TimeCube

Advanced Internet of Things

Group 4 (P. Bucher, P. Kiser, B. Kuhn, A. Ruckstuhl)

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Problem

- Track activities
- Need to track time
- Efficiency control
- Instrument for retrospectives
- Most applications require context switch (PC, smartphone)

Idea

- Track time with a cube
- Detect position of cube
- Persist data
- Display on a web application with options to filter
- Map cube's sites to projects/activities

->Improve everyones efficiency and give back the control of their time.

Overview

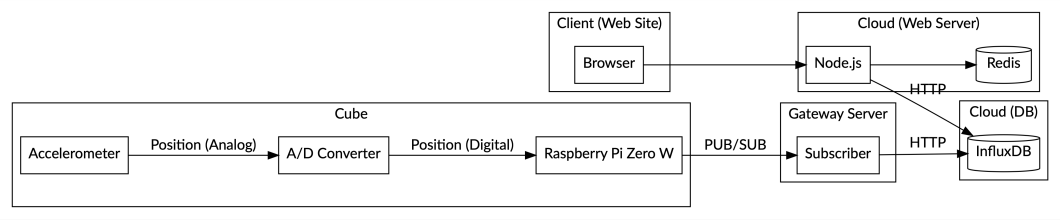

Figure 1: The architecture of the TimeCube system

Prototype I

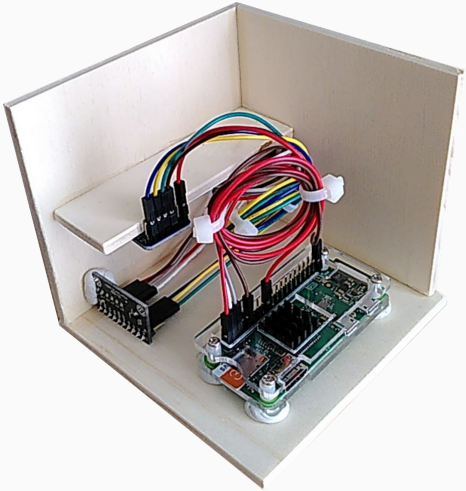

Figure 2: Prototype I

Prototype II

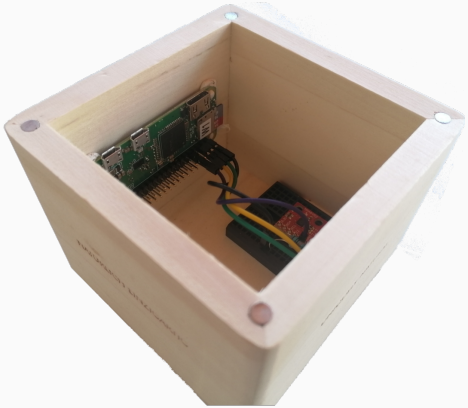

Figure 3: Prototype II

Side Detection

Approach

- Voltage per Axis (X, Y, Z)
- Threshold per Axis (low, med, high)
- Combination of Thresholds: Side

Prototype I

- Accelerometer: Adafruit ADXL 335
- A/D Converter: ADS 1115

Prototype II

- Accelerometer: MMA 8452
- No separate A/D converter needed (I^2C)

Gateway

- Data Transmission with ZeroMQ protocol
  - support different platforms and languages
  - supports different patterns (pub-sub, push-pull, client-server)
  - no broker required
  - High speed
- pub/sub was used (possibility to use multiple backends)
- mock cube (random values)

Storage

- Subscriber writes data into cloud storage
- Influx 2.0 (cloud)
  - latest version (cutting edge)
  - Cloud hosting
  - Time series
- Simple data structure: topic (“timecube”), identifier (UUID), side (1..6)
- Sends data every second

Web Application

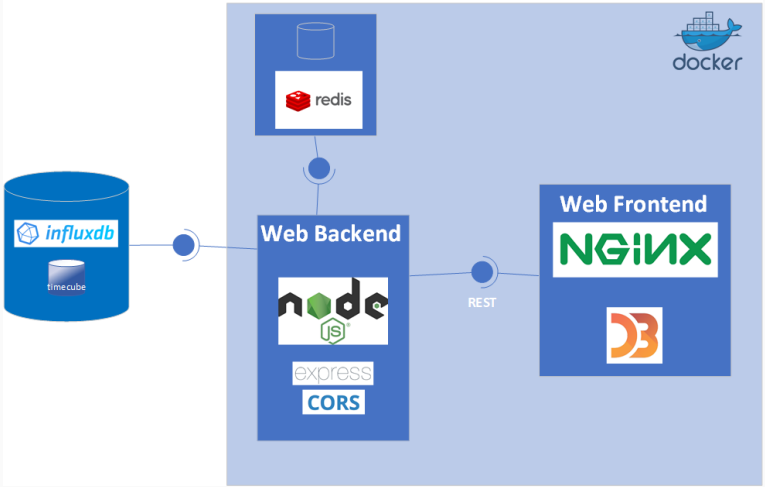

Figure 4: Web Application Architecture

Web Application

- Runs in Docker
  - Backend: Node.js/Express.js
  - Redis: store side descriptions
  - Frontend: Web Server (nginx), Vanilla JS and D3.js
- Web app collects data from InfluxDB 2 (cloud)
  - query by UUID (text field, to be improved with login…)
- Read-only InfluxDB, read-write redis (config)
- Filter data on selected cubes (UUID), from/to

Conclusion

Achivements

- 2x functioning prototypes
- Database requests and displaying of data
- Lots of testing with cutting-edge technologies
- Extensible (sensors, subscriber applications, reporting)

Further ideas

- More Chart-View for better UX
- Performance optimisation
- Authentication
- Configure UUID by account
- Integration with *«WellBean»*

Live Demo

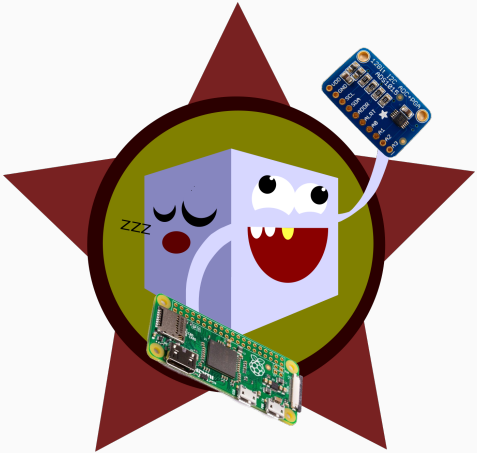

Figure 5: Let's have some fun!