Wireless Networks for Mobile Applications

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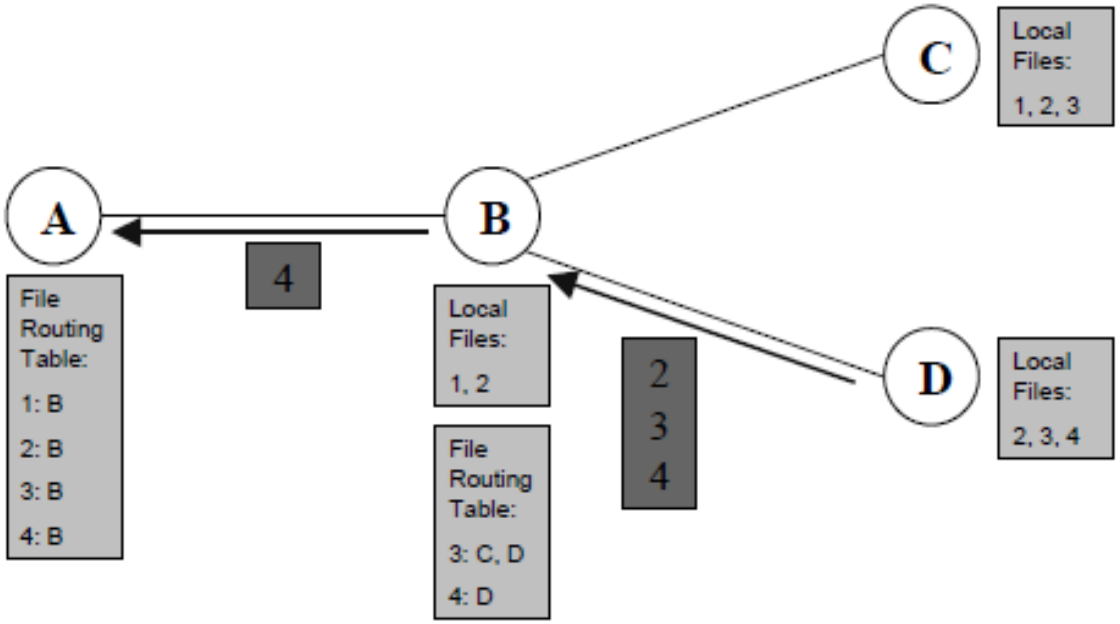
Project Examples

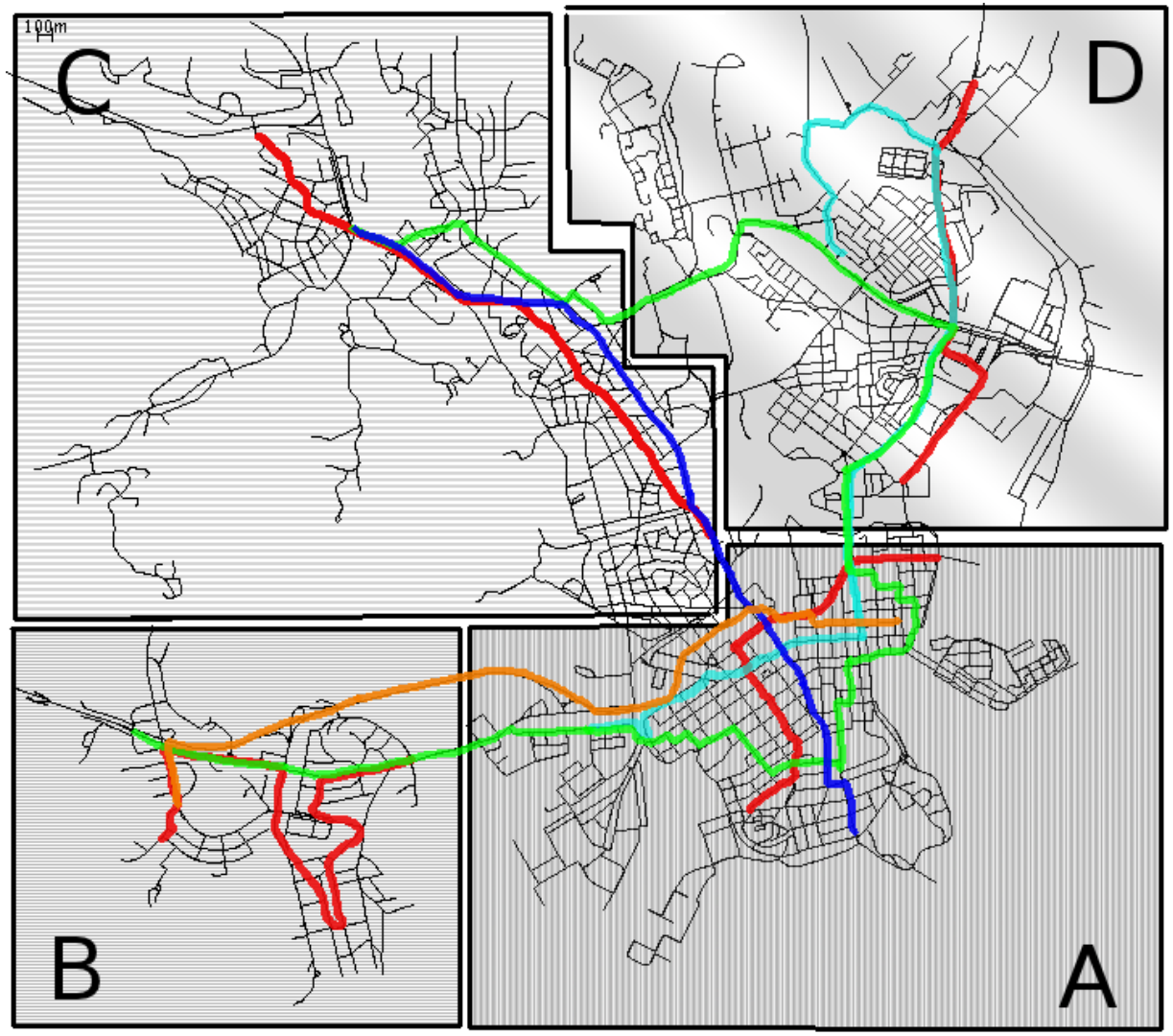
- The following examples represent projects developed for this class in past years

Progetto 0 **[P0]** - Project M2MShare (DONE)

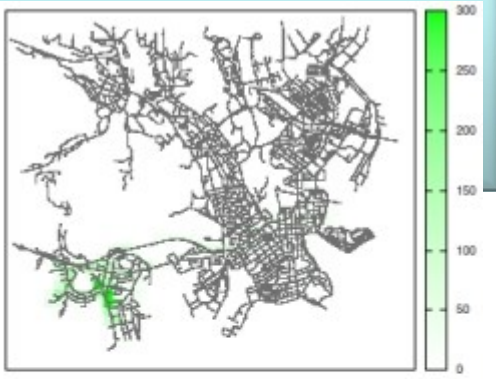
- A delay tolerant, proximity based, P2P application for file sharing among smartphones
  - Phones in proximity may exchange files or assign file retrieval task ("please find this file for me so that you can give it back to me tomorrow")



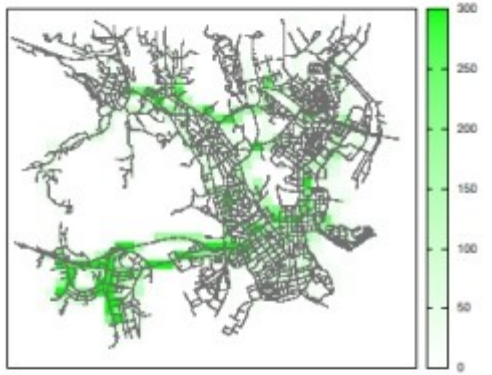
Progetto 0 **[P0]** - Project M2MShare (DONE



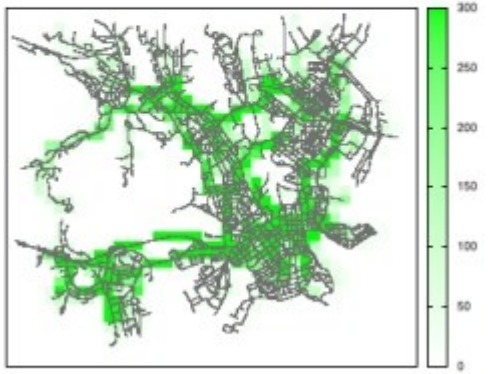
The ONE used as simulator (ideal for P2P and DTN studies)



Explored area with 1-hop



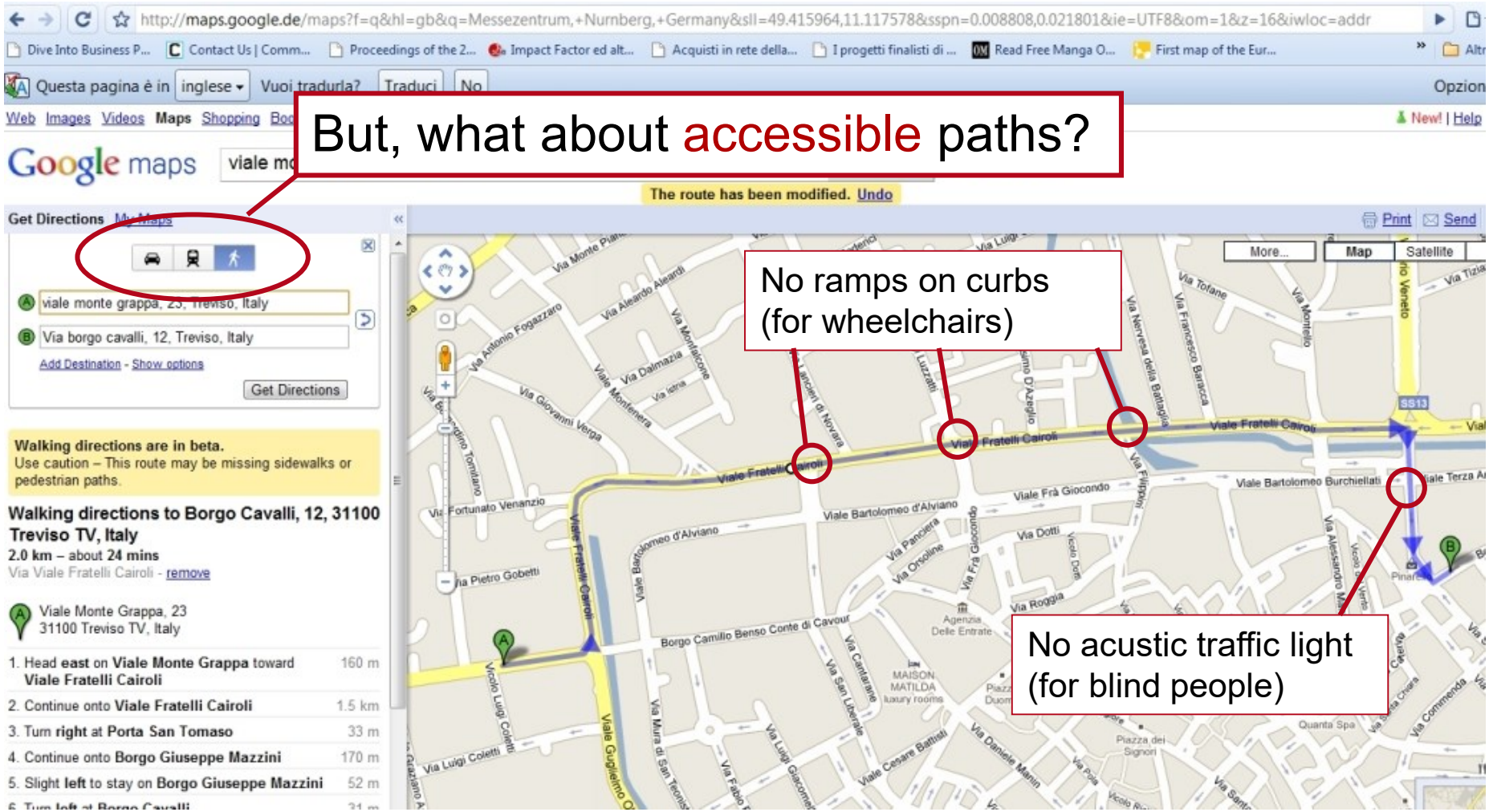
Explored area with 2-hop



Explored area with 3-hop

Progetto 1 [P1] – Shared Paths (DONE)

Today it's easy to find a path in a town (by car, public transportation, on foot)

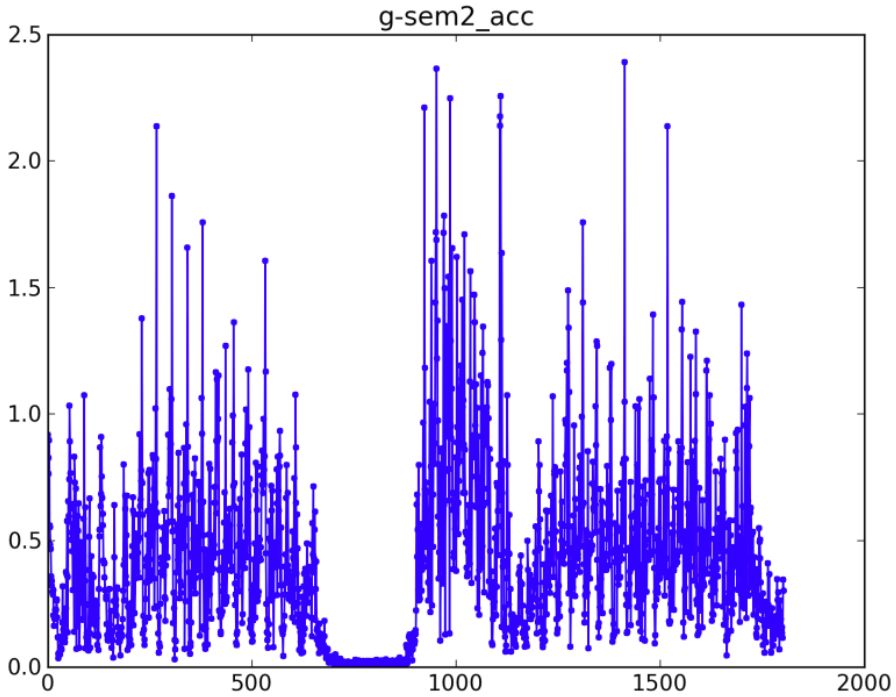


ALTERNATIVES? E.g. automatically detect crossroads or acoustic signals

Progetto 1 **[P1a]** – Shared Paths (DONE)

- During the day, several days per week, a person does the same path over and over again
  - To go to work, or to the grocery store, or to school, etc.
- This person (especially commuters) often meets the same people
- Created an app for mobile phones:
  - Identifies repeated paths
  - Using proximity based connections (bluetooth?, wifi?) allows to detect users met during this repeated
  - Allows to contact people that do the same path
  - Upload repeated paths into a server to let the server know that it is a desirable path for similar users (e.g., a person on a wheelchair, someone with heels or a strolley, etc.)

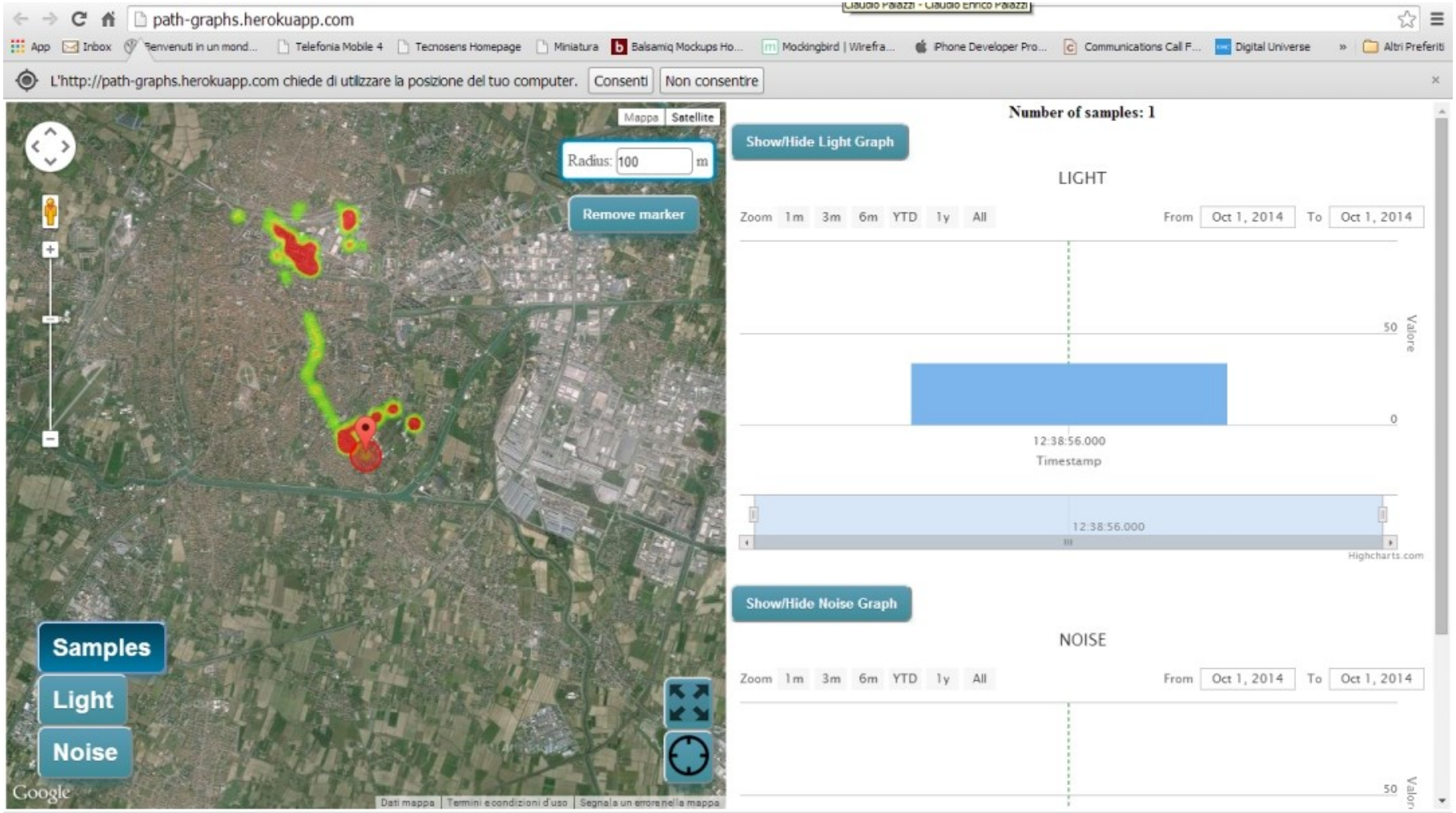
Project **[P1b]**: Road Crossing Recognition through Accelerometer



<u>Web Squared PROJECT:</u>

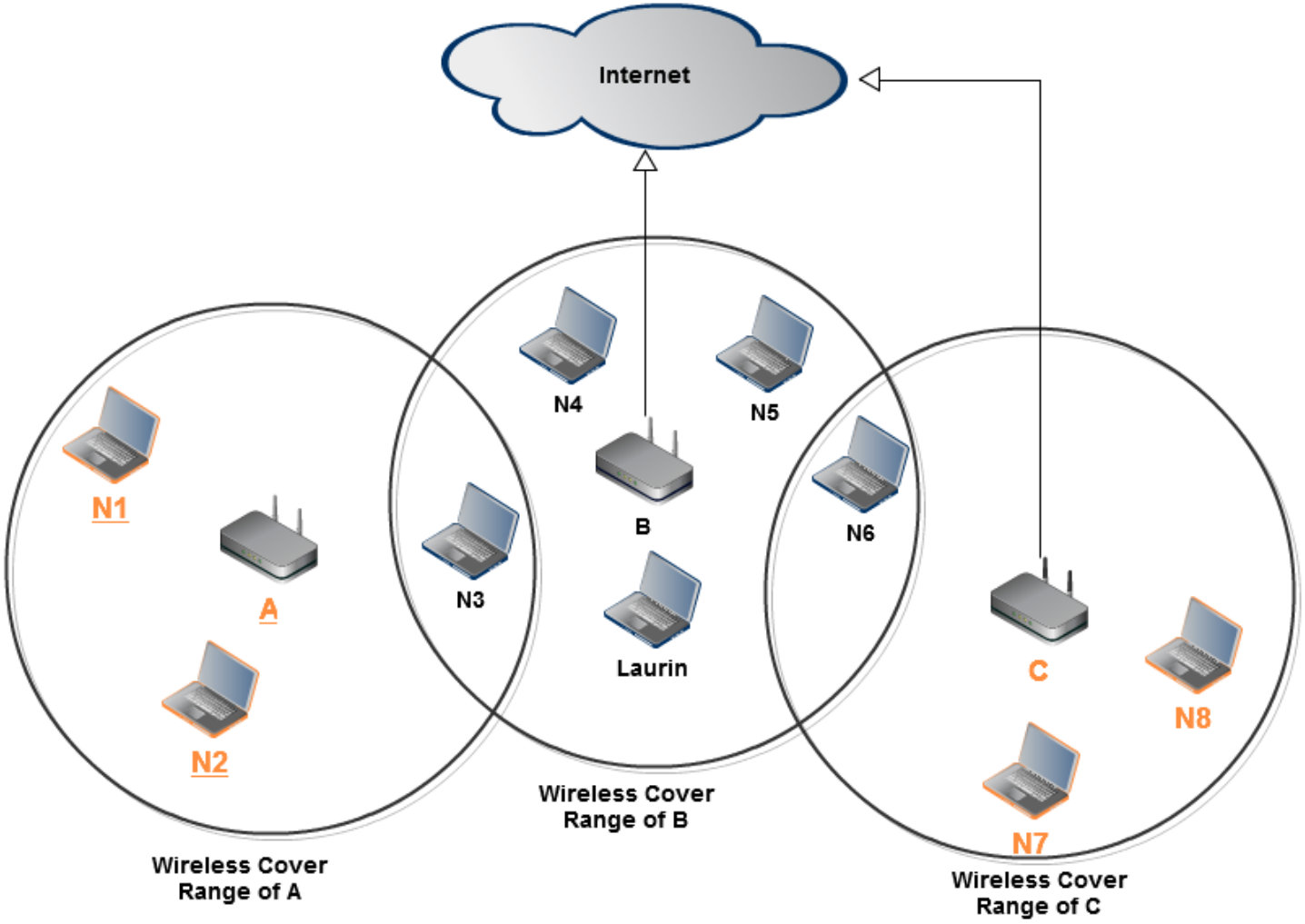
Any other way to automatically enrich maps/services?
(or through user actions)

Progetto 2 [P2] – Web Squared

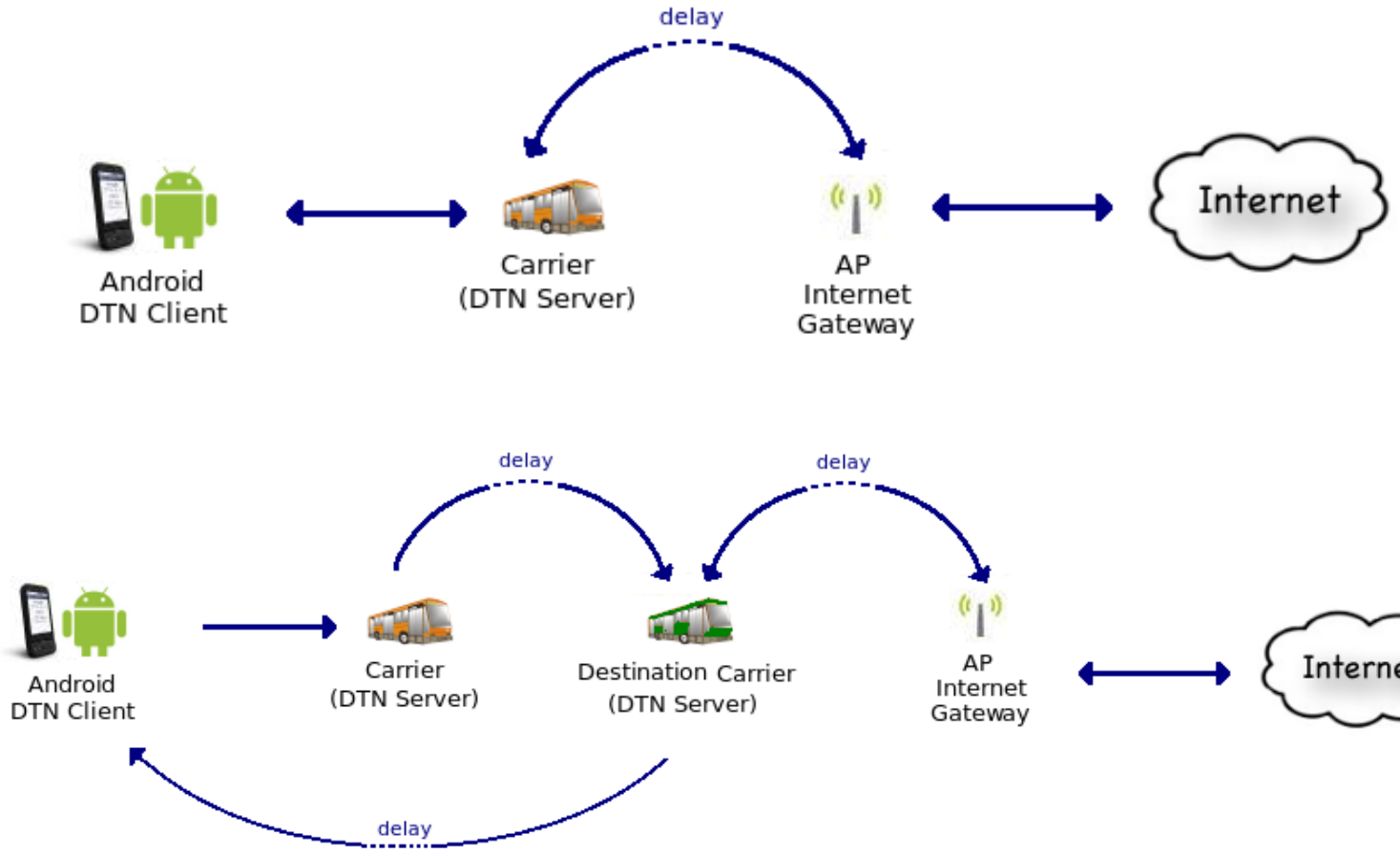


Both an app sensing the environment (sensors' calibration?) and a web service to process and visualize data

Progetto 3 **[P3]** Project Node Detection (DONE)



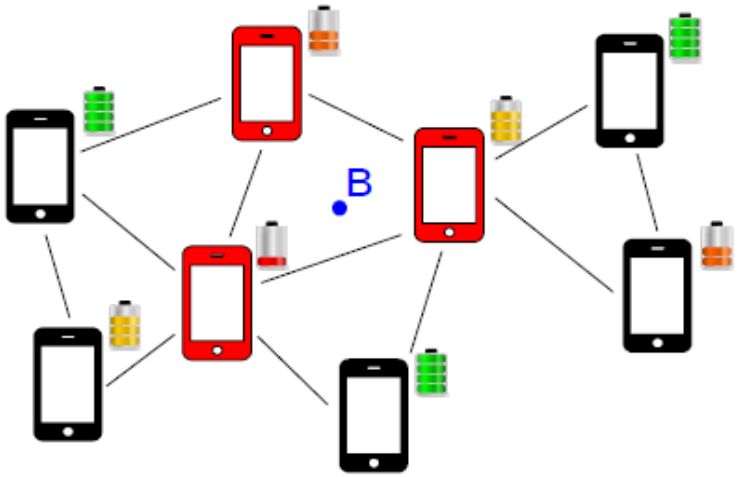
Project 4 **[P4]** - Evaluation of DTN on Android phones (DONE)



Project 4 **[P4]** - Evaluation of DTN on Android phones (DONE)

Project 5 **[P5]** Multiplayer games over Ad Hoc Networks

- Users are mobile
  - Risk of disconnection
  - Possible impact on delays & packet losses due to ad-hoc routing protocols and bandwidth fluctuation
- Radio interface necessitate some energy consumption
  - Risk of node failure (could be dramatic in C/S architecture)
- Need of new architecture for gaming over MANET (Sleeping Servers?)

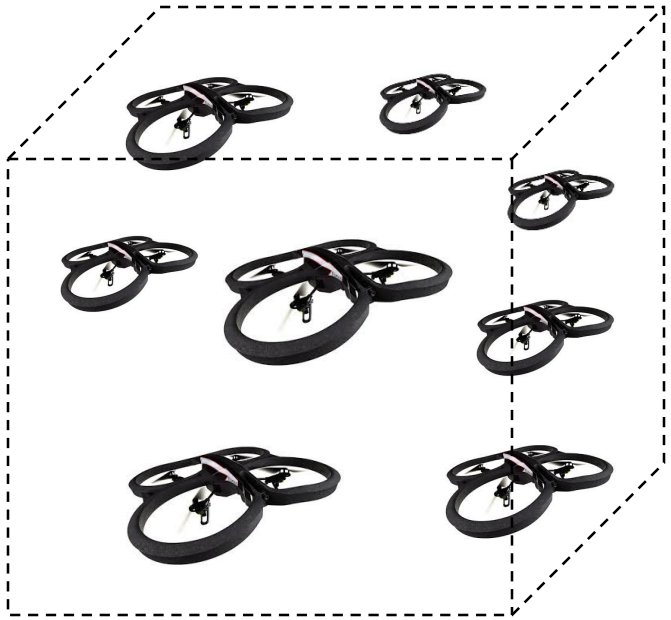


Other Entertainment Projects

- **[P6-A]** Creation of a game for mobile devices (e.g., Android, iOS, etc.)
  - Even digital versions of old games
- **[P6-B]** Creation of a mobile application for cultural heritage
- **[P6-C]** Creation of any application for mobile devices (e.g., Android, iOS, etc.) that exploits Wi-Fi, bluetooth or other connectivity means can be discussed
  - We have smartphones to lend if needed

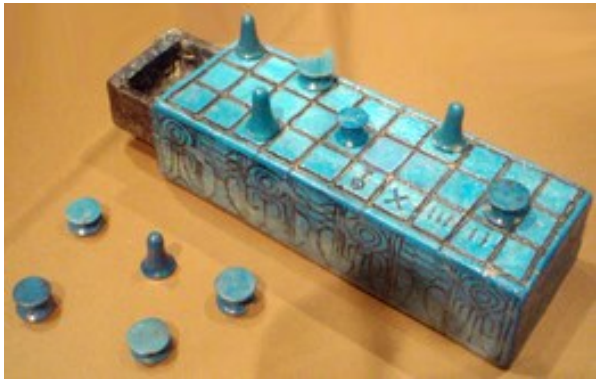
Drone Networks, Services and Applications **[P7]**

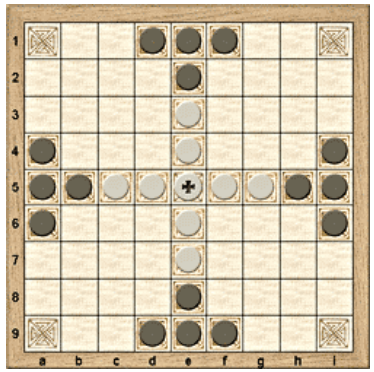
- Creation of software to manage Drones (Parrot?)
- Simulations to verify classic MANET protocols (2D topology) in DANETs (3D topology)
- Survey/Analysis of drones in Agriculture 2.0 or Industry 4.0



Mobile Ancient Games **[P8]**

- Implement ancient games on smartphones/tablets
  - Ludus duodecim scriptorum
  - The fox and the geese
  - «Le tavole dell'astronomia»
  - «Tavola delle 4 stagioni»
  - Tris
  - Tablut
  - Senet





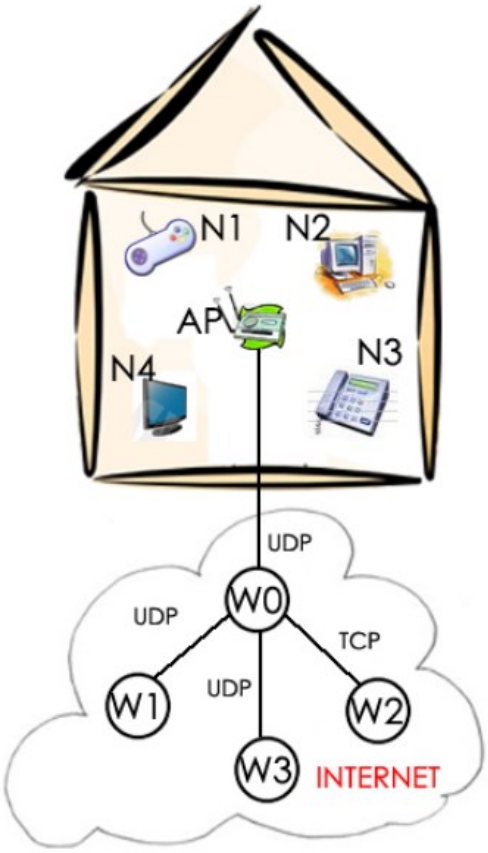
Project **[P9]**: TCP versions comparison (TO DO)

1. Real experiments with a particular configuration of the network (even just Linux TCP vs Windows TCP)
   a) Evaluate fairness / friendliness
   b) Evaluate Starbuck's scenario
   c) Evaluate mobility impact
   d) Error link impact
   e) Even just download performance

2. Simulations (as above…)
   - with well known and documented simulators (e.g., NS-2, NS-3)

Project **[P10]**: Comparison

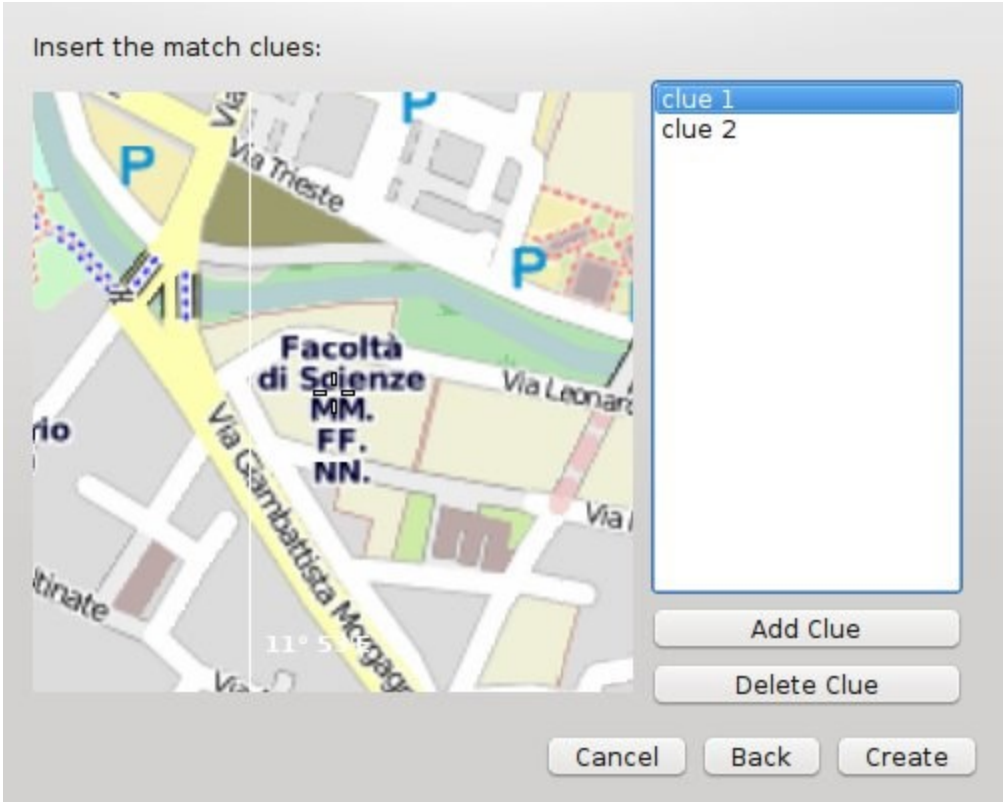
- Realistic networks and heterogeneous flows with multimedia
  - Measure different protocols (TCP)
  - Simulations vs real experiments
  - Test with some new application (AR/VR/MR…)?

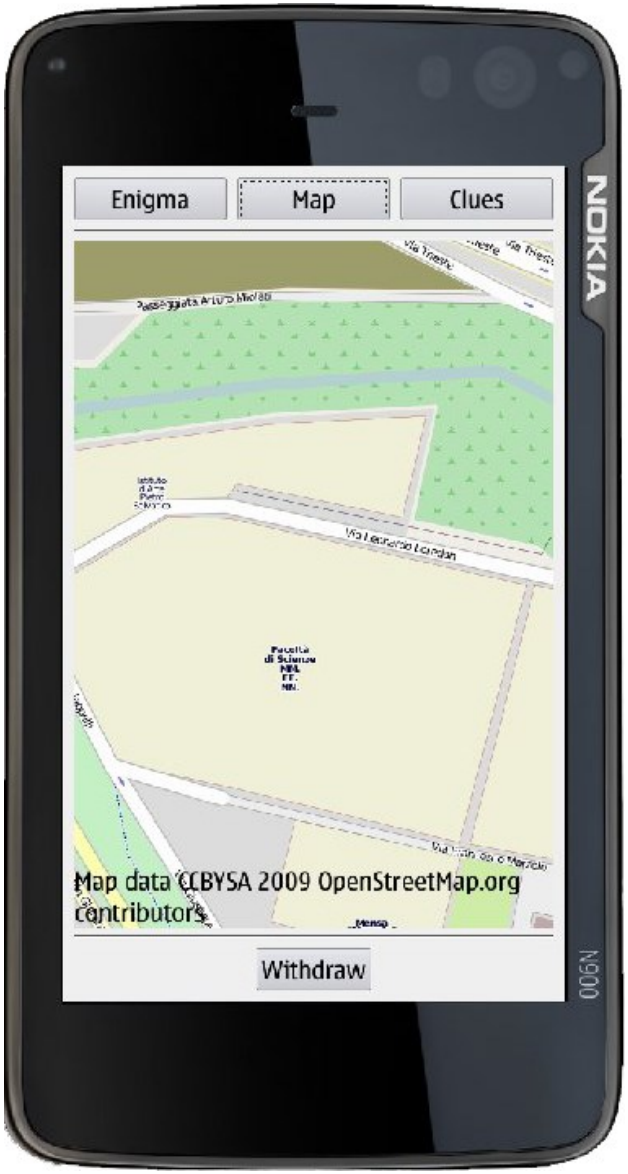


Project **[11]**: Game Flow Measurement

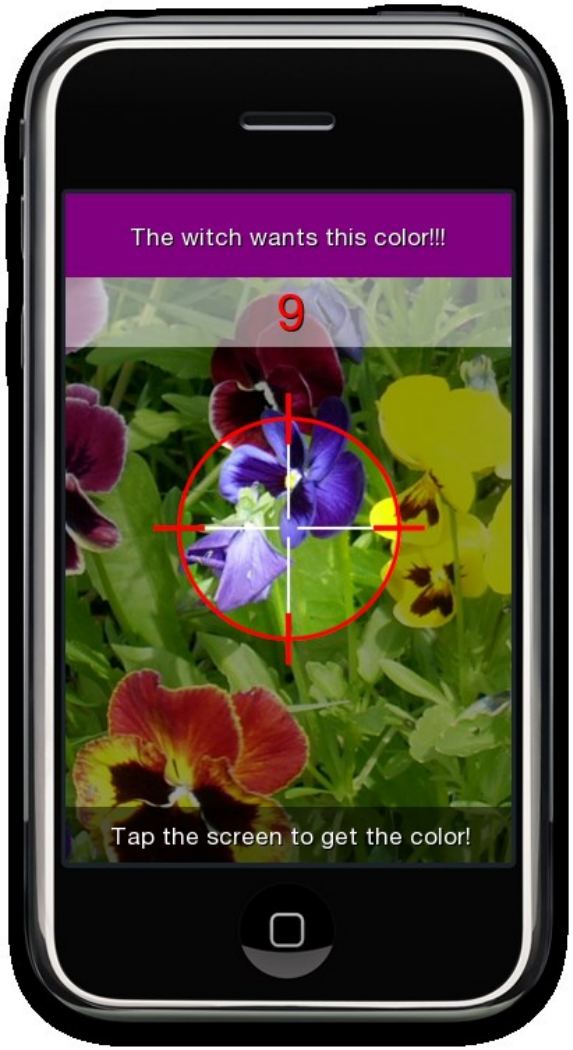
- Measure bandwidth, delay, jitter…
  - Classic online games
  - Thin client games (aka cloud games)
    - OnLive, Stadia, others?
  - VoIP
- Simulations vs Sniffers (e.g., wireshark)

Project **[P12]**: scavenger hunt game (DONE)

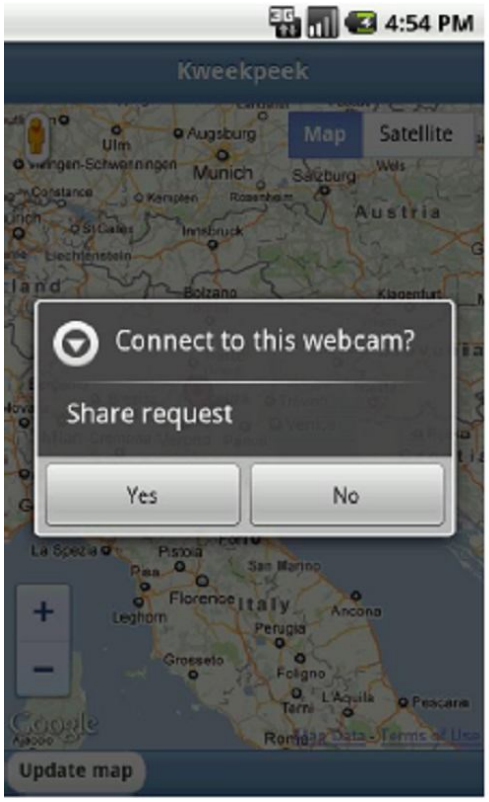


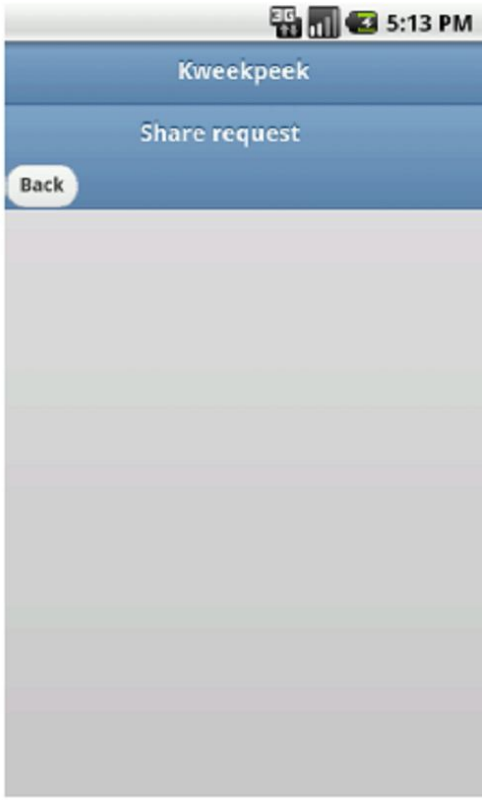


Project **[P13]**: Strega comanda colore – Simon Says the Color (DONE)

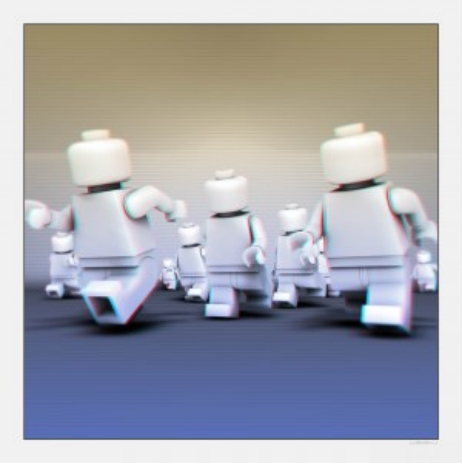


Project **[P14]**: Ubiquitous Social Cam





Project **[P15]**: Participation 2.0

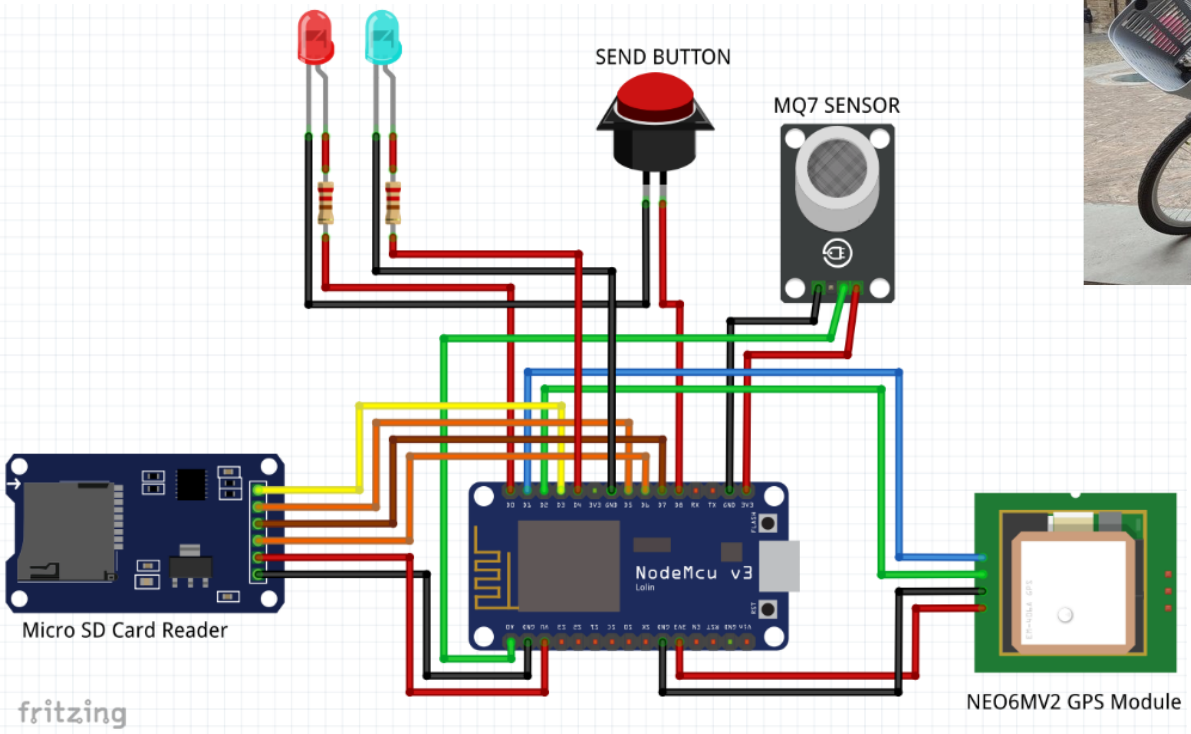


CROWDSOURCING **+** **SMARTPHONES**

- Crowdsourcing regards outsourcing tasks to a public
  - E.g., a participative online activity
- Through smartphones, these tasks can be automatically distributed to specific categories of people based on
  - Profiles, location, sensors on smartphones, current activity, etc.

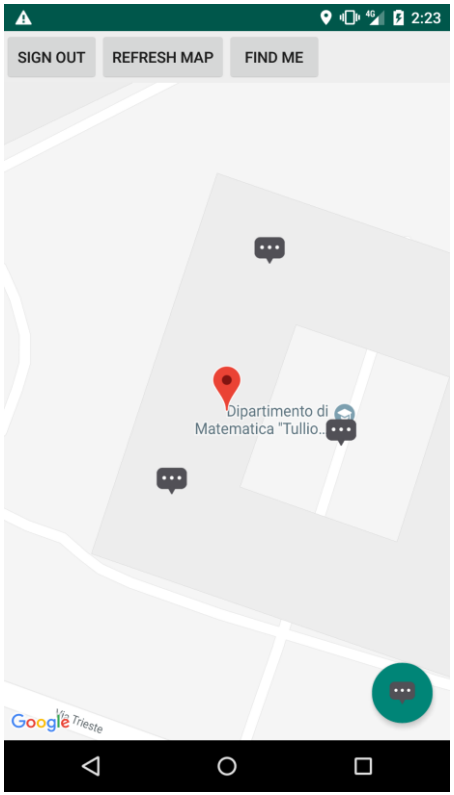
Project **[P16]**: ARDUECO (DONE)

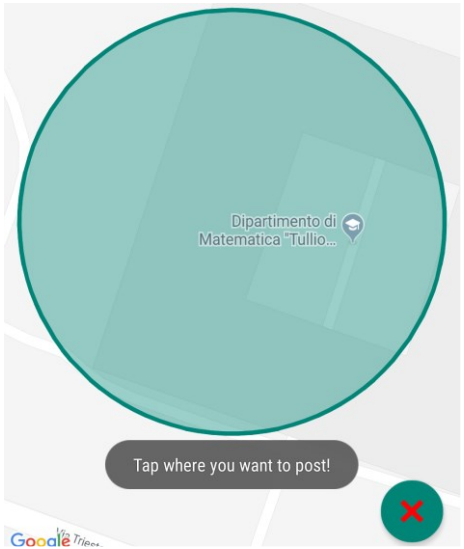
- Creation of a sensor box attached to a bycicle to sense air pollution and collect data



Project **[P17]**: GeoComments

- Attaching audio/video/text comments to a specific location
  - Users have to be in a certain location to see local comments
  - Comments: messages, touristic guides, games, information, art…





Project **[P18]**: survey (TO DO)

- Take a specific topic and make a survey paper on the state of the art (with comparison)
  - Drone networks (protocols or even applications)
  - Underwater networks
  - Alert propagation in urban (grid) vehicular networks
  - Web Squared applications
  - Internet of Things or Internet of Everything
  - eHealth
  - Smart city
  - Smart traffic/transportation
  - Nanonetworks
  - Network of cubesats
  - …

Progetto N

Miscellanea…

Any project you choose ask the teacher for further references: e.g., slides/books/examples on programming smartphones