Indoor Navigation
Indoor Navigation in the TU-Mensa

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Problem scenario & questions

Technology overview

Our approach

Timeline

- User wants to locate his/her friends using our app
- todo: Add produced user stories and use cases in a nice graphic

- ▶ How to get own position inside buildings?
- ▶ How to find other people inside buildings?
- ▶ Which privacy and security concern can be addressed?

- No GPS in buildings etc. => topic **Indoor navigation**
- todo: More…

- WiFi, Bluetooth, NFC, QR-Code, manual position pinning[BL09].
- todo: Add technology matrix (last meeting)

- ▶ With use of tubIT API.
- ▶ Provides building name, floor, coordinates.
- ▶ Problem: no coordinates in mensa and library, inaccurate coordinates elsewhere.

- ▶ Estimote beacons
- ▶ Possible positioning approaches
  - ▶ Indoor-Region Based Navigation
  - ▶ Live Indoor-Location Feedback Navigation
  - ▶ D2D Indoor-Navigation via Virtual Beacons
- ▶ Problem: possibly high battery usage

NFC

- ▸ Precondition: NFC tag on every table in mensa.
- ▸ Scenario: First group member that sits down puts phone on the table, phone reads tag and sends location to other group members.
- ▸ Cons: Requires user putting phone on table. High cost of initial NFC tags set-up. Requires NFC-enabled mobile device.

QR code

- ▸ Precondition: QR code on every table in mensa.
- ▸ Scenario: First group member that sits down scans QR code on the table, phone sends location to other group members.
- ▸ Cons: Requires user scanning codes; impractical, time-consuming.

- Fallback option, if no location can be received automatically.
- User will have option, to pin own location inside mobile application.
- Useful in cases of broken infrastructure (WiFi is down, dead batteries in Bluetooth beacons...).
- Provides alternative for users with high privacy concerns who don't want to automatically share their locations.

- How much interaction with mobile device are users willing to do?
- Always-on positioning. Requires always-on Bluetooth.
- Always-on positioning. Bluetooth turns on when WiFi positioning detects we are in mensa or library.
- Time based positioning. Application activates only in certain time intervals.
- Positioning while application is running and Bluetooth is on.
- Positioning on demand. User have to press a button to share position.
- User pins own position on map inside application.
- todo: Ask the 3 - 4 most important questions

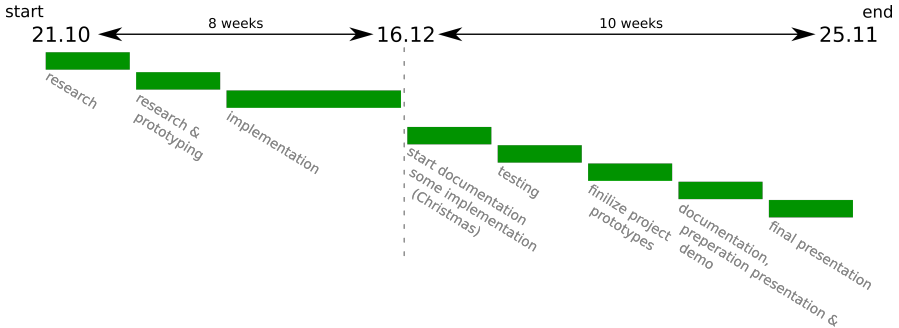|	Accuracy	Battery Consumption	User Interaction	Platform Independency
iBeacon (Bluetooth LE)	👍	👍	👍	👍
Bluetooth/Pairing (Device to Device)	👆 (neutral)	👎	👎	👍
WiFi (Localization)	👆 (neutral)	👆 (neutral)	👍	👍
NFC (Check-In)	👍	👍	👍	👎
QR-Code (Check-In)	👍	👍	👎	👎

► todo: Add graphic - include (at least): Android app, iOS app, loca

- Client-server architecture
- Server tasks
  - Retrieve details about bluetooth beacons.
  - Share location between users.
- todo: Finalize this

Our approach

start
21.10
8 weeks
16.12
10 weeks
end
25.11

research

research &
prototyping

implementation

start documentation
some implementation
(Christmas)

testing

finilize project
prototypes

documentation,
preperation
demo

final presentation
presentation &

Do you have questions?

If not - we have! :)

	Accuracy	Battery Consumption	User Interaction	Platform Independency
iBeacon (Bluetooth LE)	👍	👍	👍	👍
Bluetooth/Pairing (Device to Device)	👎	👎	👎	👍
WiFi (Localization)	👎	👎	👍	👍
NFC (Check-In)	👍	👍	👍	👎
QR-Code (Check-In)	👍	👍	👎	👎

- ▶ **Look** at the **matrix** above
- ▶ **Decide** which of the **properties** is **importend** for you
- ▶ Vote for **2** properties

📄 Allan Brimicombe and Chao Li.
Location-based services and geo-information engineering,
volume 21.
John Wiley & Sons, 2009.

📄 Silke Feldmann, Kyandoghere Kyamakya, Ana Zapater, and Zighuo
Lue.
An indoor bluetooth-based positioning system: Concept,
implementation and experimental evaluation.
In *International Conference on Wireless Networks*, pages 109–113,
2003.