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Indoor Localization of Cellular Phones

Monday 07th May, 2018

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Agenda

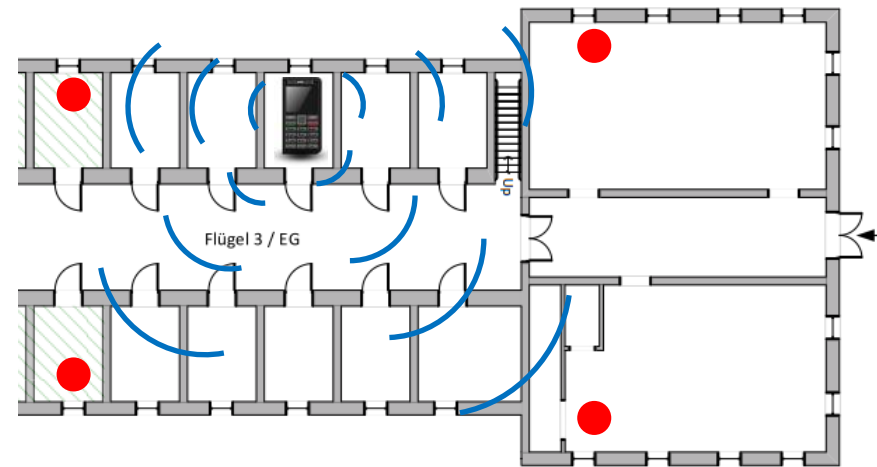


- ▶ Motivation
- ▶ Indoor Localization Method
- ▶ Validation Results
- ▶ Innovation and Added Value
- ▶ Funding and Acknowledgment
- ▶ Demonstration of System

- ▶ **Illegal** use of mobile devices in prisons for **organized crime**
- ▶ **Public Safety!**
 - ▶ Witness intimidation
- ▶ Search operations are extremely time consuming and costly
- ▶ **Every** prison cell and **inmate** have to be **searched**
- ▶ A **localization** of the cell phone is therefore **necessary**



- ▶ Each cell phone emits signal bursts during SMS or calls
- ▶ Multiple antennas are used for recording those signals



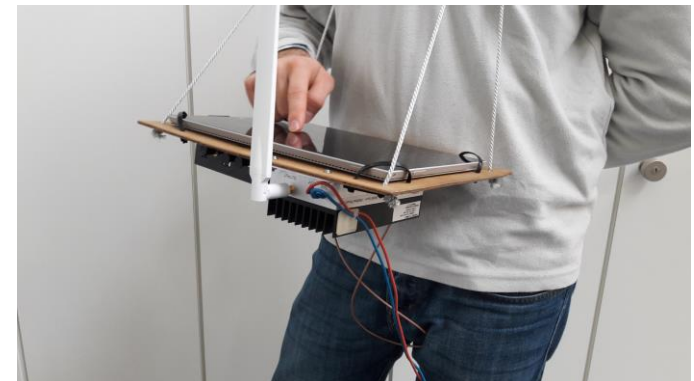
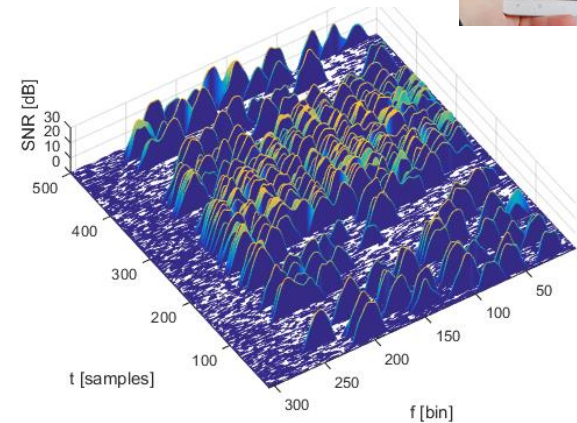
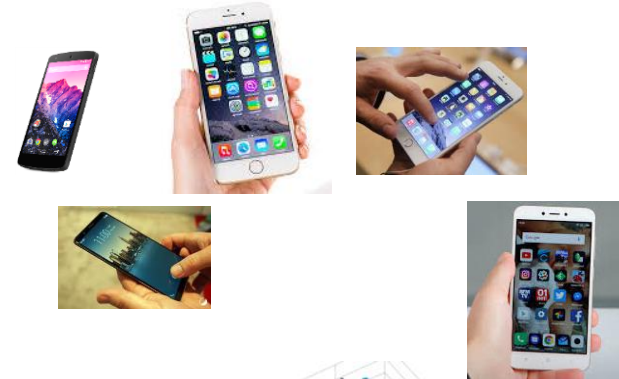
- ▶ The received signal strength is different at each antenna
 - ▶ Signal characteristics different for each position
- ▶ Create a database of “fingerprints” of known positions
 - ▶ Compare new signals to the database



Results & Limitations

- ▶ Validation in Prison Lenzburg (AG) and Burgdorf (Be) and Bellechasse (Fr)
 - ▶ 50000 recordings over 100 cells
 - ▶ Accuracy in cell size
 - ▶ 45000 within 0.8 (90%)
 - ▶ 40000 within 0.5 (80%)
 - ▶ 35000 within 0.3 (70%)

- ▶ Problem
 - ▶ High cell phone activity
 - ▶ Specifically designed Faked Handy used for Validation and Demo



- ▶ Currently deployed localization systems use sensors in every cell
 - ▶ High costs for maintenance and vandal safe installation
 - ▶ Need to be replaced if mobile standard changes

- ▶ Developed system uses only a **small number of sensors**
- ▶ **Easy upgradable** to new mobile standards

- ▶ Large Potential Market
 - ▶ 110 Prisons in Switzerland

- ▶ Public safety!
 - ▶ No more witness intimidation!

