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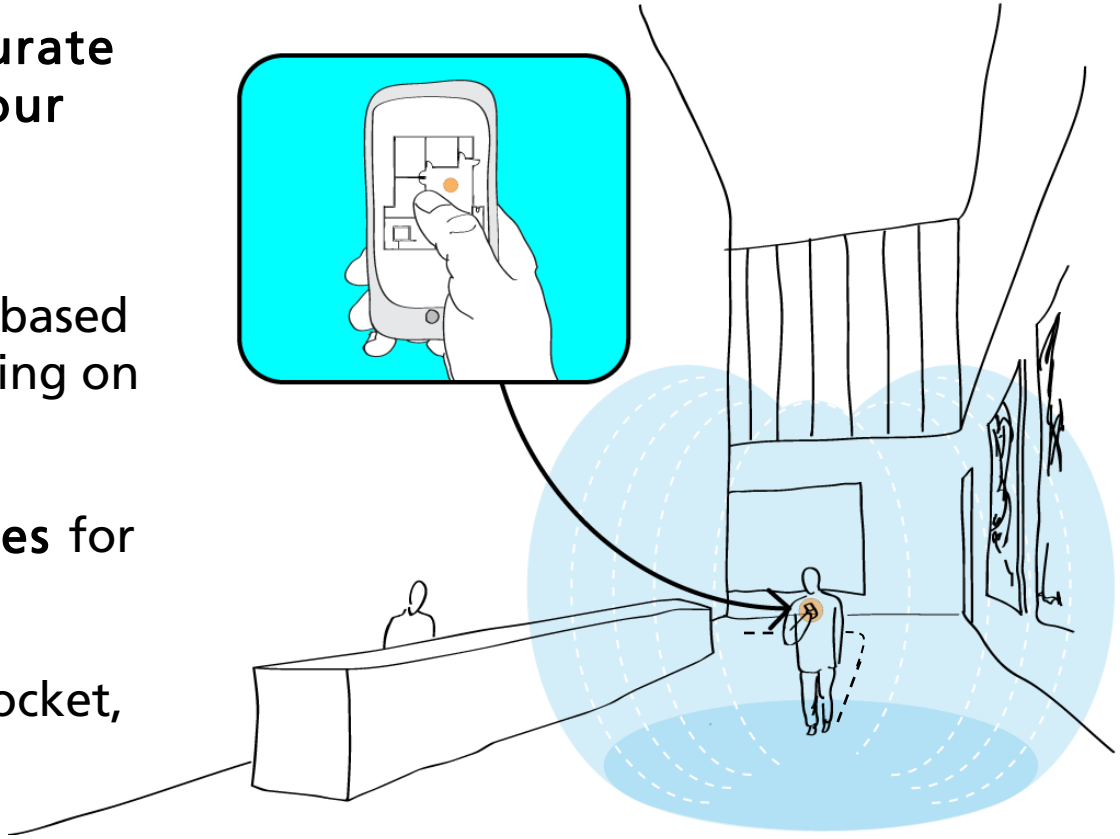
System Overview

PRECISE INDOOR LOCATION

1. System Overview

A solution that allows **accurate indoor tracking using your existing smartphone!**

- Human walking model-based **motion tracking** running on the smartphone.
- **Reference technologies** for algorithms calibration.
- Real usage scenarios (pocket, in call, texting,…)



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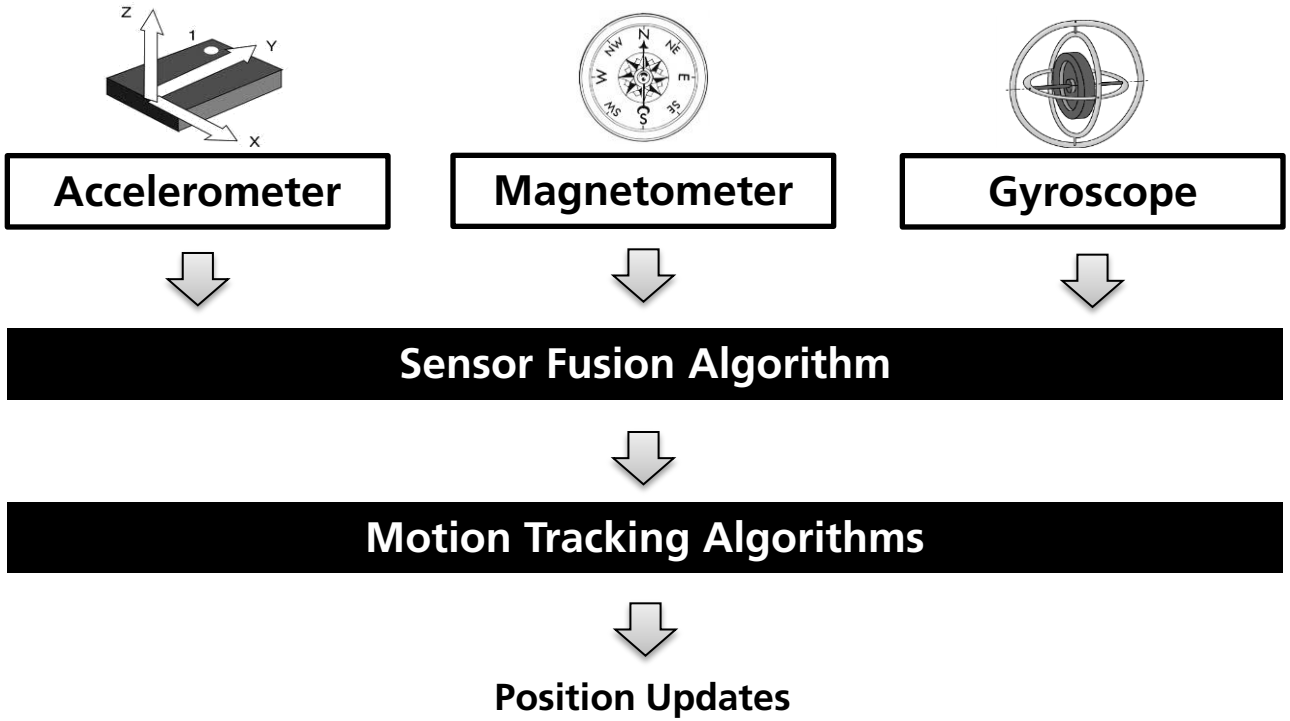
2. Motion Tracking (1/3)



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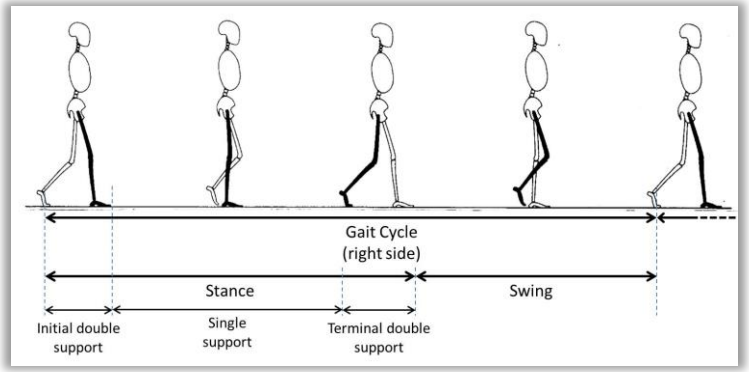
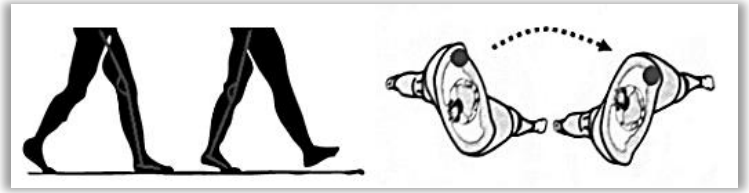
2. Motion Tracking (2/3)

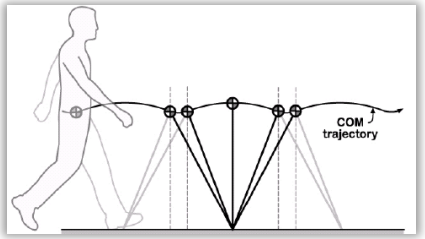
- **Human motion models**
  - Link sensor data to the gait cycle
  - Steps detection
  - Steps length evaluation



- **Direction of movement**
  - Real time evaluation
  - Backward correction mechanisms



- **Floor changes detection**
  - Motion models incl. barometer readings



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2. Motion Tracking (3/3)

- Motion tracking algorithms are **iterative** and **infer from previous positions**.
  - Track people in real time.
  - Infrastructure-free solution.
  - Subject to cumulative errors.

- **Reference technologies** can be used to calibrate motion tracking algorithms.
  - Infrastructure-based technologies
  - Infrastructure-free technologies

3. Reference Technologies (1/2)

ULF-MC

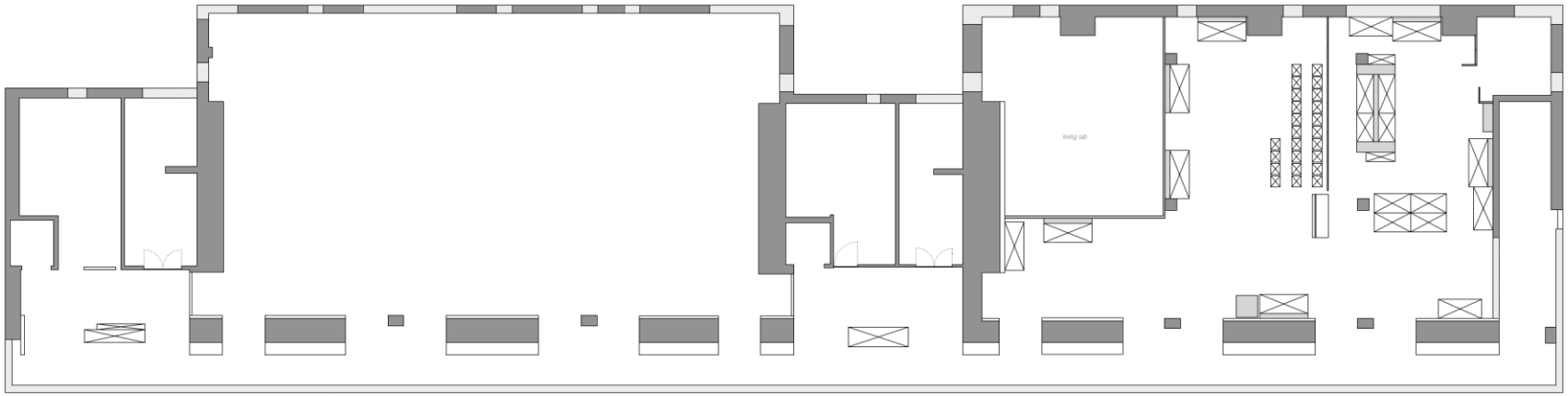
Ultra **L**ow **F**requency **M**agnetic Field Communication

- Smartphone's compass is used to **receive information** that is embedded in **low frequency artificial magnetic fields**.
- The **infrastructure** (magnetic field generators) is **simple** and thus **cost effective.**
- **No user interaction** is required (holding the phone on tags, etc.).
- **High accuracy** in the detection of **absolute coordinates.**

3. Reference Technologies (2/2)

Map Matching

- **Walk zones *versus* no-walk zones**
- Distinctive structures, e.g. stairs, elevators.
- Generation of different hypothesis that will converge to the most likely position.



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4. Work in Progress

- Integration with other reference technologies (e.g. RF-based solutions).
- Periodic calibration of tracking algorithms.
- Self adaptation (learning) of individual parameters.

5. Future Work

- Motion Tracking Algorithms:
  - Motion mode recognition and usage transitions.
  - Movement evaluation in specific scenarios: escalators, rolling tracks, etc.

- Inclusion of heading references.