### Gathering data (Crowdsourcing)

**War x-ing with a laptop**
We created a setup comprising of a GPS receiver, a WiFi card with monitor mode support and a laptop that a tech savvy user can build and contribute WiFi signal strength data to our project. All of the software used in the setup is open source although we have used a few custom tweaks. There is no GUI at the moment but we are planning that for a future version that will be friendlier to use. Why are we not calling this war driving? Because the setup is so simple it could be carried around in a backpack on foot or on a bicycle.

**War x-ing with a smartphone**
There are more and more smart phones out there and most of the people forget to turn off their WiFi when leaving their home or workplace networks. This could be even more utilized to extend our crowd and gather WiFi signal strength data. With a simple Android application an average user could turn his smart phone into a war x-ing device. A similar application could be other mobile platforms as well.

### Data parsing

After a user submits the WiFi signal strength data to our portal, we first check for data integrity and the format of the received data. After that the data is parsed and analyzed it is stored in a database locally, on a remote server farm or in the cloud.

### Statistical analysis

The data stored in the portal will enable us to provide statistical analyses such as:
- Number of APs in an area,
- APs per square mile in an area,
- Growth or decline of wireless network usage,
- Number of open/WEP encrypted/WPA encrypted/WPA2 encrypted APs,
- Number of APs by manufacturer,
- Channels used and channels free,
- Number of APs with default SSIDs,
- Commonly used SSIDs, and more.

### Ownership problem

Who is the real owner of an AP?

**Solution #1:**
OCR system for recognizing MAC addresses from a sticker on the physical hardware and comparing the data to the MAC addresses in the database. We could also use the photos of MAC address stickers as a Captcha system for new user registration.

**Solution #2:**
Use thumbs up/thumbs down or similar scoring algorithms that will enable the community decide which data it prefers.

### Main idea behind the project

Nowadays people cannot imagine life without internet access. Let it be for sending emails when on busses trip or uploading pictures during travel. The main idea behind this project is to eliminate problems which occur during travelling when one needs wireless internet access and cannot find any access points near him, the consequence of this is resorting to UMTS/GPRS data transfer which in the end costs very much abroad and it’s generally slower than Wi-Fi. We will accomplish this by creating a portal and community around it embracing the open-source philosophy so that user will be able to locate Wi-Fi hot spots near desired destination prior to his departure thus eliminating these high costs. In addition to solving this problem, the portal will offer the user ability to: download selected portions of a map, locate user and nearest hotspots, (For more features please look under paragraph 6).

This project will also serve as a platform for location based services which we all know are used on various fields such as health, work, entertainment, personal life and much more and are the next big thing. We are developing a mobile application for Android and I OS that will provide user with the ability to download maps on their phone into a war x-ing device. A similar application could be used even more for a laptop that a tech savvy user can build and contribute WiFi signal strength data to our project. All of the software used in the setup is open source although we have done a few custom tweaks. There is no GUI at the moment but we are planning that for a future version that will be friendlier to use. Why are we not calling this war driving? Because the setup is so simple it could be carried around in a backpack on foot or on a bicycle.

### Modification of AP’s by owners

The portal will enable the community members or owners of AP’s to:
- Delete an AP
  Not every AP owner will be fond of the project but his AP will be included on the map. Therefore he should have the option to remove his AP from the map and from the database.
- Modify the AP location and description
  A community member or an owner of an AP should be able to edit the location of his AP by submitting exact GPS coordinates and modify the description. This will enable the user to adjust the correction-factor algorithms and improve overall precision of AP’s on the map.
- Add individual AP
  Maybe the user will wish to add a second or a third AP. If such a user does not want to rescan “the neighborhood” there should be functionality in the portal that enables him to enter data on a per AP basis.

### End user

- Location based services
- Graphing
- Determining user location
- Determining nearest hotspots
- Mobile APP(Android, IOS)
- Access stats
- Downloading specified portion of map
- API

### Location approximation and mapping

We are using a method similar to trilateration to determine the location of an AP based on the captured data. We looked into using triangulation but decided to go with trilateration to use less CPU cycles at this stage. We have designed our system in a way that we can easily apply different techniques to determine AP positions.

**Location correction algorithm**

The GPS signal in the cities is usually distorted because of echoes. Echoes are a consequence of tall concrete walls which are based relatively close to each other so that the signal bounces from wall to wall. This results in distorted GPS data and ultimately breaks the accuracy of our AP map. We have to know that a distance difference of 20m is not acceptable for an end-user trying to navigate his way around a city center. We are researching algorithms that will correct these anomalies.

### Similar projects

Open Maps, Wigle, OpenStreetMap, GoogleStreet