bikeNavi

HCI Seminar: Physical Computing
Summer term 2014

Group 1:
Maximilian Dürr, Thomas Griesshaber
Mohammad Haque, Benedikt Kromer
Shraddha Kulkarni, Alexander Schönhals

Agenda

- Ideation workshop
- Workflow
- Open problems
- Future work
- Distribution of work
- Demo

IDEATION WORKSHOP

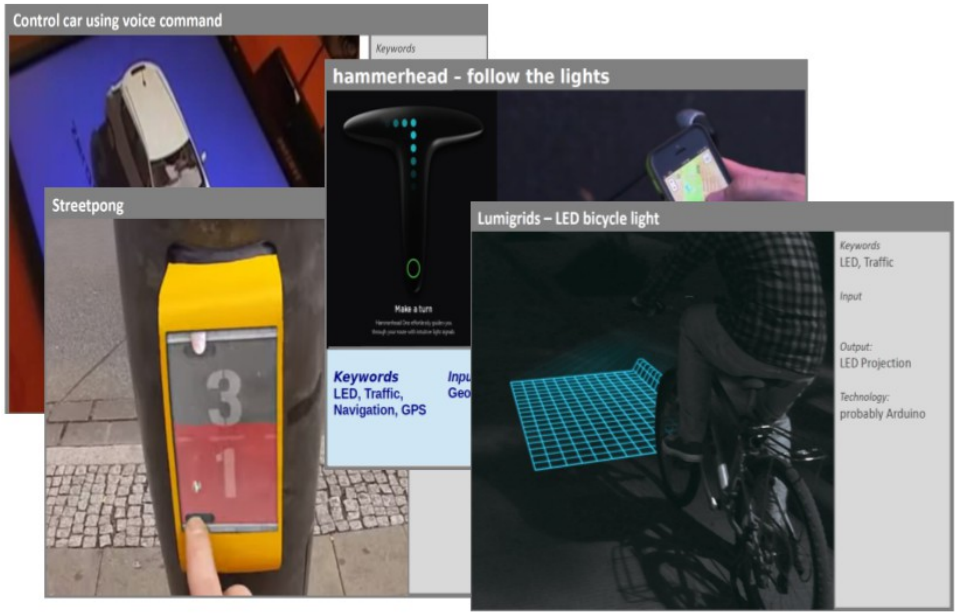
Domain: Traffic

- Navigate through crowded streets or in a new area
- Find alternative path while driving
- Distraction while driving to look at display

Inspiration Cards

Domain card

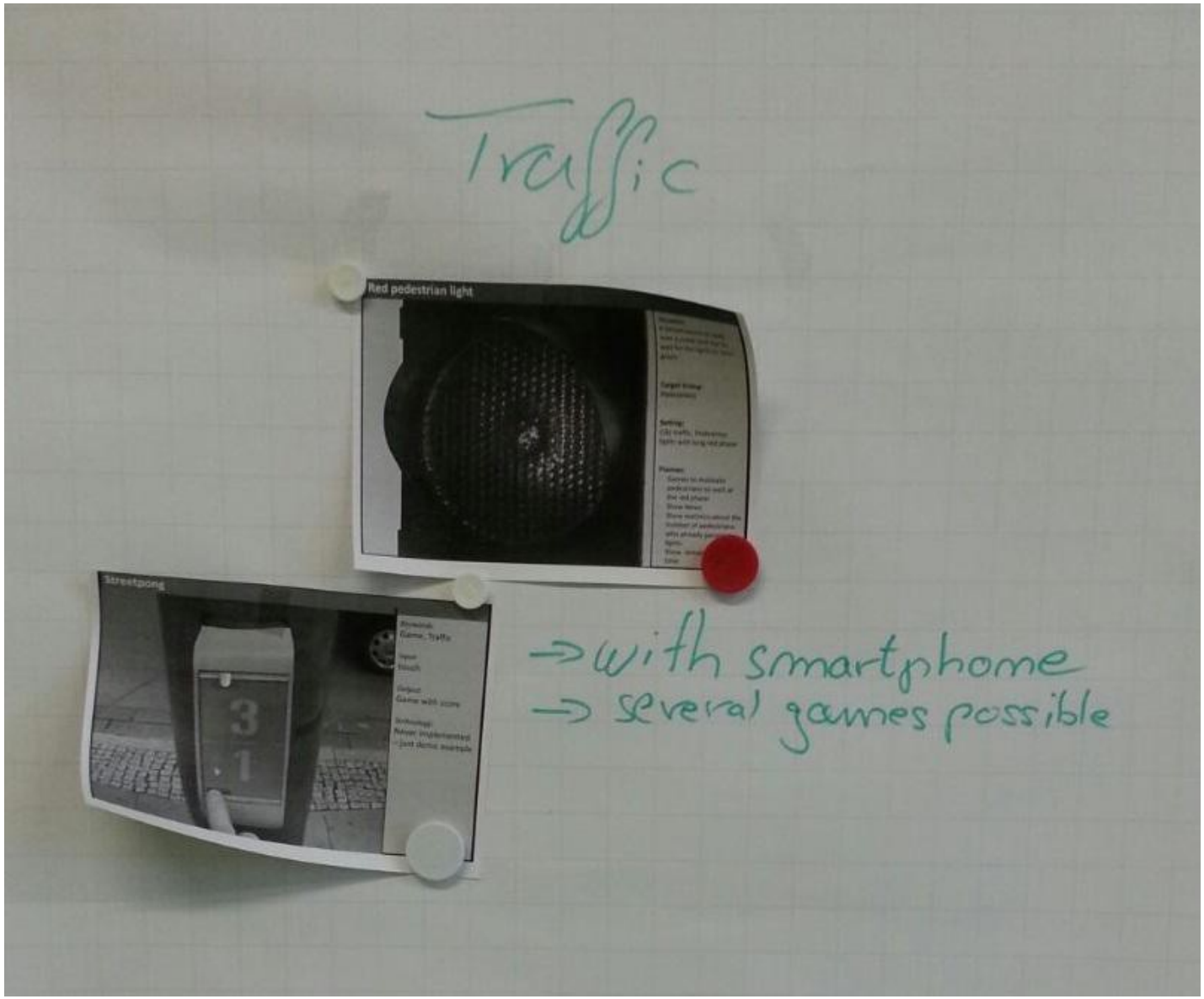
Sub-domain cards



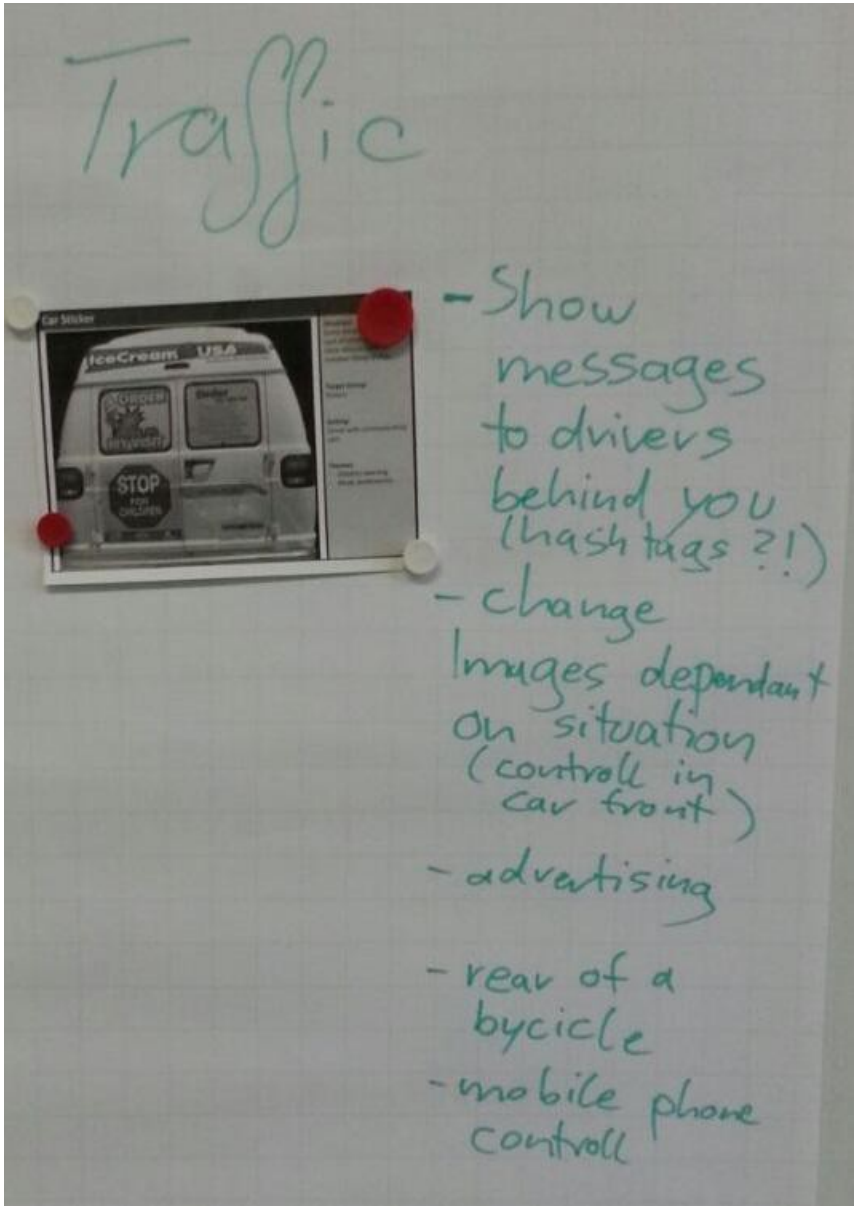
Technology cards

OUR IDEAS

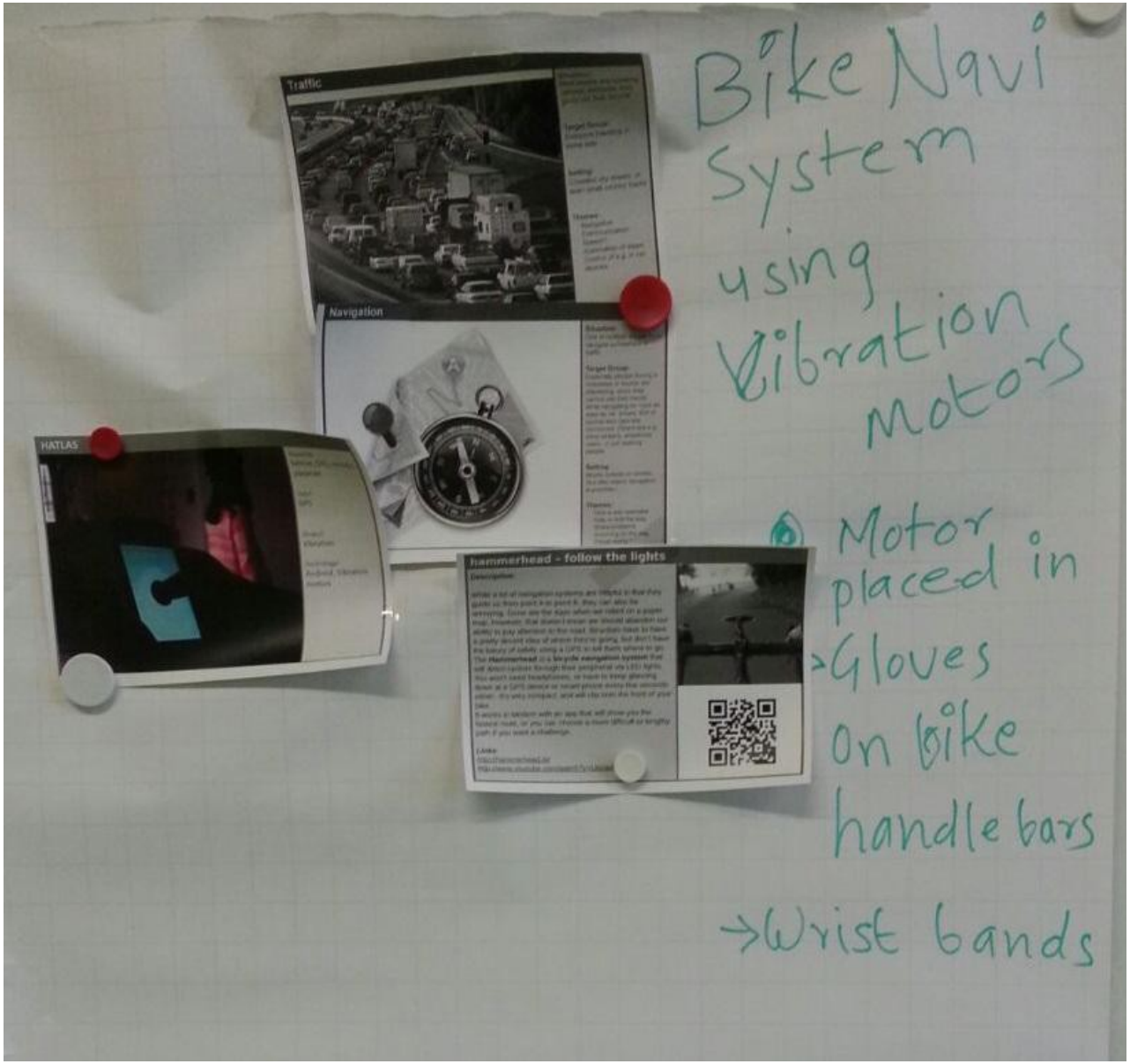
Traffic Light Game



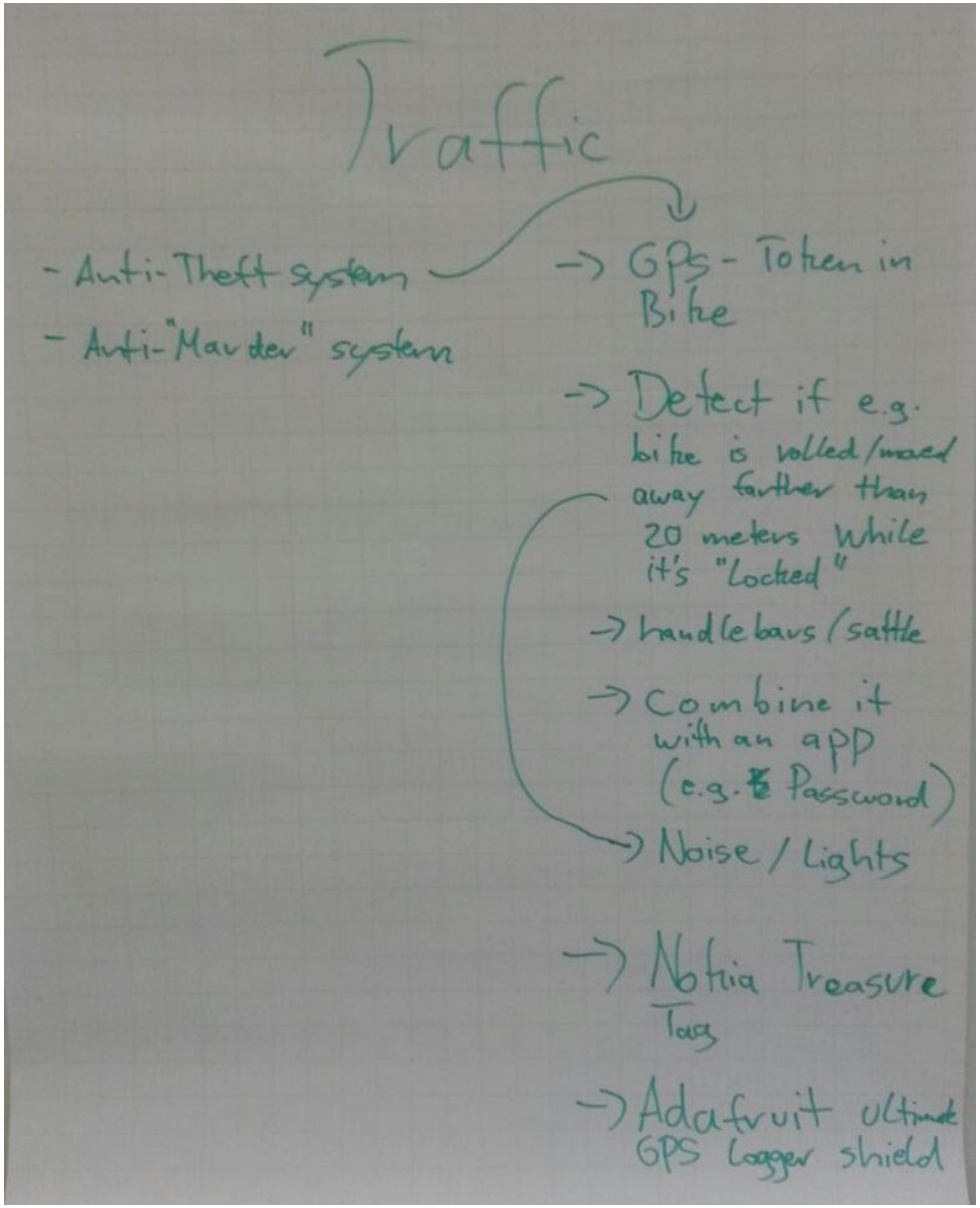
Car Message Board



Bicycle Navi with Vibration



Anti-Theft


Traffic
- Anti-Theft system
- Anti-"Marder" system
-> GPS - Token in Bike
-> Detect if e.g. bike is rolled/moved away farther than 20 meters while it's "locked"
-> handlebars / sattle
-> combine it with an app (e.g. Password)
-> Noise / Lights
-> Nokia Treasure Tag
-> Adafruit ultimate GPS Logger shield

Our Favorite Idea

- **Bicycle Navigation with Vibration**
  Because…
  - ✓ It's **most innovative**
  - ✓ **No distraction** (no need to glance on display)
  - ✓ **No noise interference** (problem with audio navigation)
  - ✓ It **helps people** to navigate in unknown areas

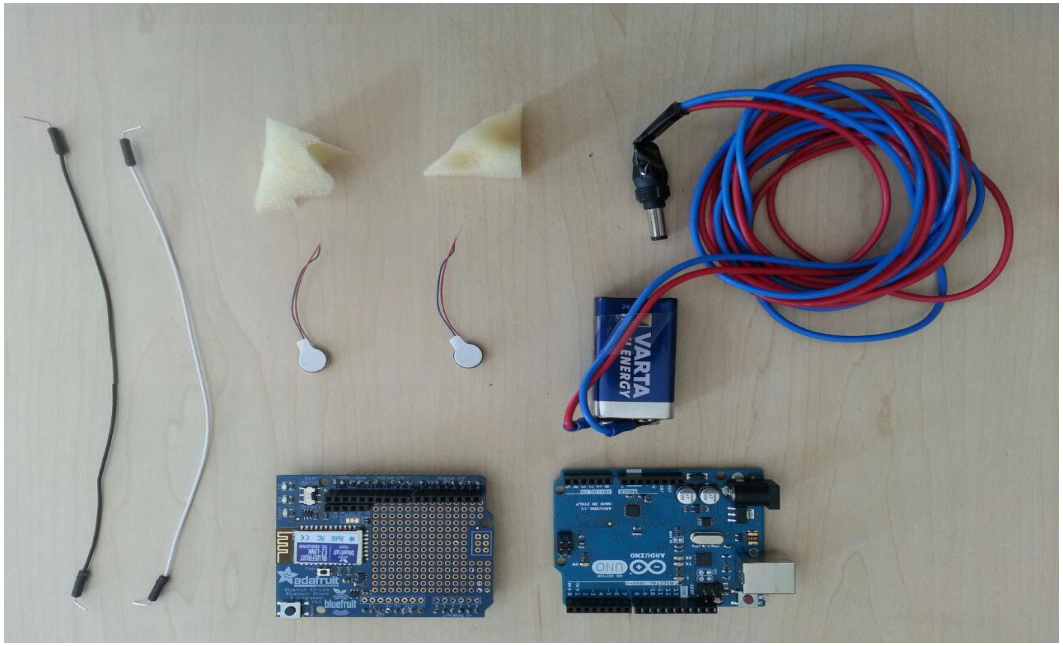
  ➔ Biggest **potential** for a commercial project!

WORKFLOW

Step 1: Design

Step 2: Hard-/ Software

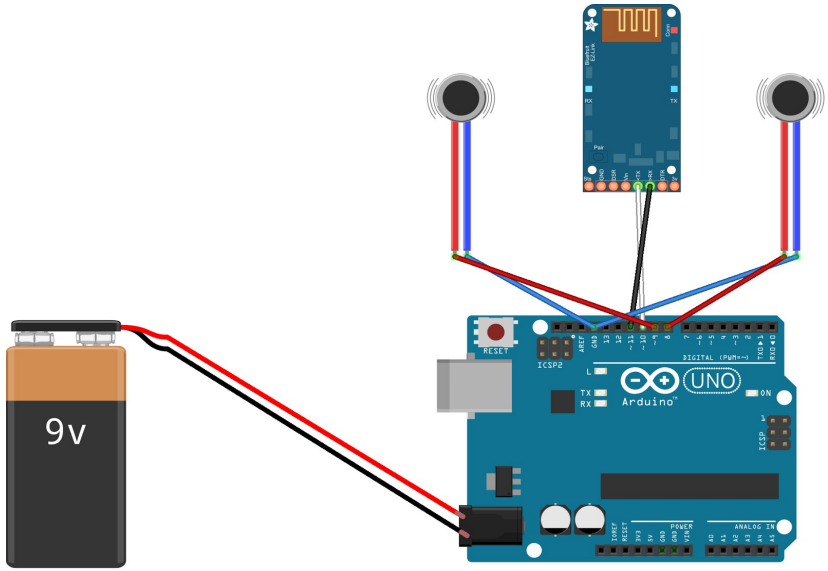
- **Hardware**
  - Arduino Uno
  - Bluefruit EZ-Link Shield - Bluetooth Arduino Serial & Programmer
  - Two compact vibration motors
  - Battery (9V)
  - Wires
  - Android smartphone (4.3+)



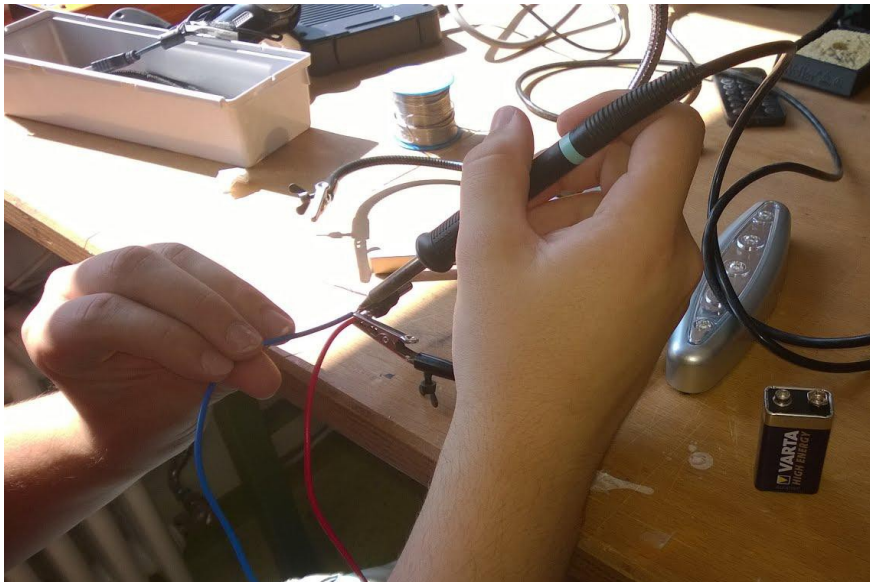
Step 2: Hard-/ Software

- **Software and Programming libraries**
  - Arduino Software
  - Aptana IDE
  - Cordova framework
  - JQuery Mobile
  - Native droid (User interface design)
  - Movable type scripts (GPS calculations)

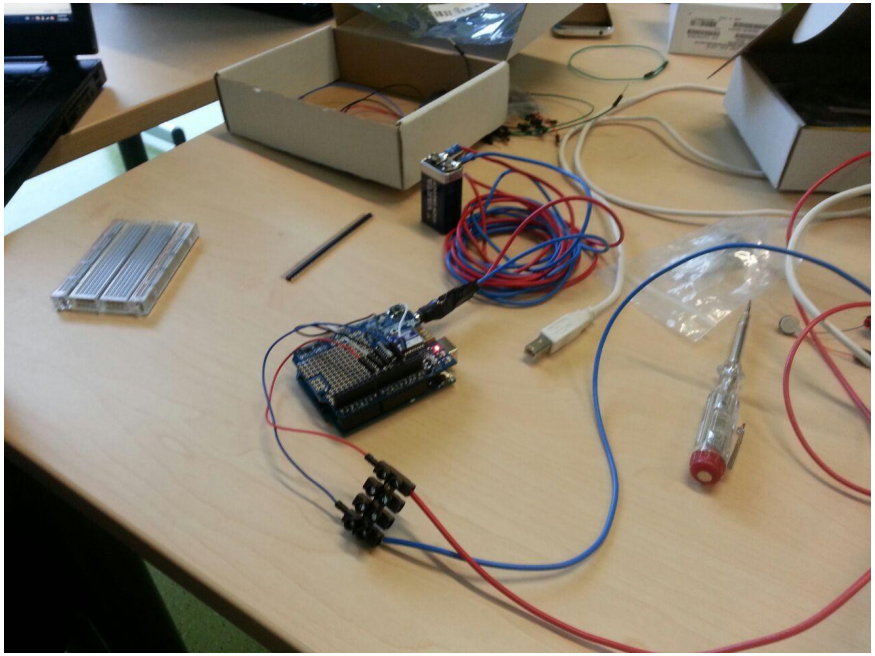
Step 3: Soldering & Wiring



- Attachment Battery
- Attachment vibration sensors

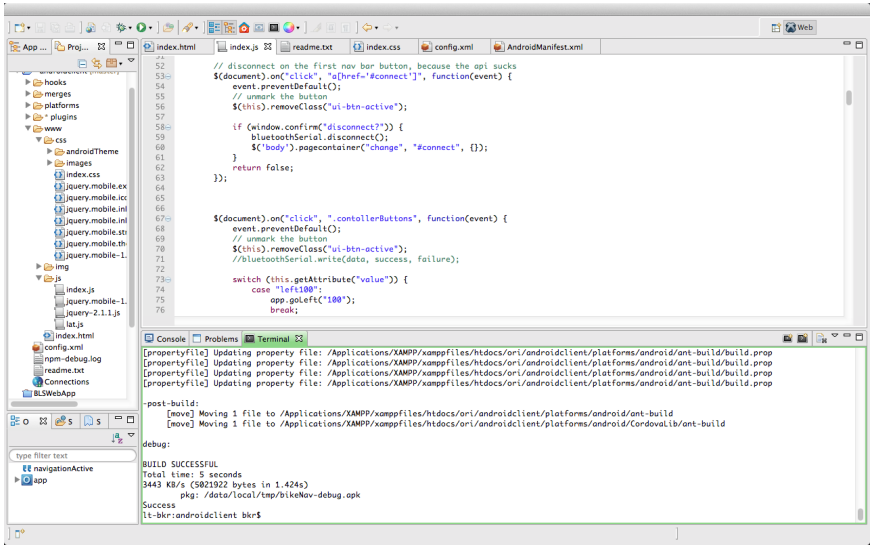


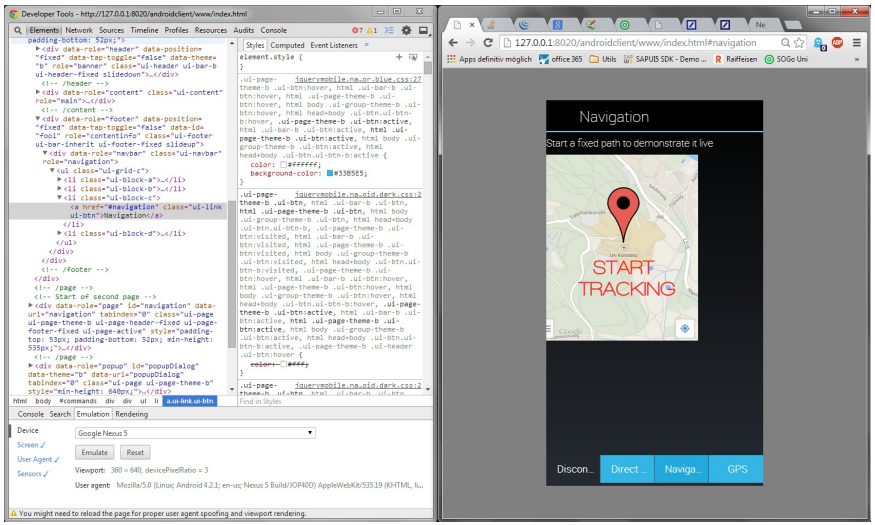
Step 4 Part I: Arduino



- Generation of vibrations
- Based on the inputs from GPS

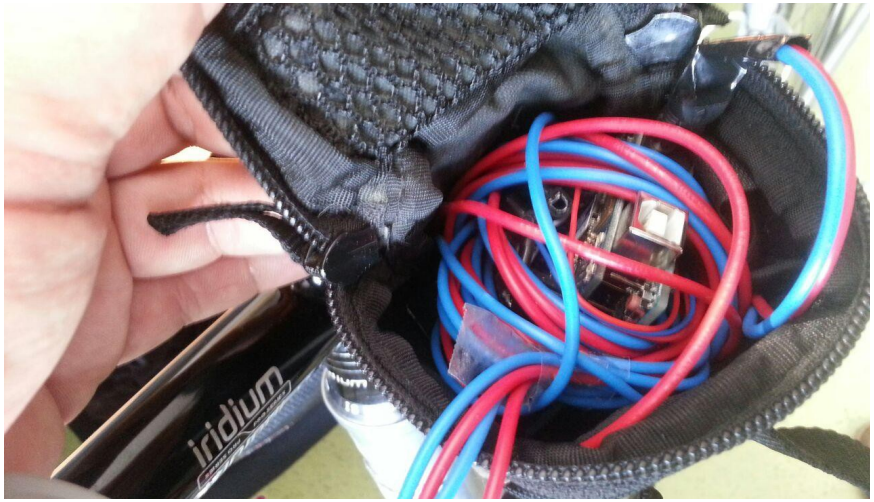
Step 4 Part II: Android





- Setup Cordova
- Access smartphone bluetooth interface
- Access smartphone's geolocation data
- Send commands via Bluetooth
- Native Droid (user interface)

Step 5: Integration



- Mount the vibration motors
- Mount the Arduino on a bicycle
- Fixate cables
- Test the whole system

Step 6: Enjoy the ride!

OPEN PROBLEMS

Open Problems

- Hardware problems
  - Weak intensity of vibration motors
  - Unplug BT shield for every upload
- Software problems
  - Inaccuracy of GPS, when using Cordova framework
  - Layout issues for android user interface
  - Google map API complex to implement

FUTURE WORK

Future Work

- Use stronger vibration motors
- Use Google API
- Try out external GPS device

DISTRIBUTION OF WORK

Distribution of work

- Arduino development
  - Alexander Schönhals
  - Shraddha Kulkarni
  - Maximilian Dürr
- Android Development
  - Benedikt Kromer
  - Thomas Griesshaber
  - Mohammad Haque
- Documentation
  - Maximilian Dürr
  - Shraddha Kulkarni

THANK YOU FOR YOUR ATTENTION

LET'S RIDE A BIKE!