Autonomous Real-Time Interactive Architecture

Overview

1. Context
2. Objectives
3. Demo
4. Technical Details
5. Project Roadmap
6. Meeting Objectives - Engineering Practices

Project Context

Smart Home

Oxford Dictionary:

“A home equipped with lighting, heating, and electronic devices that can be controlled remotely by smartphone or computer”[1]

Machine Learning

Oxford Dictionary:

“The capacity of a computer to learn from experience, i.e. to modify its processing on the basis of newly acquired information” [2]

Existing Home Automation

SAMSUNG SmartThings™

wink

nest®

INSTEON®

Motivation

Why do people use home automation?

What problems can people use home automation to solve?

Project Objectives

Project Scope

Monitoring

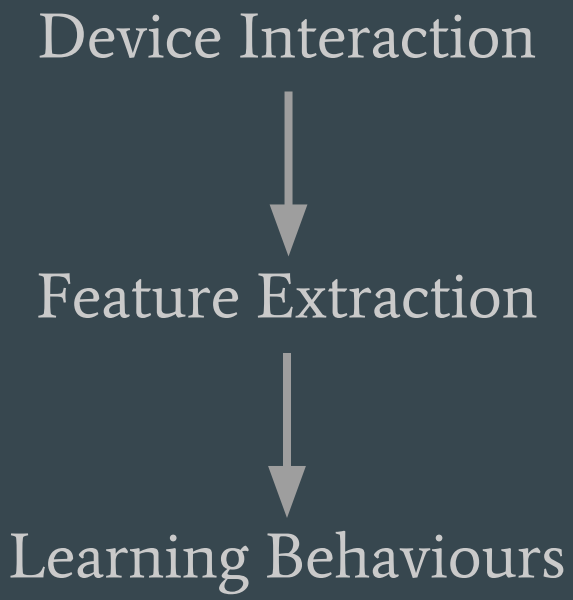
Controlling

Learning

Demo

Technical Details

Scenarios


Device Interaction
Feature Extraction
Learning Behaviours

Use Cases


Learning Automation System
InstallHub
«include»
ConnectToNetwork
«include»
AddDevice
RemoveDevice
«include»
DeleteDeviceHistory
«include»
ResetDevice
HomeOwner
ViewConnectedDevices
EnterTrainingMode
EnterPlaybackMode
EnterStandbyMode

Non-Functional Requirements

What major properties should be accounted for in system design?

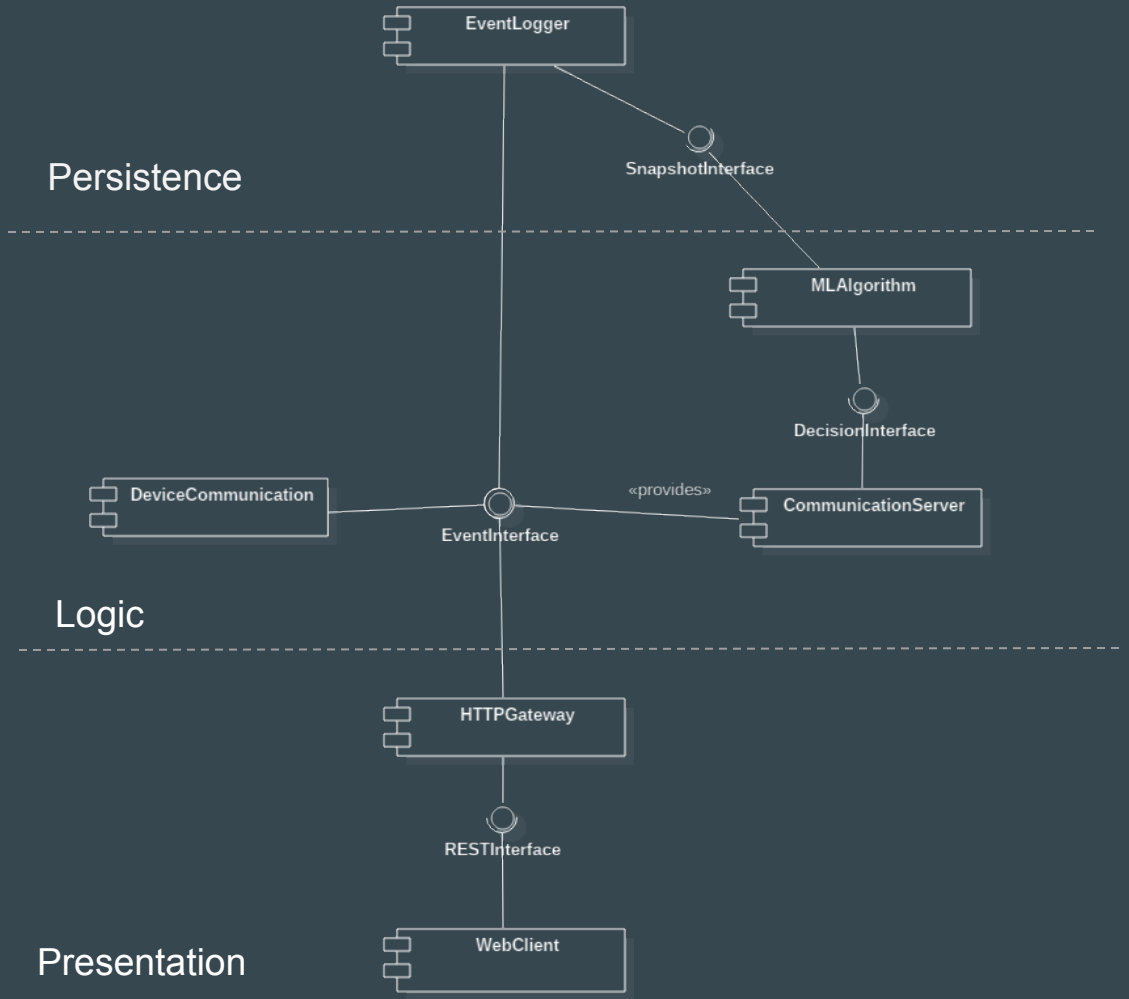
- Performance
- Security
- Testability
- Modifiability

Communication Protocols

Protocol Comparison

Protocol	Transfer Rate	Battery Life	Frequency	Range	Topology
Zigbee	250 Kbps	Good	2.4 GHz	35 ft.	Mesh
Z-Wave	40 Kbps	Great	915 MHz	100 ft.	Mesh
Insteon	13 Kbps	Good	915 Mhz	150 ft.	Mesh
WiFi	54 Mbps	Bad	2.4 GHz / 5.0 Ghz	105 ft.	Star
BLE	10 Kbps	Good	2.4 Ghz	200 ft.	Star

System Design



Data Storage

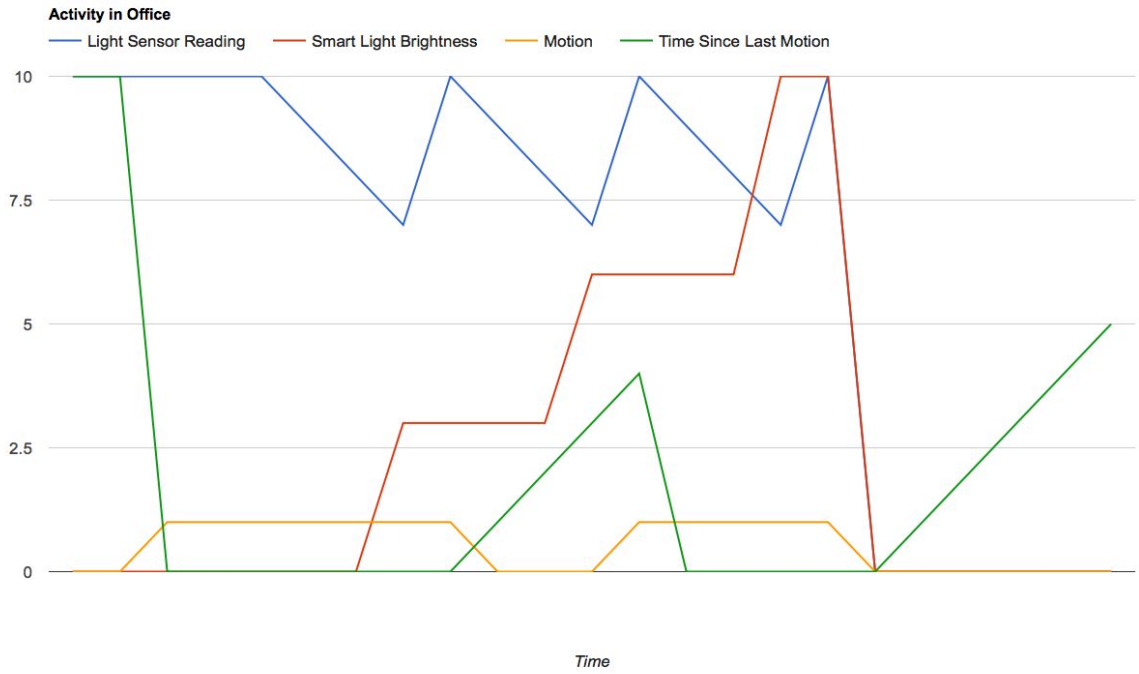
PostgreSQL

SQLite

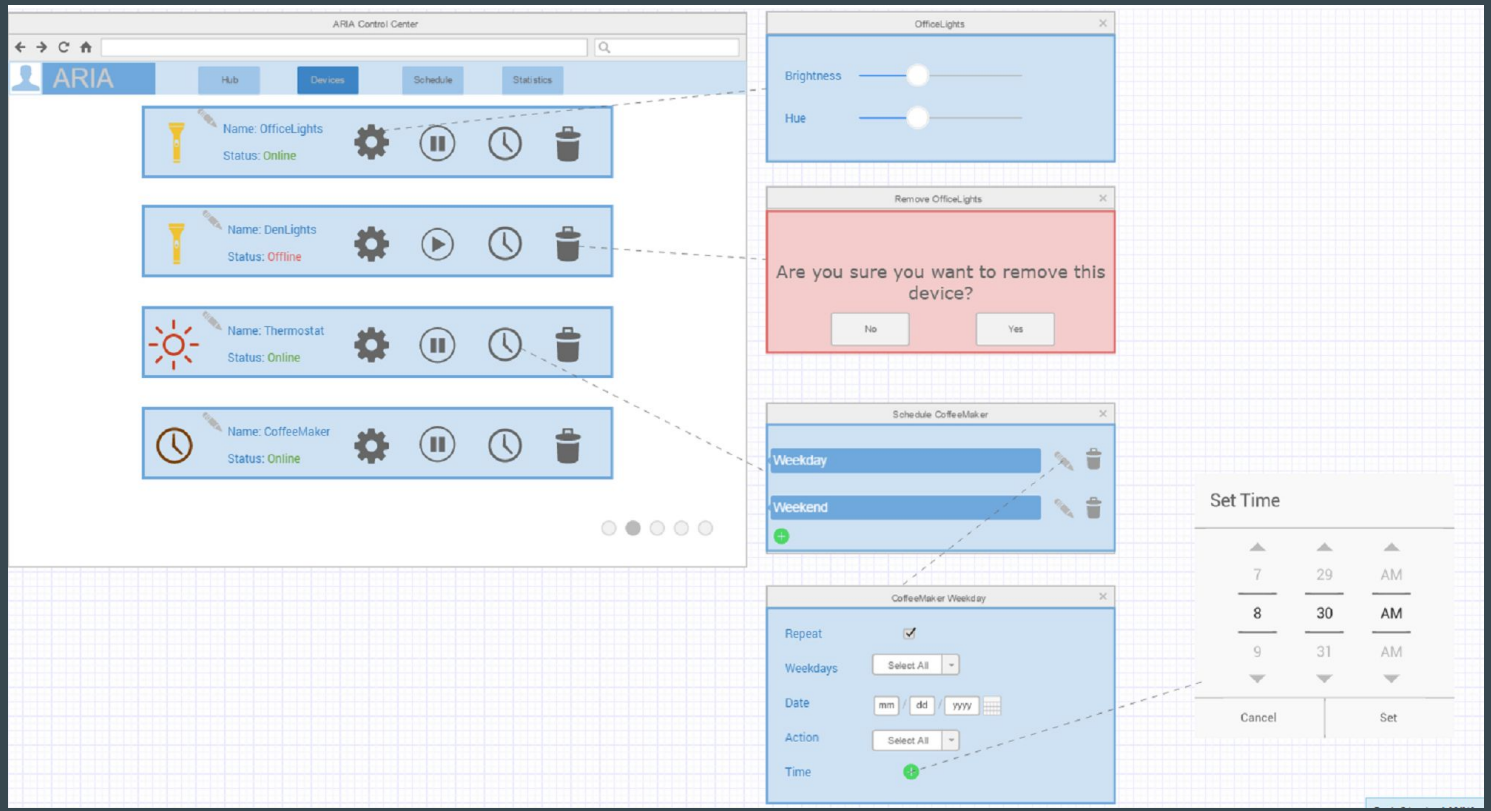
MySQL®

Project Roadmap

System Statistics



Scheduling


ARIA Control Center
ARIA
Hub
Devices
Schedule
Statistics
Name: OfficeLights
Status: Online
Name: DenLights
Status: Offline
Name: Thermostat
Status: Online
Name: CoffeeMaker
Status: Online
OfficeLights
Brightness
Hue
Remove OfficeLights
Are you sure you want to remove this device?
No
Yes
Schedule CoffeeMaker
Weekday
Weekend
CoffeeMaker Weekday
Repeat
Weekdays
Select All
Date
mm
dd
yyyy
Action
Select All
Time
Set Time
7
29
AM
8
30
AM
9
31
AM
Cancel
Set

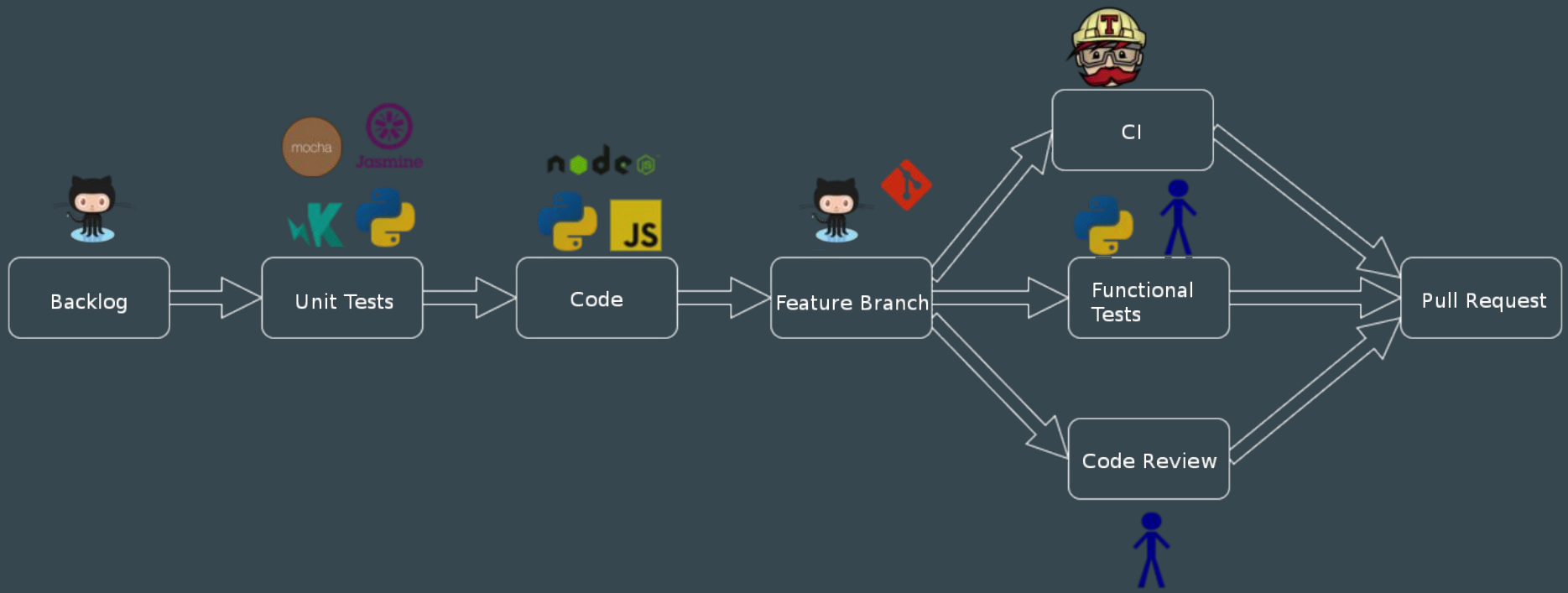
Machine Learning

Which algorithms have we considered?

Which algorithm are we planning to implement?

Meeting Objectives

Code Lifecycle



This repository Search Pull requests Issues Gist

mattmaynes2 / aria Private

Sprint Tasks

Unwatch 4 Star 0 Fork 0

Code Issues 64 Pull requests 0 Projects 1 Wiki Pulse Graphs Settings

Sprint

Details Add cards Fullscreen

TODO 15

Hub - All public APIs need to be updated to match specification
#338 opened by mattmaynes2
priority:critical type:task

Hub - Message encoding should be type agnostic
#378 opened by mattmaynes2
priority:blocker type:bug

Scenarios - Add a scenario for a light on and off with a sensor
#333 opened by mattmaynes2
priority:critical size:medium type:report

Database - APIs need to be updated to match specification
#344 opened by mattmaynes2
priority:major type:task

Report - Document weekly meetings about backlog grooming
#336 opened by mattmaynes2
priority:major type:report

Add behaviours tested in integration tests
#331 opened by mattmaynes2
priority:major type:report

In Progress 2

UI - Remote should be able to access all logs
#337 opened by mattmaynes2
priority:critical size:medium type:task

Create the Presentation
#414 opened by ctblanch2
priority:blocker size:large

In Review 0

Complete 10

Max value of UI Control slider is not being respected for bytes
#406 opened by mattmaynes2
priority:major size:small

Setting ZWave Dimmer to Zero Triggers Incorrect Event
#410 opened by ctblanch2
priority:blocker size:medium

Unit Tests for ZWave Code
#397 opened by ctblanch2
priority:critical size:medium

UI - Add Byte Data Type
#361 opened by mattmaynes2
priority:major type:task

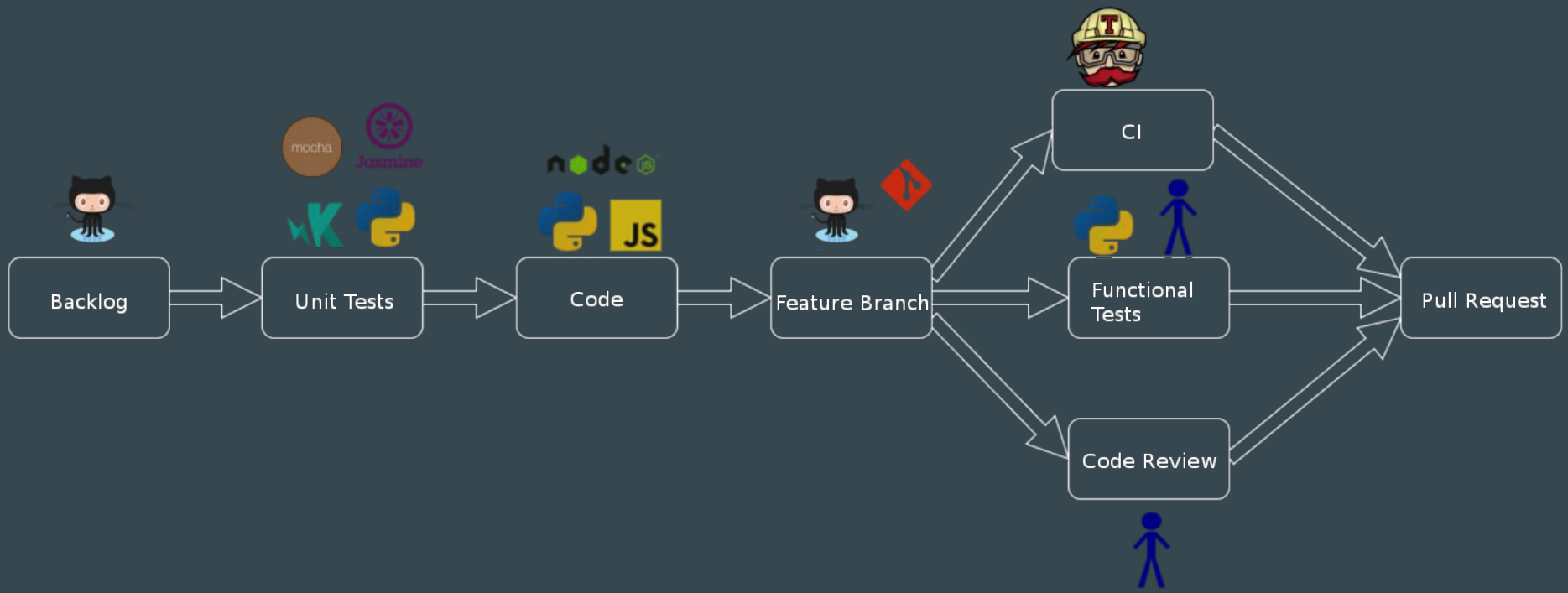
duplication of events in DB
#407 opened by jed15
priority:major size:small type:bug

Bug in database_translator
#372 opened by jed15
priority:major type:bug

multiple events are being linked to same request

Add column

Code Lifecycle



Summary

Where are we?

Where we want to go?

Autonomous Real-Time Interactive Architecture

Questions?

References

[1] "smart home," in Oxford English Dictionary Online, 2016. [Online]. Available: https://en.oxforddictionaries.com/definition/smart_home. Accessed: Jan. 15, 2017.

[2] "machine learning," in Oxford English Dictionary Online, 2016. [Online]. Available: https://en.oxforddictionaries.com/definition/machine_learning. Accessed: Jan. 15, 2017.