

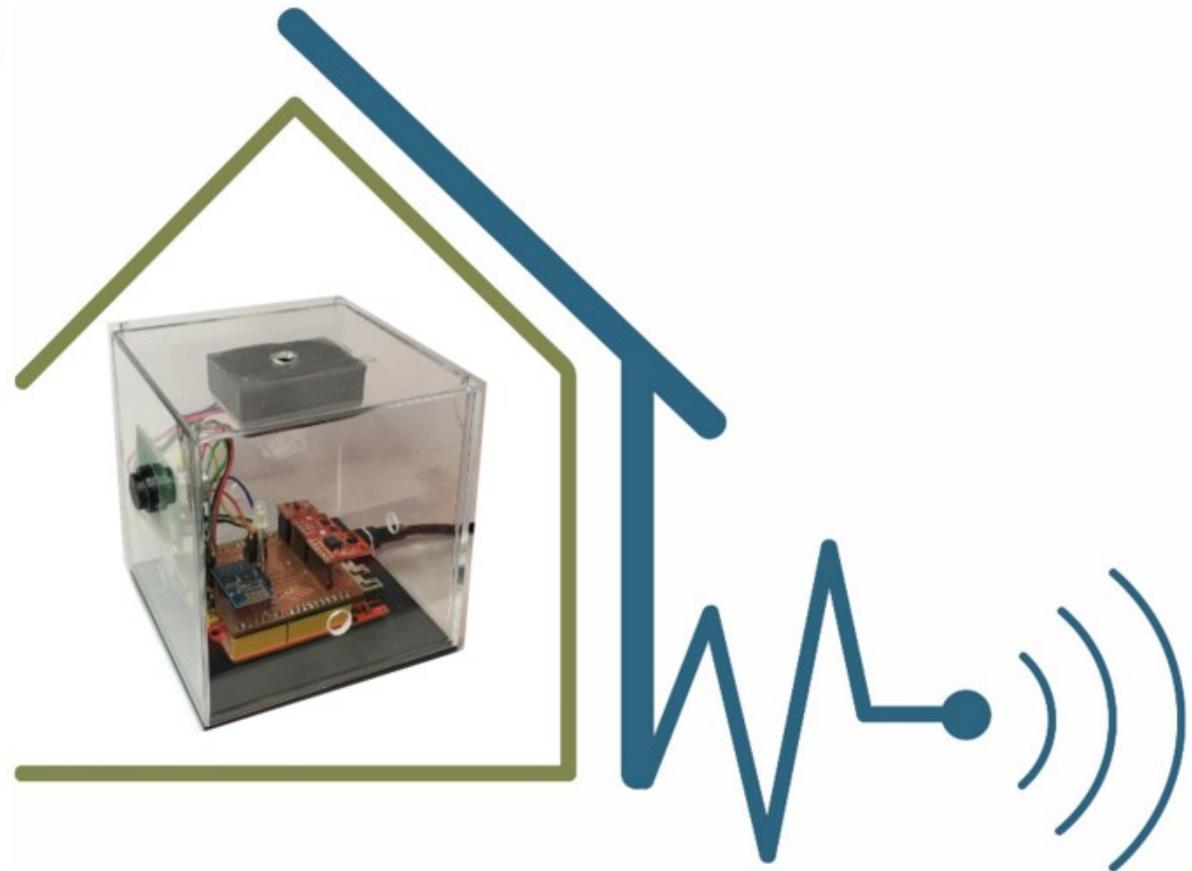
An introduction to HomeSense

Nigel Gilbert,

Klaus Moessner,

Kristrún Gunnarsdóttir

and Jie Jiang



HomeSense: digital sensors for social research

- The project will make it easier and more productive for social researchers to use the digital sensors that are becoming available as a result of the rise of the 'internet of things' and ubiquitous computing.



- The project will yield *guidelines* for and *examples* of the use of digital sensors, including consideration of technical, methodological and ethical issues.

Three strands

1. Adapting and developing sensors and digital devices for social research purposes;
2. Developing data collection methods to use these sensors and trialling the methods in a sample of homes; and
3. Creating tools for analysing the data streams that the sensors generate.

The project

- Started formally on 1 January 2016 (actually, 1 March 2016)
- Three years
- £800,000
- Staff
 - 1 three year post-doc at Surrey
 - **Kristrún Gunnarsdóttir**
 - 2 two year post-docs at Surrey
 - **Jie Jiang**
 - [...]
 - PI
 - **Nigel Gilbert**
 - Co-I
 - **Klaus Moessner, Surrey 5G Centre**
 - **Ewa Luger, Microsoft Cambridge**

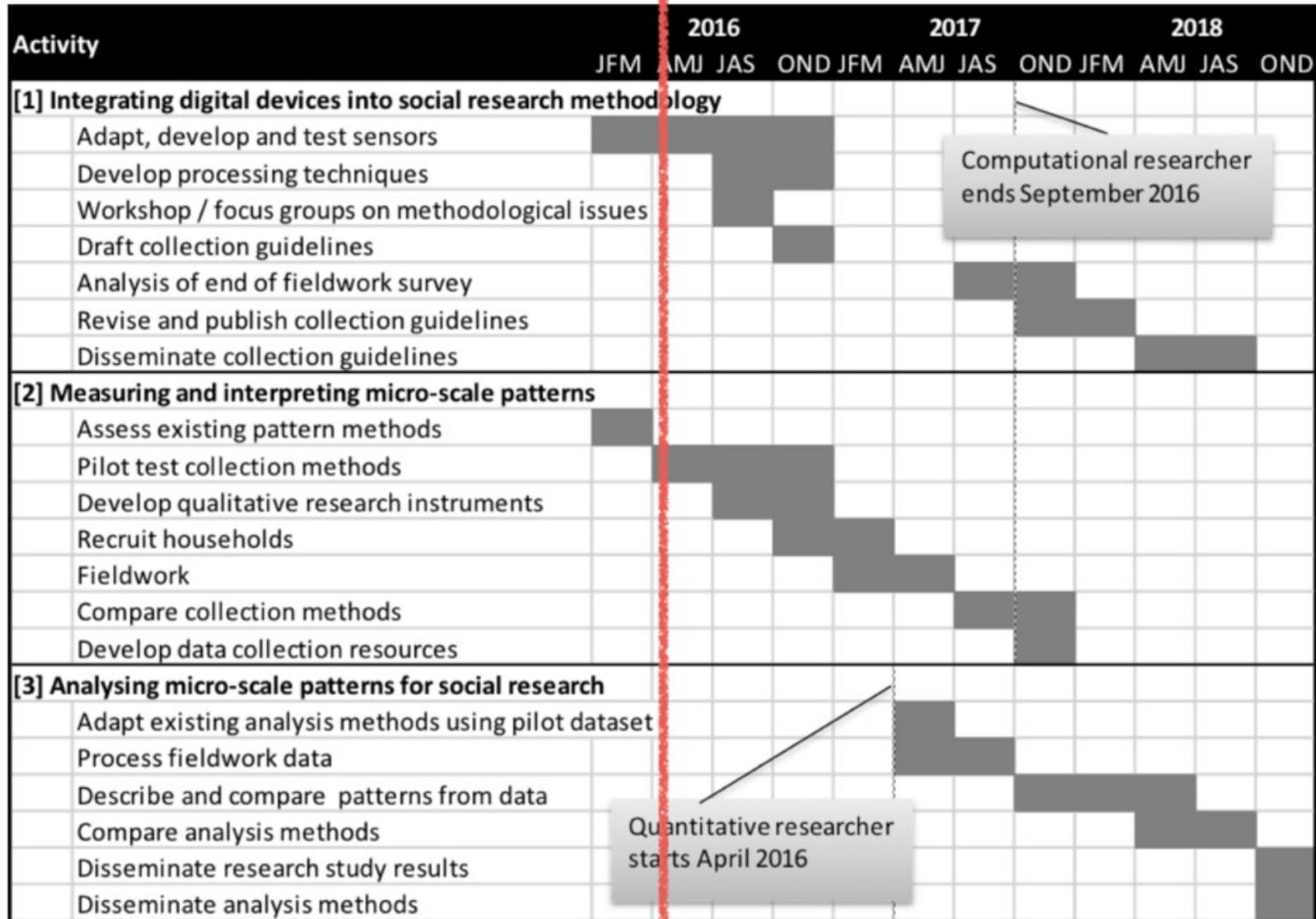


Activity patterns within the home

- What do we know about activities and interactions in households?
- Time use diaries can find out – but intrusive, tedious to complete – as can retrospective accounts – probably inaccurate
- 20 volunteer households
- Fitted with sensors
- For 3 months
- Triangulation with
 - Time use diaries
 - Questionnaires
 - Walking interviews



Progress



Computational researcher ends September 2016

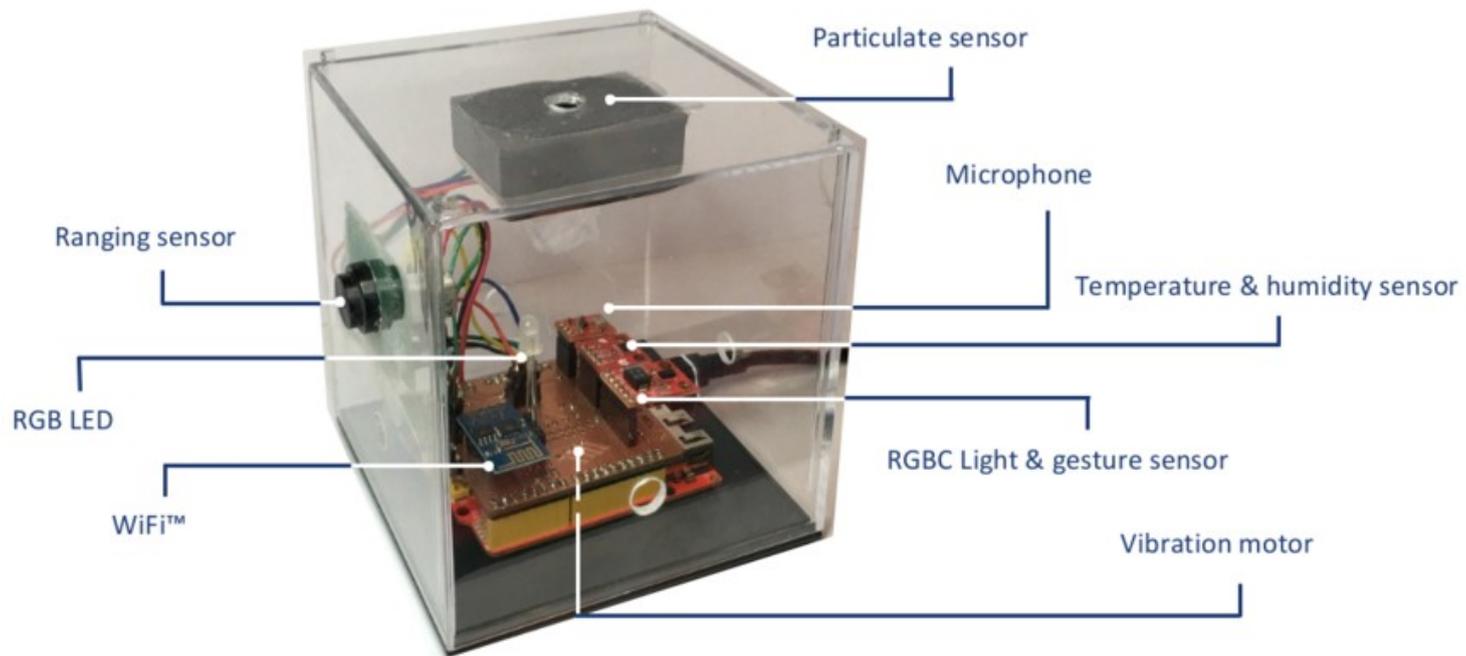
Quantitative researcher starts April 2016



Strand 1: Adapt, develop and test sensors

- In home fixed sensors
 - temperature, humidity, dust, noise, movement
- Wearable sensors
 - heart rate, movement, sleep
- Mobile phones
 - activity, location, answers to questions, e.g. emotions

Fixed sensor



Mi Band



Ultra-thin 8mm battery

Battery capacity: 41 mAh
Battery type: lithium polymer
Input current: 25 mA(TYP)
Input voltage: DC 5.0 V



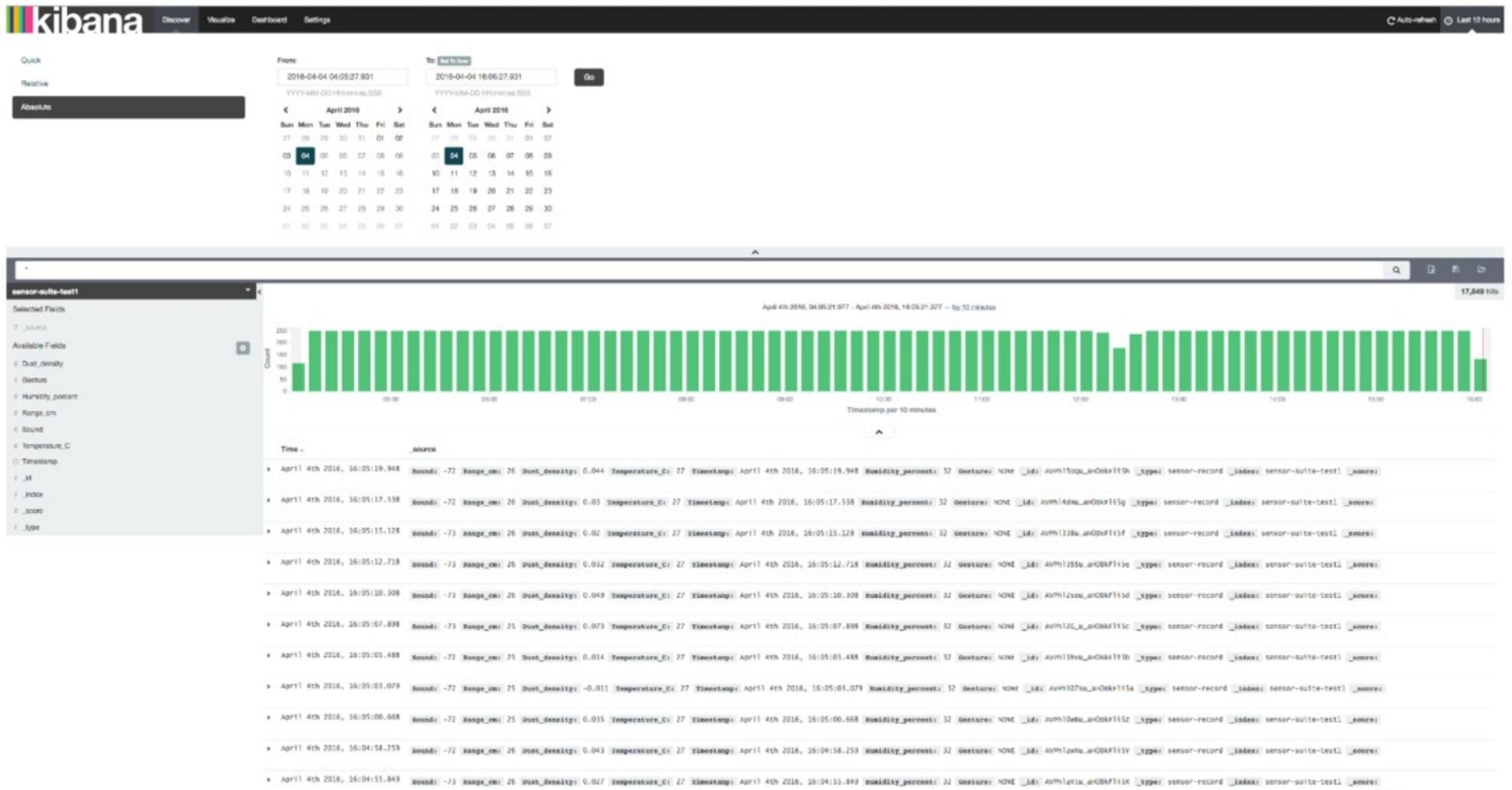
Military-grade accelerometer by ADI

Premium-quality Bluetooth® chip by Dialog

Bluetooth® version: 4.0

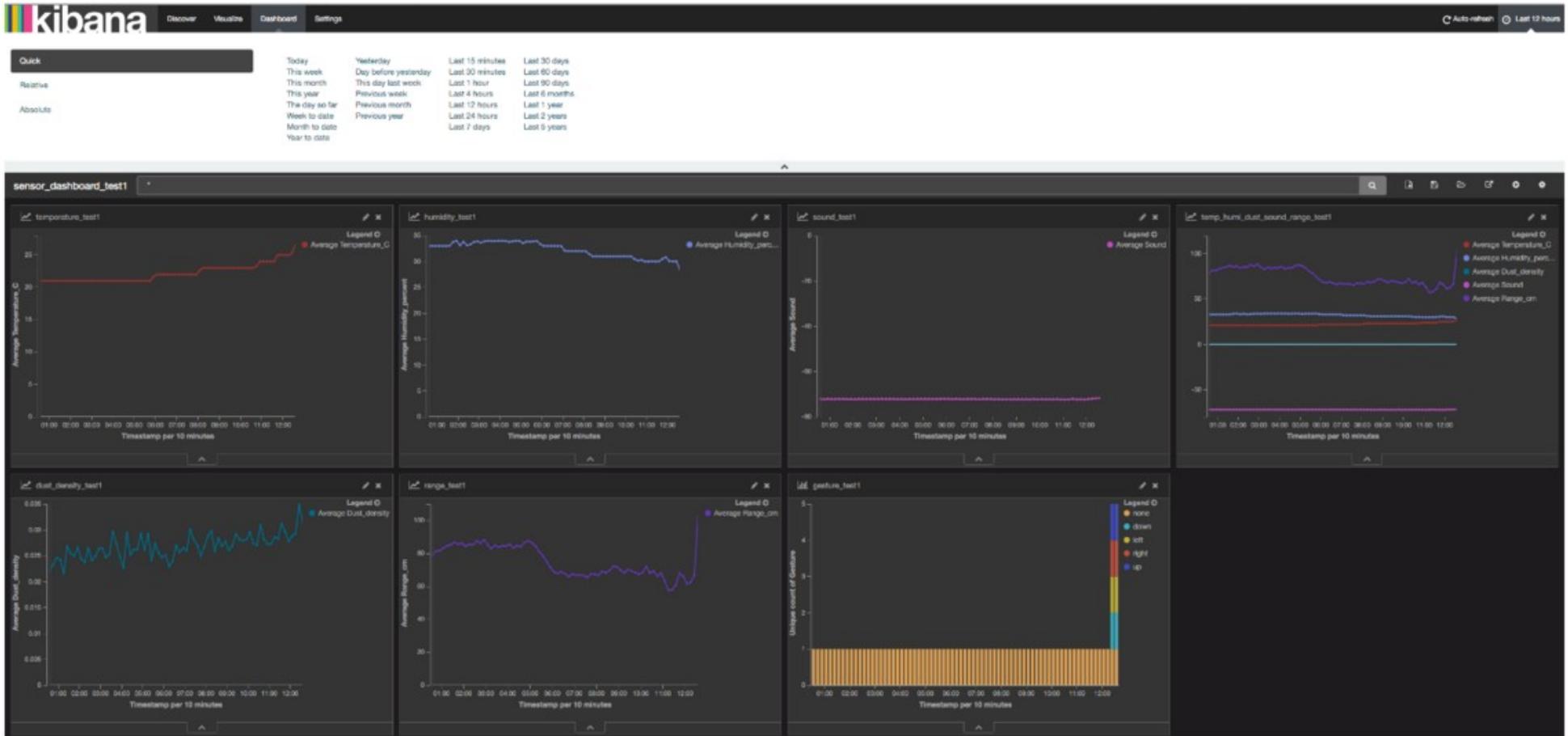
Data from Sensor Suite

Real-time data stream from a desk egg



Data from Sensor Suite

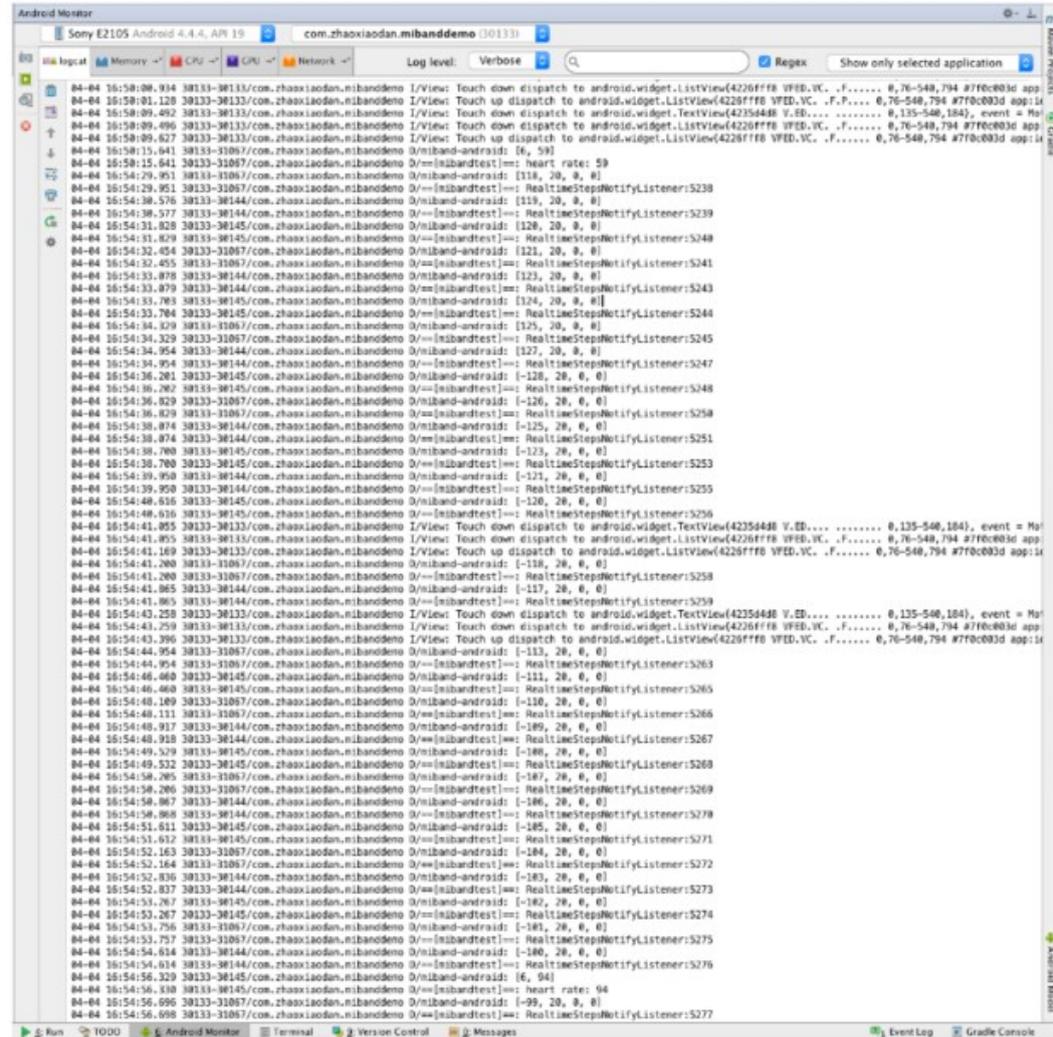
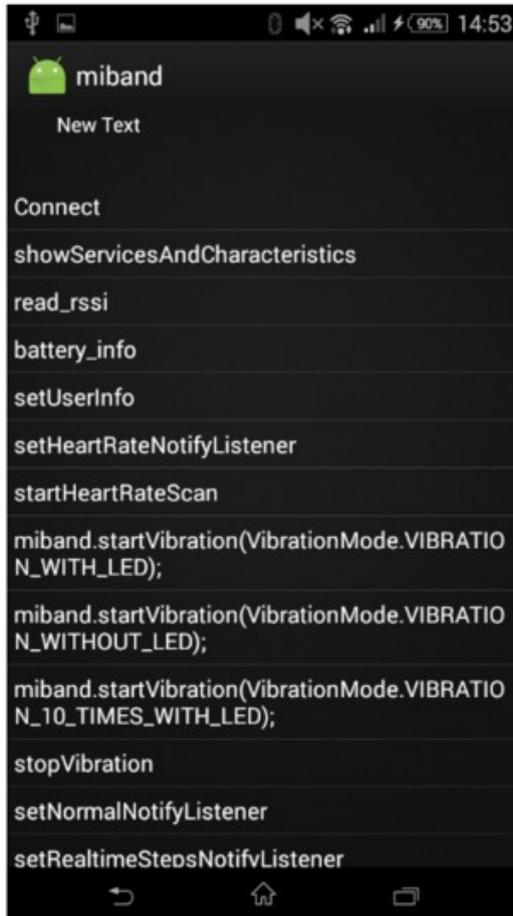
Visualization of the data stream in real time



Data from wearable device

App to extract data

Real-time data stream of a Mi Band

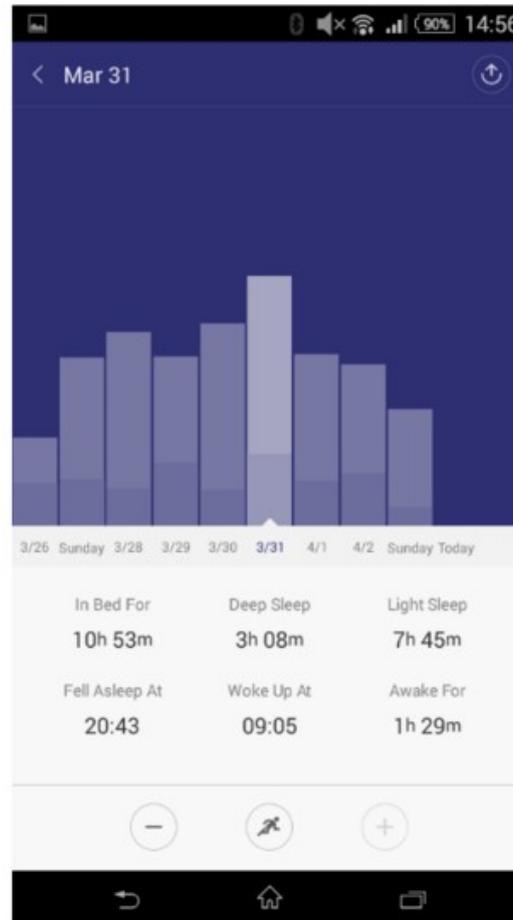


Data from wearable device

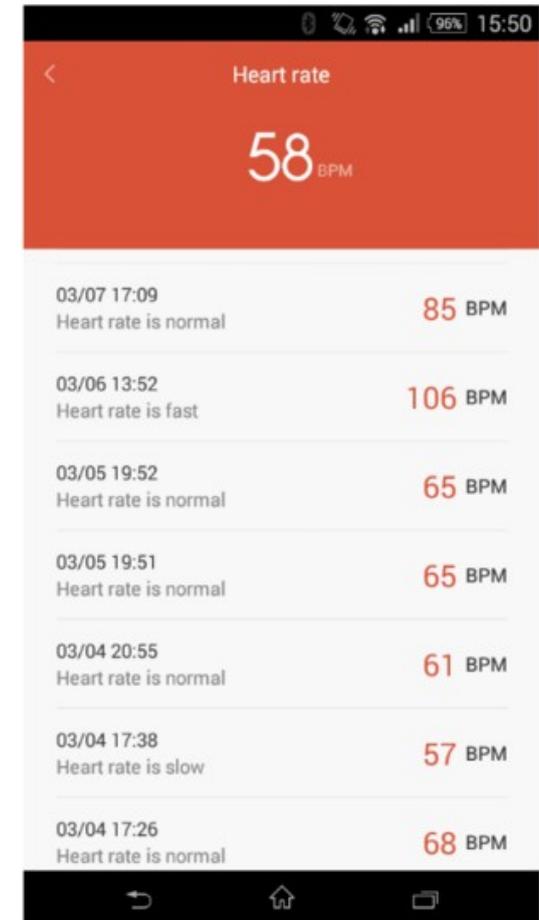
Movement



Sleeping



Heart rate



Strand 1 research questions

- What can be measured?
- Which technologies work, and how should they be assembled and configured?
- What are the practical problems of installing sensors in homes?
- How should one handle privacy and security?
- What are the ethical issues to be considered?
- How does one obtain informed consent, and from whom?
- What is the best way to recruit and motivate participants?

First Workshop



Workshop

London, 20-21 June 2016

INSIGHTS: bringing together sensor technology and social research
The Goodenough Club, 23 Mecklenburgh Square, London WC1N 2AD. Tel: +44 (0) 2078 378831



Research Methods Festival 2016



You are here: Home > RMF2016 > Programme

Session: The Ethics of Sensors
Time: Tuesday 5th July, 15:45 - 17:15
Convenor: Professor Nigel Gilbert (University of Surrey)

Abstract Details

Digital devices are becoming more sophisticated. A mobile phone can measure position and movement, as well as what the phone is being used for. Many people wear sensors for heart rate, sleeping patterns, and physical activity. And fixed sensors in houses can be plugged in to measure sound and energy use. Using such sensors effectively could reduce the need for questionnaires and interviews, providing potentially more accurate reporting.

However, the availability of such sensors and the data they can produce raises important ethical questions. This session will review the use of sensors in social research and the related ethical issues.

The level of the session is: Accessible

Presentation details

Presentation 1

Start time: 15:50
Presentation title: Ethics and research on telehealth with (older) people
Presenter: Dr Malcolm Fisk (De Montfort University)

Presentation 2

Start time: 16:15
Presentation title: User consent and the challenge of ambient, sensor-driven systems
Presenter: Dr Ewa Luger (Microsoft Research Fellow, University of Cambridge)

Presentation 3

Start time: 16:40
Presentation title: Towards a responsible research agenda for the use of sensors in the social sciences
Presenter: Professor Marina Jirotko (University of Oxford)

Next steps

- Recruit households
- Start to develop data analysis methods
 - We expect to collect about 165GB of data just from the sensors!
- Complete first draft of methodological and ethical guidelines
- Develop a training course on *Digital Sensing Devices for Social Research*
 - to be presented first in summer 2017, then every 6 months
- Create an international network of social researchers interested in using sensors and IoT for data gathering
- Interest companies marketing home automation and (health care) monitoring systems in the results of the project.



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[@CRESS_HomeSense](https://twitter.com/CRESS_HomeSense)

HomeSense

digital sensors in social research