

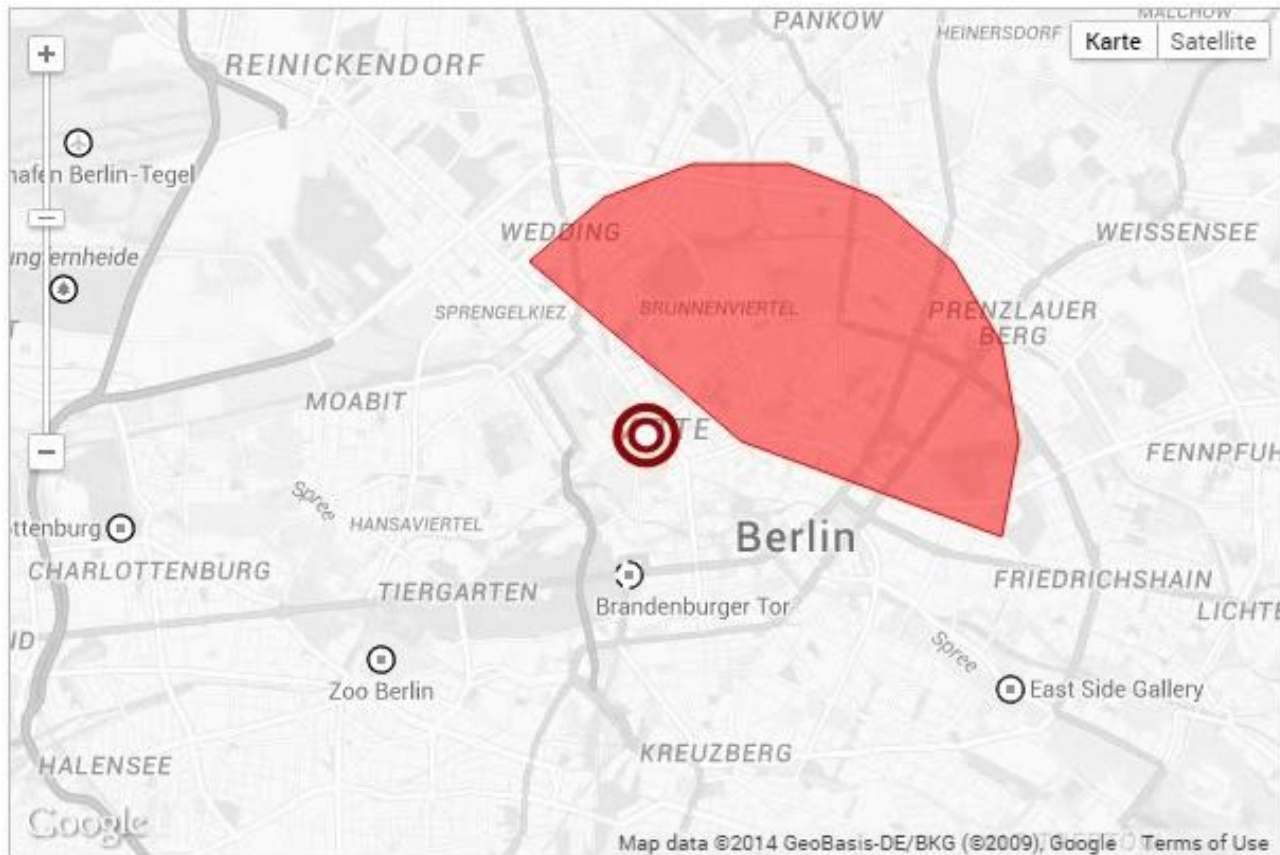
On The Feasibility of Using Two Mobile Phones and WLAN Signal to Detect Co-Location of Two Users for Epidemic Prediction

Khuong Nguyen, Zhiyuan Luo & Chris Watkins

Are we being tracked?



Cellular mobile phone tracking



Google Location History

Location history

« October 2014 »

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

Show: 1 Day ▾

October 14, 2014

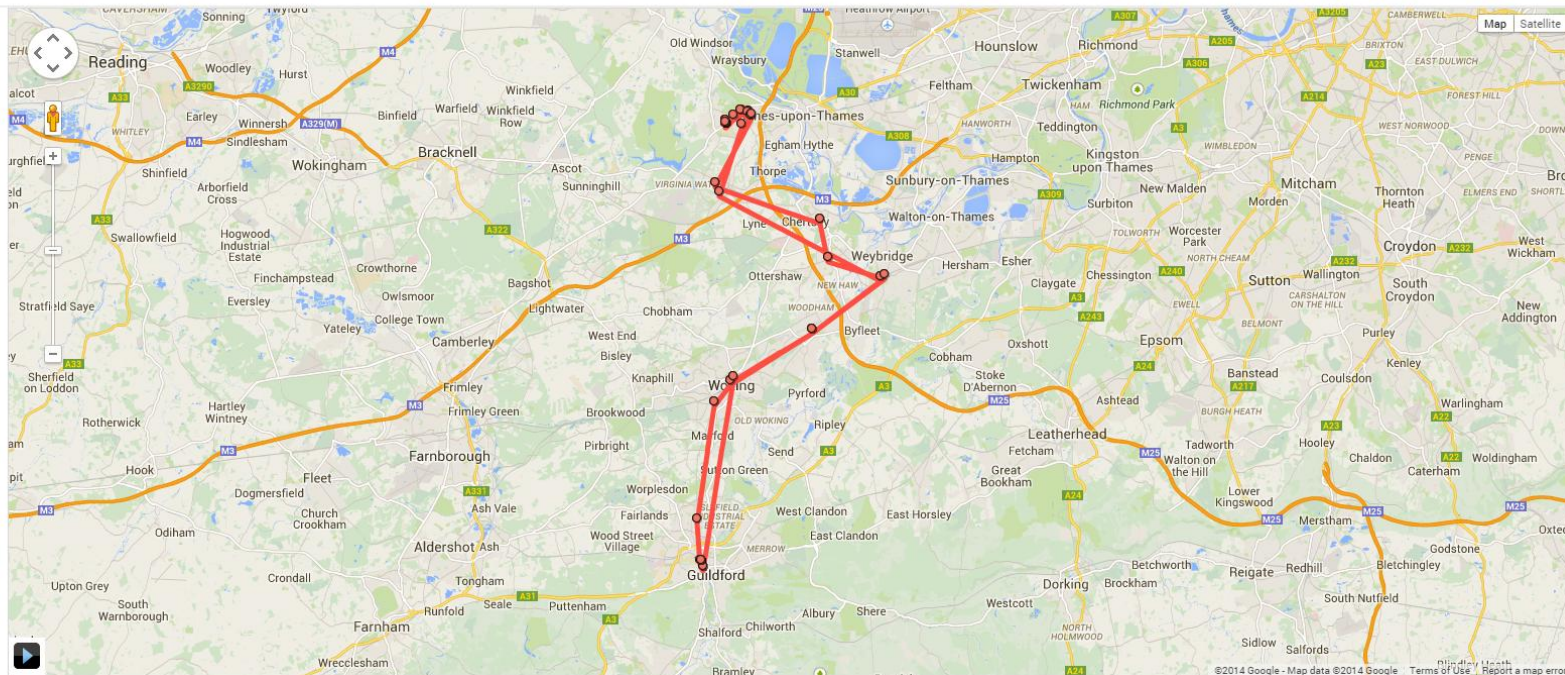
► Show timestamps

Export to KML

Delete history from this day

Delete all history

Some points have been hidden from view. [Show All Points](#) [Learn More](#)



<https://maps.google.com/locationhistory>

Google Location History

Location history

October 2014						
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Show: 1 Day

October 14, 2014

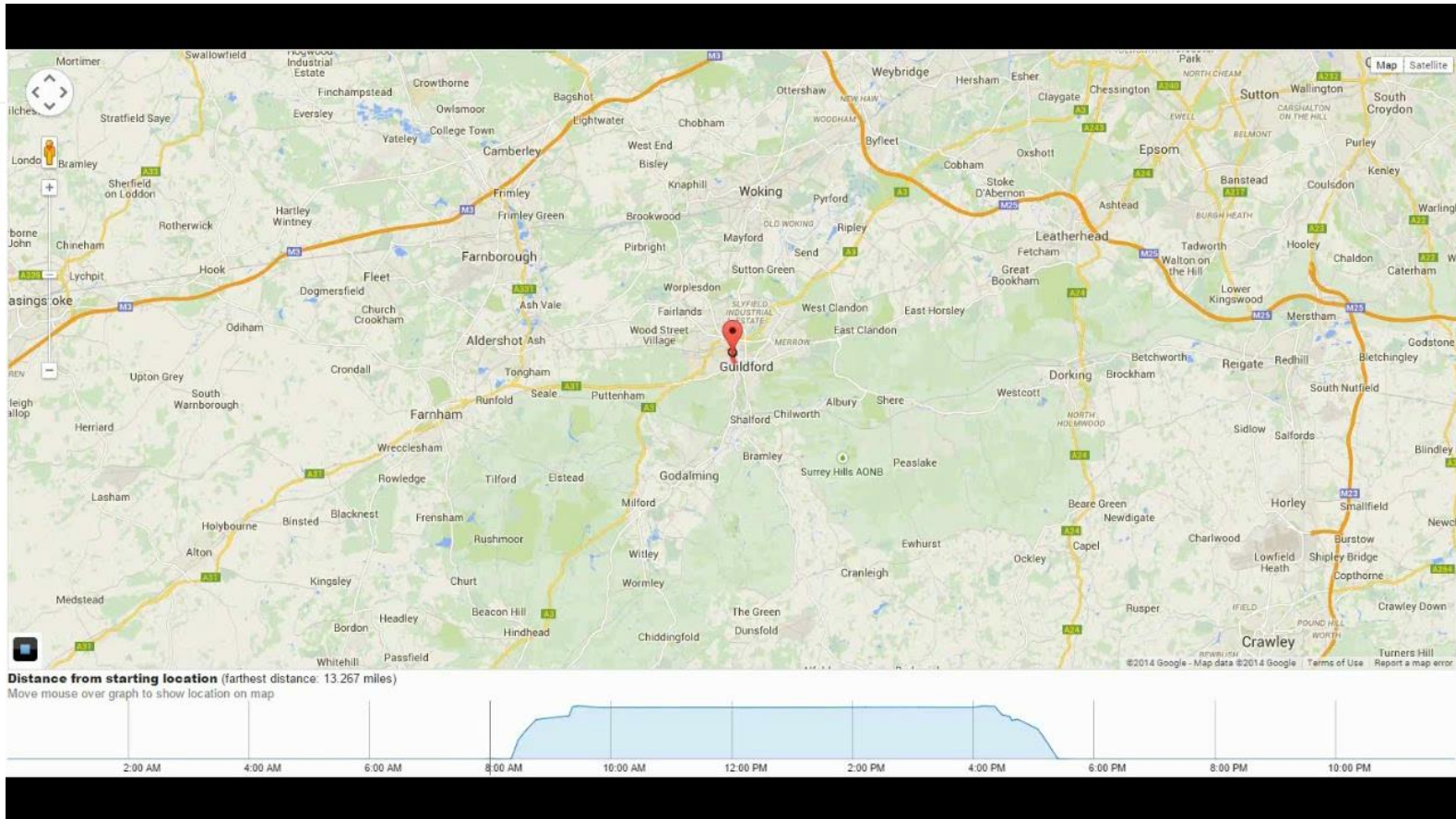
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<https://maps.google.com/locationhistory>

Google Location History

November 2014						
«	Sun	Mon	Tue	Wed	Thu	Fri
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	1	2	3	4	5	6

Show: 1 Day

November 25, 2014

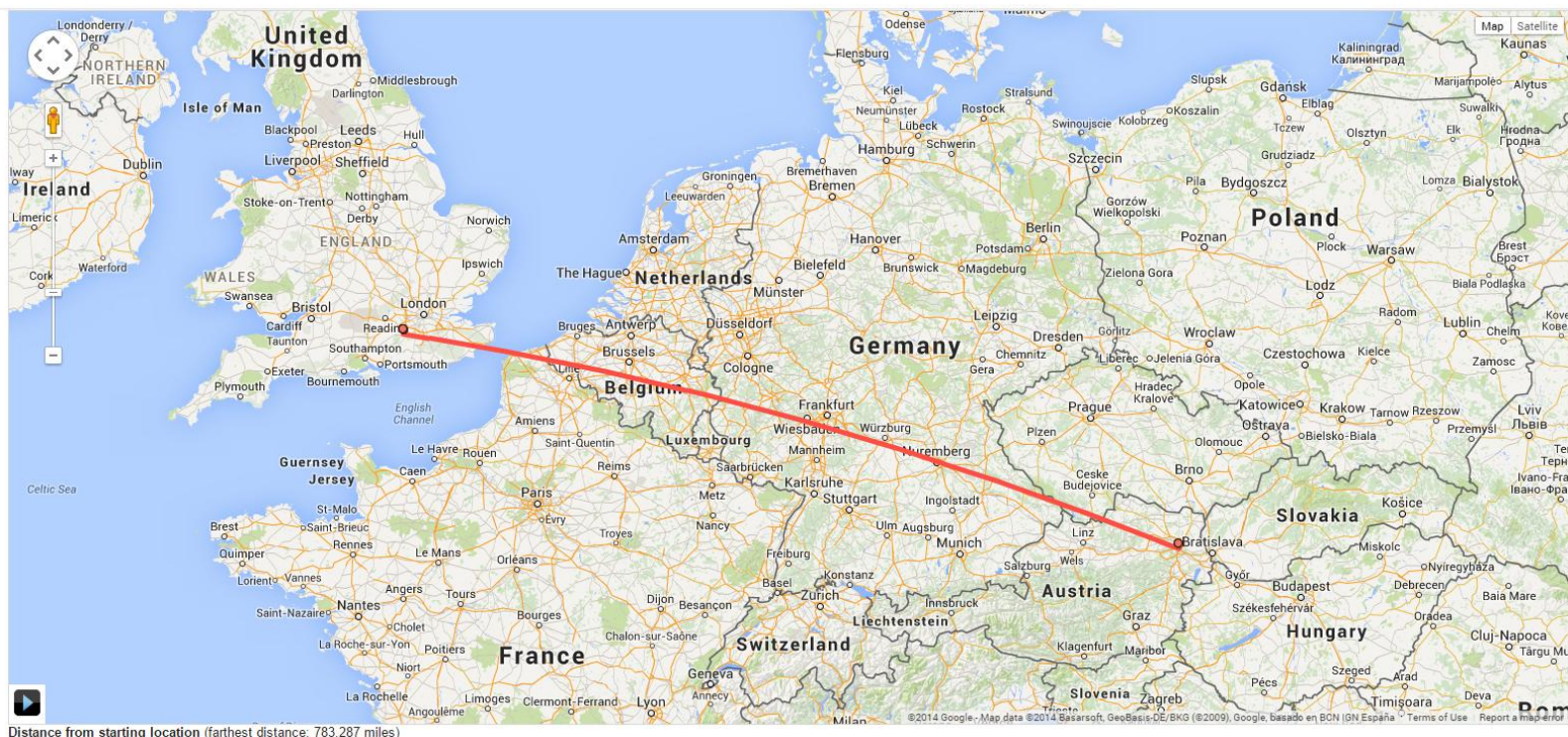
Show timestamps

Export to KML

Delete history from this day

Delete all history

Some points have been hidden from view. [Show All Points](#) [Learn More](#)



<https://maps.google.com/locationhistory>



Motivation

- Revolution in communication technology
 - Mobile phones
 - Internet
 - GPS / WiFi / Bluetooth
- Most people carry a mobile phone
 - Smart phone



Wireless Co-located Tracking

- **Co-localisation** is the process of tracking two entities in the same proximity at the same time.
- A physical contact between 2 persons may be regarded as a 'handshake' between the phones.



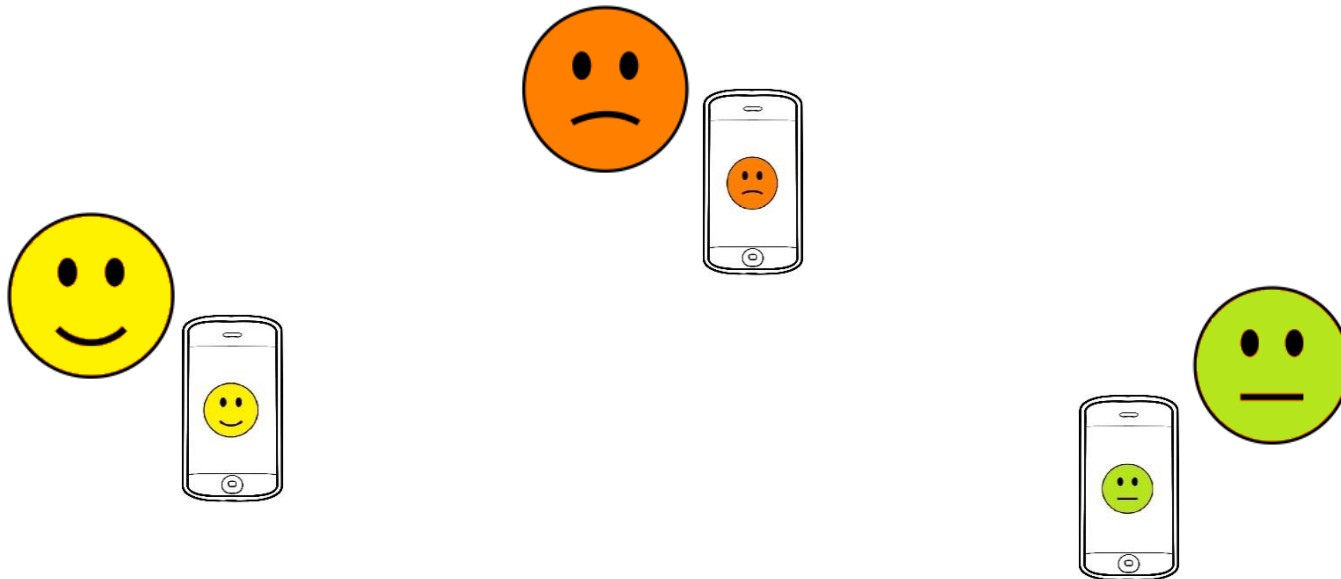
Wireless Co-located Tracking

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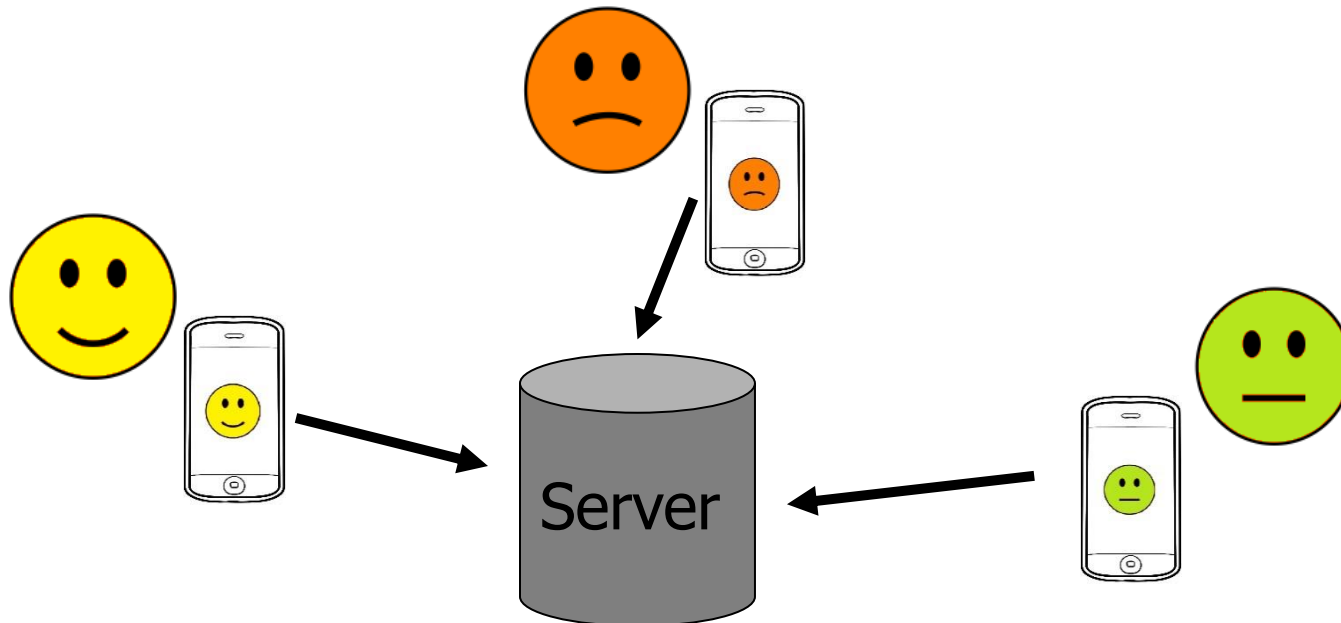
Wireless Co-located Tracking

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Wireless Co-located Tracking

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Wireless Co-located Tracking

- **Reactive:** find the origin of an outbreak.
- **Pro-active:** predict the severity of an epidemic, and the safety level for the user.
- “How can we detect when the 2 mobile phones are close?”



An Android tracking app

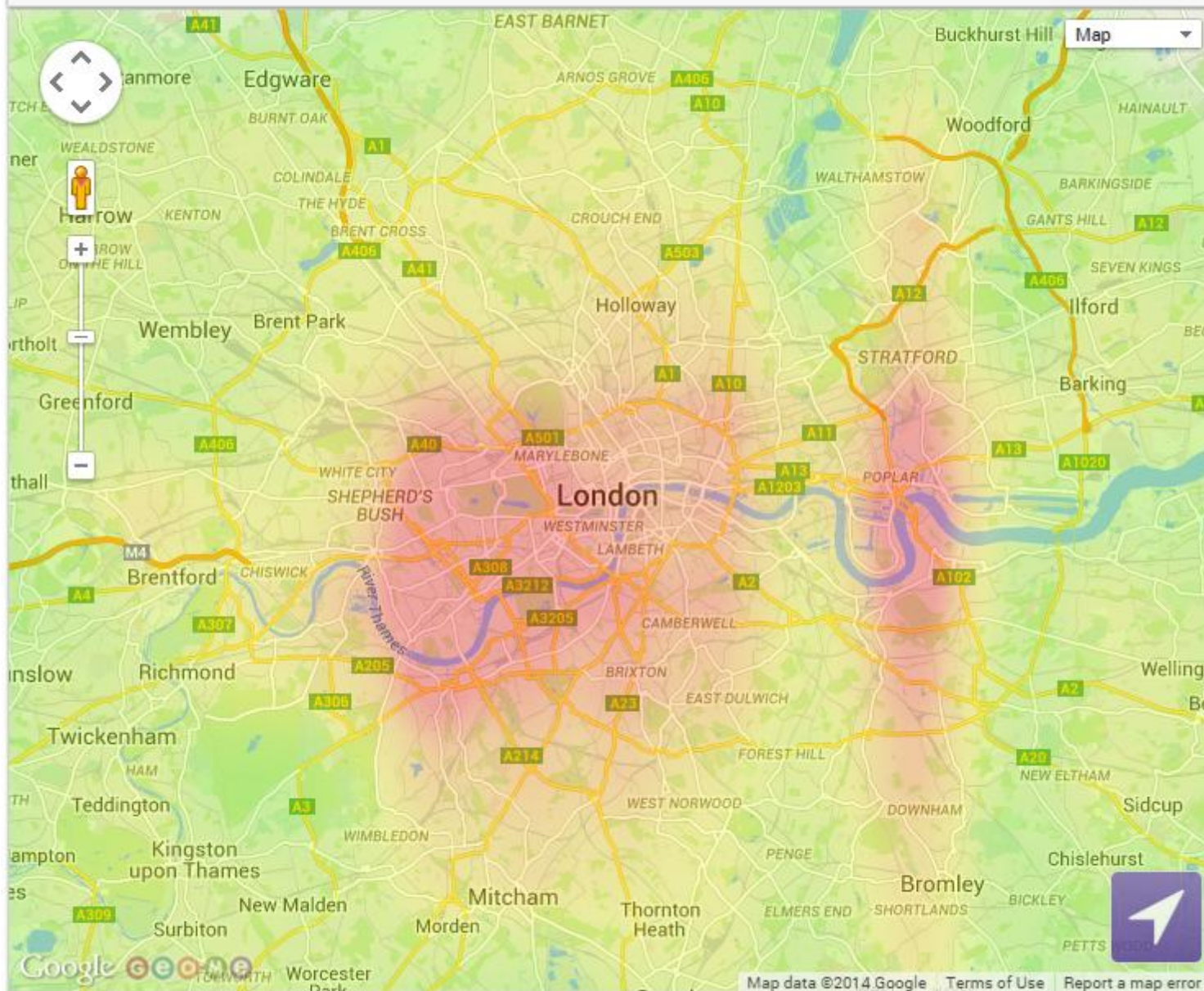
- Android app running in the background to record the WiFi signal.
 - no Bluetooth or GPS.
 - saving WiFi data into a local file.
- Consumes less than 30% of the total power when used continuously.



Scanning modes

- **Passive scanning:** constantly listens for beacons.
- **Active scanning:** sends request to discover other devices.
- **Hybrid mode:**
 - Active scanning if moving.
 - Passive scanning if static.

Total hotspots in view: 506,140



? Hotspot coverage:



Premium Venue



Lots



Quite a few



Not so many

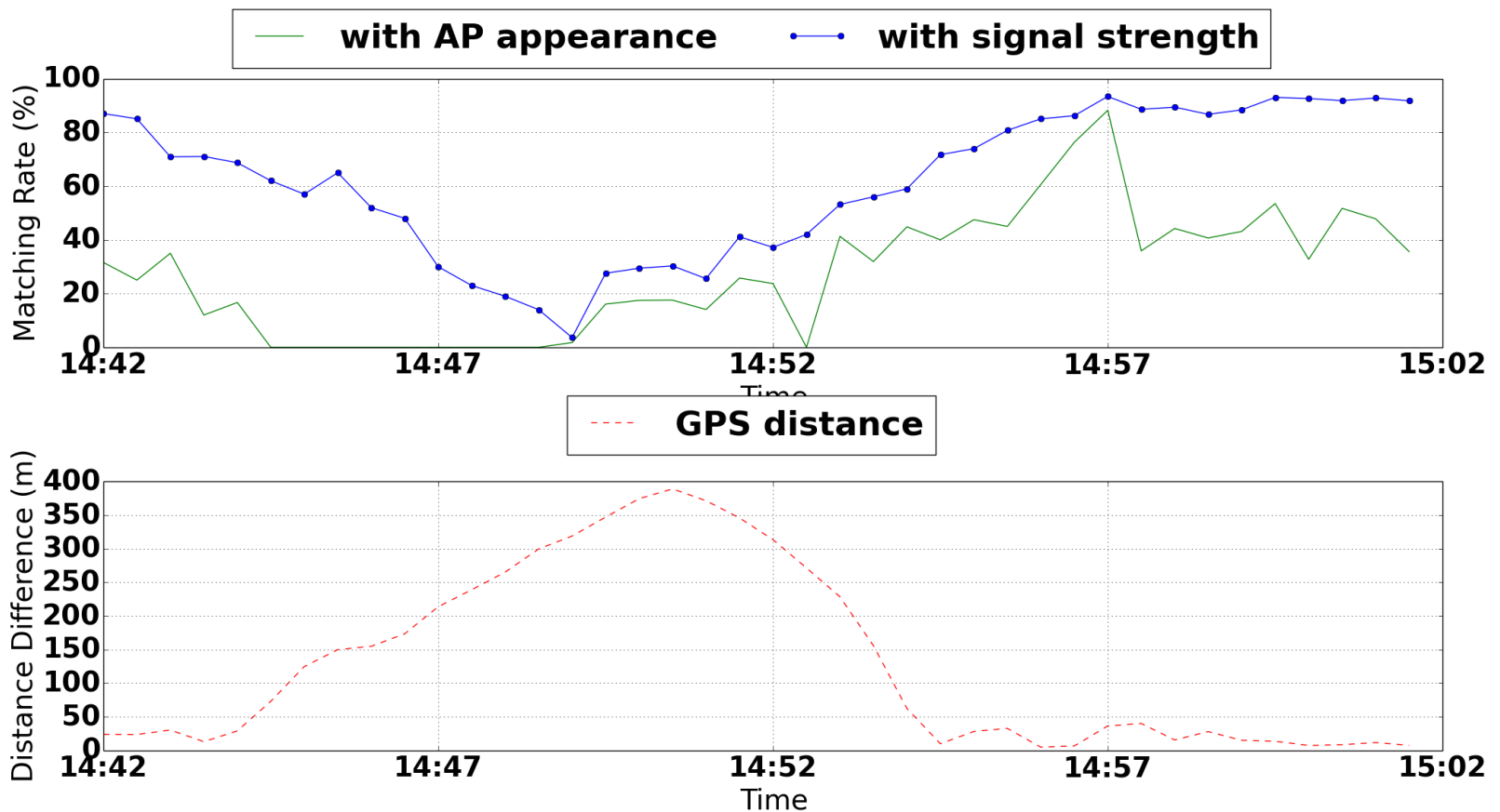




Research question

- Can 'matching rate' be constructed to reflect the corresponding GPS distance?

Matching rate vs. GPS distance





Questions

Thank you.