

Blind Navigation Systems & Technologies

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Rev 0.0

Agenda

- ▶ Problem Statement
- ▶ Solution Space
- ▶ What's Next?

Problem Statement

Lack of Independence

Key Issues

- ▶ **Orientation in the surrounding**
- ▶ **Avoid random or moving potential limiting objects/persons**
- ▶ **Be aware of important special obstacles**

Problem Statement

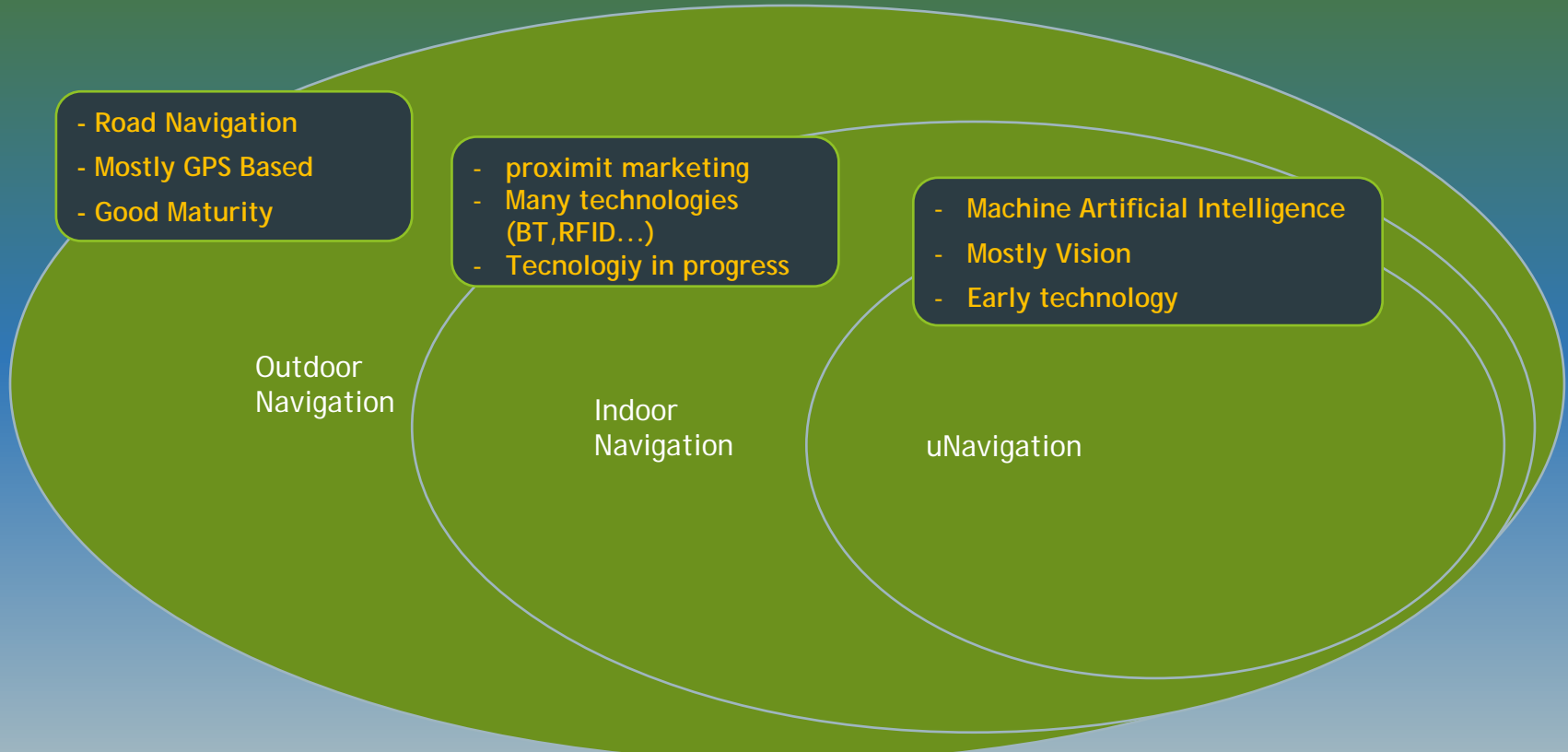
Technological Advances

- ▶ The Goal
 - ▶ Overview of technologies that can improve visually impaired independence
 - ▶ What the future may hold...



Problem Statement

Layers of Navigation

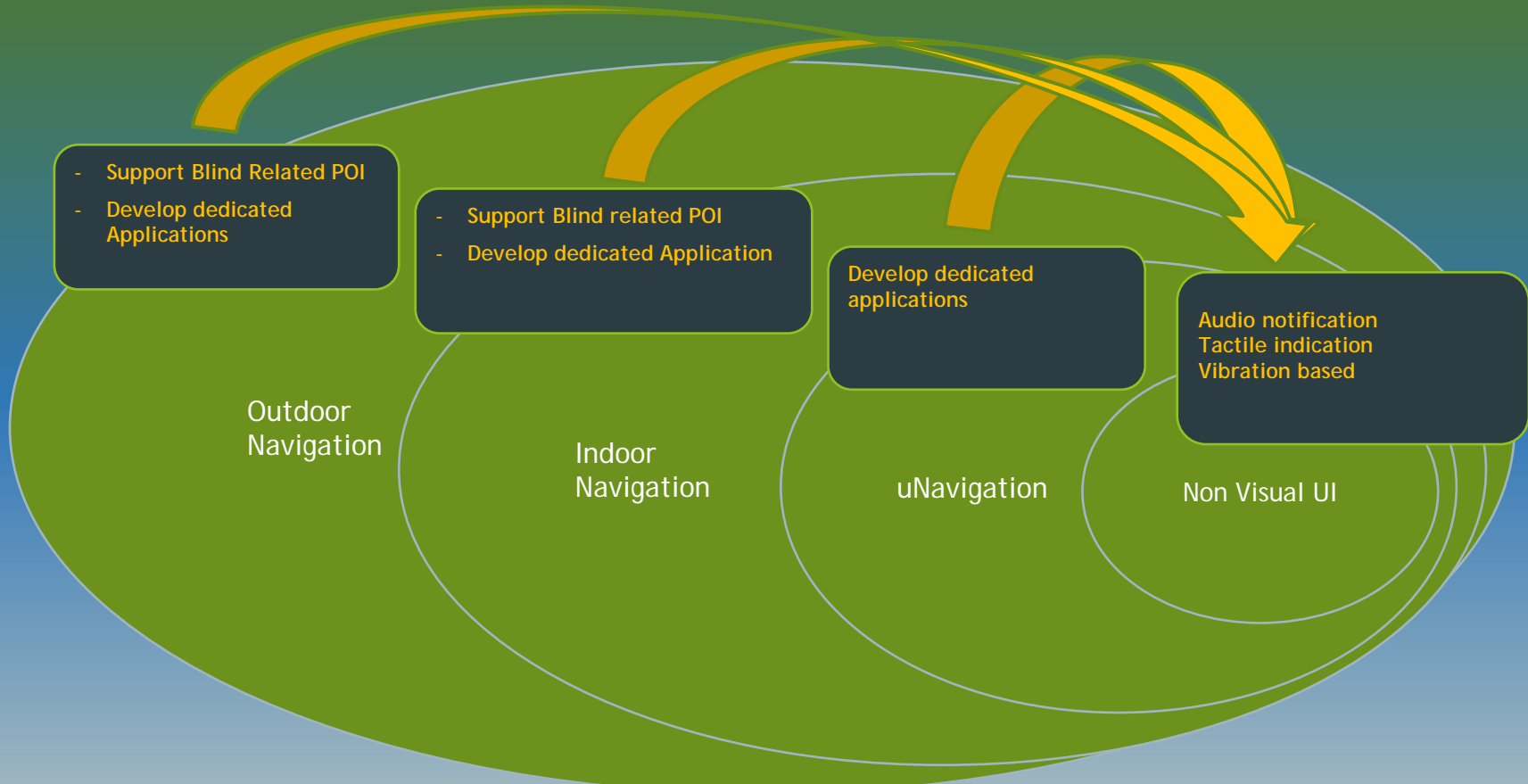


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Solution Space

Layers of Indoor Blind Navigation



Outdoor Navigation

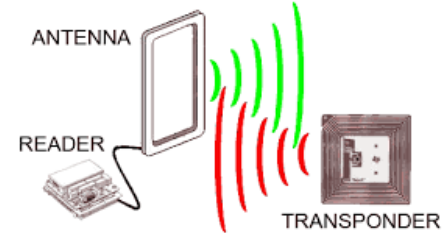
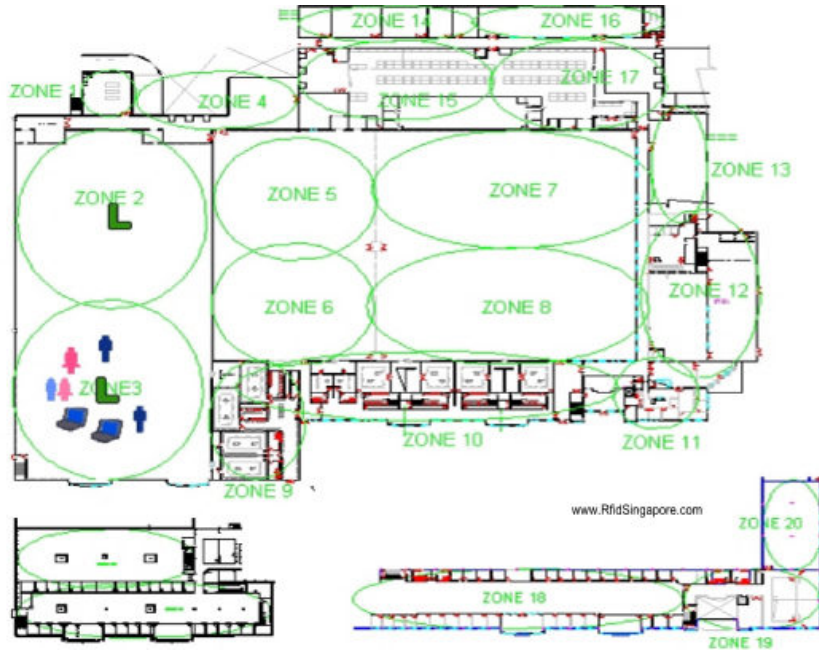
GPS Enablement

- ▶ The Argus Project <http://www.projectargus.eu/default.asp>
 - ▶ Navigation based on GPS satellite and dedicated maps. Information about obstacles is accumulated based on user reports
 - ▶ Acoustic oriented user interfaces enabling users to obtain a 3D spatial insight of their surrounding environment and outdoor navigation
 - ▶ <https://www.youtube.com/watch?v=kOFDeIJ-87I>
- ▶ Blind Maps
 - ▶ A GPS and crowd sourcing module connected to the cellular device, which gives directions in Braille.
 - ▶ <https://www.youtube.com/watch?v=rseieiXZo0E>



Indoor Navigation

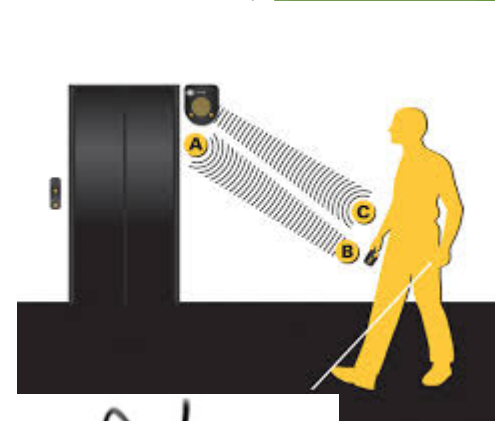
RFID Technology



Indoor Navigation

RFID Based Systems

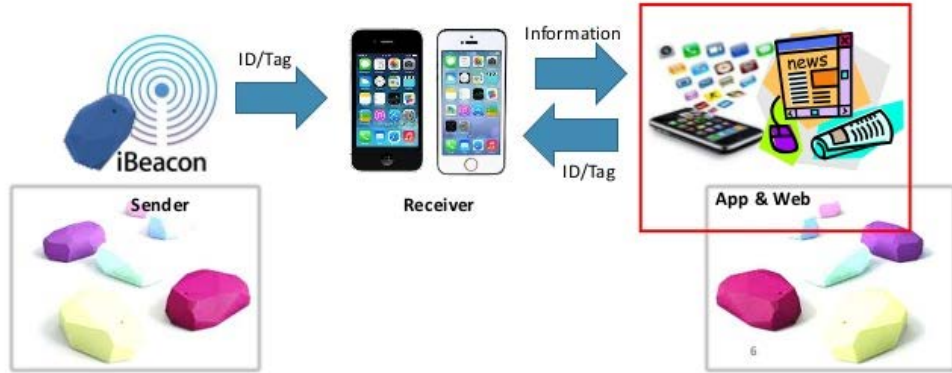
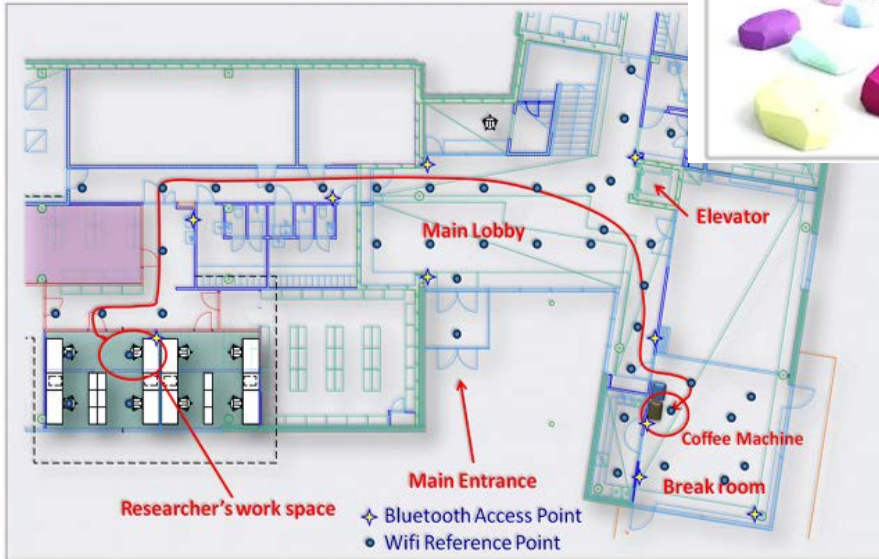
- ▶ Step Hear <http://www.step-hear.com/sh-how.htm>
 - ▶ A Bip is heard when approaching a StepHear device and a specific recordings is received indicating loction.
 - ▶ <https://www.youtube.com/watch?v=puLUjFTGEjQ>
- ▶ Blind Guide
 - ▶ a passive RFID device is located on specific objects, and a handheld device communicates with it the objects and give audio directions.
 - ▶ <https://www.youtube.com/watch?v=eKgJlaPwvOA>



Indoor Navigation

iBeacon Technology

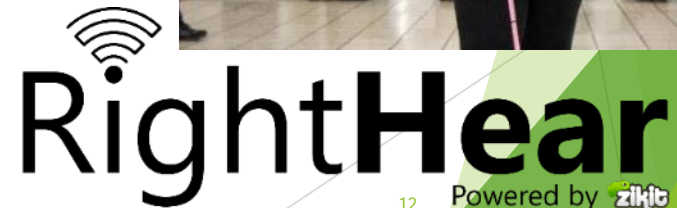
iBeacon's Technology



Indoor Navigation *iBeacon Based Systems*

- ▶ Indoo.rs - <http://indoo.rs/sfo/>
 - ▶ Developed a POC system for navigation in SFO airport
 - ▶ <https://www.youtube.com/watch?v=5uCaMyWJ-Uw>
- ▶ WayFindr - <http://www.wayfindr.net/>
 - ▶ A POC system for navigation in the London Tube
 - ▶ A standard for audio guidance
 - ▶ <https://www.youtube.com/watch?v=9jH-Bdjmg4>
- ▶ RightHear - <http://www.zik-it.com/righthear.html>
 - ▶ iBeacon based Israeli company for Generic indoor navigation



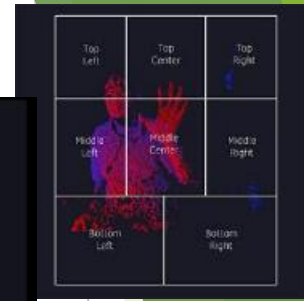
**RightHear**

12 Powered by 

uNavigation

Augmented Reality

- ▶ Spatial Awareness Wearable (SAW).
 - ▶ based on Computer vision. Identify the distance of items in the spatial environment and give a vibration based indication to the user
- ▶ Smart Assist System for Blind People (SASB).
 - ▶ use ground sensors and give audio and vibration indication to the user.
 - ▶ <https://www.youtube.com/watch?v=by0aMBQDjyk>



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Cane Based Technology

▶ Navater

- ▶ Google Glass and Sensor based Dead-Reckoning indoor navigation
- ▶ <https://www.youtube.com/watch?v=Q07oHm3zh04>

▶ SmartCane

- ▶ A Sonar based cane used to track nearby obstacles with vibration based indication.
- ▶ <https://www.youtube.com/watch?v=A1CO8NKxUFY>



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What's Next ?

- ▶ Technology Solutions
 - ▶ Integrality of Solutions
 - ▶ Cost effective integrative solution for all aspects
 - ▶ Adaptations to blind related
 - ▶ 3D Obstacle indication
 - ▶ Large scale blind related POI management
- ▶ Cost Reduction
 - ▶ Deployment and maintenance
 - ▶ Device Cost
- ▶ Standardization
 - ▶ Definitions for localization accuracy, audio interface etc.

What's Next

Further awareness

- ▶ Regulation
 - ▶ Legislation and enforcement
 - ▶ Prioritize grants for development of technological solutions
- ▶ Promote the subject in the technological community
 - ▶ CES2016, mEnable
 - ▶ Dedicated Hackathons

