POSIT: Free Search & Rescue Tool

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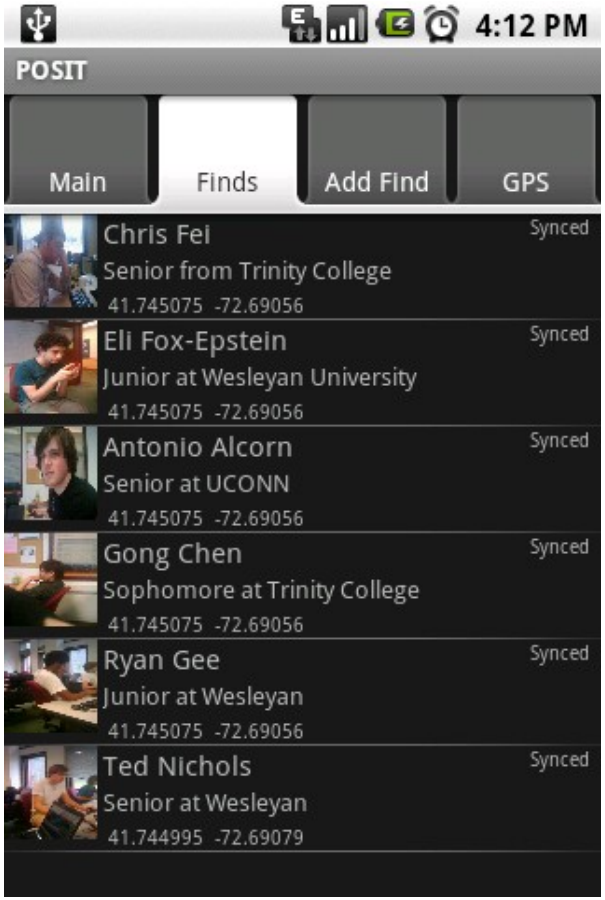
What is Android?

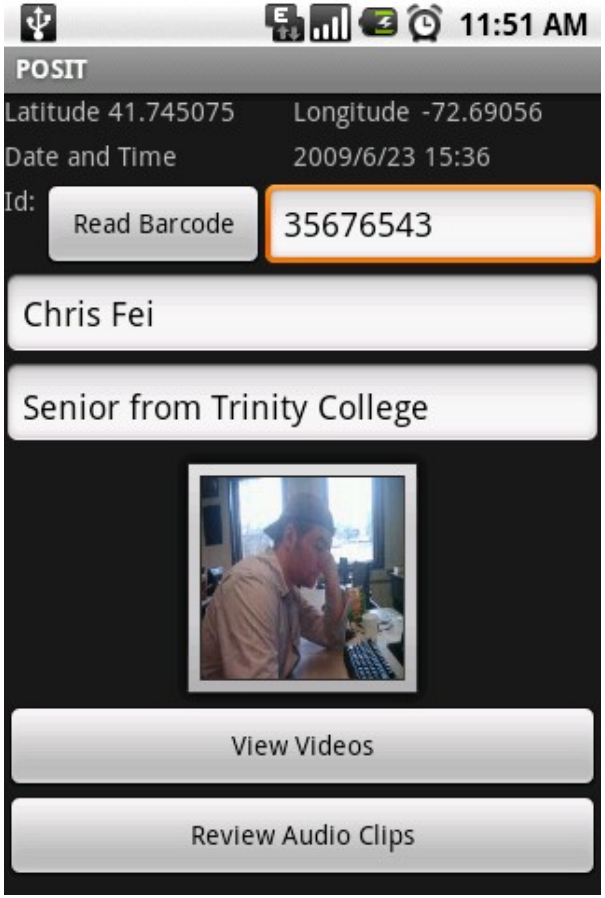
- Mobile application platform by Google
- Java based
- Free & open source

About POSIT

- Portable Open Search and Identification Tool
- Keep track of geographic locations on your phone
- Help rescue workers track victims, or researchers track finds in the field
- Originally written by:
  - Prasanna Gautam
  - Trishan deLanerolle
  - Professor Ralph Morelli

About POSIT



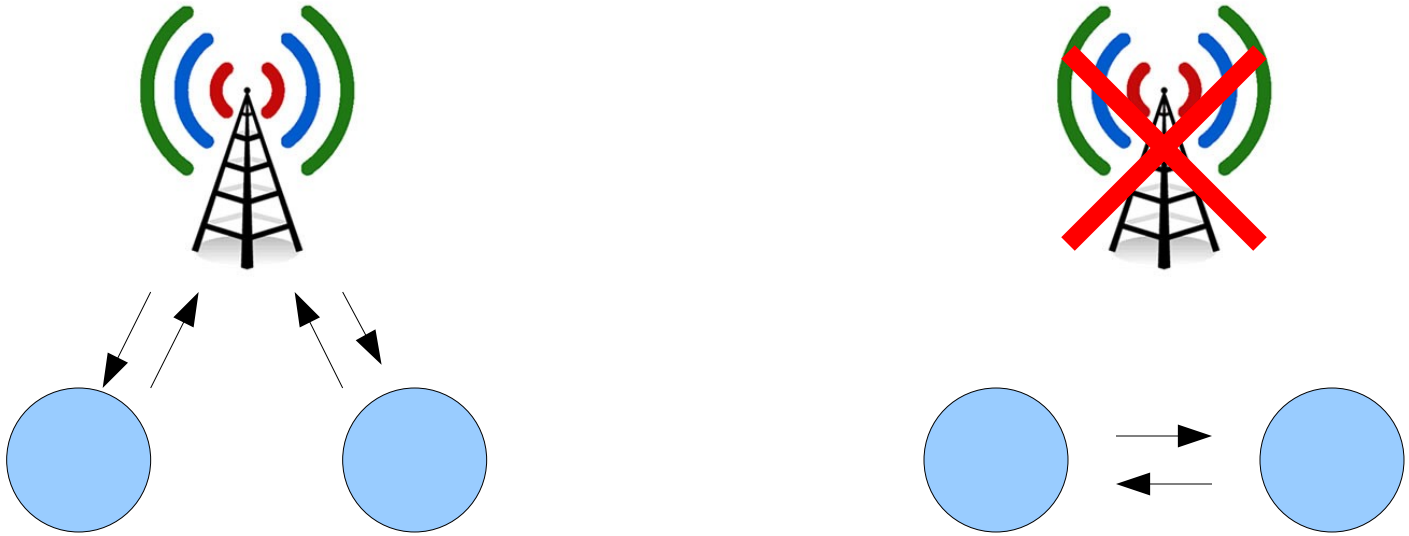


Our Main Goals for POSIT

- Let phones talk to each other without a cell tower (ad-hoc networking)
- Let searchers track areas they have covered
- Secondary goals
  - Rewrite web server
  - Improve existing features and stability
  - Record audio, video
  - More user-friendly interface
    - Painless server registration

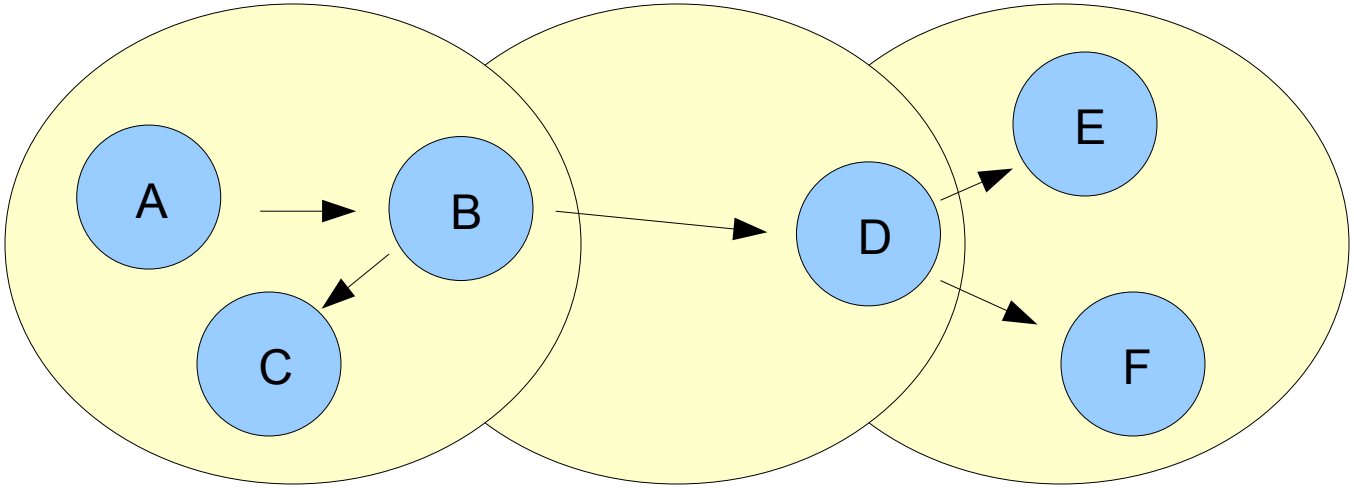
Ad-hoc networking

- Disaster areas: cell towers, infrastructure destroyed
- Let phones talk to each other directly



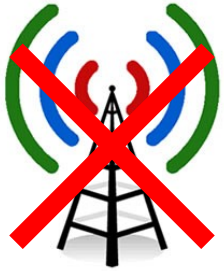
Ad-hoc networking

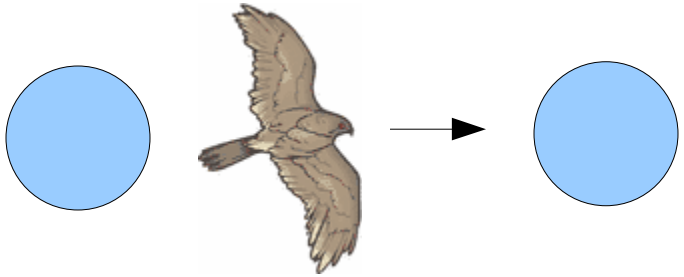
- Collaborated with Swedish group at Linköping University
  - Gustav Nykvist, Mikael Asplund
  - Random-Walk Gossip algorithm
  - Multihop path



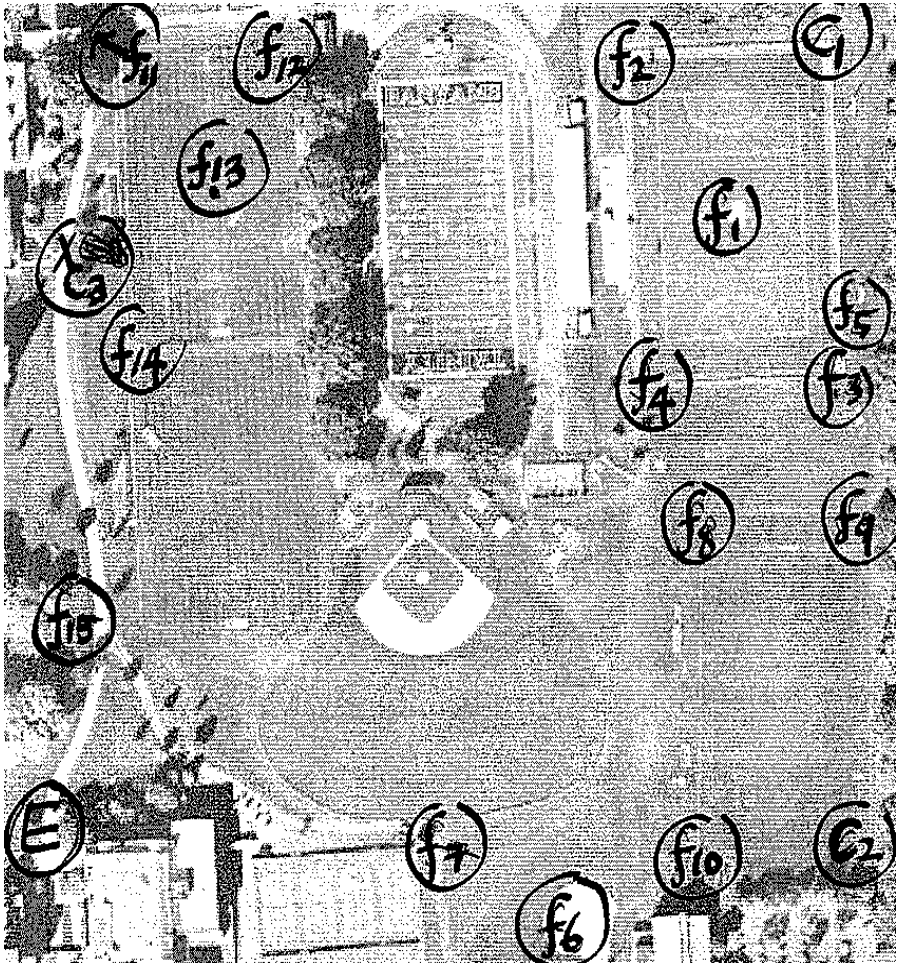
Ad-hoc synchronization

- Use ad-hoc network to synchronize finds between phones
- When a find is marked, tell the network about it
  - GPS coordinates
  - Some metadata
- Use random walk to propagate
  - Disconnected network





Testing the Ad-Hoc Network

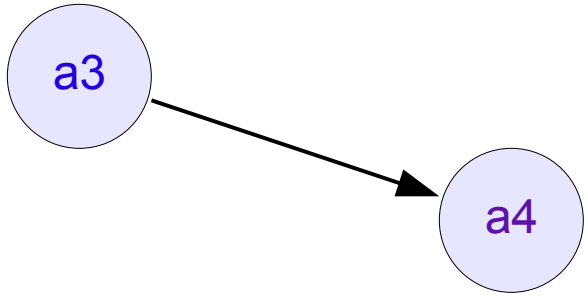


Time	Action
00:00	Node A_1 starts at C1, walks to find F_1 Node A_2 starts at C1, walks to find F_2 Node A_3 starts at C2, walks to find F_3 Node A_4 starts at C2, walks to find F_6 Node A_5 starts at C2, walks to find F_{11} Node A_6 starts at C3, walks to find F_{13}
00:04	Node A_2 walks to C_2
00:05	Node A_1 walks to find F_{10} Node A_3 walks to find F_4 Node A_6 walks to find F_{15}
00:06	Node A_5 walks to find F_{12}
00:07	Node A_2 walks to find F_8 Node A_4 walks to find F_9
00:08	Node A_3 walks to C_1
00:09	Node A_5 walks to C_2
00:10	Node A_1 walks to C_3 Node A_2 walks to find F_7
00:11	Node A_6 walks to C_3 Node A_4 walks to C_3
00:12	Node A_3 walks to find F_5
00:13	Node A_1 walks to find F_{14}
00:15	All nodes go to the end position E.

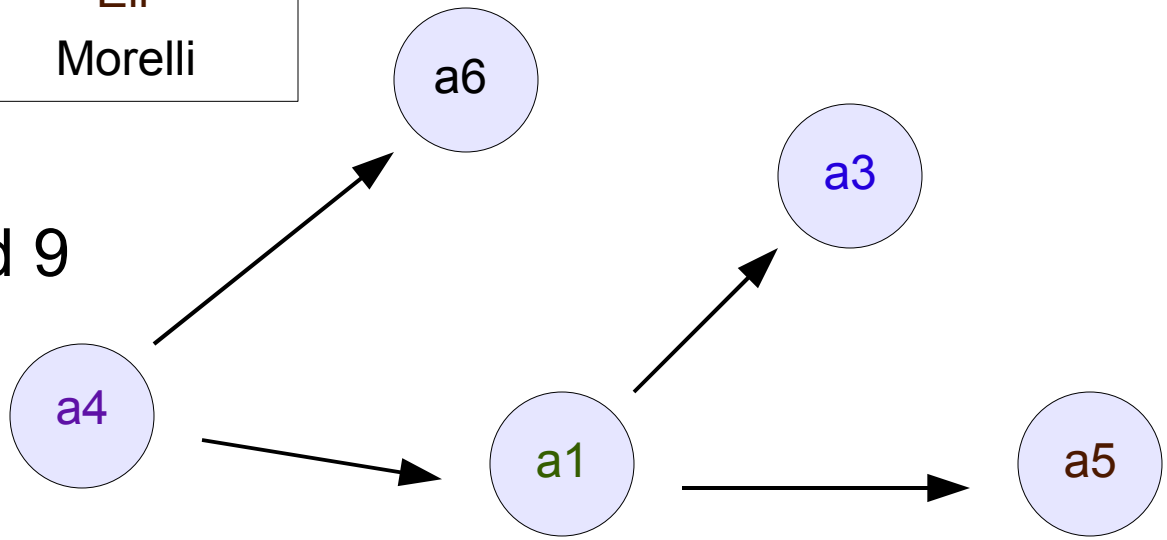
Testing the Ad-Hoc Network: Results

Actor	Name
a1	Antonio
a2	Gong
a3	Qianqian
a4	Chris
a5	Eli
a6	Morelli

Find 3



Find 9

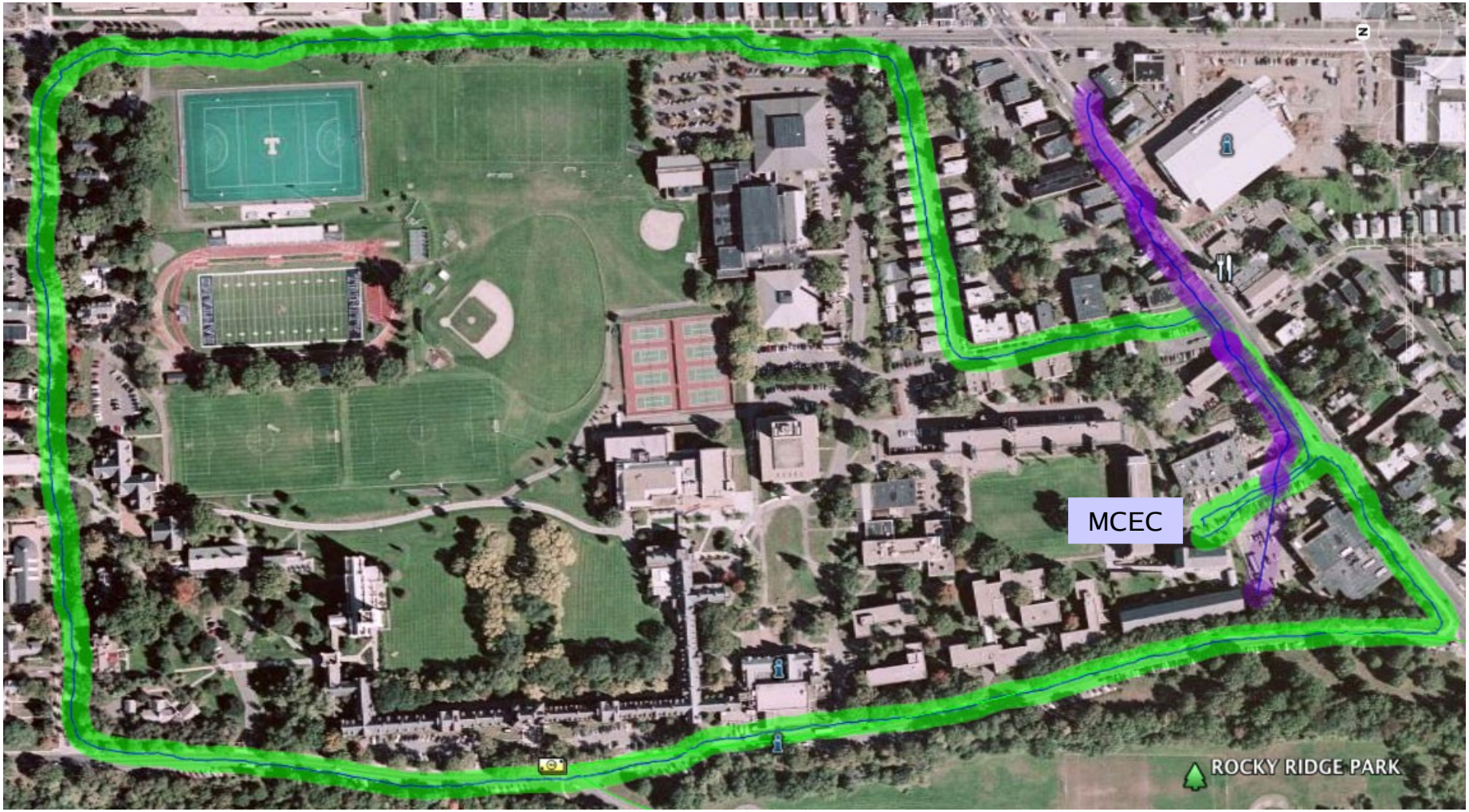


Testing the ad hoc Network: Results

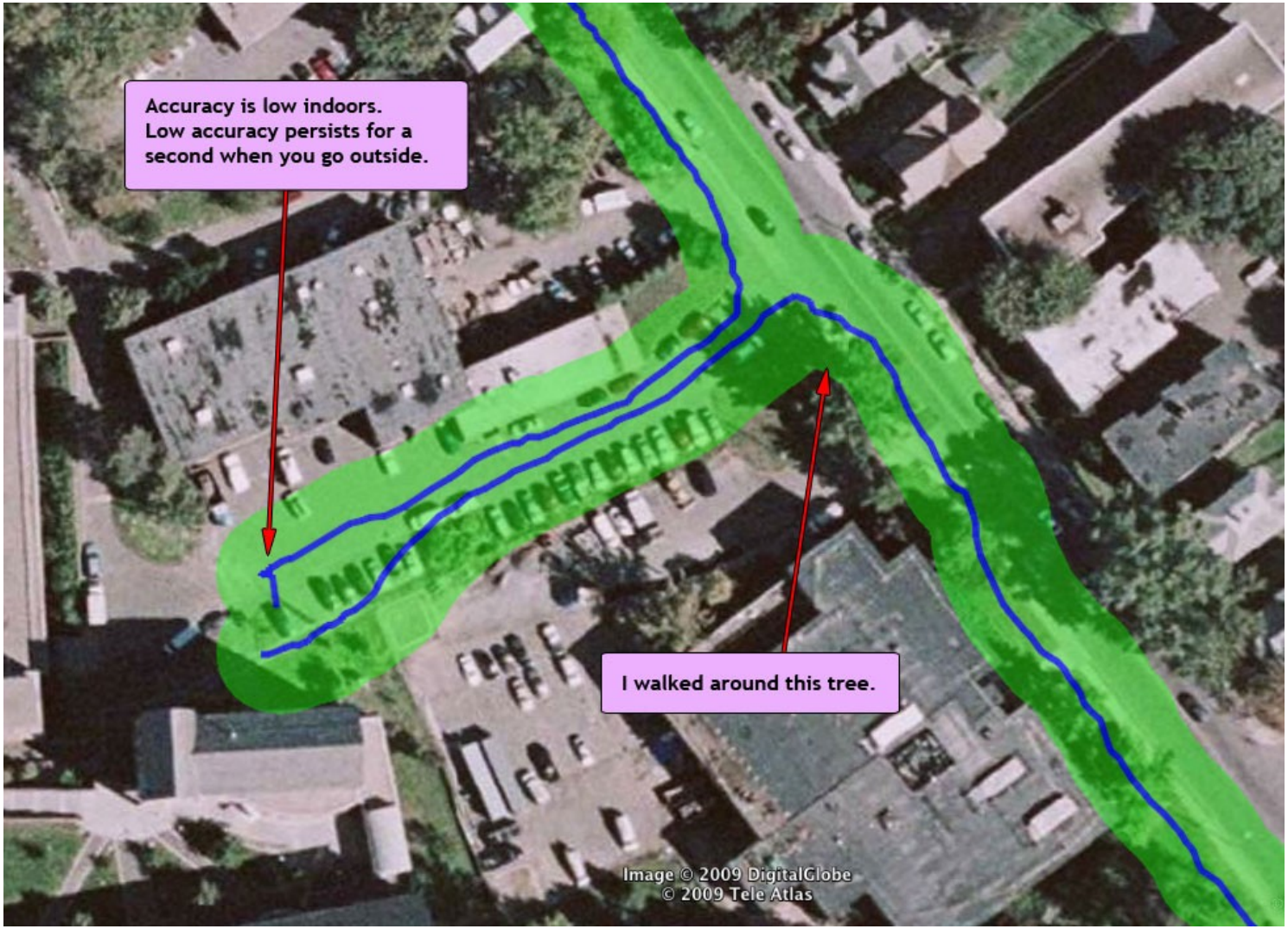
Coverage Tracking

- Track areas searchers have covered
- Poll GPS sensor for location
- Draw line-of-sight overlay
  - Adjustable

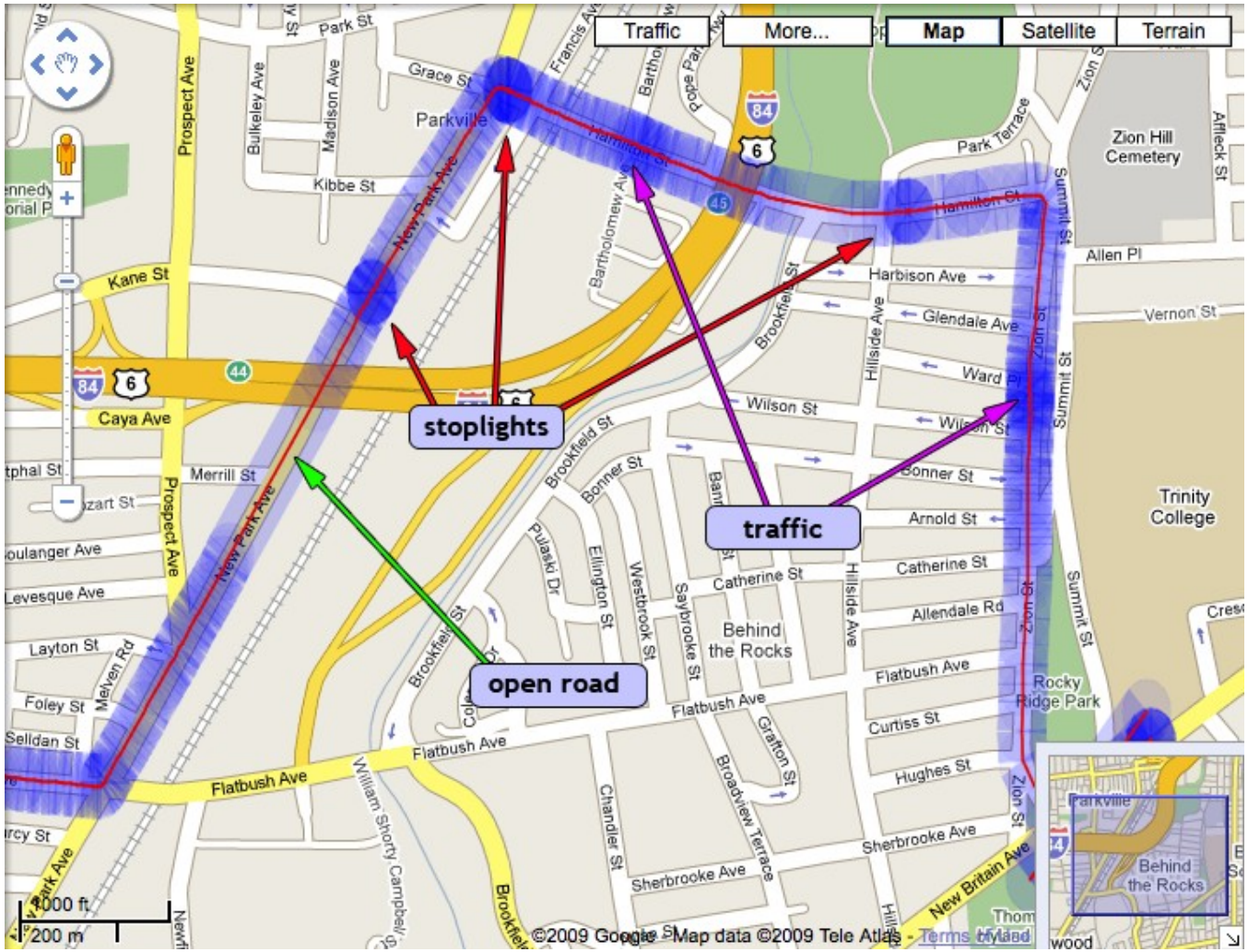
A walk around campus



GPS fix accuracy

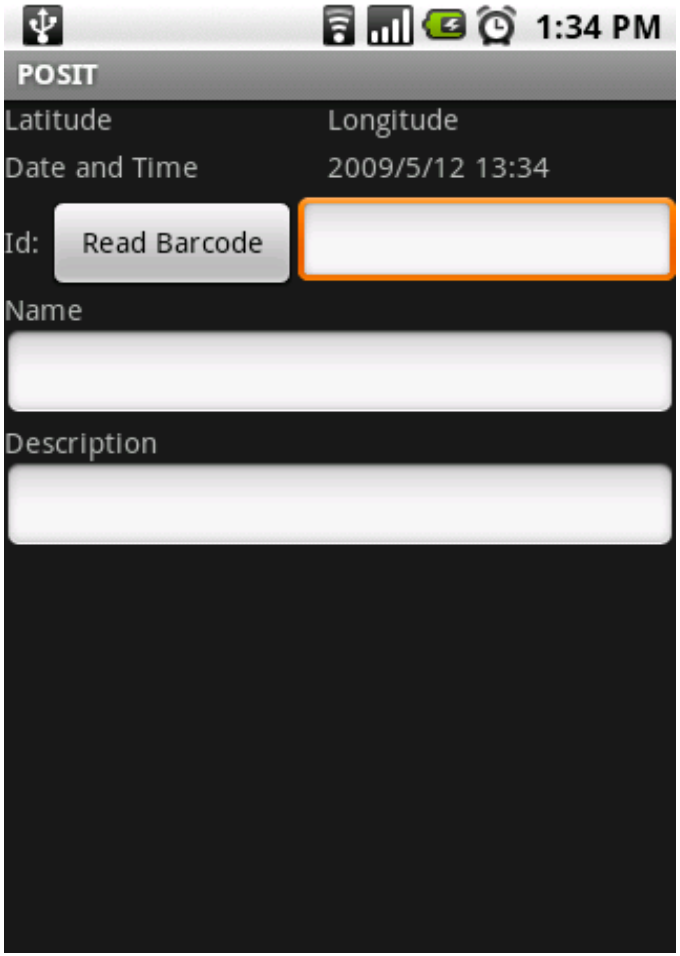


Sample density map

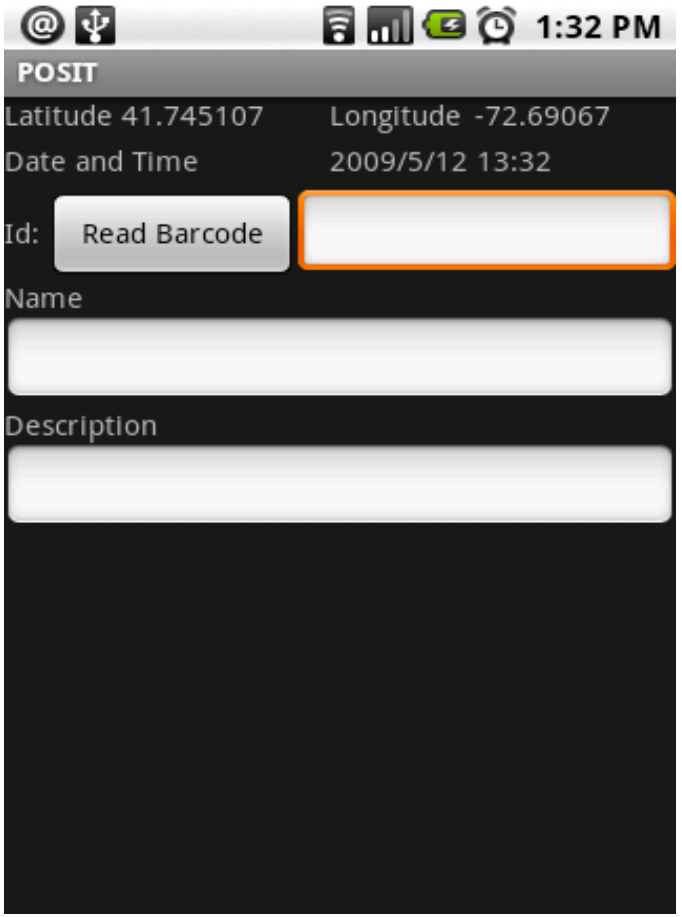


Making the GPS work

Before

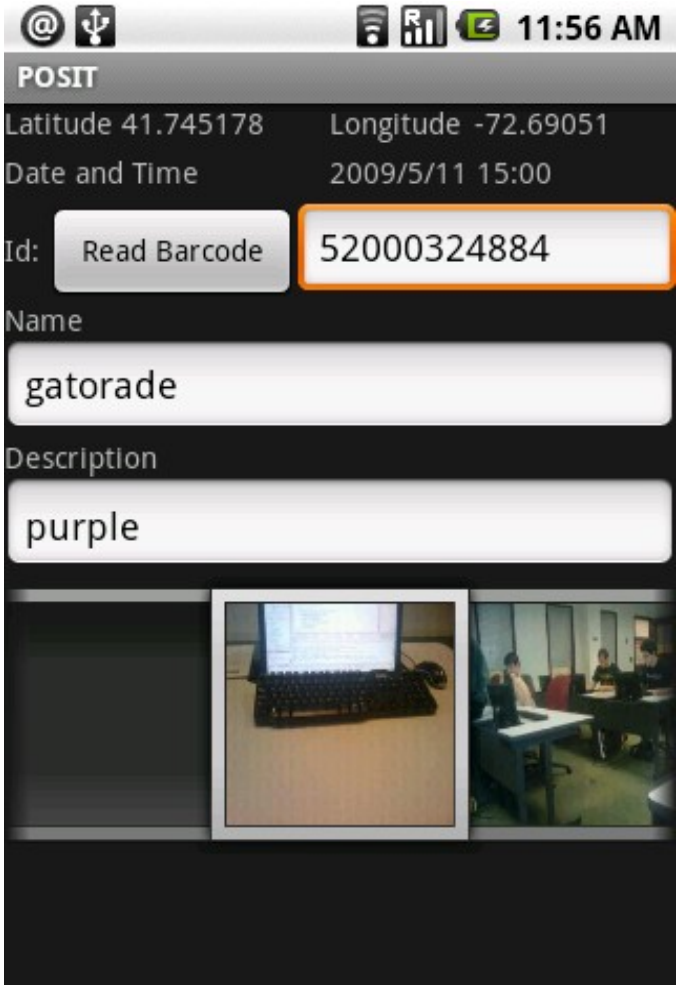


After



Displaying Find Photos

- Now when a photo is clicked from the Find view, a user does not access the full photo gallery
- Can also scroll through pictures

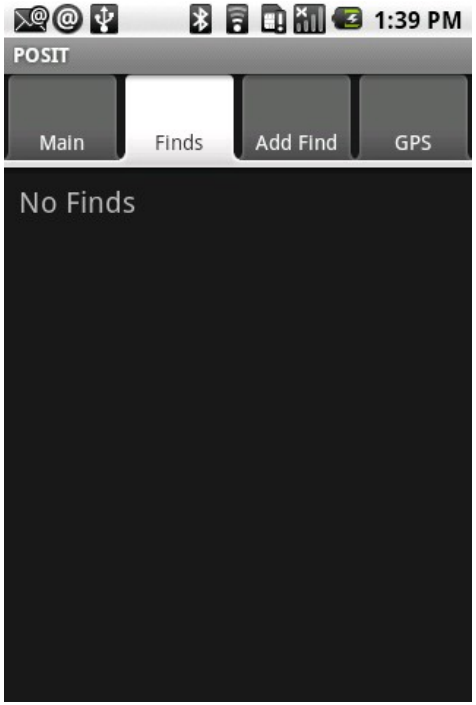


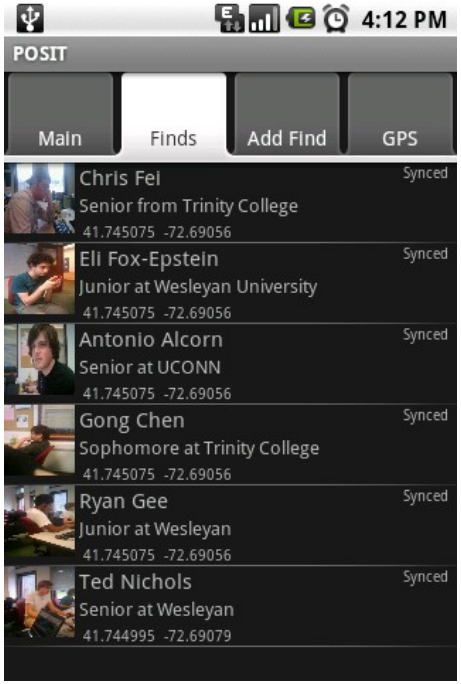
POSIT Web Server

- Existing web server was jumbled and not well structured
- We implemented a new web server to store finds and data sent from the phone
- Server allows for phone registration to ensure authentic and authorized data is sent

Syncing and Server Communication

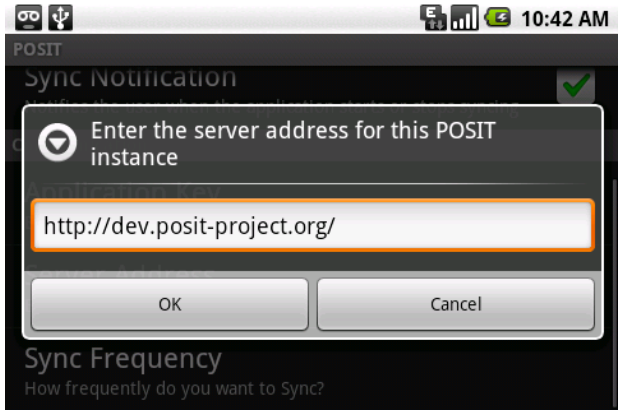
- Synchronize data between server and phones
  - Phones push/pull data to and from the server
  - Data for brand new finds, and updates of previously existent finds

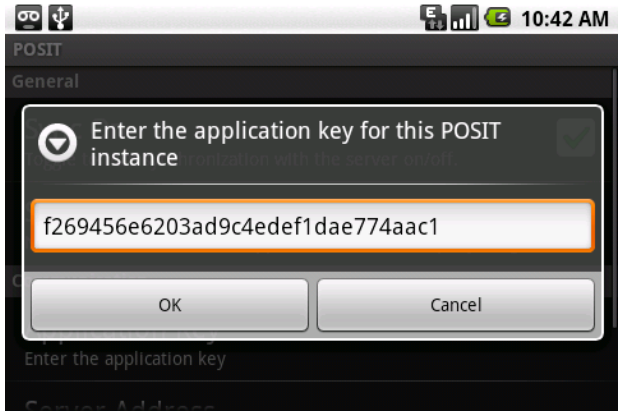




Demo: Server registration

- Existing registration process:
  - Lots of typing
  - Tiny keyboard
- New registration process
  - QR codes
  - High-density 2D bar code
  - Demo!





Future goals

- Speed up synchronization
- Improve random walk reliability
- Handle GPS accuracy data
- More field testing
- Documentation
- Marketplace!

Acknowledgements

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