sourced
cloud at scale™

The Internet of Things and the Modern Household

29/5/2020

What is the Internet of Things ?

The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data.

Examples of common IOT devices

Security Systems & Baby Monitors	Air Conditioning & Climate Control	Industrial Control Systems	Smart Speakers & TVs
Automated Vacuums & Lawn Mowers	Smart Watches & Health Trackers	Cars & Automotive	Washing Machines & Fridges
3D Printers	Garden & Irrigation Systems	Garage Controls & Locking systems	Medical Implants
Toothbrushes and personal care	Air Quality and Smoke Detectors	Smart Helmets, Drop Detection and Personal Safety	Smart Bins and Waste Management

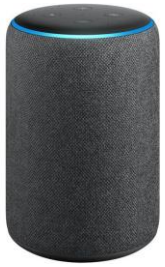
IOT Platform Providers

- Many different IOT Platform providers
  - Azure IOT
  - AWS IOT Services
  - Google Cloud IOT
  - Xiaomi IOT Platform
  - Alibaba Cloud IOT Platform
  - Tuya Smart

Examples of common IOT protocols

Open APIs / Closed APIs	MQTT	Open Protocols / Closed Protocols	Zigbee / Z-Wave
WiFi / Ethernet	Websockets	Bluetooth / Bluetooth LE	NFC
Cellular / Mobile Data	Local / Cloud Based	InfraRed (IR) / RFID	Z-Wave
mDNS	SOAP	SSH / Telnet	Undefined Chinese and Russian protocols…

Common IOT devices in Sourced employee's home



W1-HEM
HOME ENERGY MONITOR

SEK-2
SOLAR EXPANSION KIT

ESP8266 IoT SoC
(Wifi / BT)

IOT Security

- This is a complex and evolving subject.

  Gartner reported in 2017 there are 8.4 Billion IOT devices in use and expect that to be 20.4 Billion today.

- ***For the most part*** IOT Security is summed up as follows
  - It is good when implemented correctly by reputable brands with world class developers
  - Is staggeringly horrific at worst when the equipment is cheap, and mass produced out of China and Eastern Europe

- IOT Security best practices for the home
  - ***Buy reputable equipment*** unless you know what you are doing and are willing to invest the time into securing them independently.
  - Buy equipment with cameras, microphones, tracking devices and other privacy implications with ***extreme caution***
  - Look to buy equipment that has ***local only functionality*** or cloud functionality as a value add.
  - ***Factor in the lifetime of the device*** and how long the vendor is likely going to provide updates for features and security, as well as what happens when they stop. (ie, Device stops working)
  - You should treat many IOT devices on your network as ***computer systems that other people control*** and as such, segregate onto dedicated networks with additional security controls (pi-hole, firewall rules, etc)

- More information
  - Troy Hunt's IOT Posts – Lots of IOT nightmare stories and how to mitigate risks at home
  - The internet of shit guide - We track Internet of Things devices, their privacy track record and what's worth buying.

IOT Security – The Staggeringly Horrific

- The Mirai Botnet (2016)
  - 400,000 Cheap IOT Devices using a set of 61 different username/password combinations were compromised and used to flood websites @ 620 Gbit–1TBit/Sec
  - This also provided access to remote video feeds and controls

Mirai Breached Cameras

- Baby monitor remote access (2017)
  - Multiple IOT baby monitor cameras we found to have security issues allowing remote access to video feeds and speaking to the child over the internet

- Tracking Watches
  - Brands such as TikTocTrack provide A watch for parents to provide visibility of the children through a tracking device (Creepy)
  - Multiple vulnerabilities provided the ability to track other people's children and interact with them.

Breached Baby Monitors

Keiran’s Home and Integration Challenges

Keiran's Home

Vendor	Functionality	How do you use it ?

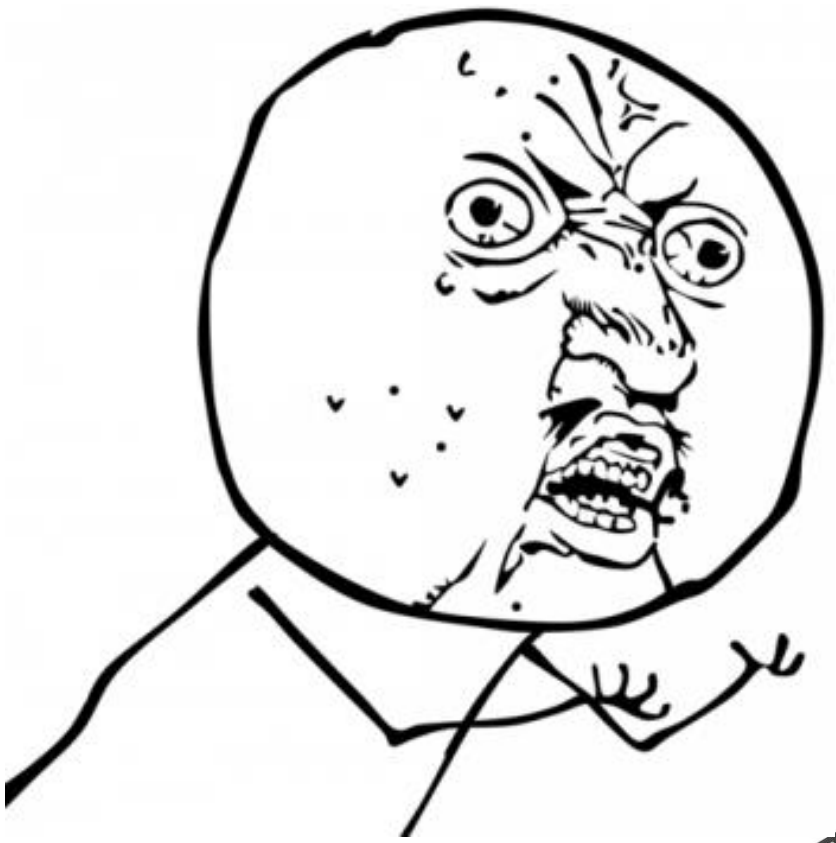
• Google home
  • 3 x Google Home Speakers
  • 1 x Google Chromecasts
	• Media player (Audio)
	• Media Player (Video)
	• Voice control and digital assistant
		• Google Home smartphone application
		• Google Cast supported applications
		• Voice Control

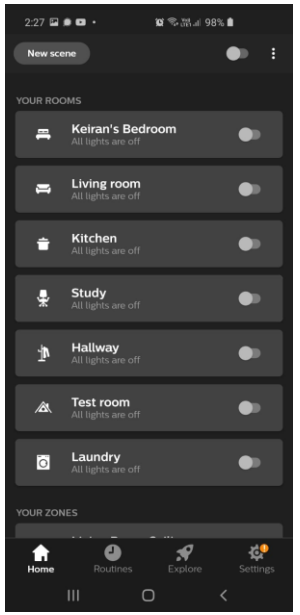
• Samsung • Television	• Media Player (Video) • Chromecast plugged into HDMI1	• Infra Red Remote Control • WiFi Enabled • No Google home support • No Smartphone application

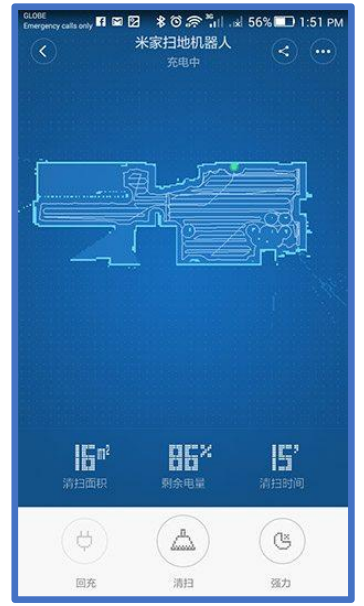
• Phillips Hue Lighting
  • 1 x Hue Base station
  • 22 x IKEA Smart Downlights
  • 2 x Hue Strips
  • 2 x Hue Bulbs
  • 6 x Hue Smart Switches
	• Entire home lighting solution	• Ethernet / WiFi enabled
		• Smartphone App
		• Optional cloud service
		• Native Google Home Support
		• Excellent local API

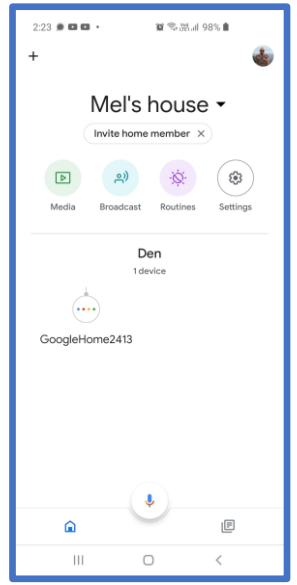
• Daikin Air Conditioning	• Climate Control for the home	• Infra Red Remote Control • Wifi Enabled smart controller • Nasty Smartphone app • Completely broken cloud service • Reverse engineered local API and Python Library
• Xiaomi Robotic Vacuum Cleaner	• Robot Vac for the home • Cleans carpets, floors, etc	• Wifi Enabled • Smartphone Application for control (Chinese Language) • New Google home support • Communicates to Chinese cloud services • Hacked firmware to provide SSH access and non-supported local API support.

Keiran’s Home user experience









This isn’t making my life easier.

I need to bring all these ecosystems together.

Introducing : Home Assistant

- Open source home automation platform
  - Primary objective is local control and privacy first.
  - Runs on a Raspberry Pi or a local server in your home to provide a single automation platform for diverse and fragmented IOT ecosystems
  - Currently supports 1600+ Integration types
- Current focus is on end user experience
  - Moving away from YAML configuration files
  - Focus on auto-discovery and GUI driven configuration
- 2019 - #10 Github project by contributors
  - Written in Python 3
  - Has a release cadence of 3 week sprints
  - Has become the de-facto home automation platform today

Home Assistant : Integrations (Local)

Daikin Integration

Daikin HTTP API

Samsung Local API

Samsung TV Integration

HUE Rest API

Google Local API

Xiaomi Local API

Phillips Hue Integration

Google Home Integration(s)

Xiaomi Robot Integration

Home Assistant – Core Functionality

- Integrations
  - Create ***Entities*** inside the platform that represent each device and their available functionality
    - Turn on / off
    - Change Colours
    - Read sensors current values (Temperature)
    - Text to Speech
- Scripts
  - Chain a set of actions on across devices together for a particular outcome
- Automations
  - Provides a capability to change entities state or trigger scripts on certain events
    - Schedules
    - Certain temperatures
    - Doors or Windows open/close

Home Assistant – Core Functionality

- Home Assistant Cloud (Nabu Casa)
  - $5/Month SaaS Service
  - Enables remote access to your Home Assistant platform without the need to do complex home setup
  - Provides Alexa and Google Home Skills to easily integrate Home Assistant integrated technologies into their ecosystem
  - Much much more. An absolute bargain.

Home Assistant – Results

- All my devices are integrated in a central location for management and automation
- Nabu Casa enables Google Home & Google Assistant to manage all devices anywhere
- This includes all Google Home functionality such as voice control and Google based automation routines.

Google Home

works with the Google Assistant

Demonstration Time !

Other uses of Home Assistant

- Controlling multiple Aquariums
- Marijuana grow setups (Heat, Light, Watering Schedules)
- Microbrewing and Independent Wine production
- Gardening control (Watering and Automated mowing)
- Cloud Platform Integrations (AWS, Azure, GCP, etc)
- Measuring power usage in your home
- Automating your doorbell so it sends messages to your TV
- Join us in #IOT and get involved – Large global Sourced community of users !
- Limitless possibilities checkout #homeassistant On Twitter & Instagram

Useful links and resources

- Home Assistant Website
  - https://www.home-assistant.io/
- Home Assistant Podcast
  - https://hasspodcast.io/
- Home Assistant Data Science Portal
  - https://data.home-assistant.io/
- 2019 State of the Union Presentation
  - https://www.home-assistant.io/blog/2019/11/22/state-of-the-union/