Presence detection

... and some cool(?) applications

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• **Hobbyist since 2015**
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• **Fully equipped my '80s house**
  Lighting, shading, all HVAC, alarming, blinds, bots, family…

• **Guilty of everything in the household to fail**
Presence detection strategies

- Why
- Some generic thoughts
- Local sensors based
- Personalized
  - WiFi login
  - Geo tracking based
- Inhouse localization
The Wasp In A Box Algorithm


(1) Assume there is no wasp in the box.

(2) Have you heard the wasp buzzing in the box?
   YES = There is a wasp in the box until you are told otherwise.

(3) Have you opened the box since you last heard buzzing?
   YES = There is no wasp in the box.
   NO = There is still a wasp in the box if you heard one earlier.

(4) Go to step 2.
- **False positives**
  Animals crossing, left mobile at home / in car, devices left on, ...

- **False negatives**
  Out of power
  Out of connectivity: outdated values

- **Bad values**
  Improper deployment/use/config

  peaks, misses, misreadings due to outer and inner noise

  Inappropriate detection range/resolution/sensitivity: flapping, proper thresholds
Reuse sensor items in purpose-built groups

Motion detector @Markus in room-Markus, Markus@home
Light switch @Markus in room-Markus
Smartphone Markus in Markus@home
Foscam @garden in garden, house
TV, coffee maker in house
room-Markus, Markus@home in house

Combine the most reliable sensors for a detection purpose into a custom group

- Use lambdas to validate values before use
  ```
  val Functions$Function1 validate [ double input | ...... ]
  ```

- Use a moving average on sensors (motion detectors, analog sensors)
  ```
  item.averageSince(now.minusMinutes(period))
  ```

- Implement anti-flapping (binary) / hysteresis (numeric) sound volume, light level,...
  ```
  !item.changedSince(now.minusMinutes(period))
  ```

- Use quorum to fight false positives & negatives
  ```
  Group:Number:SUM groupname
  ```

On sensor reliability
• Lawn mower
• Welcome lighting
• Ventilation shutoff
• Extended heating period auto party mode
• Vacuum cleaner
• Get me a coffee (please !!!)
Personalized presence

- **WiFi and BT login**
  - networkhealth assign fixed IPs
  - TR069 Fritz!Box, Ubiquity Unifi, ... MAC based

**Visitor tracking**

- **Owntracks**
  - GPS & BT beacon
  - mqttitude binding
• **Weasley clock**

• **Who is it?**

• **Garage door opener** place BT beacon / smartphone in your car

• **Autostart heating** when leaving work

and its apps
• Framework for Internal Navigation and Discovery

“FIND hypercube“ in Play store
[mqtt|https]://
ml.internalpositioning.com

• Find your s.o.‘s mobile
• Individual lighting,
  household appliance settings,
  Music and Media