickly explore different cabinet layouts and costing options.



The View

A mock-up for SUTRA

The SUTRA representation for a component:



SUTRA

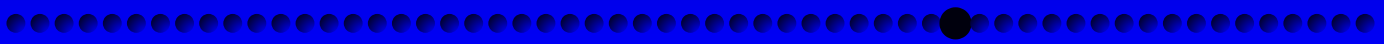
Signals

Unmasked using a

Table

Representation with

Annotations.



PART III

Case Study

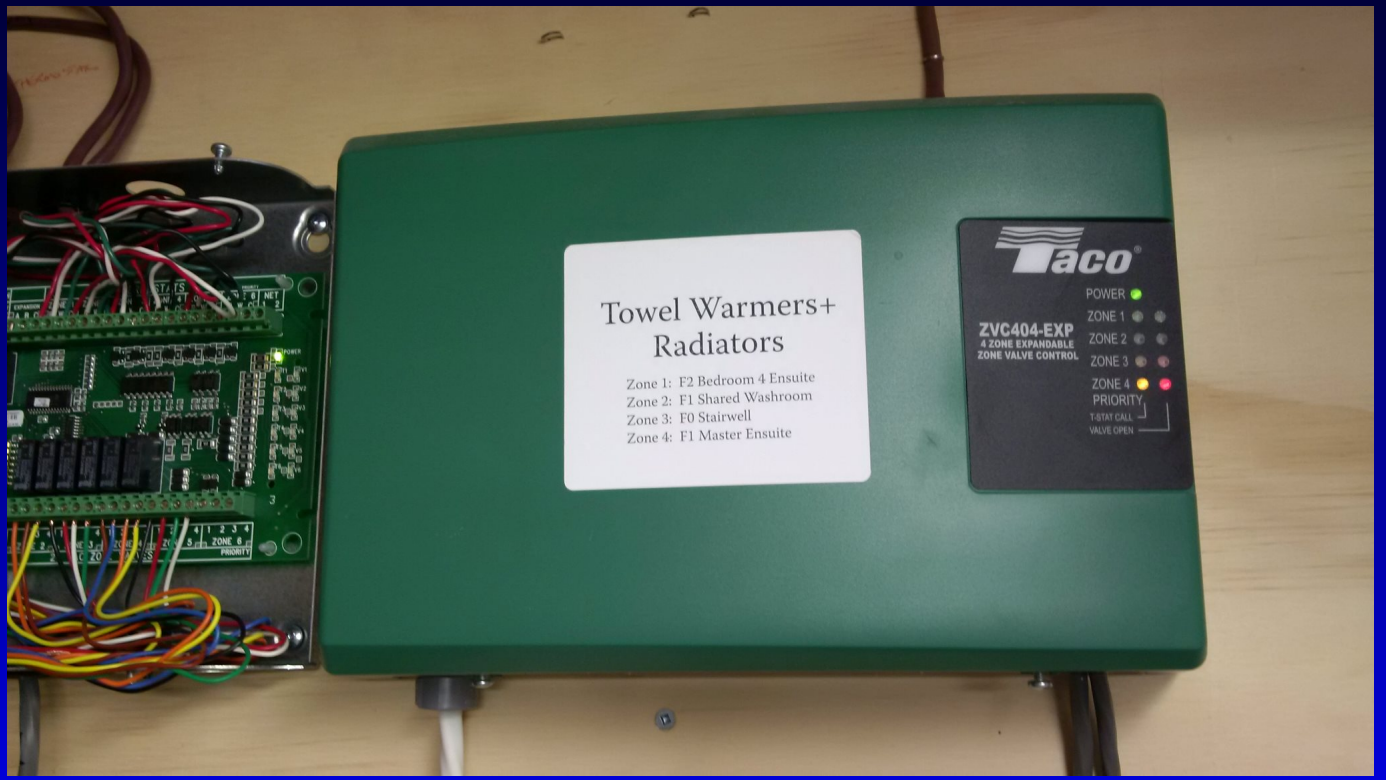
A Hydronic System Malfunction

A Hydronic System Malfunction

A Hydronic System Malfunction

A Hydronic System Malfunction

A Hydronic System Malfunction

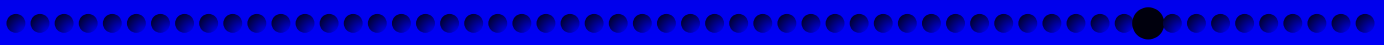


SUTRA Specification

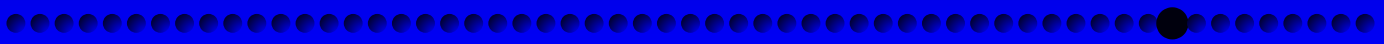
```
:locAreas:
    - :locArea:
        :locAreaID: F2
        :locRooms:
            - :locRoom:
                :locRoomID: Bedroom 4
                :components:
                    # THERMOSTATS
                    - :component:
                        :componentID: Tekmar 508
                        :componentType: Thermostat
                        :locPlaceID: Room Entrance (East Wall)
                        :layers:
                            - :layer: thermostat control
```

SUTRA Specification

```
:connections:
    - :connection:
        :type: thermostat
        :from:
            :port: 4-wire control
        :to:
            :sysAreaID: F0
            :sysRoomID: Mechanical Room
            :componentID: Taco ZVC406
            :port: 4-wire control
            :portDesc: Thermostat/Zone 3
        :desc: F2 Bedroom 4 under-floor heating
```



Demonstration



#trendingyearsfromnow

Yet another day in the life...

Yet another day in the life...

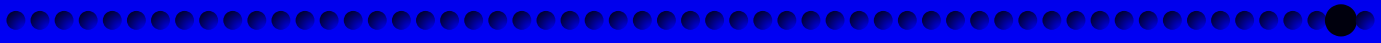
Yet another day in the life...

Yet another day in the life...

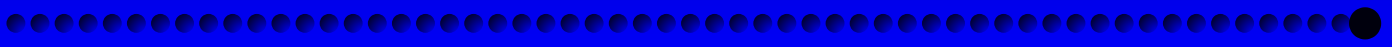
Yet another day in the life...

what a wonderful thing
is the end of a string

ee cummings, Poem 87



Pavneet Arora

Bespoke Spaces

pavneet_arora@bespokespaces.com