

# Rešitve za javne institucije INVALIDI:

## SLEPI

### INDOOR NAVIGACIJA

#### NAVIGINE

<https://navigine.com/blog/>

The indoor position system is based on beacons or tags that are installed in buildings or placed on tracked objects. Special readers receive signals from these devices and send them to the server that processes the obtained data and directs the information with the exact coordinates to the computer or mobile application. Such a solution makes it possible to build routes, send push notifications with advertising or useful tips to users.

#### Tehnologije

##### - UWB: Ultra WideBand

- o Natančnost 20-30 cm, doseg do 100m
- o Različni načini pozicioniranja (TDoA (Time difference of Arrival od senzorja do sprejemnikov), PDoA (Phase difference of Arrival od senzorja do sprejemnikov), TWR, AoA (Angle of Arrival + jakost signala) )  
<https://navigine.com/blog/uwb-technology-features-examples-of-application>
- o 3.1 do 10.6 GHz, širina > 500MHz, 41.5dBm/MHz (šibki)
- o za dobro delovanje potrebuješ posebne tage, oz:
  - iPhone11 naprej
  - Samsung Galaxy S21PlusUltra, S22..., S23, Note20 Ultra, Pixel 6Pro in 7Pro  
(**OMEJENO zaenkrat na dobre telefone**)

##### - WiFi:

- o Natančnost 3-5 m (Android 8) oz. (8-15m od Android 9 naprej, zaradi zmanjšanja hitrosti skeniranja), doseg do 150m
- o Lociranje preko RSSI (received signal strength indicator) and MAC-address)
- o **NE DELUJE na Apple napravah zaradi privacy issues**, dela na Android
- o Lahko problem z interferencami
- o Porabi več energije

##### - Bluetooth

- o Natančnost 1-5 m, doseg v praksi do 30 m
- o Lociranje preko
- o iBeacon standard ali Eddystone (google)
- o porabi malo energije

- **Ultrasonic system**
  - o Natančnost nekaj cm
  - o Lociranje preko ToF (Time of flight)
  - o Relativno malo opreme (zapestnica ki oddaja UZ signale?)

## STANDARDI ZA ZEMLJEVIDE

**GOODMAPS:** <https://www.goodmaps.com/>

- Mapirajo z LIDARjem, naredijo tlorise z opisi (labels): <https://www.goodmaps.com/process>
- Potem ti opisuje kaj je v smeri telefona ali pa te usmerja
  - o Camera based positiononing (brez beaconov) *which uses geo-referenced images to determine a user's position*. Dela na osnovi slik, ki so jih posneli med skeniranjem stavbe z LIDARjem
- Uporaba v wallmart

prednosti in dobre ideje:

- 📺 Intuitive search for objects on the map by keywords;
- 📺 Possibility to make a remote appointment;
- 📺 Reminders about appointments or other visits;
- 📺 Personalized notifications based on the current location;
- 📺 **Possibility to share your location with relatives or friend**

Patients are provided with special bracelets (or smart watches/badges), inside of which are tags with identifiers. (Če nimajo ustreznega telefona, dobijo SMS?)

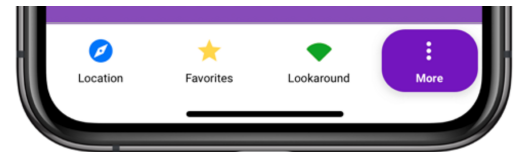
... →

## UI → INDOOR NAVIGATION APPS

### GoodMaps: Explore

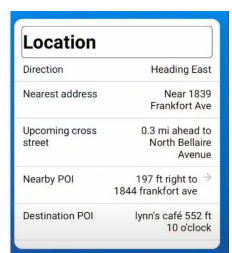
<https://www.goodmaps.com/apps/explore>

- uses LiDAR
- user can choose their language and cuing method
- app works with speech, a Braille Display, or both together.
- very simple design, easy to understand
  - ◆ audio feedback (speech + beeps) - users can choose the voice (female, male, accent?), voice talks fast (CUSTOMISABLE)
  - ◆ LOCATION function (*Shake* your phone to hear a snapshot of your current location, including current direction, nearest room, street, or points of interest (POI).)

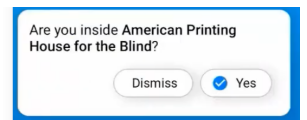


- **OUTDOOR** mode

- states **cardinal direction** in which user is headed or facing (eg. north-east)
- states **nearest address** (eg. "Near 10199 23 Ave NW")
- states **upcoming cross street** (eg. "Near 109 Street NW")
- states **nearby POI** (eg. "124 ft, 10 o'clock to Heritage Dental Centre")
- states **destination POI** (eg. Lynn's café, 552 ft, 10 o'clock)
- once user enters a building, it asks "are you inside XX?" (user has to *press on right answer*), then switches from OUTDOOR to INDOOR mode

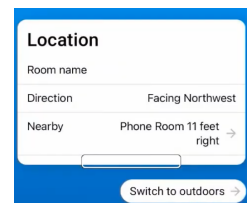


- ◆ when user clicks, there is a beep → confirmation they pressed the button



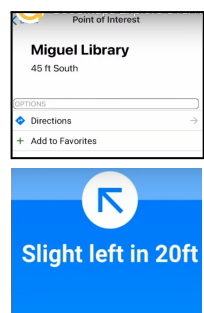
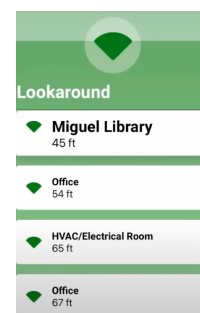
- **INDOOR** mode

- states **room name** (eg. "Front Lobby")
- states **direction** (eg. "heading north-east")
- states **nearby locations** (eg. "Phone room, 11 feet, right")



- ◆ LOOKAROUND function

- voice asks user to "Look around" with the phone, then starts stating nearby rooms/locations in the directions they're facing (eg. "West Stairwell 2, 45 feet") - locations stated in order of proximity
- Locations appear on screen, user *presses* on their point of interest, then *presses* "Directions" to go there.
- Voice then states status → eg.: "continue 30 ft", "slight left in 12 ft", "you have arrived at Miguel Library, door 10 o'clock"



- ◆ FAVOURITES function

- favorite destinations in one place, quick shortcut

- ◆ 'MORE' function

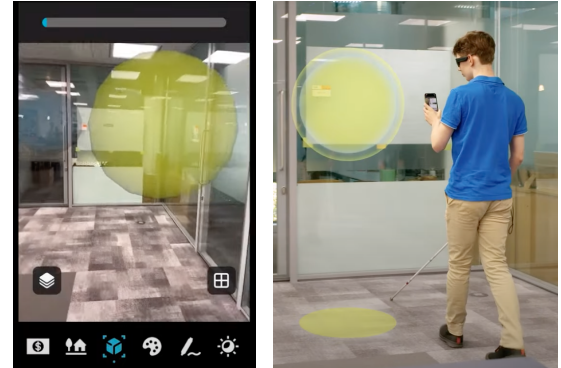
- settings, customisation

→ users like it, also wanna have it on apple watch

## Microsoft: Seeing AI

<https://www.youtube.com/watch?v=sKMHg1DpTuE>

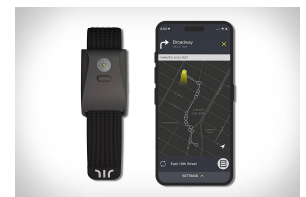
- works with **spatial audio cues**
- **trail of virtual waypoints**
- uses LiDAR
- INDOOR NAVIGATION (Available on the World Channel, enables you to create routes through a building, like "entrance to classroom", and navigate by following the sound (requires a device with an A9 or later processor, and iOS 14+))
  - ◆ user selects a route, opens the camera channel on app,
  - ◆ waypoints appear on screen as if they're in the room (virtually, a series of floating balls, stretching out along the route), they are **emitting sound** based on how close you are to them
  - ◆ user must follow them to get to their destination - once the user passes through a waypoint, a **popping sound** is heard as confirmation
- Other tools for reading signs while navigating:
  - ◆ SHORT TEXT - Speaks text as soon as it appears in front of the camera, doesn't
  - ◆ SCENES - Hear an overall description of the scene captured. Explore the photo by moving your finger over the screen to hear the location of different objects
  - ◆ COLORS - Identifies colors.
  - ◆ HANDWRITING - Reads handwritten text like in greeting cards (available in a subset of languages).
- user swipes up to move through different tools/items in the list
- *liked by users*



## WearWorks: Wayband

<https://www.youtube.com/watch?v=yj7kZQbOOQlc>

- wristband + app on smartphone
  - ◆ can also use just the smartphone
- uses **only vibration** cues
  - ◆ when you're going the right way you feel no vibration at all
  - ◆ when you go off route you start to feel a tiny vibration
  - ◆ the vibration gets stronger the more off you are
  - ◆ if a sharp turn is coming up, the device gives off a preemptive haptic about 5 m before, to signal it to the user (2 buzzes, followed with either 4 distinct buzzes (turn right) or 1 long buzz (turn left))
  - ◆ when you arrive at destination, you get 10 consecutive buzzes
- eliminates the need for audio, meaning that even in crowded city centers, the visually impaired have the freedom to find their way around with ease
- more discreet, personal and secure
- can create and share custom routes
- Use case:
  - ◆ used by a guy who became the first blind person to run the New York marathon without assistance



→ generally liked by users

## BlindSquare

<https://www.youtube.com/watch?v=GDAMGSfTOq8>

- most widely used blind navigation app
- mostly used for outdoor navigation
- information app states - user has to shake their phone for app to state it
  - ◆ **distance** to destination ( yards, feet, or meters) (as a straight line from user to POI - like a bird's path)
  - ◆ **direction** in which you're facing, according to the clock face (eg. 1 o'clock)
- app by itself can't plan a route, give specific directions
  - ◆ works with a third party mapping app
- has a separate voiceover from the iPhone (can be confusing because they may talk over each other) (user can adjust speech rate)
- app has "look around" and "around me" tools → used to search for POIs in close vicinity
- *users like it, especially for its clock-based directions*

## Lowiz ting

<https://www.youtube.com/watch?v=RCWecoWoPVM>

- iBeacons
- uses **audio feedback + vibrations**
  - ◆ hum: if you are on the right route there is no hum. The more off-route you go, the louder and higher pitched the tone gets (vibrations accompany it)
  - ◆ speech: gives directions (eg.: "Move forward past the store on your right and turn left at the corner.")
- A version of this app has been used in the San Francisco International Airport (SFO).
  - ◆ "The app makes use of iBeacons located throughout Terminal 2, which prompt it to audibly call out various points of interest when they are within the smartphone's proximity"
  - ◆ it can work either actively (you want to get to your gate) or passively (here's what you happen to be walking past)
  - ◆ It also employs the same gestural cues—a triple-tap brings up a menu, for instance—that other accessible apps, such as BlindSquare, do

## ClickAndGo Wayfinding

<https://www.youtube.com/watch?v=5o7RKvHhXIA>

<https://www.clickandgomaps.com/clickandgo-nextgen-talking-signs/>

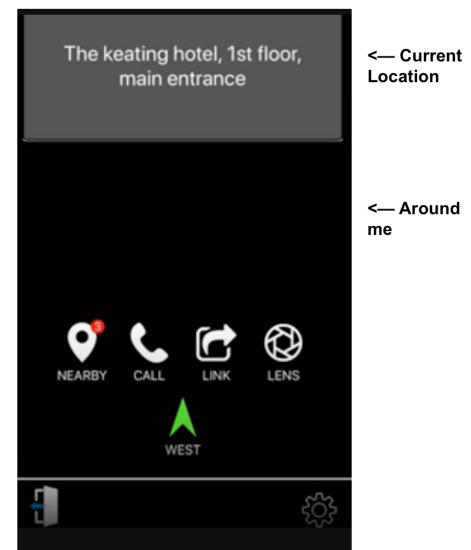
- uses iBeacons
- speech feedback
  - ◆ it can work either actively (you want to get to your gate) or passively (here's what you happen to be walking past)
    - actively eg.: "Turn east at the next sidewalk intersection" "Walk 30 ft ahead and turn right"

- passively eg.: "You are now near XXX" "You are now walking towards gates 6 through 10"
- ◆ incorporates environmental cues, such as surface changes under foot (for example wood to carpet)
- manual advancement of route steps
  - ◆ *allows users to repeat messages or quickly review previous steps, providing flexibility and supporting situational awareness*
  - ◆ participants also expressed a desire for a more automated progression of instructions or voice command interactions, which would make the interaction faster, easier, and free up their hands
- *many users generally prefer hands-free interaction (because they are usually holding a cane or a dog)*
- *users also like using a headset as opposed to the system speaker - reduces interference with ambient environmental sounds, does not disturb people around*

## RightHear

<https://www.youtube.com/@RightHear>

- iBeacons
- indoor and outdoor
- audio feedback - speech
- main functions (activated if clicked-on):
  - ◆ 'Current location': tells the user their current location (eg.: "The Keating Hotel, 1st floor, main entrance")
  - ◆ 'Around me': based on the direction the user's phone is pointing in, the app states different points of interest and how far away they are (eg.: "Wheatley Heights is about 50 m in this direction")
  - ◆ 'Nearby spots': opens a list of all nearby POIs (eg.: "2nd floor, elevator area, The Keating Hotel, 3293 F St San Diego, CA 90384, USA")
    - also offers function 'simulate spot' which allows user to search for the map/ nearby spots around the exact chosen location
  - ◆ 'Lens': redirects you to a 3rd party app such as 'Be My Eyes' which describes the scenery around you
  - ◆ 'Sky Mode': works as compass, states the cardinal direction the phone is pointing in/moving in (eg.: "West")
  - ◆ ...
- *positive reviews*



## Wayfindr RLSB

- used in London underground, Sydney underground, mall XX in Barcelona
- uses earphones

- states instructions as user is walking - when it senses user is at a certain point, it states your location or further instruction, for example “turn left and walk down the stairs” “there are 9 steps” “you are approaching the end of the escalator”
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## GENERAL USER PREFERENCES:

- speech input and output (JVIS survey, 2004)
- Bone conduction headphones
  - In busy and noisy environments, hearing instructions from the smartphone speaker, particularly when in a pocket are a challenge
  - danger in blocking out auditory clues and warnings in the environment
- ideally wireless headphones
- users like if you can customize the voice, especially the speed
- most do not care if voice sounds robotic when it comes to practical use cases
- *many users generally prefer hands-free interaction (because they are usually holding a cane or a dog)*
- *users also like using a headset as opposed to the system speaker - reduces interference with ambient environmental sounds, does not disturb people around*

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## UI → READING SIGNS + ORIENTATION apps

### Supersense

<https://www.youtube.com/watch?v=yqk-vdkrEEw>

- scans environment/text around you, uses VoiceOver to read it to user
- features it has:
  - ◆ **Smart Scanner:** the app automatically detects whether the user’s trying to quickly read a piece of text, a document, a currency, or a barcode
  - ◆ **Smart Guidance:** app guides users on how to point the camera and finds the best angle to have the most accurate results
  - ◆ **Quick Read** feature allows users to instantly read text that’s in the front of the rear camera
  - ◆ ...
- There's a menu button top left where users can choose the function
- There's a stop/start button at the bottom which indicates whether the camera should be scanning the environment
- *very positive response from deaf community, app is very useful*

## Voice Dream Reader

<https://www.voicedream.com/>

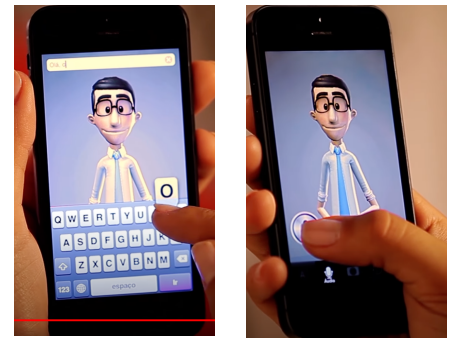
- the app highlights the read text on screen
  - *very good reviews, from sighted community also*
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## GLUHI

### Speech to sign translators

#### The Hand Talk App

- user presses mic-button and speaks into the phone OR types the text
- a 3D figure “Hugo” or “Maya” on the screen will translate that text into sign language
- “Hugo” and “Maya” are customisable characters (you can change their clothes)
- speed of translation is adjustable
- (works in brazilian and american sign language - american doesnt work as well as brazilian)
- *a big majority of users support the app, some get embarrassed to use it*



### Sign to speech translators

#### SignAloud

- a pair of wired gloves
- as user speaks in sign language, the gloves translate the hand movements to speech, word by word
- *idea currently disliked by deaf community → ‘they don’t take into account body language and emotions’, ‘they only help the hearing person’, ‘it is impractical to wear them’*

