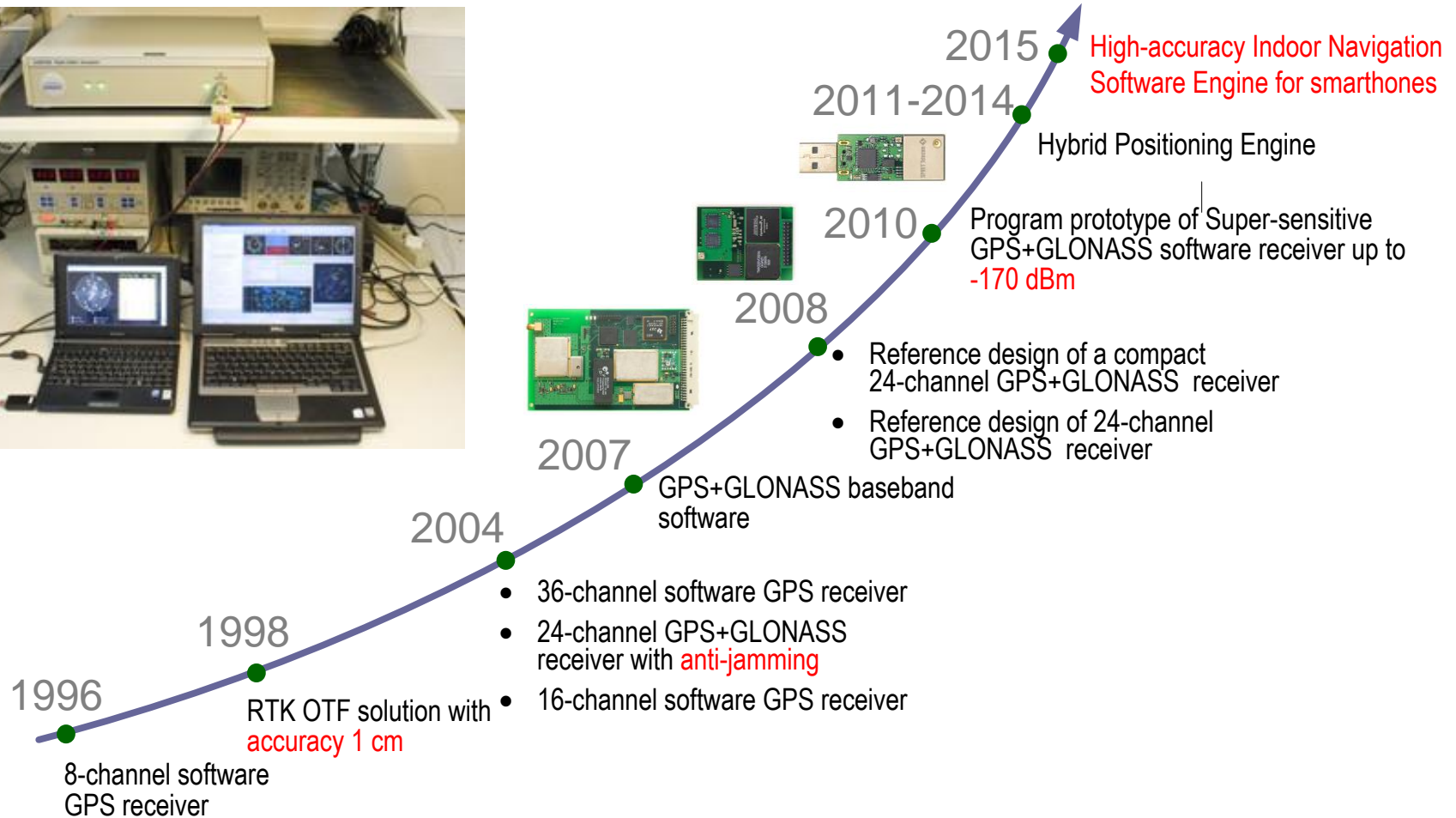
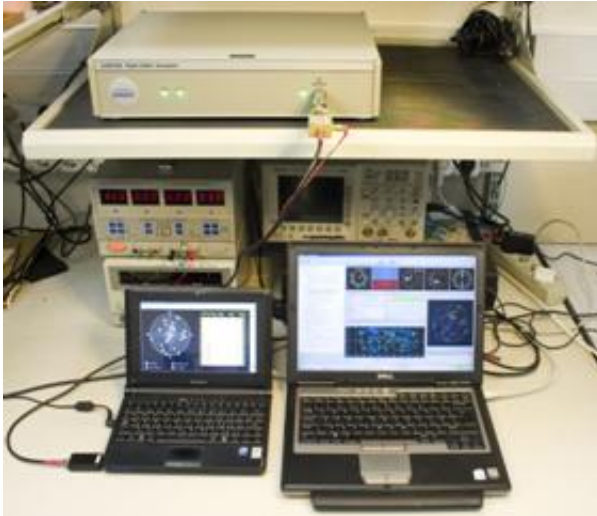


Hardware-free Indoor Navigation for Smartphones



Navigation product line 1996-2015



Accuracy is the problem

Today indoor Wi-Fi- and iBeacons based positioning accuracy of 30-300 meters is not satisfied for mobile users and Location Based Services (LBS):

- Indoor routes calculation
- Turn-by-turn pedestrian navigation indoors
- Mobile marketing and advertising indoors
- Geo-fencing and precise informing indoors
- Rescue and emergency services indoors
- Internet of Things



What users, LBSs and IoT need

- 1-meter positioning accuracy indoors
- Turn-by-turn navigation indoors
- Infrastructure free
 - beacons infrastructure setup is expensive, takes time, does not provide smooth GPS-like turn-by-turn navigation indoor
- Seamless outdoor-indoor navigation
 - today users loose precise positioning and navigation ability at outdoor-indoor each time passing from the street into building



Growing indoor LBS and IoT market

- 80% of internet access is indoors
- Google: Indoor Location-Based Services will be next \$BB market created by smartphones
- Opus Research: Indoor Location and place-based marketing to surpass \$10B by 2018
- ABI Research: Global Location Based advertising market to reach \$13B by 2017

Time spent ...



People spend 80-90% of their time indoors
70% of cellular calls and 80% of data connections originate from indoors.
(Source Strategy Analytics)

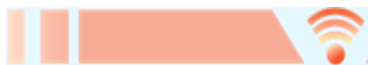
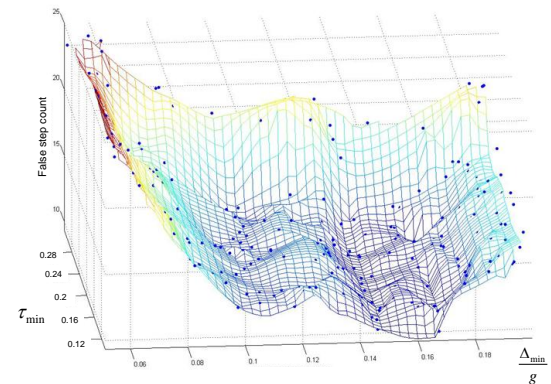
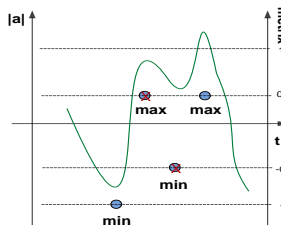


SPIRIT's software indoor navigation engine

Software indoor navigation engine operates as follows:

- Gathers positioning-useful data from internal smartphone's sensors such as accelerometer, gyroscope, magnetometer, barometer, camera, microphone and touch screen and radio communication modules
- Uses special map layer that contains the floor plan supplemented with the picture of geomagnetic and radio fields' intensity (fingerprinting). We create the map layer by means of own mobile application beforehand. The map layer is being kept and accessible in cloud
- Integrates sensors' and mapping data providing accurate and reliable navigation indoors

and assumes NO infrastructure support



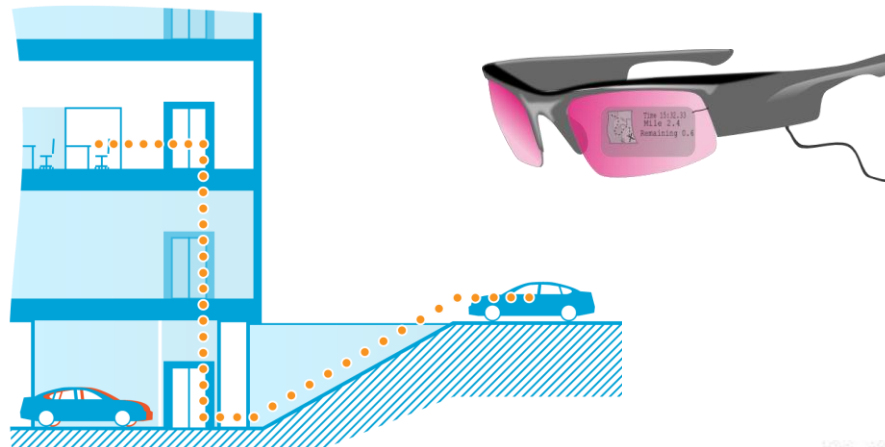
SPIRIT Navigation's list of integrated technologies

1. Heterogeneous data fusion by means of Particle filter
2. Pedestrian Dead Reckoning (PDR) based on smartphone-grade inertial MEMS
3. Map matching is the floor plan-based constraints control
4. Wi-Fi radio field fingerprinting
5. Geomagnetic fingerprinting, we create and use geomagnetic field's distribution map indoors
6. Automatic start by Wi-Fi field fingerprinting
7. Automatic start by geomagnetic fingerprinting
8. Automatic floor detection indoors is the 2.5D realization
9. Anthropometric personalization is the automatic detection of user's height and length of step
10. Screen rotation support on user go
11. Support indoor tracking in background mode
12. Automatic calibration of magnetometer
13. Seamless indoor/outdoor switch control algorithms
14. iBeacons (Bluetooth Low Energy) are used in iOS devices instead of WiFi access points
15. Neuromorphic computing, control and adaptation of information sources



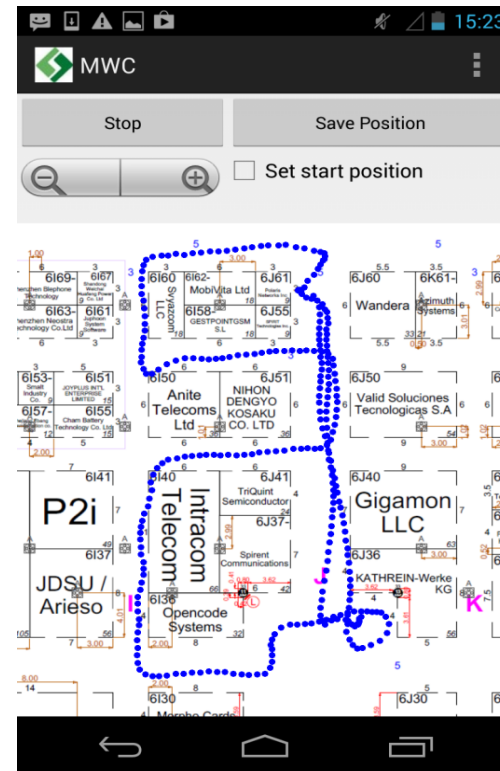
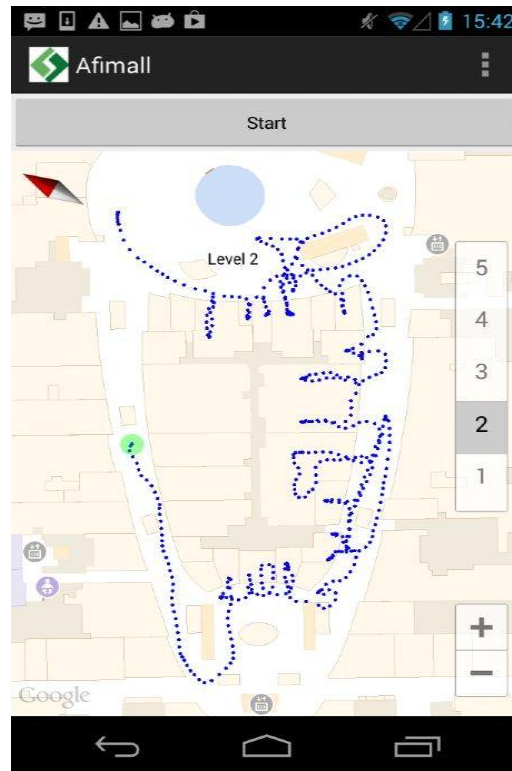
Result

- Automatic fix indoors (without additional WiFi access points, iBeacons, lidars, other radio and RFID beacons)
- Continuous step-by-step 1-3 meter (CEP) accuracy navigation indoors
- Automatic floor determination and switch
- Seamless outdoor-indoor navigation
- More reliable navigation in urban areas blocked to penetration of GPS signals: tunnels, city canyons, viaducts



Beta-version software on Android and iOS handset

Real-time tracks in shopping mall and exhibition hall



click on video demo

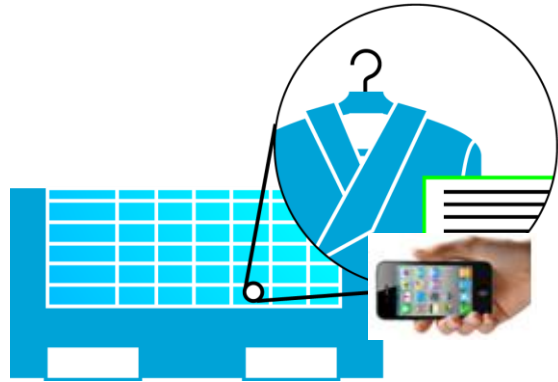
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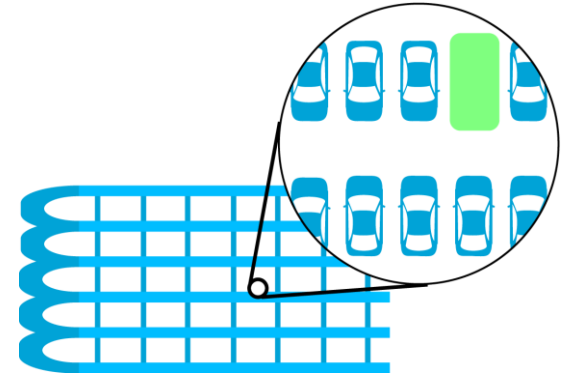
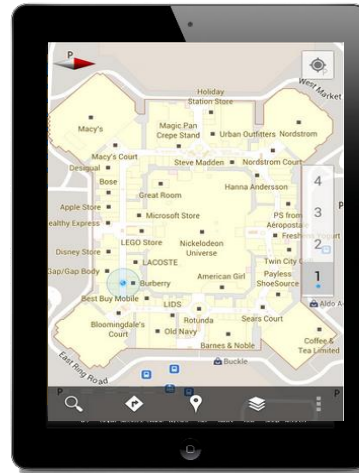


SPiRiT Navigation

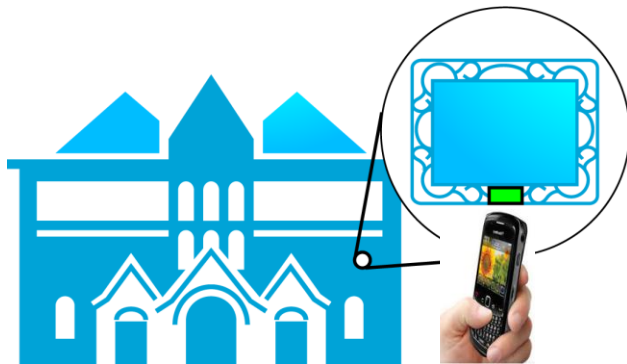
New quality of well-known applications



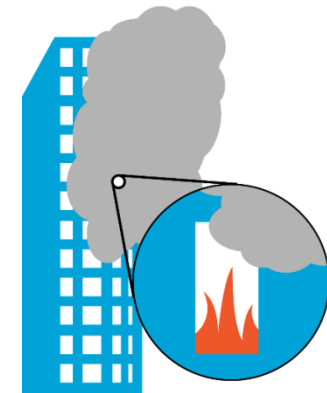
Search, routes, discounts in shopping malls



Search and routes inside the underground parking



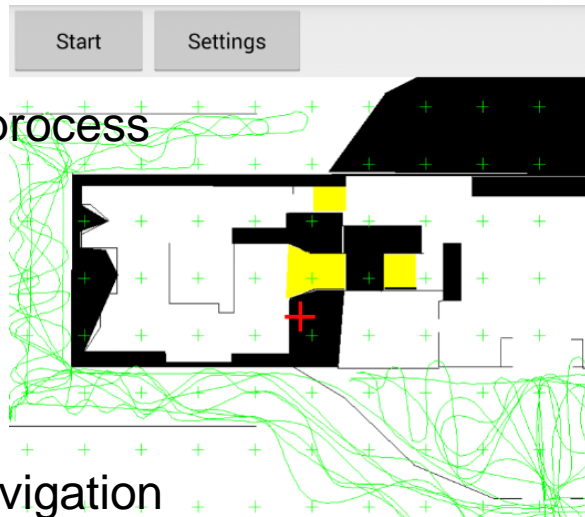
Precise Museum guides on the screen of any Smartphone



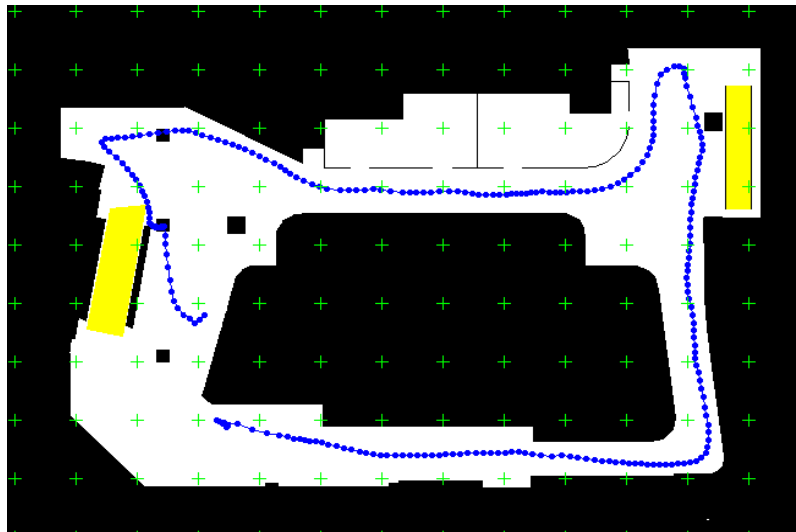
Emergency and rescue search and help: 911, 112

Setup in shopping center

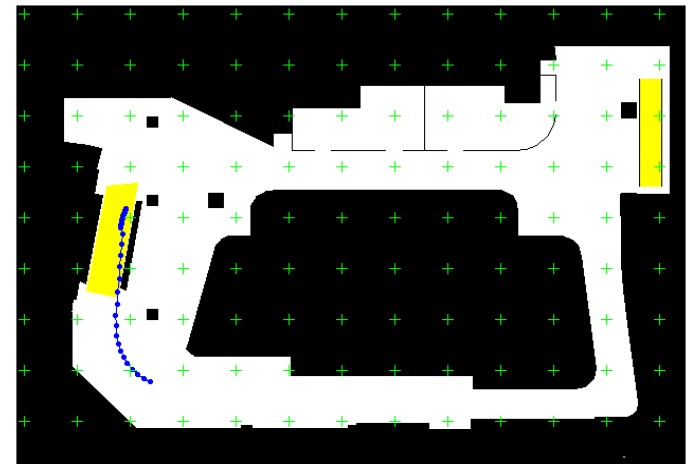
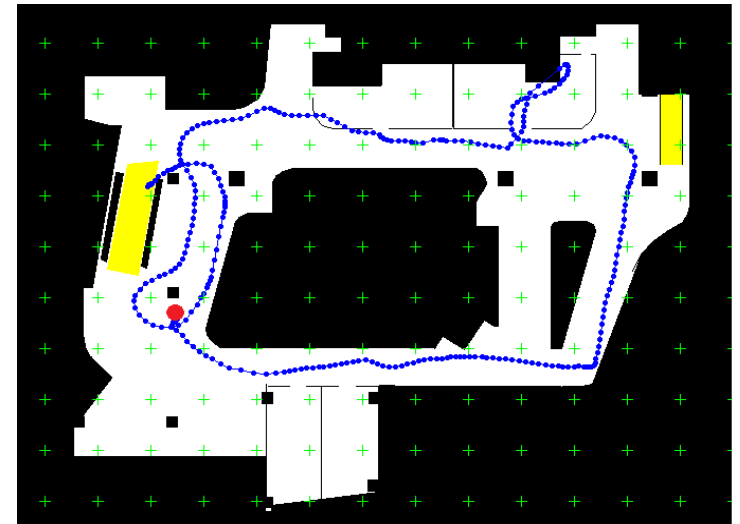
Map creation process



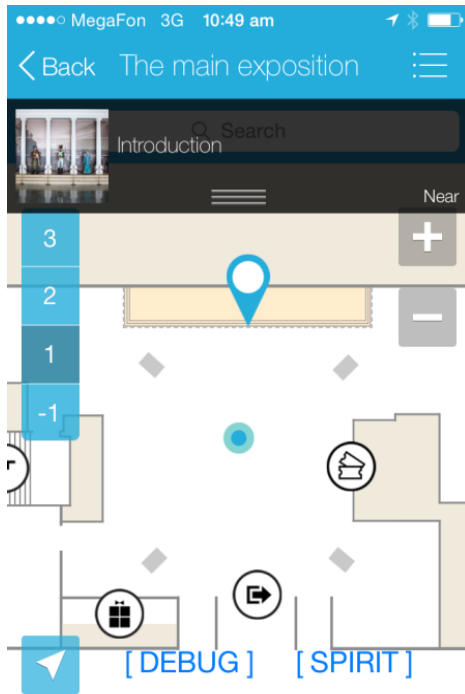
Single floor navigation



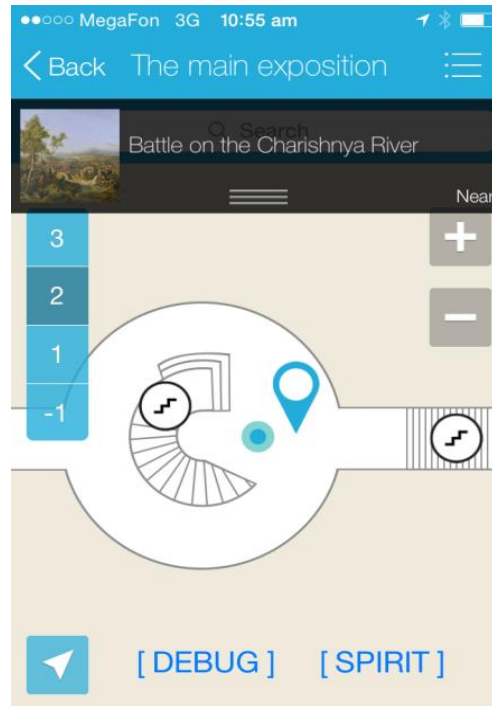
Automatic switch from 2 to 3-rd floor



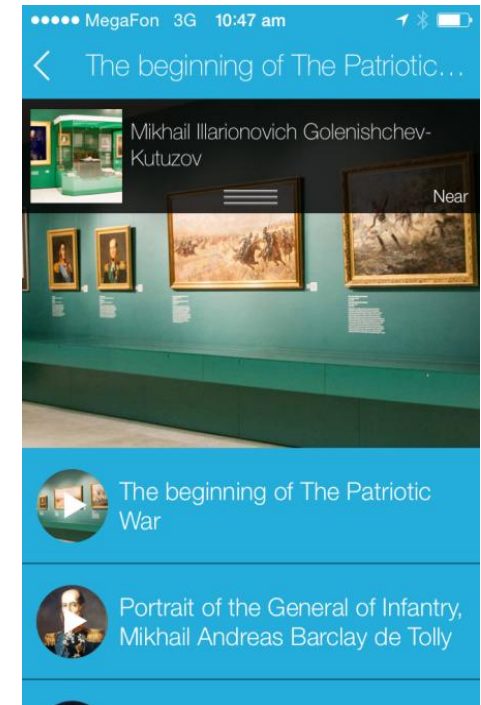
Deployed in museum mobile application



Precise positioning inside the museum



Automatic switch on actual floor



Geo contextual delivery of content

New quality of life!

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