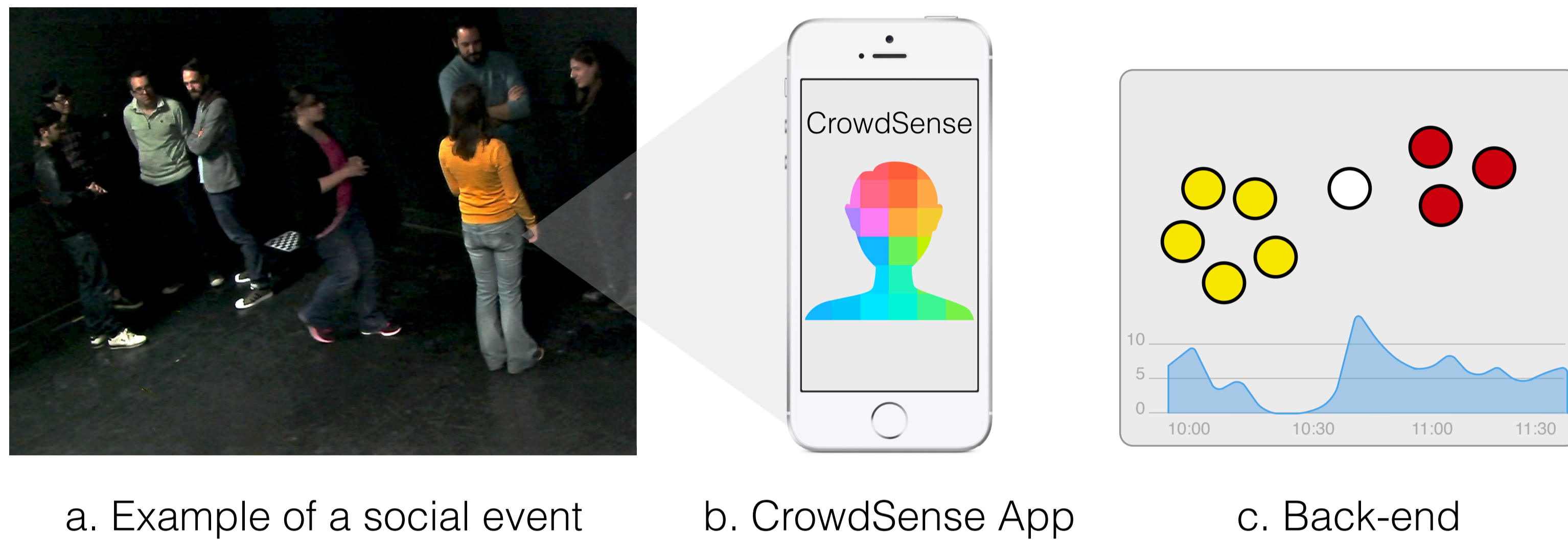


# Demo: Detecting Group Formations using iBeacon Technology

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## Introduction

We present a system for detecting **social interactions** inside crowds, depending entirely on the sensors available in a modern smartphone device. Our approach is particularly beneficial to the design and implementation of crowd behavioural analytics, influence strategics and algorithms for crowd reconfiguration.



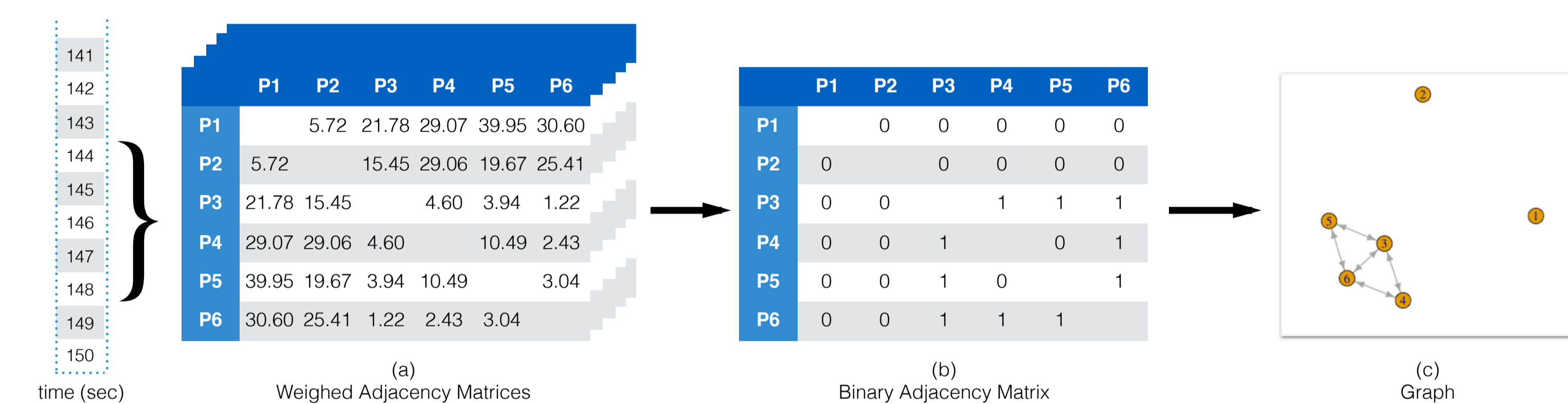
a. Example of a social event

b. CrowdSense App

c. Back-end

## How our system works

By utilising Apple's iBeacon™ implementation of Bluetooth Smart using **SensingKit**, our open-source multi-platform mobile sensing framework, we are able to detect the proximity of users carrying a smartphone in their pocket. We then use an algorithm based on graph theory to predict group interactions inside the crowd.



Please check our video at:

<https://vimeo.com/kkatevas/mobisys17-demo>

## How to Participate in our Demo

Come and join us in the live demonstration of our system at MobiSys 2017 demo session.

1. Make sure you are connected with MobiSys WiFi network.
2. Download **CrowdSense App** for iOS, available for free at the App Store.
3. Open the app and tap at the **MobiSys'17 Demo** button.
4. Join the demo and...start socialising! Analytics about your interactions will start appearing live in our screen.

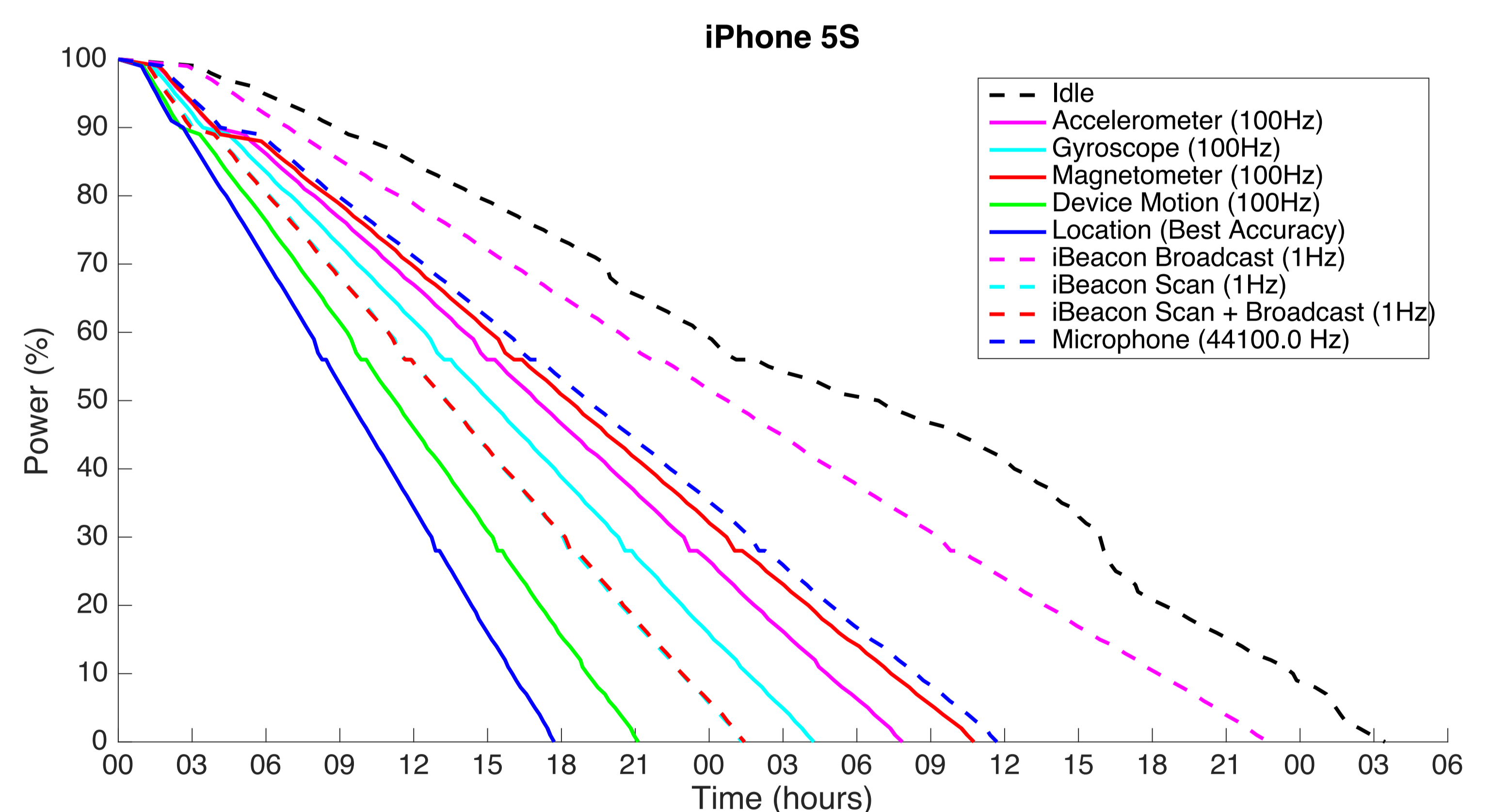
<http://tiny.cc/crowdsense>



## SensingKit framework

Our system is using our SensingKit continuous sensing framework to access sensor data from the user's device.

- Works in **iOS** and **Android** mobile systems.
- Supports most of the available smartphone sensors.
- Power efficient proximity sensing using iBeacon™ / Eddystone™ technology over Bluetooth Smart (BLE).
- Easily extensible using a modular design.
- Available in **open-source** under the GNU LGPL v3.0.
- For more info, please visit [www.sensingkit.org](http://www.sensingkit.org).



Power consumption of SensingKit running on an iPhone 5S smartphone running iOS 9.

## References

- Kleomenis Katevas, Hamed Haddadi and Laurissa Tokarchuk, "SensingKit: Evaluating the Sensor Power Consumption in iOS devices", 12th International Conference on Intelligent Environments (IE'16), September 2016, London, UK.
- Kleomenis Katevas, Hamed Haddadi, Laurissa Tokarchuk, Richard G. Clegg, "Detecting Group Formations using iBeacon Technology", 4th International Workshop on Human Activity Sensing Corpus and Application (HASCA2016) in conjunction with UbiComp2016, September 2016, Heidelberg, Germany.
- Kleomenis Katevas, Hamed Haddadi, and Laurissa Tokarchuk. 2014. Poster: SensingKit: a multi-platform mobile sensing framework for large-scale experiments. In *Proceedings of the 20th annual international conference on Mobile computing and networking (MobiCom '14)*. ACM, New York, NY, USA, 375-378.

## Acknowledgements

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