

IoT sensor integration and back-end development for Sequoia

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Problem Statement

Four Main Goals

Smart Plug



[1]

Flow Meter



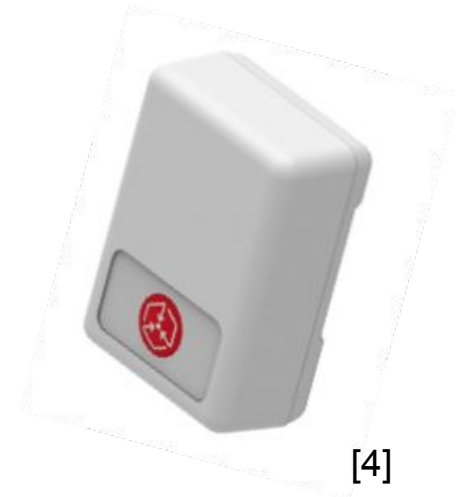
[2]

Fall Detection



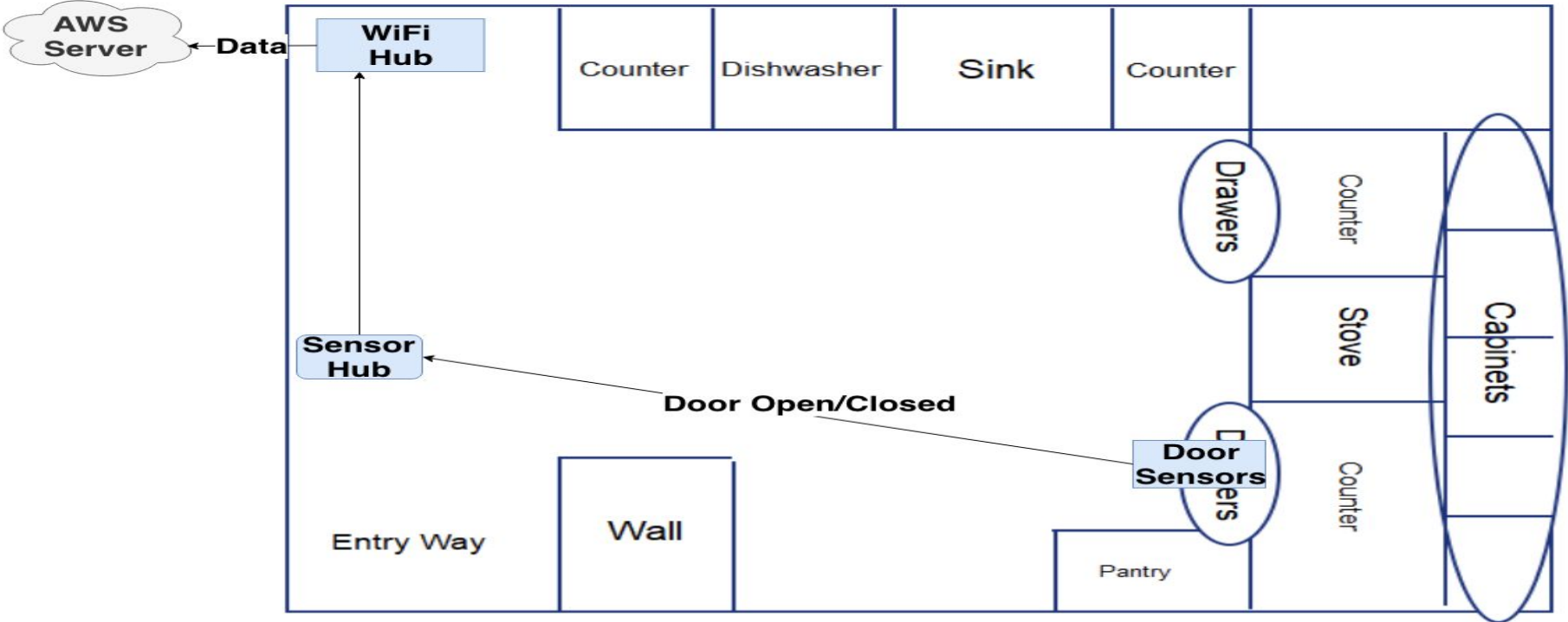
[3]

Guest Tracking

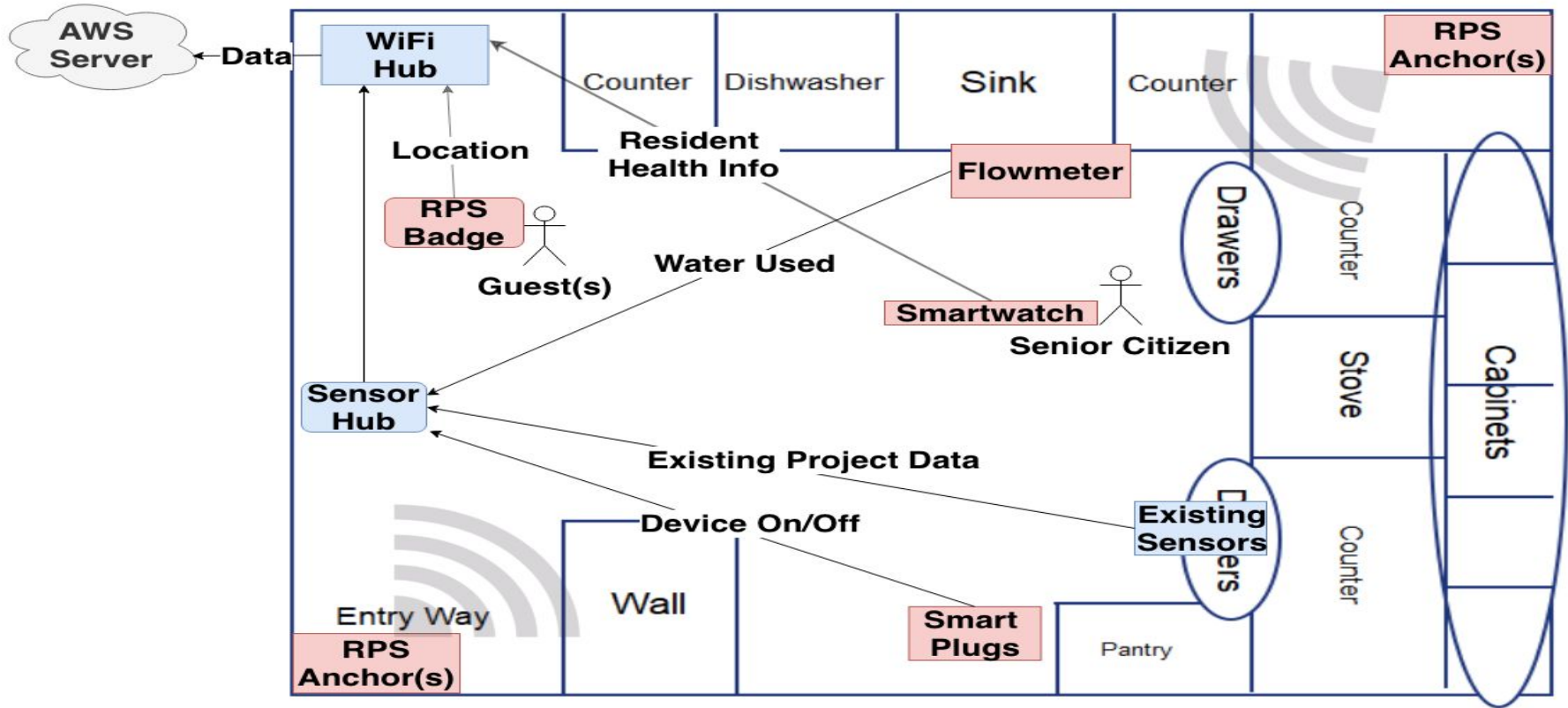


[4]

Existing Design



Design Extension Conceptual Sketch



Functional Requirements

FR.1: The sensor hub will be notified when power goes through the smart outlet

FR.2: The data from the smart outlet shall be sent to the existing AWS server

FR.3: The smartwatch will provide an alert when a fall is detected.

FR.4: The guest tracking system will track guests with one meter accuracy.

Non-Functional Requirements

NFR.1: All products used should be easily available to allow for scale up

NFR.2: Number of wires used should be minimized

Constraints/Considerations

Positional tracking

Accuracy



[5]

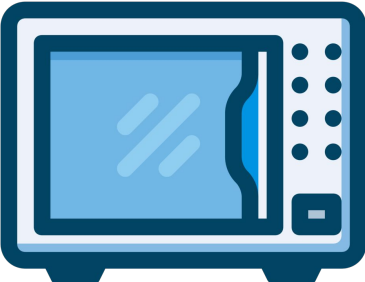
Setup



[6]

Smart Plug

Appliances



[7]

Interfaces



[8]

Smart Watch

Sensors



[9]

Device Tethering



[10]

Market Survey

Tracking Methods

Existing Solutions

Smartwatch APIs

Smart Plug

**Active
vs
Passive**

Apple Watch 4



[11]

Open Source
APIs



[12]

Wear OS



Wear OS by Google

[13]

Fitbit



fitbit

[14]

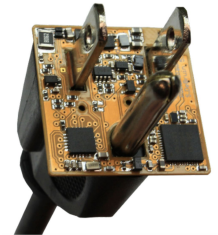
Koogeek



Available on the
App Store and Google Play

[15]

PowerBlade



[16]

Potential Risks

Health Data Security



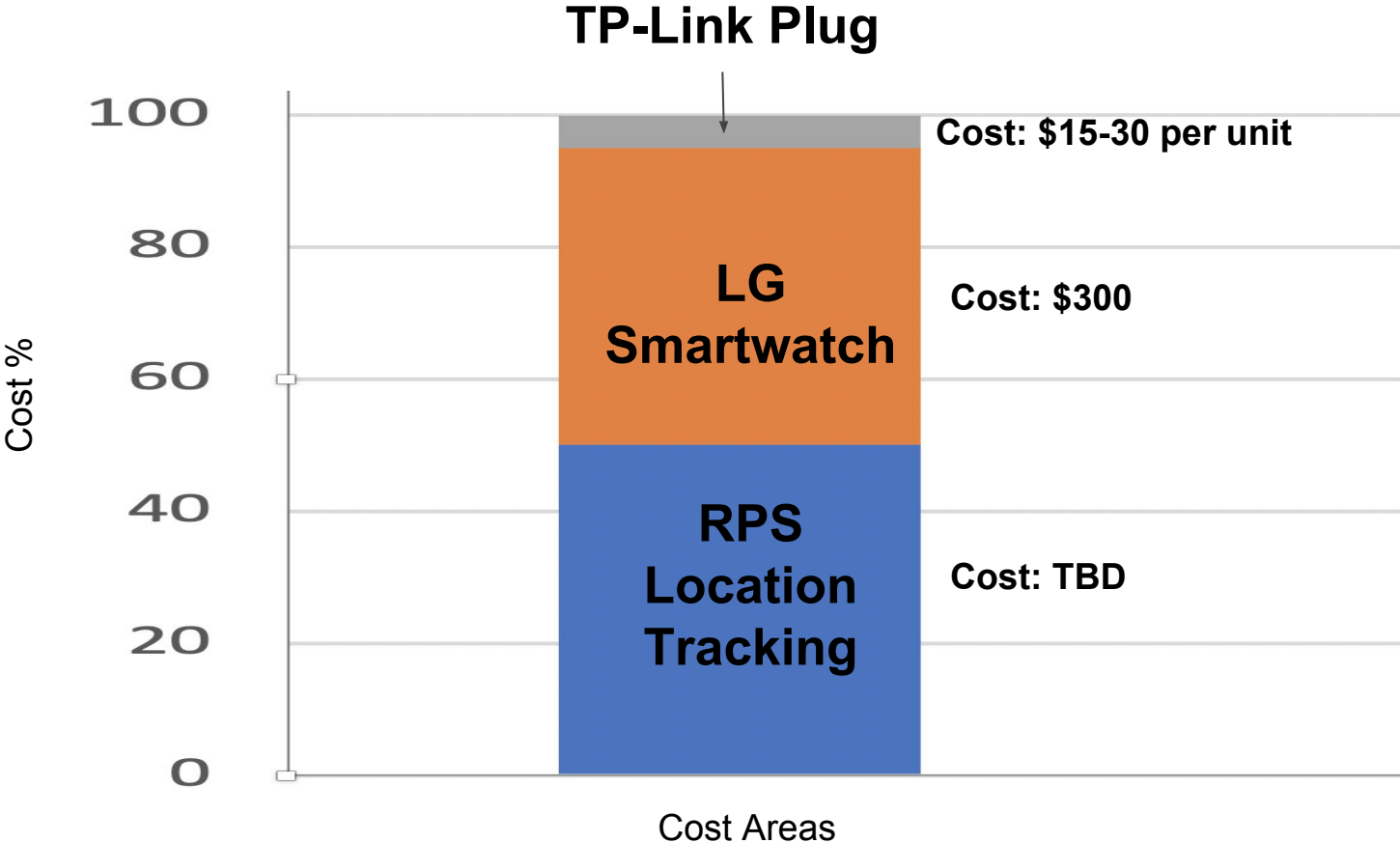
[17]

HIPAA Compliance

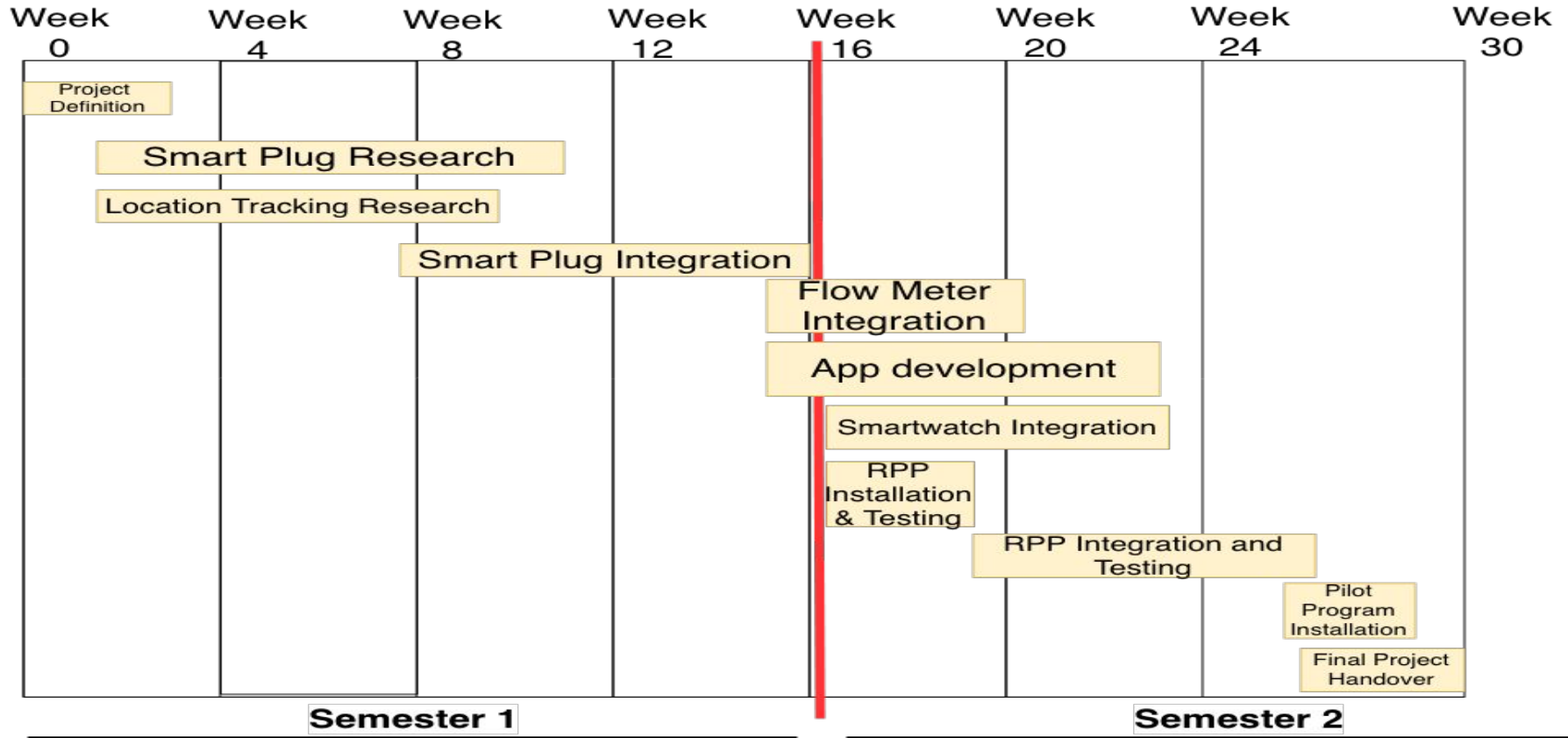


[18]

Cost Estimate

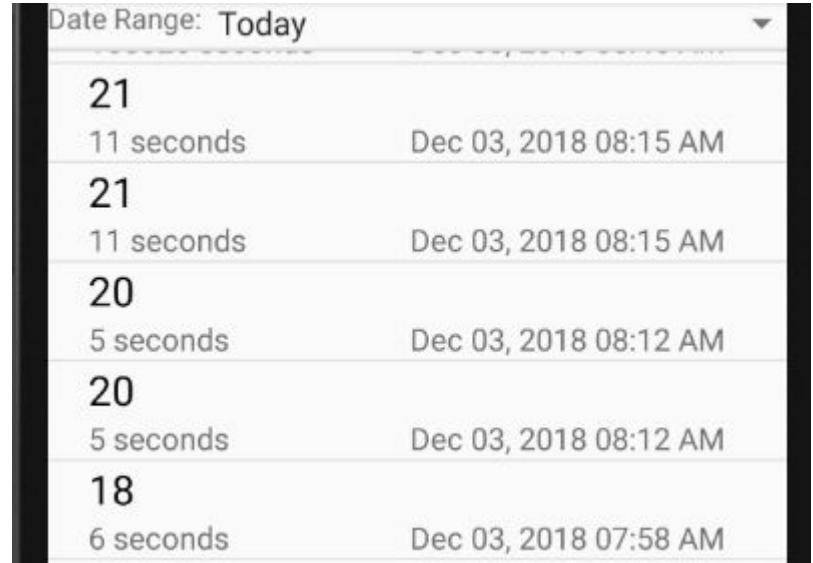


Schedule



Application Development

- Android App displays data



The screenshot shows an Android application interface with a date range filter set to 'Today'. Below the filter is a list of six data entries, each consisting of a large number, a duration in seconds, and a timestamp.

Date Range: Today		
21	11 seconds	Dec 03, 2018 08:15 AM
21	11 seconds	Dec 03, 2018 08:15 AM
20	5 seconds	Dec 03, 2018 08:12 AM
20	5 seconds	Dec 03, 2018 08:12 AM
18	6 seconds	Dec 03, 2018 07:58 AM

Smart Plug

TP-Link HS110



[1]

Smart Hub Code



[19]

Server Backend Code



[20]

Smart Watch

LG Watch Sport



[21]

Watch Data Code - Android



[22]

Guest Tracking

- Plan on working with RedPoint Positioning
- Client is becoming a distributor
- Full access to API at that point



[4]



[4]

Flow Meter

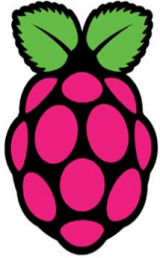
- Digiten Flow Meter Sensor
- Install under kitchen sink (2)
 - Water flow of both the hot and cold water
- Will be used in determining what the senior citizen is doing
 - Making coffee or just washing hands
- Python script up and running on RPi
- Send data to server



[2]

Platforms Used

Sensors



RaspberryPi

[23]

Watch and App



Android

[22]

Server



[24]

Test Plan

- Smart Watch
 - Health data is sent to server
 - A notification is sent to EMS (Tumble)
 - Unless otherwise stated
- Smart Outlet
 - Usage data sent to server, when in use
 - A notification is sent to smart sensor hub when appliance is turned on
- Guest Tracking
 - Track senior citizen up to a meter

Current Status

Smart Plug

Testing Stage

FlowMeter

Development
Stage

SmartWatch

Research Stage

Mobile App

Development
Stage

Contributions

Mike: Smart Plug research, App development

Justin: Smart Plug Implementation

Cody: Smart Plug research, Wearable research

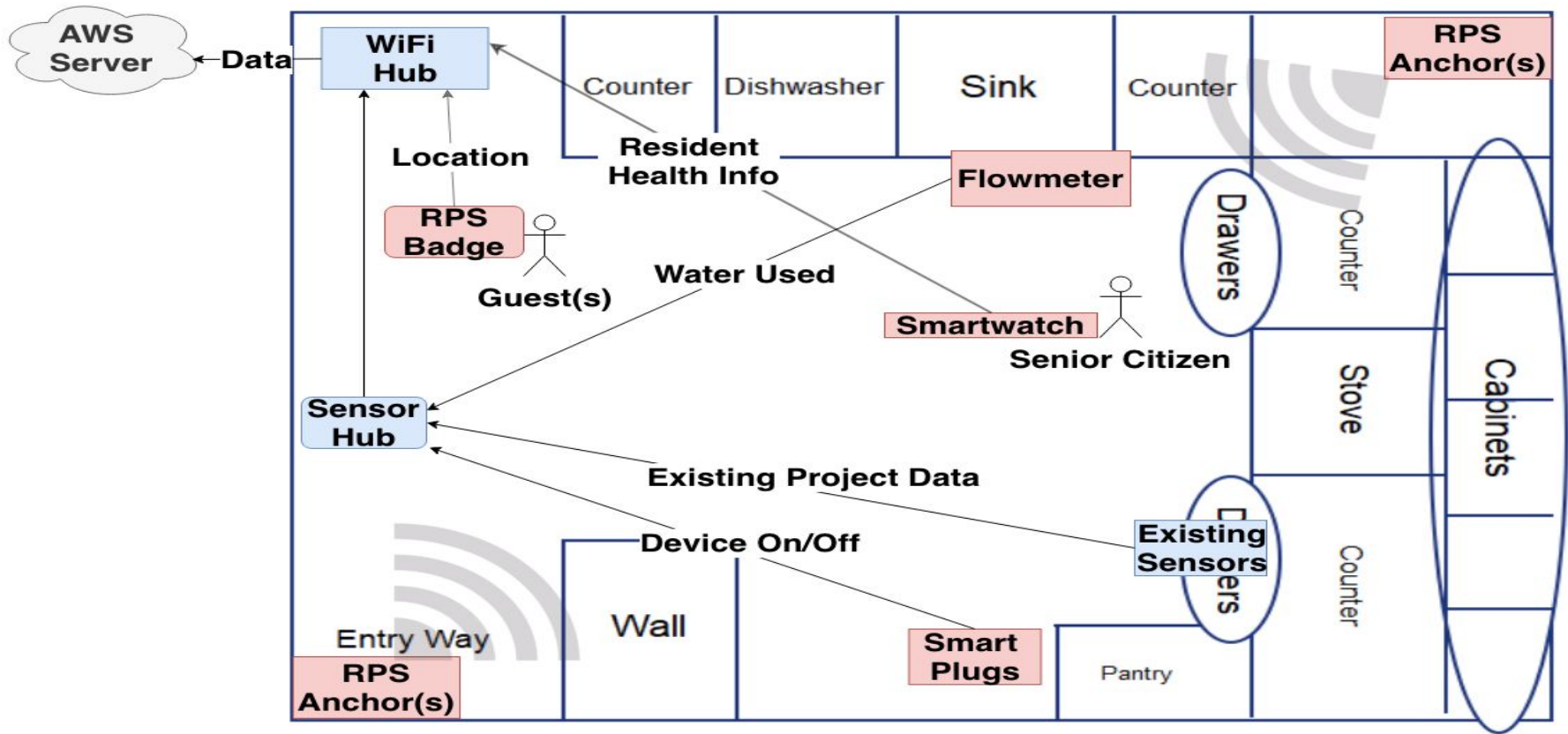
Josh H: Smart Plug Implementation

Guan: Flow Meter Implementation

Josh L: Smartwatch research

Summary

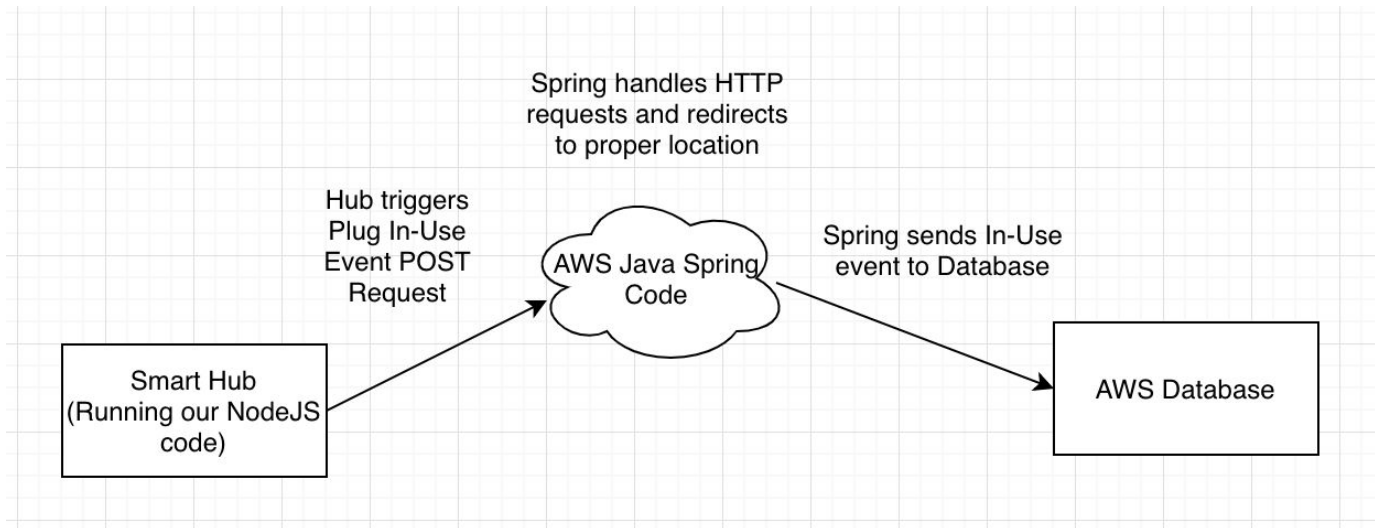
- Collecting data on seniors habits
- Data gives behavioral profile
- Data used to identify events
- Improve Quality of life



Smart Plug Event Log Example

```
power: 3.859979
  ▲ PowerObject: PowerStatistics {deviceAlias: "alpha-1", d
    current: 0.068794
    ▶ dateTime: Sun Nov 04 2018 15:13:25 GMT-0600 (CST) {}
    deviceAlias: "alpha-1"
    deviceID: "80062F4C50E9656CA54DBDA47EA8AD2B19E8D269"
    power: 3.859979
    status: "in-use"
    total: 0.015
    voltage: 119.914969
    ▶ __proto__: Object {constructor: }
```

Smart Plug Implementation



References

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