IXE : From Web to Urban Navigation

SP4

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IXE V1 (2011)

IXE BROWSER

AUDIO-VISUAL NAVIGATION

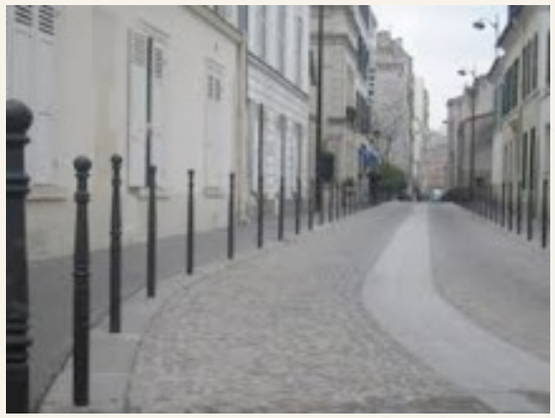
IMU LOCALIZATION

XLIB

XML-OSM DOCUMENT

JOSM

IMU-Localization needs a regular Layout



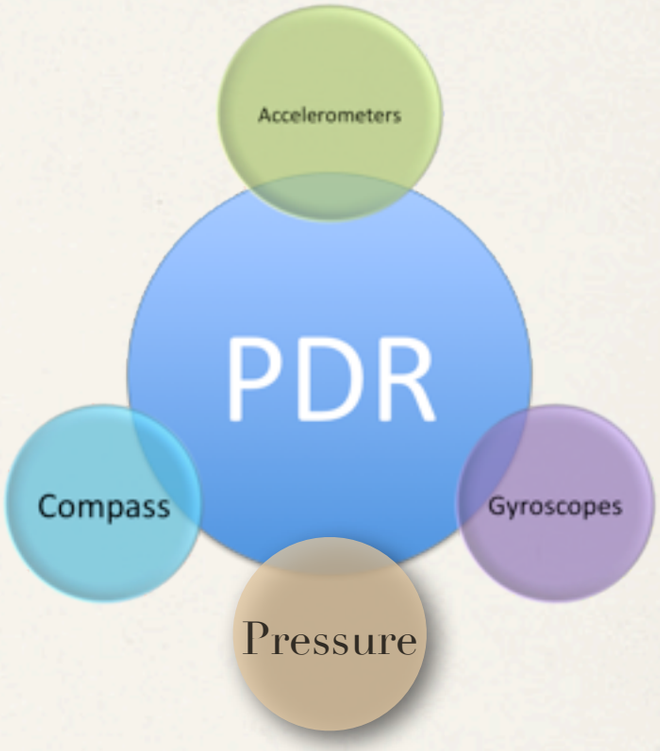
Pedestrian navigation is structured by

- Pedestrian crossings
- Sidewalks
- Pedestrian streets
- Tactile paving
- Poles
- Urban furnitures

OpenCorridorMap.org

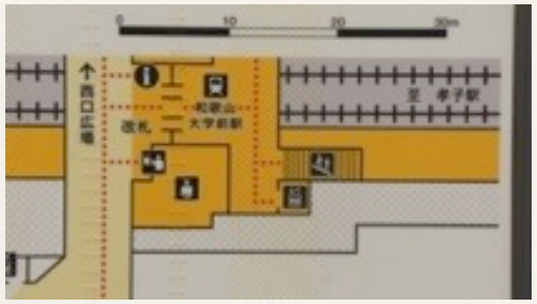
Localization using relative positioning (Pedestrian Dead-Reckoning)

- Inertial Measurement Unit (10 sensors)



- Models of walking

- Map



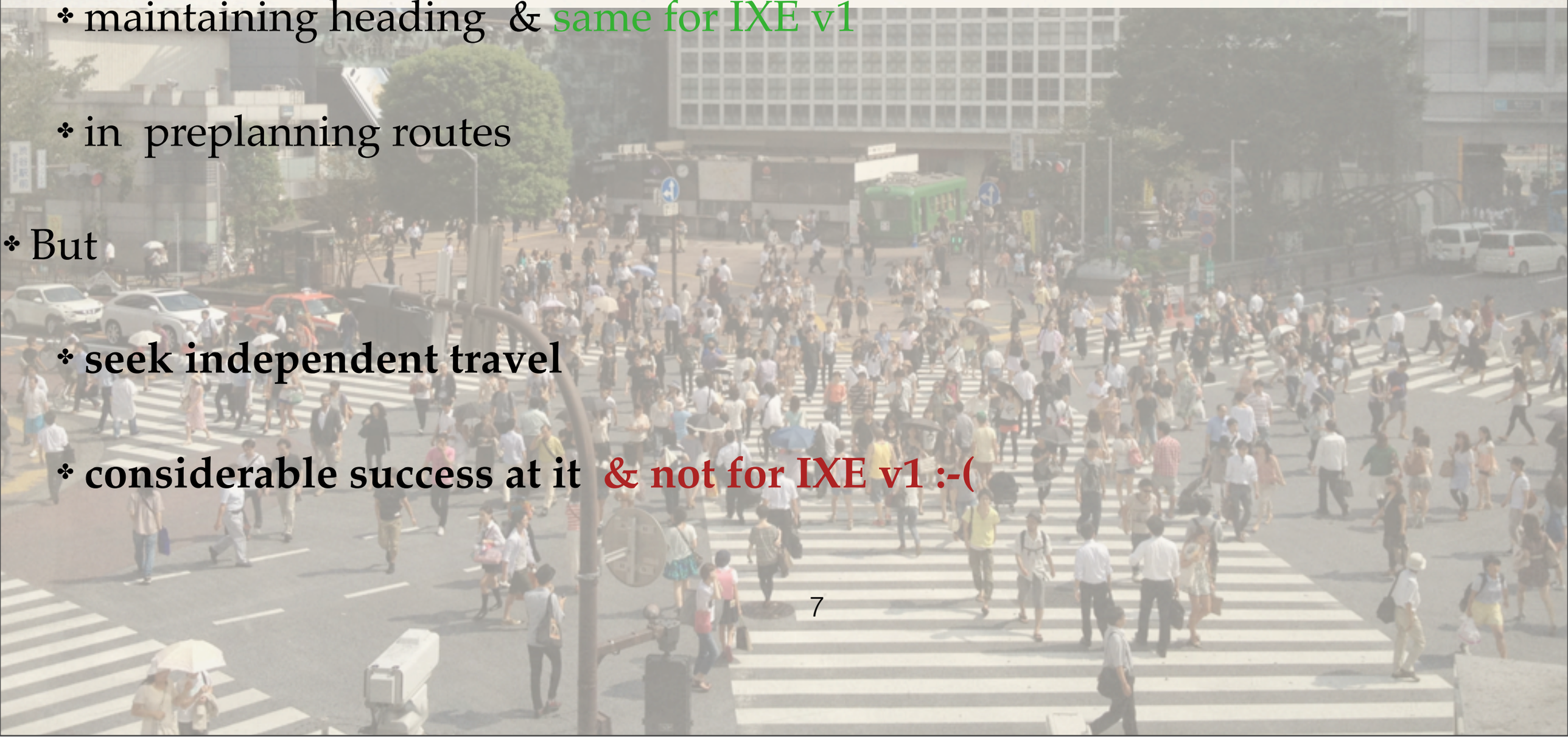
Wheel Dead-Reckoning is easier

IX V 1 2011

http://youtu.be/rj5LQKZD4Vo

Learning Navigation fromVisually Impaired People

- Difficulties **UJF Evaluation gave us the input for IXE V2.0**
  - in recovery from unexpected detours and same for IXE v1
  - maintaining heading & same for IXE v1
  - in preplanning routes
- But
  - **seek independent travel**
  - **considerable success at it & not for IXE v1 :-(**



IXE V2 (2012)

Detours, Heading stabilization, Localization on a network,
Recovery on errors, Isolation of localization from navigation

Localization & Navigation

Navigation Networks and Routes

Localization

Navigation

Hybrid System

For unexpected detours, you have to switch from navigation to localization and back using projections on the route

Testing IXEV2 for navigation on tactile paving in subway and railway stations

Tactile Paving in Japan

Many models of walking on tactile_paving

Walking on the edge of tactile paving path

Networks

White stick on the left is the most useful

Railway Platform

Advantages of tactile paving

- Localization
  - Structured navigation network with discrete set of orientations.
    - Gyro drift elimination easier (heading).
    - Walking model adjustment easier (distance).
- Navigation
  - Navigation instructions are easier to place on the network
    - placed at points where the confidence in localization in high.
    - content must be in accordance with localization's precision and user walking capacity.

OSM Models : Authoring

Wakayamadaigakumae Stn

Wakayamadaigakumae Stn.

How to create an OSM model ?

By using the JR map at the entrance of the STN ?

By using satellite images?

Neither, the railway track is the solution

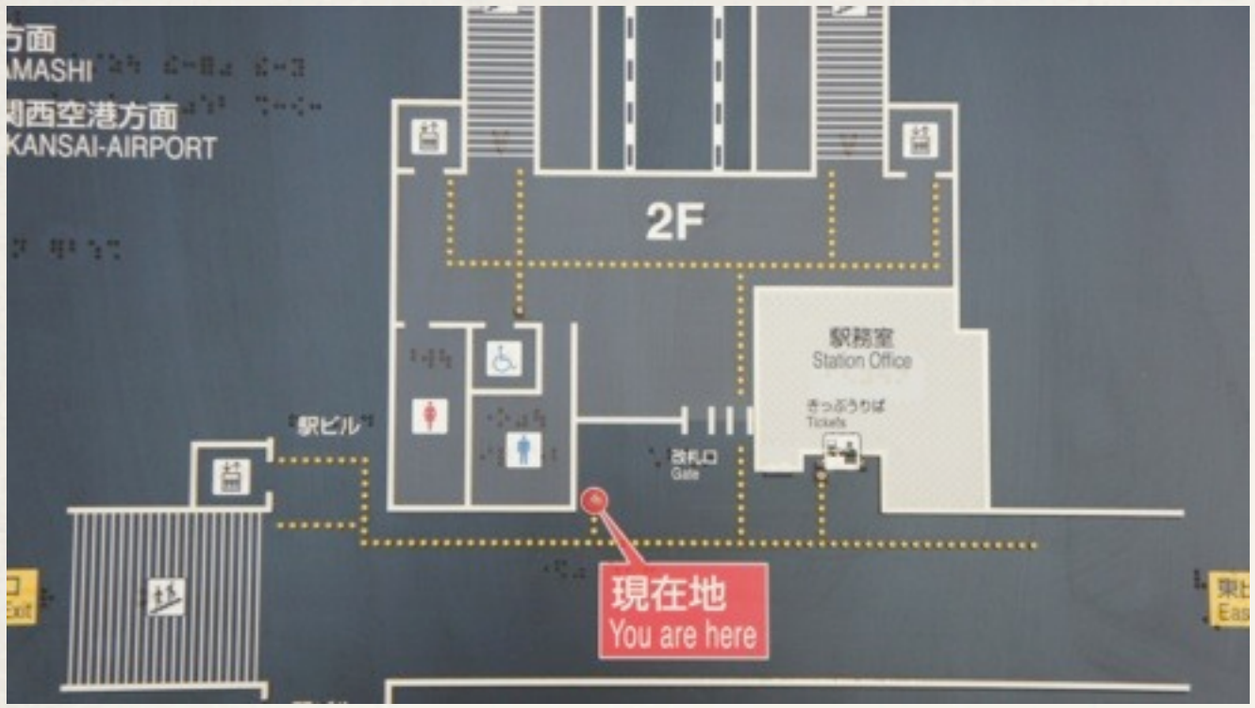
Wakayamadaigakumae Stn & Satellite images

Wakayamadaigakumae Stn: 3 Tools for modeling

Android Kick-Scooter: Raisonance tracker successor

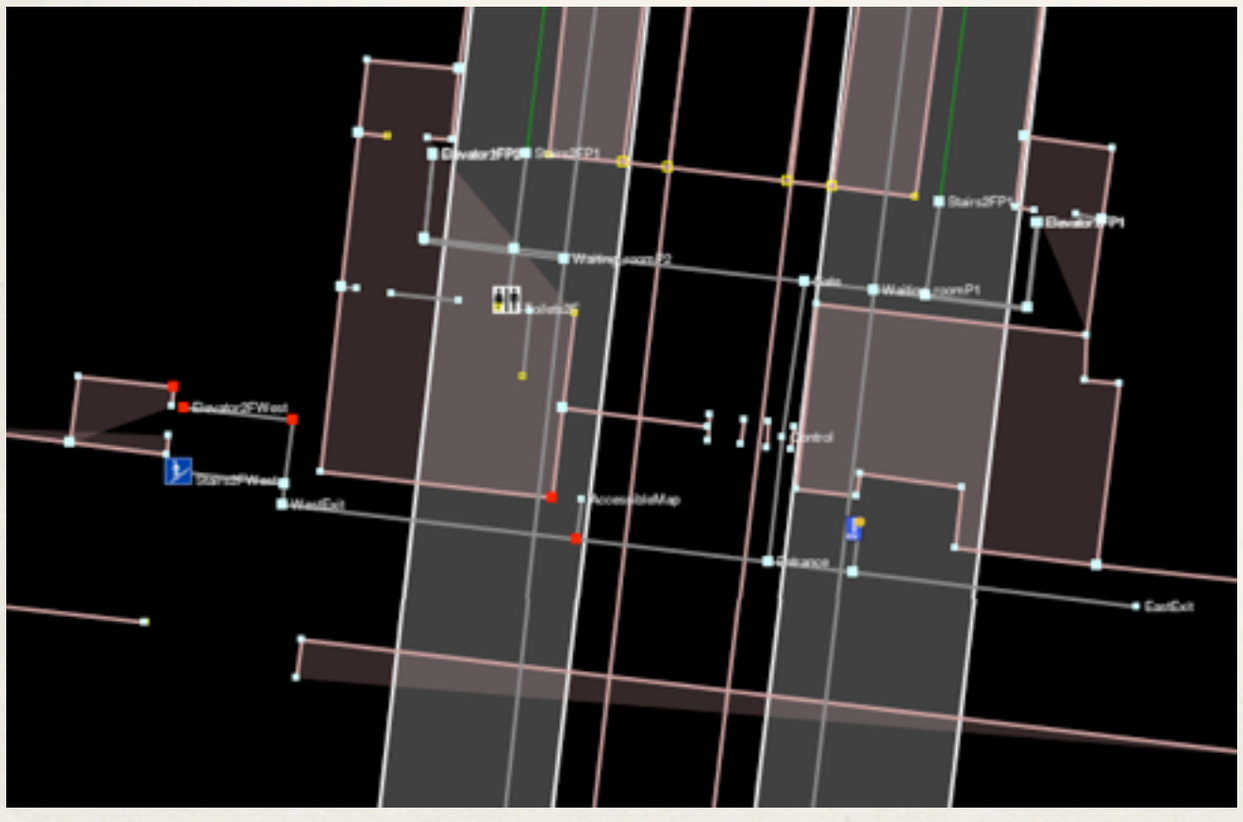
ANT+ sensors

JR Map



OSM

JOSM



iPhone SVG :-)?

Localization in Wakayama STN.

Localization on Waka OSM
Tactile Paving Network

http://youtu.be/F8kE3KTYbhg

Localization in Wakayama STN.

http://youtu.be/nKG72yT8Dhw

Sugimotocho

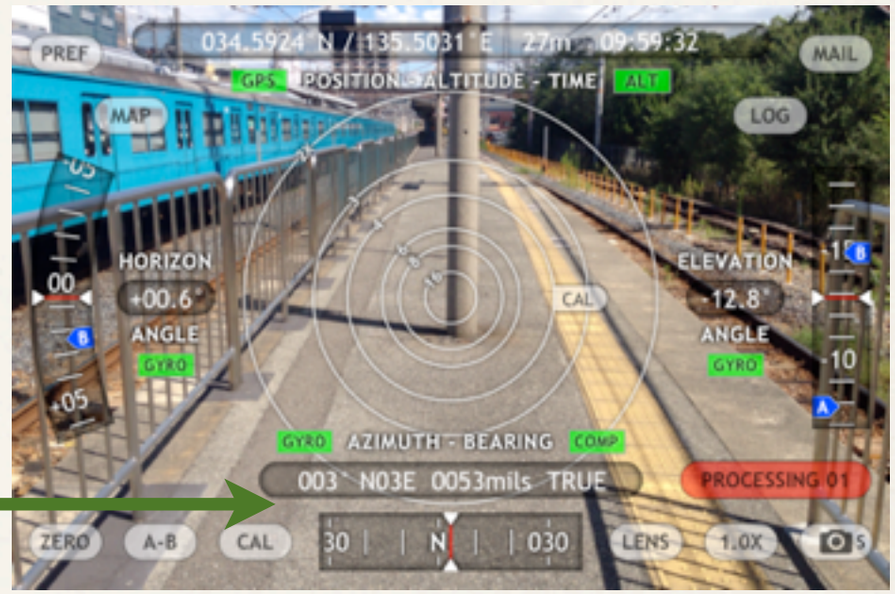
Osaka City University

Sugimotocho Stn

How to create an OSM model ?

A solution: Railway track + GPS + Kick-scooter

??



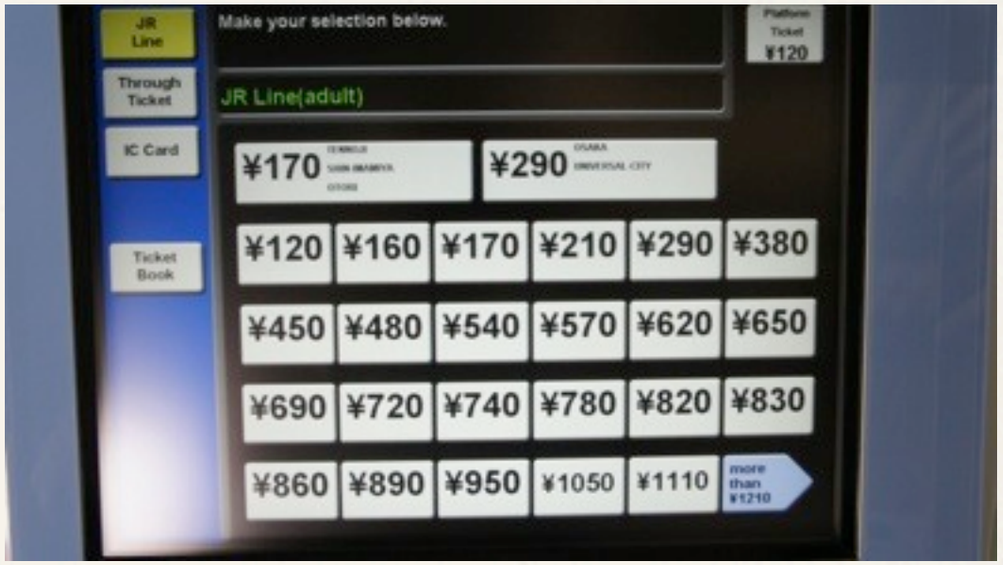
Doing it!

Kick-scooter

1

Platform ticket: 120 Y

2



3

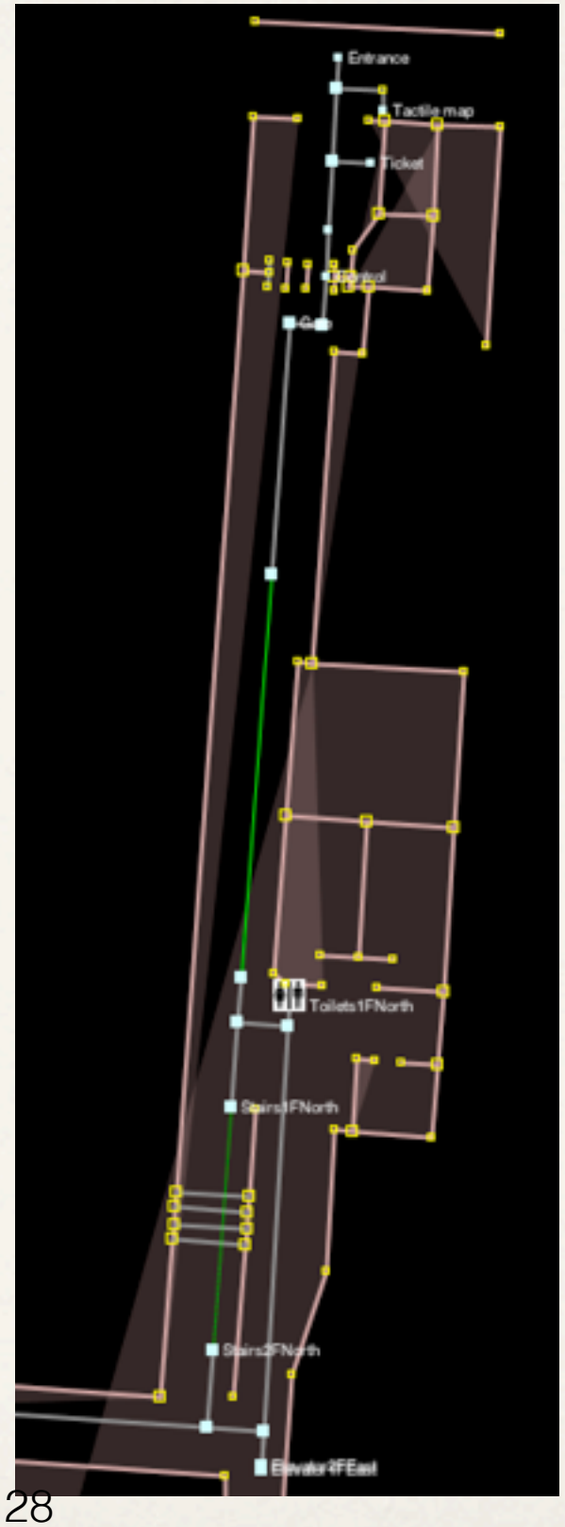
GISlab Students (OCU)

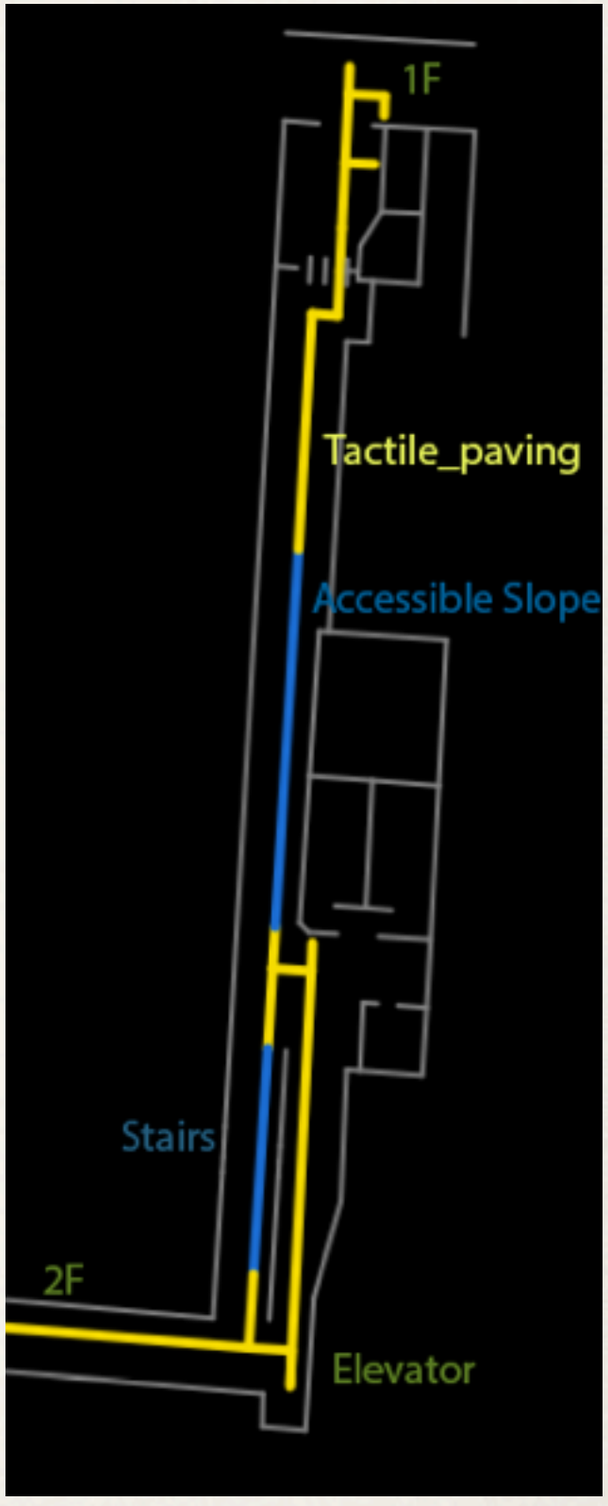
Kick-scooter papers in Sugimotocho Stn

http://youtu.be/5uRbUUxo6eA

JR → JOSM → iOS


杉本町駅東口構内ご案内
Sugimotochō East Gate Station Map
誘導ブロック
Tactile Pavement
自動きっぷうりば
Tickets
男子お手洗
Gentlemen
女子お手洗
Ladies
多機能お手洗
Accessible Facility
エレベーター
Elevator
スロープ
Accessible Slope
2 天王寺・大阪方面
for Tennōji, Ōsaka
4 鳳・関西空港・和歌山方面
for Ōtori, Kansai-airport, Wakayama
2 4
ホームへ
改札
現在地
You are here
東口


Entrance
Tactile map
Ticket
Toilets1FNorth
Stairs1FNorth
Stairs2FNorth


1F
Tactile_paving
Accessible Slope
Stairs
2F
Elevator

Navigation in Sugimotocho STN.

http://youtu.be/a0MwJLyE3Iw

Localization in Sugimotocho Stn

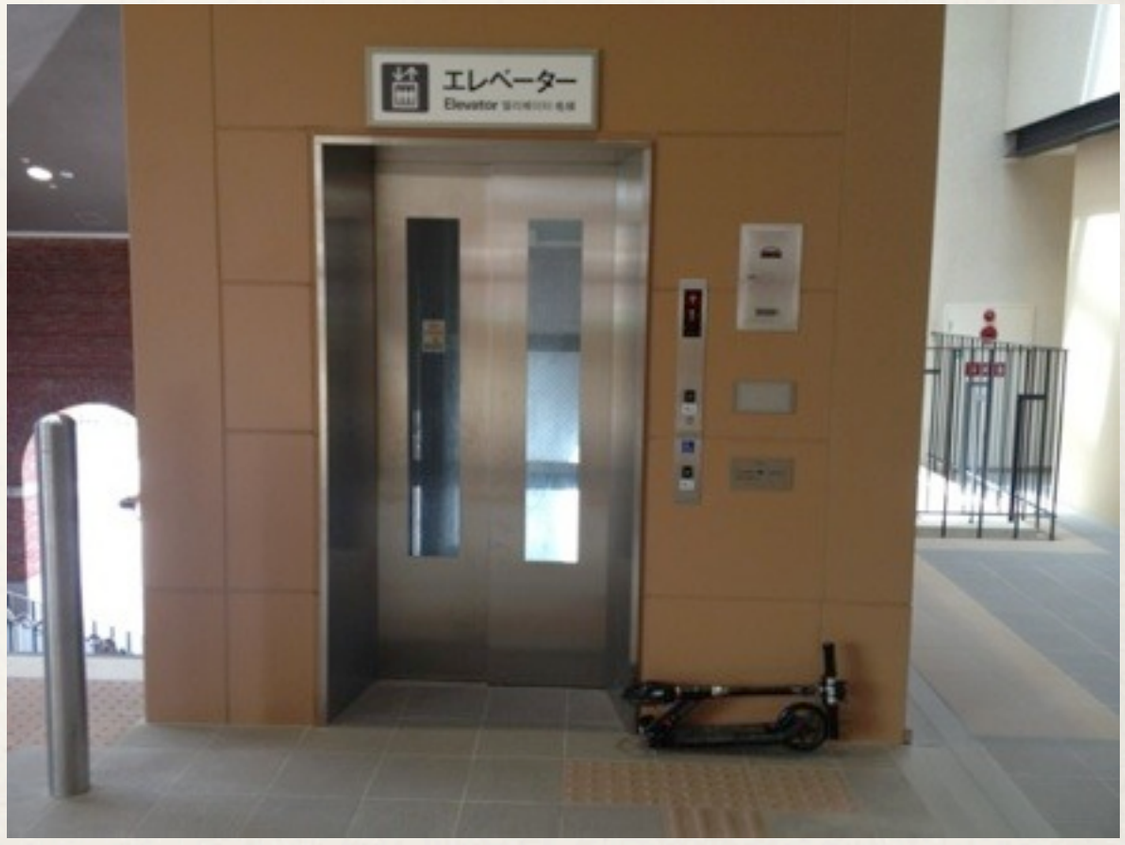
http://youtu.be/bC1V-5_0f2E

Departure Point (2F)

Arrival Point (1F)

IXE V3 (2013) will be enhanced by :

- Micro-navigation using computer vision
  - VENTURI
- Indoor Messaging spots (IMES consortium)
  - STE? Sony?



IXE V3 will be enhanced by :

- Specific models of walking
  - For the blind, for visually impaired people, for slopes and tactile_paving
- Sensors based detection of:
  - Stairs, elevators, levels
  - Speed through shoes mounted accelerometers

TYREX Project Team (Grenoble)

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2011-2014

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