DEN Summer School 2018 Linking the Physical and the Virtual - Talk2Lab

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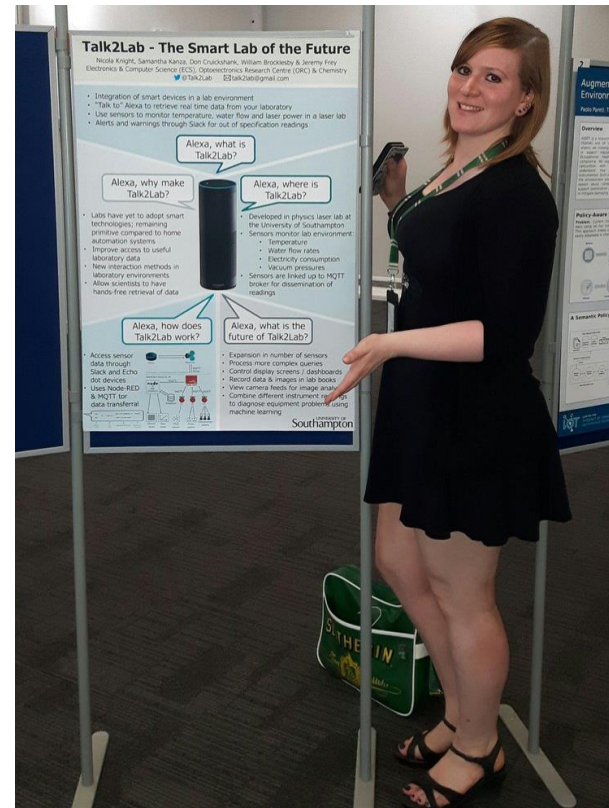
Tuesday 3rd July 2018

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Introduction

Dr Nicola Knight

K...

Dr Samantha

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Talk2Lab - What

- Integration of smart devices in a lab environment

- "Talk to" Alexa to retrieve real time data from the lab

- Use sensors to monitor temperature, water flow and laser power in our laser lab

- Alerts and warnings through Slack for out of specification readings

Talk2Lab - Why

- Labs have yet to adopt smart technologies; remaining primitive compared to home automation systems

- Improve access to useful laboratory data

- New interaction methods in laboratory environments

- Allow scientists to have hands-free retrieval of data

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Talk2Lab - Where

- Prototype system developed in physics laser lab at the University of Southampton

- Sensors monitor lab environment:

  - Temperature

  - Water flow rates

  - Electricity consumption

  - Vacuum pressures

Talk2Lab - How - Sensor Data

- Collect data for :
  - Temperature
  - Water flow
  - Power consumption
  - Laser power
- Most sensors are controlled by Raspberry Pis
- Sensors link up to MQTT broker for dissemination of readings

System Overview
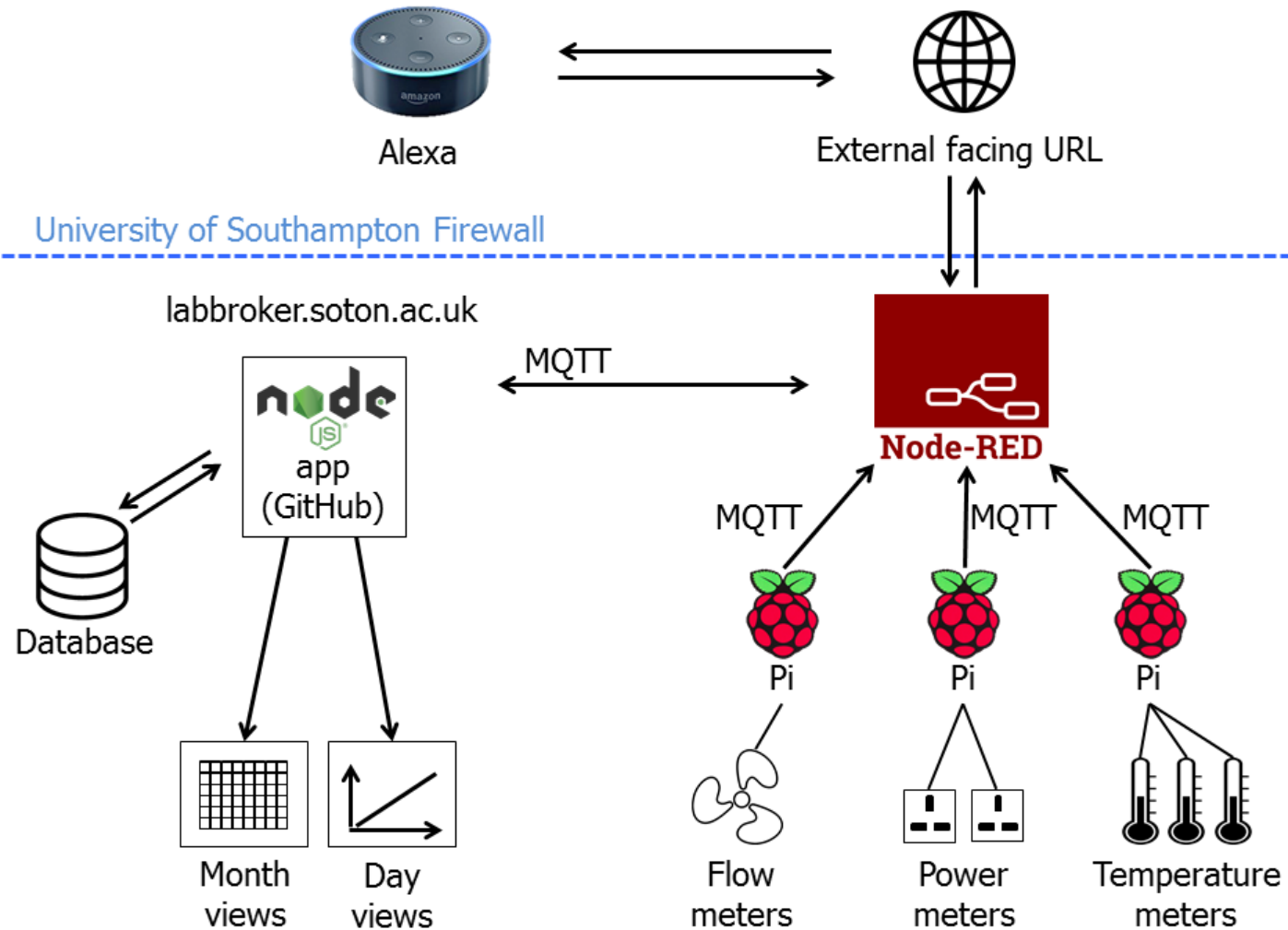
Accessing Sensor Data

- Sensor data was initially accessible via web browser interface

- Graphs sensor readings over time

- Uses visualisation library d3.js for interactive display

- Interfaces developed with voice interaction (Alexa) and text interaction (Slack)
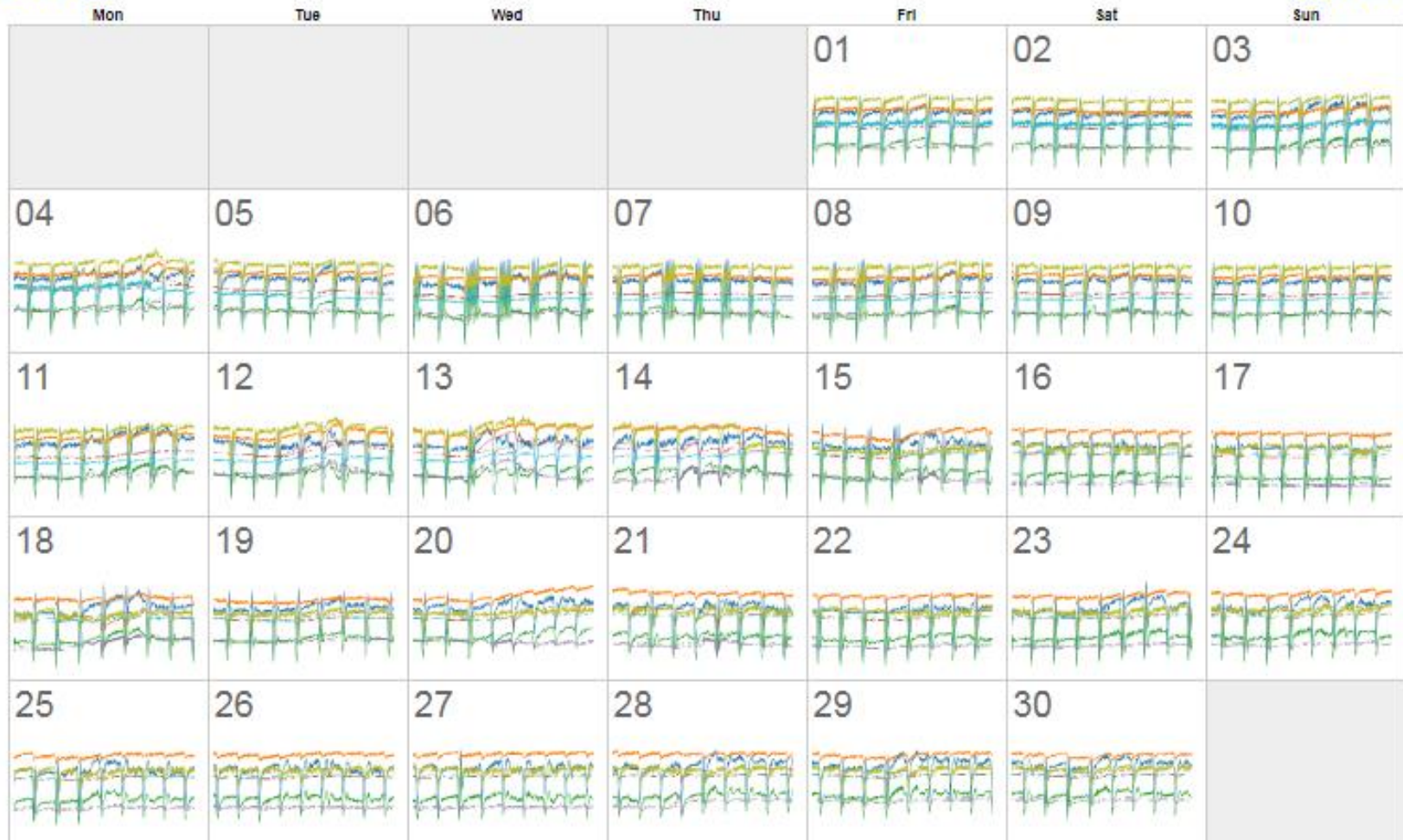
DataBroker

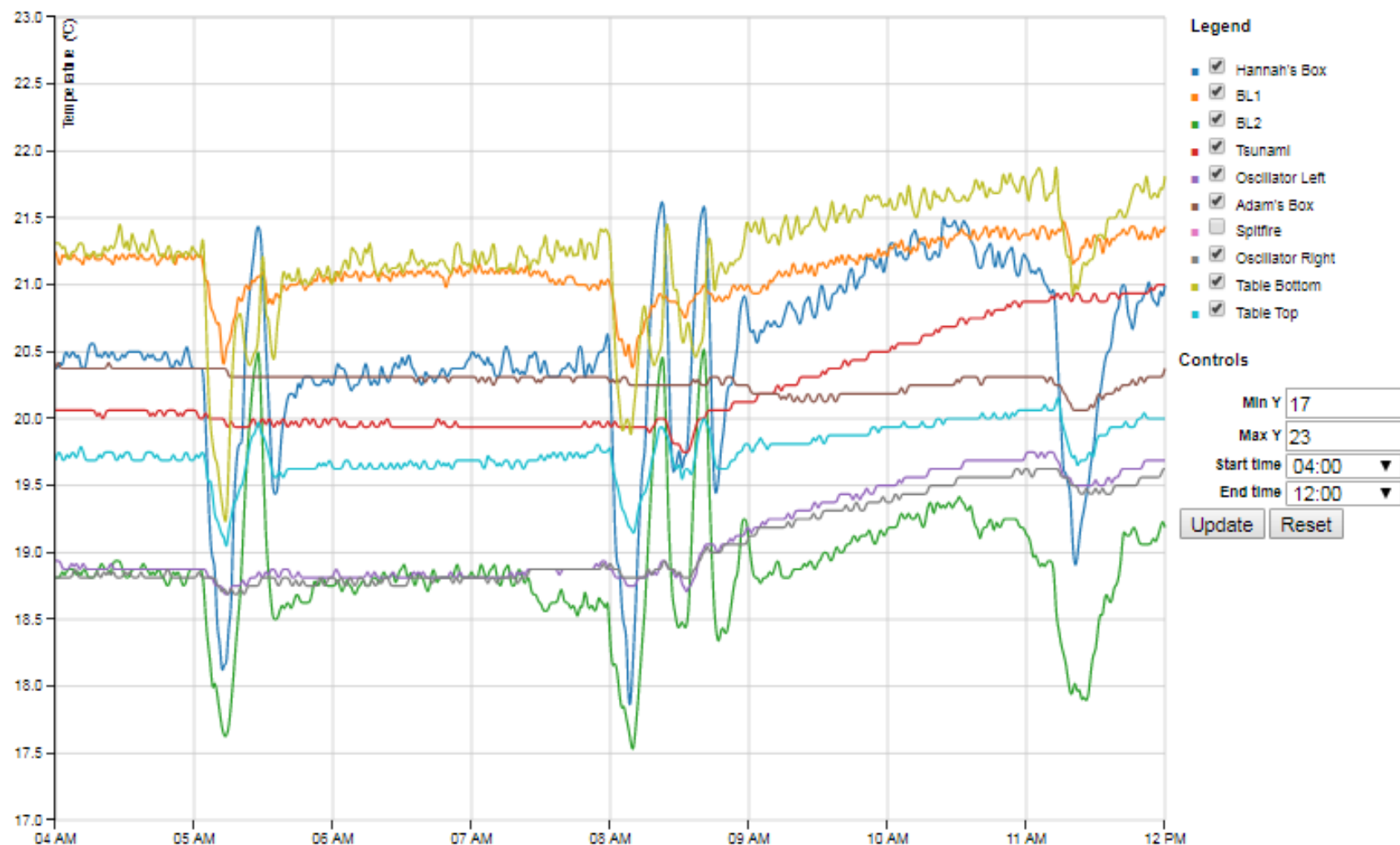## Temperature sensors (Bench) in 46:1047

June 2018

DataBroker

Temperature sensors (Bench) in 46:1047

◀ **Tuesday, June 12, 2018**   Wednesday, June 13, 2018   **Thursday, June 14, 2018** ▶

Voice Interaction

Alexa Demo of live sensor data from Southampton Lab

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Bournemouth Hackathon

- Worked with Pi systems to control a screen display

- Modular system allows multiple different 'apps' to be displayed.

- Modules created displaying individual readings or track readings over time

- Integrated with Alexa to allow voice control of the screen display

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Future Work

- Expansion in number of sensors

- Process more complex queries

- Control display screens / dashboards

- Record data & images in lab books

- View camera feeds for image analysis

- Combine multiple readings to diagnose equipment problems using machine learning

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Thank You

Any Questions?

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🐦 @Talk2Lab - We love tweets!