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
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Agenda

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

Advantages:
- Combining AI with big data 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 are stored in the cloud
- Often connected devices cannot work without Internet
How Open Source Helps?

- 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
Home Assistant

- 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

- 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
Options for getting started on Raspberry Pi:

- **Hass.io**
  

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

- **Manual installation**
Home Assistant MQTT

MQTT

MQTT Binary Sensor
MQTT Camera
MQTT Cover
MQTT Device Tracker
MQTT Eventstream
MQTT Fan
MQTT HVAC
MQTT Light
MQTT Lock
MQTT Room Presence
MQTT Sensor
MQTT Statestream
MQTT Switch
MQTT Vacuum

Alarm (30)
Automation (20)
Binary Sensor (108)
Calendar (8)
Camera (39)
Car (12)
Climate (55)
Cover (41)
DIY (46)
Doorbell (4)
Downloading (10)
Energy (30)
Environment (13)
Fan (16)
Finance (15)
Front End (5)
Geolocation (6)
Health (18)
History (19)
OpenHAB
**OpenHAB 2**

- **Open Home Automation Bus** 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/](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
MQTT Thing Auto-Discovery supports two conventions out-of-the-box:

- Homie 3.x specification
- HomeAssistant MQTT Components specification
Domoticz
Domoticz

- 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

- 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
MisterHouse

- 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/](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

- 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/](https://iot.mozilla.org/gateway/)
Calaos

- 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
OpenNetHome

- 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/
- 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

- There are a lot of other great open source tools more focused on a specific home automation task:
  - KODI
  - LibreELEC
  - openelec
  - PLEX
  - MYCROFT AI
  - snips
  - ownCloud
  - RETRO PIE
  - RETRO ARCH

- and many more...
Conclusions

- 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!

Useful links:
- 6 open source home automation tools
  https://opensource.com/tools/home-automation
- Home Assistant: The Python Approach to Home Automation [Video]
- BRUH Automation
  https://www.youtube.com/channel/UCLecVrux63S6aYiErxdiy4w
- MQTT Arrives in the Modern openHAB 2.x Architecture
- 2018 Roundup Of Internet Of Things Forecasts And Market Estimates