Comparison of Open Source Software Home Automation Tools

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Konsulko Group

- Services company specializing in Embedded Linux and Open Source Software
- Hardware/software build, design, development, and training services
- Based in San Jose, CA with an engineering presence worldwide
- http://konsulko.com/

Agenda

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- Challenges for home automation in the IoT era
- Overview of popular open source home automation platforms
- Conclusions

Internet of Things

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- The popularity of Internet of Things increased over the past few years and the market is expected to continue to grow
- Internet of Things are heavily used for home automation tasks, most notably for smart lightning, smart speakers and robotic vacuum cleaners
- Though gateways embedded devices communicating over various different protocols (for example ZigBee, Bluetooth, Modbus) are connected to the Internet

IoT and Home Automation

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Advantages:

- Combining AI with big date generated by Internet of Things creates huge opportunities for making life better

Disadvantages:

- Interoperability between devices from different vendors is a challenge
- Often sensitive personal data in stored the cloud
- Often connected device cannot work without Internet

How Open Source Helps?

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- Collaborative projects for interoperability

  Open Connectivity Foundation
  https://openconnectivity.org/

  OpenDOF
  https://opendof.org/

  Mozilla WebThings
  https://iot.mozilla.org/

  Eclipse IoT
  https://iot.eclipse.org/

- Open source home automation platforms

Home Assistant

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Home Assistant

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- Open source home automation platform written in Python 3 with Polymer and YAML for configurations
- Perfect to run on a Raspberry Pi (3 B or newer)
- Started in 2013 by Paulus Schoutsen
- Huge community, more than 1500 contributors
- Very documentations and active forums
- Source code available at GitHub under Apache 2.0 license
- https://www.home-assistant.io/

Home Assistant Key Features

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- More than 1000 components for integration with popular Internet of Things such as IKEA Trådfri, Philips Hue, Google Assistant, Alexa / Amazon Echo, Nest, KODI, etc.
- Authentication with user profile and an option for MFA
- Automatic discovery of devices
- Automatic updates of Lovelace UI
- Excellent integration of MQTT components

Home Assistant on Raspberry Pi

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Options for getting started on Raspberry Pi:

- **Hass.io**

  Embedded Linux distribution made with Buildroot using Docker and RAUC for software updates. Started by Pascal Vizeli in 2017. Compatible with Raspberry Pi, Intel NUC, Odroid C2/XU4, TinkerBoard, OrangePi Prime or a virtual appliance.

- **Hasspbian**

  GNU/Linux distribution for Raspberry Pi with Home Assistant based on Raspbian that uses the same repositories.

- **Manual installation**

Home Assistant MQTT

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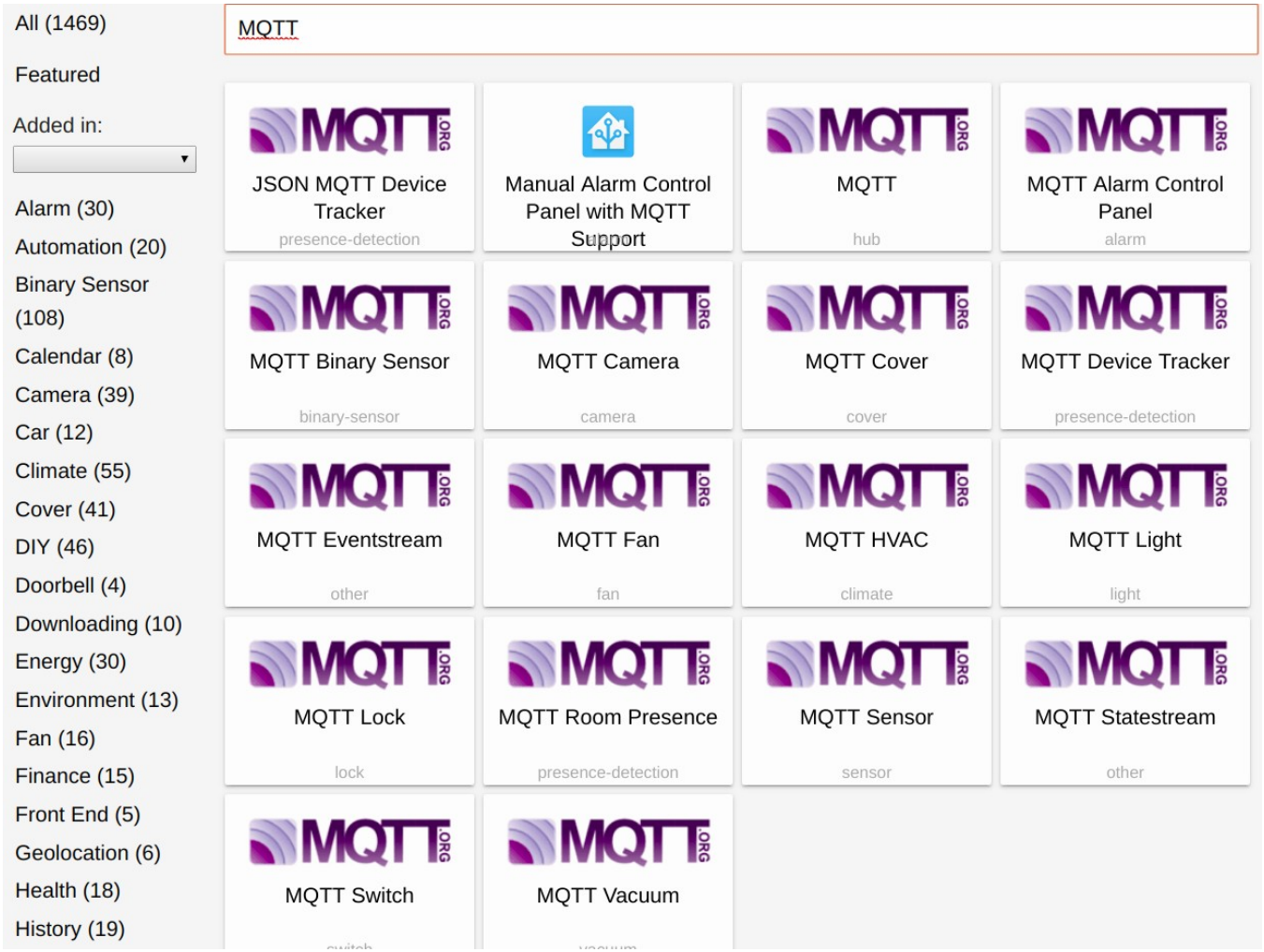

OpenHAB

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OpenHAB 2

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- **Open H**ome **A**utomation **B**us version 2 is written in Java with OSGi, Apache Karaf, Eclipse Equinox and Jetty
- Major changes between version 1 and 2, not based on Eclipse SmartHome since version 2.5
- More than 1500 supported things
- Started in 2010 by Kai Kreuzer
- Big community, more than 400 contributors
- Source code available at GitHub under Eclipse Public License 2.0 license
- https://www.openhab.org/

OpenHAB 2 Compatibility

- Runs on Microsoft Windows, Mac OS and GNU/Linux distributions
- Perfect to run on Raspberry Pi, PINE64 or Docker
- Mobile applications for Android and iOS

OpenHAB 2 MQTT

MQTT Thing Auto-Discovery supports two conventions out-of-the-box:

- Homie 3.x specification
- HomeAssistant MQTT Components specification

Domoticz

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Domoticz

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- Light weight home automation system written in C++ with support for a Python plugin framework
- Perfect to run on a Raspberry Pi
- Started in 2012 by Gizmocuz
- Big community, more than 250 contributors
- Source code available at GitHub under GPLv3
- https://www.domoticz.com

Domoticz

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- Runs on Microsoft Windows and GNU/Linux distributions
- Perfect to run on Raspberry Pi
- Easy installation with a script or building from source

```
curl -L https://install.domoticz.com | bash
```

Other Open Source Home Automation Platforms

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MisterHouse

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- Written in Perl
- Started in 1999
- “Runs on Windows 95 or newer and on most Unix based platforms, including Linux and Mac OS X“
- Available at GitHub under GPLv2 license: https://github.com/hollie/misterhouse
- http://misterhouse.sourceforge.net/

OpenMotics

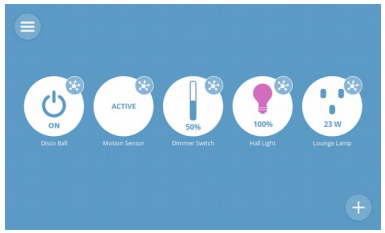
- Written in Python, front-end based on Aurelia
- Provides a complete solution
- Started in 2004, open source since 2012, company based in Belgium
- Software source code available at GitHub under GPLv2
- Hardware schematics available at GitHub under CC BY-SA 4.0
- Community maintained Home Assistant plugin

Jeedom

- Core written in PHP with paid Android and iOS applications
- Supports various protocols Z-Wave, EnOcean, KNX, Legrand Bus, RFXcom, RTS, Chacon, Edisio, etc.
- Started in 2014 by 2 co-founders in Lyon, France
- Jeedom SAS sells hardware hubs, provides paid support and a market for free and paid plug-ins
- Core source code available at GitHub under GPLv2
- https://www.jeedom.com/site/fr/

ioBroker

- Written with JavaScript with Node.js and Redis
- Runs on ARM and x86, compatible with GNU/Linux distributions, Windows and Mac OS
- More than 285 connected devices and systems
- Supports numerous adapters for integration of 3rd party systems and protocols
- Automatic discovery of devices over ping, UpnP and MQTT
- Started in 2014 in Karlsruhe, Germany
- Available in GitHub under MIT license
- https://github.com/ioBroker



Mozilla WebThings Gateway

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- Written in JavaScript with Node.js and Python
- Runs on Raspberry Pi 3 and Turris Omnia
- Uses the WebThings Framework
- Monitors and controls smart home devices via a unified web interface (Things UI) and add-ons for integrating various devices
- Available at GitHub under Mozilla Public License 2.0
- https://iot.mozilla.org/gateway/

Calaos

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- Server written in C++, web app based on AngularJS, GUI for mobile devices and desktop application written in Qt/QML, some integration APIs are written in Go
- Linux distributions built with the Yocto Project and OpenEmbedded
- Runs on Raspberry Pi, Premoboard, Cubieboard, Intel Atom and Intel x86-64 machines
- Created by Raoul Hecky, most users are French-speaking
- Available at GitHub under GPLv3 license
- https://www.calaos.fr

OpenNetHome

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- Written in Java and Apache Maven
- Runs on Windows, mac OS, and GNU/Linux distributions, including Raspbian for Raspberry Pi
- Supports multiple protocols and devices, including WiFi and 433 MHz radio-band devices
- Offers open REST interface and can be extended with plugins
- Available at GitHub under GPLv3 license
- http://opennethome.org/

SmartHomeNG

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- Written in Python
- Available for manual installation or with Docker, image for Raspberry Pi (based on Raspbian)
- Started in 2012
- User documentation in German, developer documentation in English
- Available at GitHub under GPLv3
- https://www.smarthomeNG.de

HomeGenie

- Written in .NET C#, Python and JavaScript
- Available for Microsoft Windows, Debian/Ubuntu (and compatible distributions supporting .deb), Mac OS
- Android client application
- Supports DLNA/UPnP devices, RF/IR remote controls, MQTT with lighting scenarios and voice control
- Starter in 2012 by g-labs
- Available at GitHub under GPLv3
- http://www.homegenie.it

Honorable Mentions

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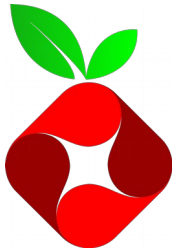
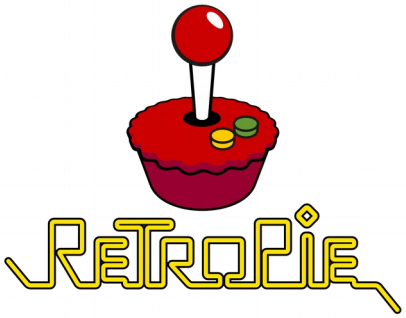
- There are a lot of other great open source tools more focused on a specific home automation task:





- and many more...

Conclusions

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- There are a lot of open source home automation platforms
- In my opinion Home Assistant, OpenHAB 2 and Domoticz are ahead of game as of 2019
- Don’t start another home automation platform unless you have a very good reason
- Often installation, initial configuration and integration of devices is difficult
- Business models include paid cloud subscriptions, paid support, marketplaces for plugins and selling hardware devices

Thank You!

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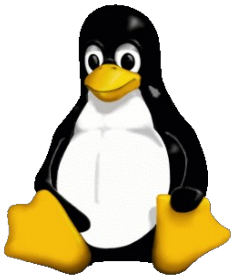

Useful links:

- 6 open source home automation tools
  https://opensource.com/tools/home-automation
- Home Assistant: The Python Approach to Home Automation [Video]
  https://www.linux.com/news/home-assistant-python-approach-home-automation-video/
- BRUH Automation
  https://www.youtube.com/channel/UCLecVrux63S6aYiErxdiy4w
- MQTT Arrives in the Modern openHAB 2.x Architecture
  https://www.openhab.org/blog/2018-12-16-mqtt-arrives-in-the-modern-openhab-2-x-architecture.html
- 2018 Roundup Of Internet Of Things Forecasts And Market Estimates
  https://www.forbes.com/sites/louiscolumbus/2018/12/13/2018-roundup-of-internet-of-things-forecasts-and-market-estimates/#77caa4b57d83