RUTGERS
WINLAB | Wireless Information Network Laboratory

IoT Bandwidth Locators for User Evaluation

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OBJECTIVE

Designing an end-to-end security-conscious IoT framework for everyday home devices using machine learning.

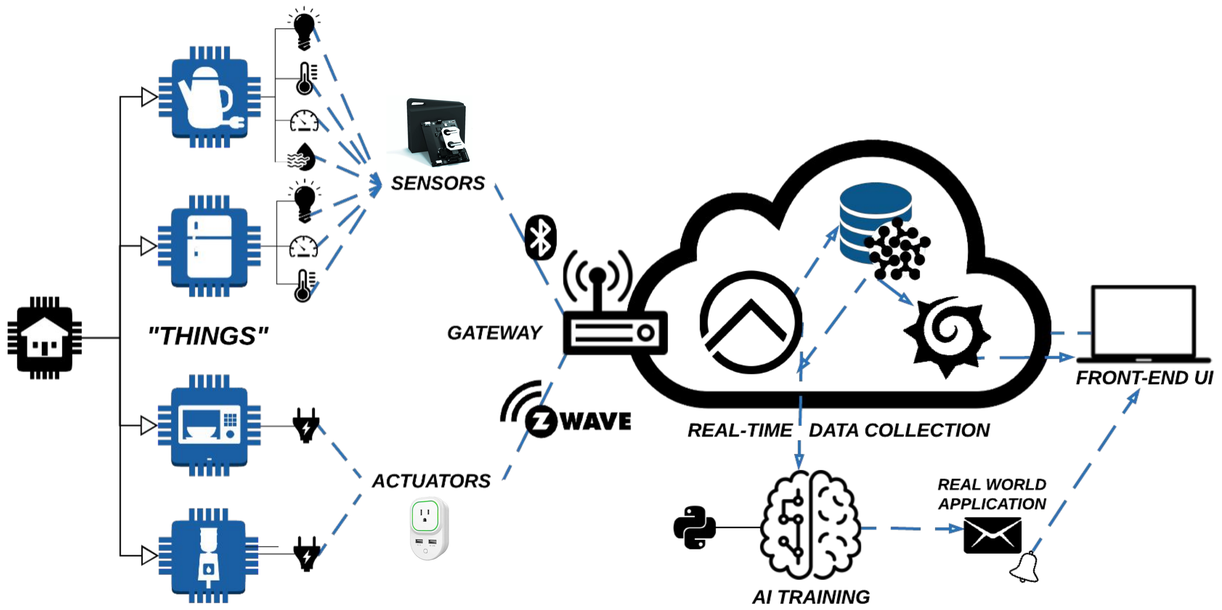
- DATA COLLECTION — collecting data from TI Sensortag CC2650 & Aeotec Smart Switch 6
- SIGNAL TRANSMISSION — secure gateway communication via BLE & Z-Wave to ORBIT node
- SIGNAL PROCESSING — setting threshold for parameters sending user notifications
- ATTACK DEFENSING — training AI models to detect attacks on system

FRONT-END APPLICATION

openHAB's lightweight UI: HabPanel

sample UI after tunneling iOS device to HabPanel

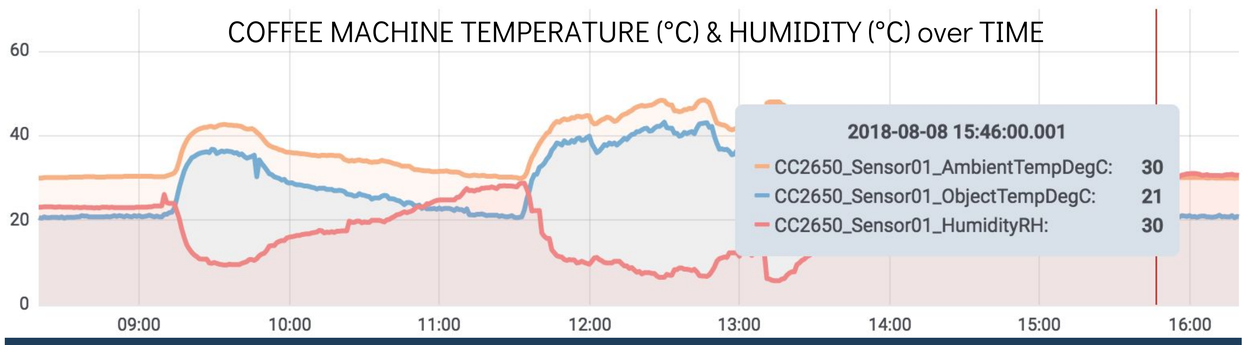
FRAMEWORK ARCHITECTURE



DATABASE PERSISTENCE

To persist data in real time, openHAB stores all configured things' states on InfluxDB; allowing user to create customizable graphs on Grafana

- openHAB — empowering the smart home — versatile home automation open-source platform
- InfluxDB — time series database for storing & querying data
- Grafana — open-source platform for time series analytics

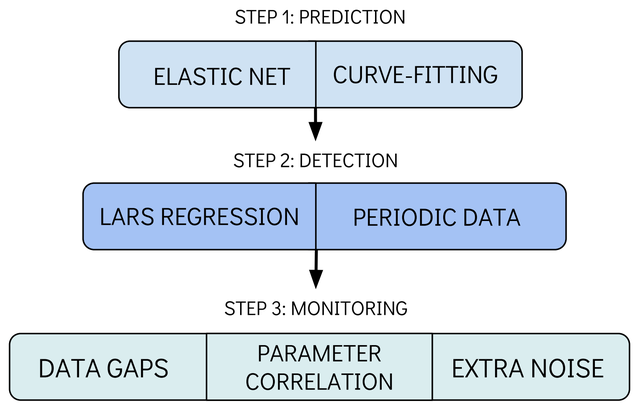


REFERENCES

[1] SimpleLink™ Bluetooth LE Multi-standard SensorTag CC2650STK
[2] Aeotec Aeon Smart Switch 6 for Z-Wave
[3] Gmail API
[4] BluePy Github Repository
[5] REST API

winlabiot.wixsite.com/blue

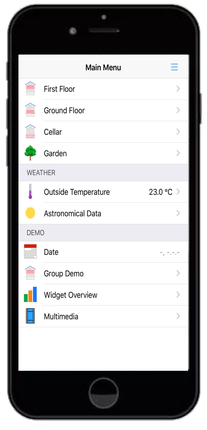
AI MODELS



- predicts future values with Elastic Net & Curve-Fitting models
- detects spoofed data by cost distributions generated with LARS regression and by using periodic data detection
- monitors gaps in data, compares correlated parameters for heuristic analysis, & checks for extra noise

FUTURE WORK

- adjust AI model to counter & defend from future attacks
- implement email notifier further
- shift front-end application to remote access of openHAB



- expand framework across more home devices for better integrated home automation system
- make UI more accessible for remote users

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