

IPIN competition 2017 - Track 2

Track 2 Pedestrian Dead Reckoning
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International Conference
on Indoor Positioning
and Indoor Navigation

Track 2: Pedestrian Dead Reckoning Positioning (on-site)

► Competition Goals

- Evaluate the performance of state-of-the-art PDR solutions based on the inertial, compass, pressure sensors, and etc.
- Conduct quantitative comparisons for those PDR approaches

► General Goals

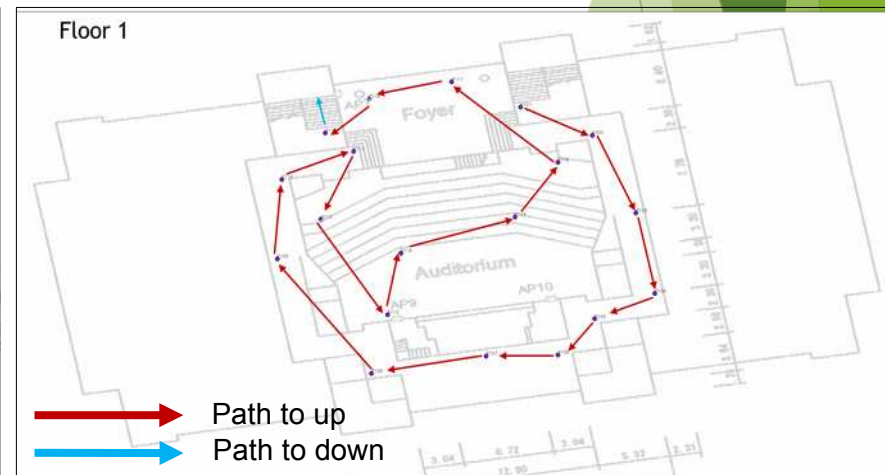
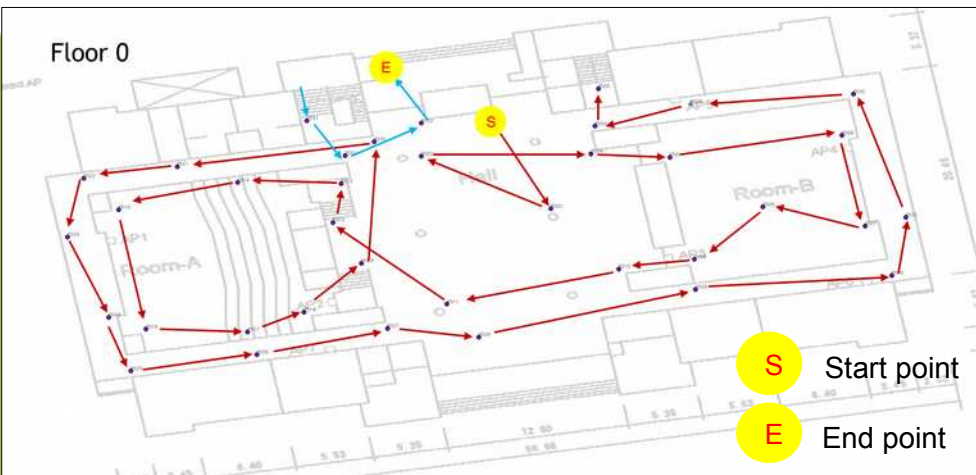
- Identify the topmost approach in this area
- Provide an opportunity for common interest group to share their ideas

Path of Track 2

- ▶ Official scenario
 - ▶ Site : Conference Hall, Hokkaido University
 - ▶ **58 key points** for evaluations (same as Track 1)
 - ▶ Throughout two floors (P0, P1)
 - ▶ About 15~20 min of walk
 - ▶ Walking in **normal pace**
 - ▶ Including stairs (do not use elevators)
 - ▶ **Initial coordinates and heading is provided**
 - ▶ **Two trials are given for each competing team**
 - 1st Trial : Competitor wears and operates his/her system
 - 2nd Trial : An Actor wears and operates the competing system

Path of Track 2

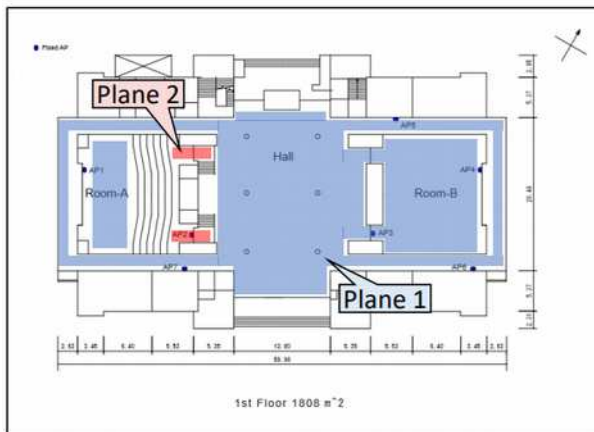
Conference Hall, Hokkaido Univ.



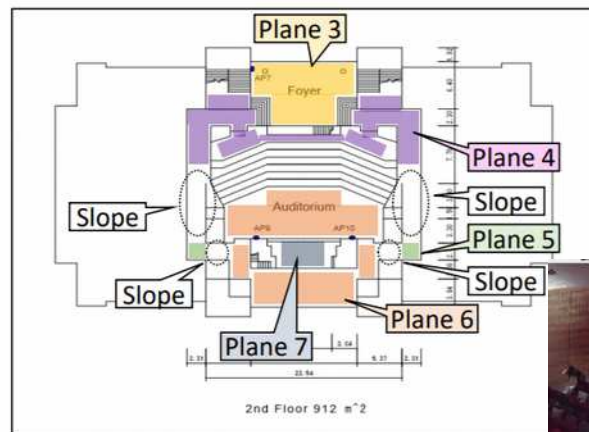
Challenging Points

- ▶ The conference building has 7 different floor heights (2 heights in Floor 0, 5 heights in Floor 1)
- ▶ Four slopes and small number of steps inside of Auditorium and Room A

Floor 0



Floor 1



- Floor heights [m] (vertical distance from plane 1)

Plane 1	Plane 2	Plane 3	Plane 4	Plane 5	Plane 6	Plane 7
0	0.92	5.48	6.49	5.76	5.48	5.80



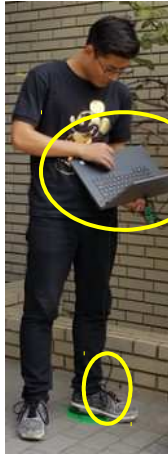
Competitors of Track 2

No	Organization	Name
1	Xiamen Univ.(CN) University of Ulster (UK) 	Lingxiang Zheng,Rongxin Wang, Dihong Wu, Ao Peng Dihong Wu, Biyu Tang, Hai Lu, Haibin Shi Huiru Zheng
2	Univ. of Chinese Academy of Sci. (CN) 	Wenchao Zhang, Xianghong Li, Dongyan Wei, and Xinchun Ji
3	Sysnav (FR) 	Charles-Ivan Chesneau, Mathieu Hillion, Christophe Prieur
4	Kyushu Univ. (JP)	Chuanhua Lu, Hideaki Uchiyama, Diego Thomas and Rin-ichiro Taniguchi
5	Tianjin Univ.(CN)	Yu Liu, Liqiang Zhang, and Kai Guo
6	DLR (GE) 	Susanna Kaiser, Estefania Munoz Diaz, and Dina Bousdar Ahmed

Competing Systems of Track 2



Foot-mounted IMU & Laptop



Foot-mounted IMU & Laptop



Foot-mounted IMU & Laptop



Foot-Mounted IMU & Laptop

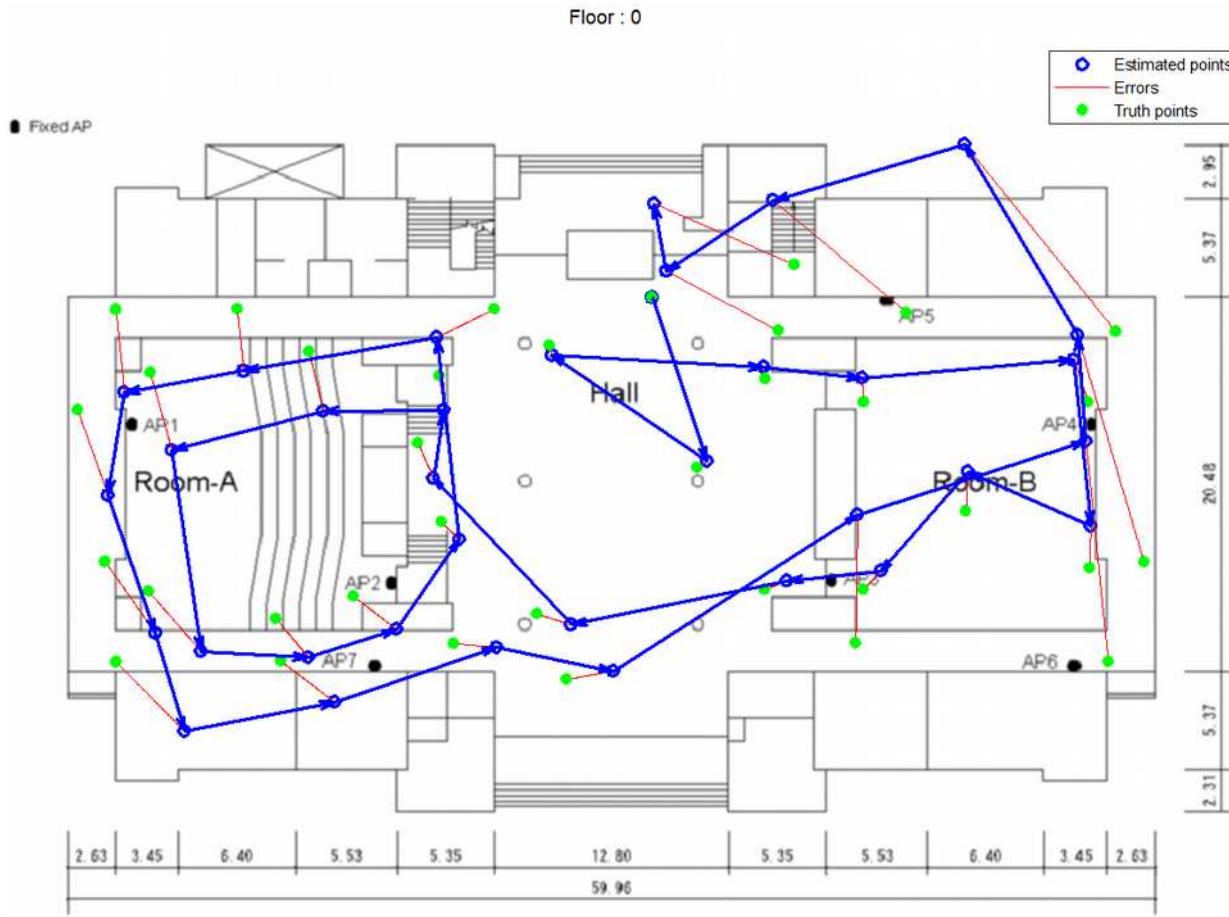


Shoulder-Mounted & Proprietary Device



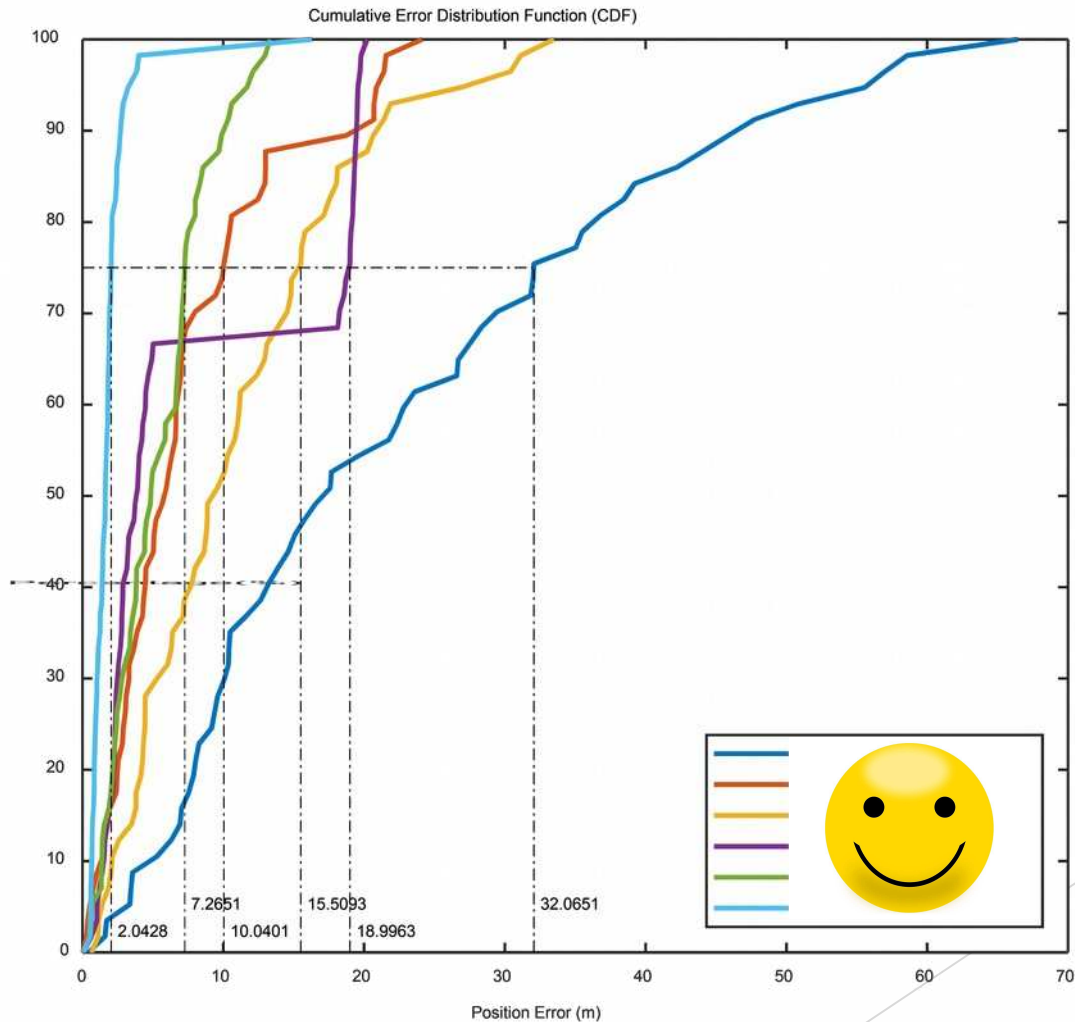
Ankle-mounted IMU & Smartphone

Results - Trajectory

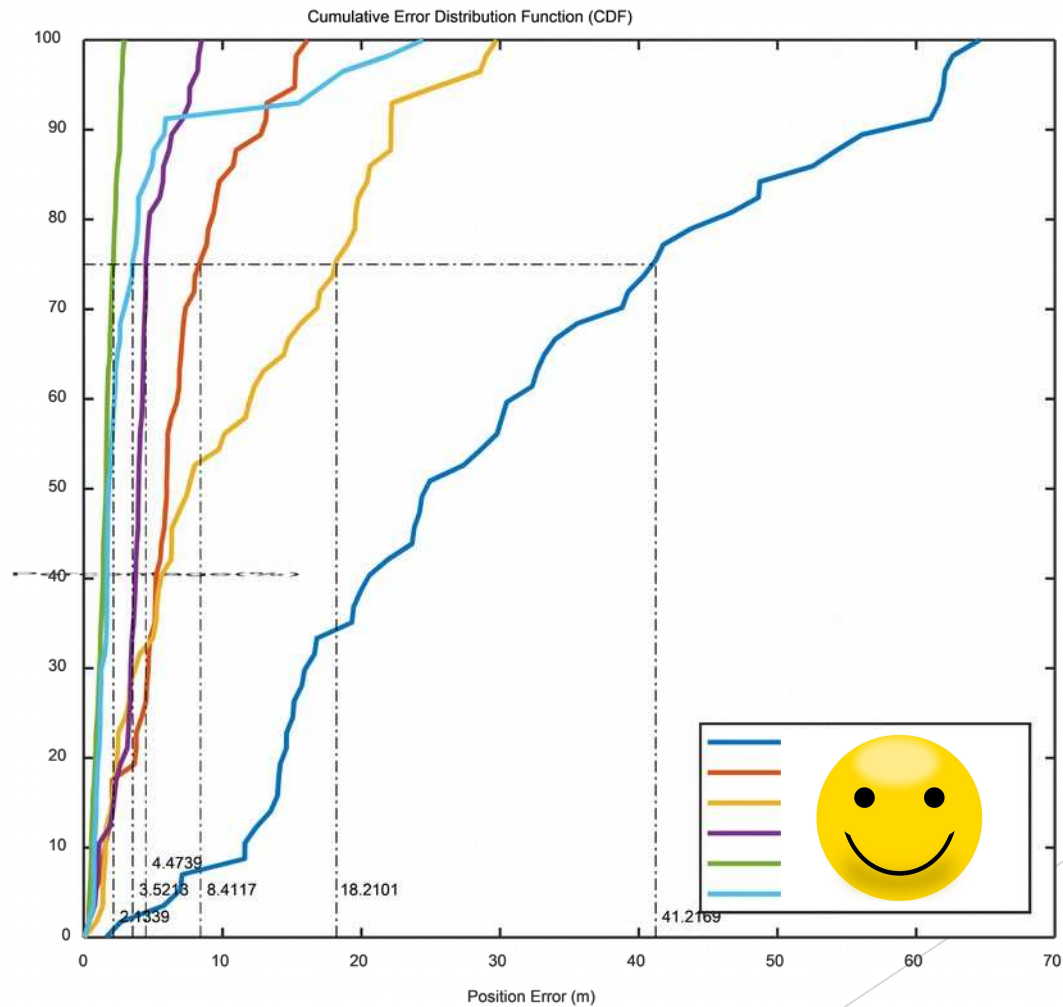


Example of competitor's trajectory estimation w.r.t to Ground Truth

Results - 1st CDF (Competitor Trial)

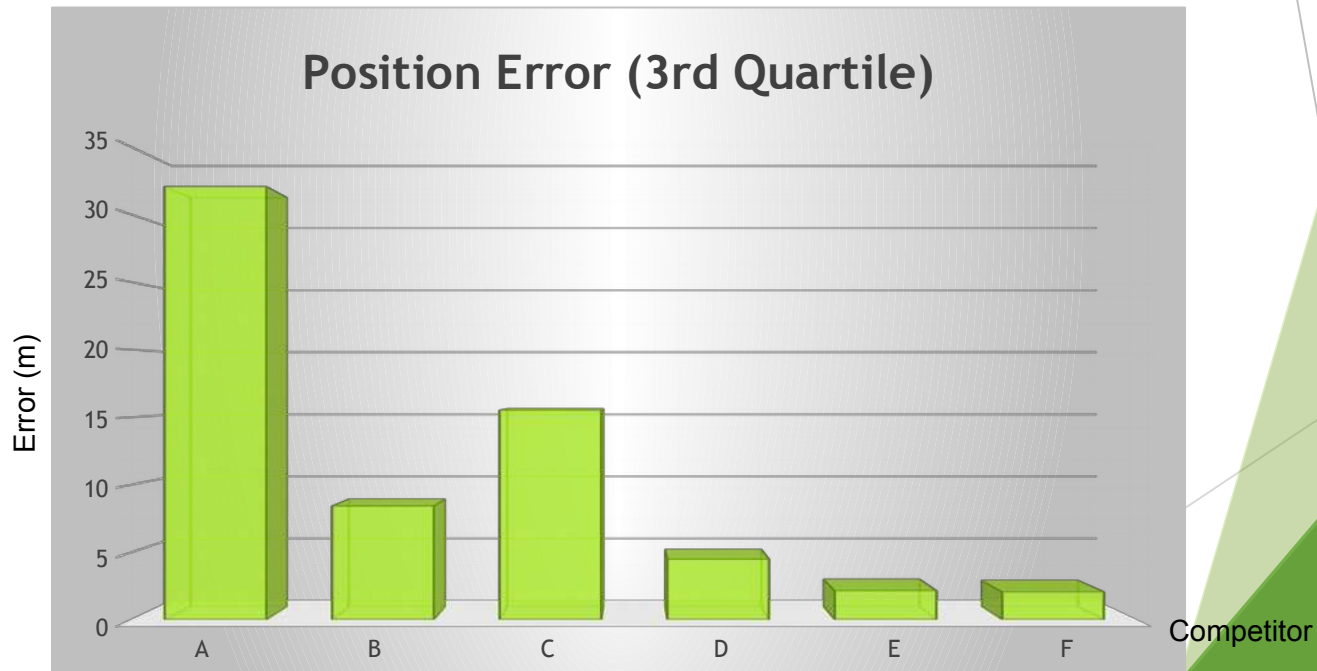


Results - 2nd CDF (Actor Trial)



Results - Final

- ▶ Three teams got quite good result!
- ▶ Relatively large errors came from
 - ▶ Heading alignment
 - ▶ Wrong floor identification



Results - Final

Rank	Competition Metric	Organization
1 st	2.043m	Chuanhua (Kyushu Univ)
2 nd	2.131m	Yu Liu (Tianjin Univ)
3 rd	4.477m	Chesneau (Sysnav)

The Winner of Track 2 (IPIN 2017 Competition)

Chuanhua Lu, Hideaki Uchiyama, Diego Thomas and Rin-ichiro Taniguchi

Kyushu University



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Thank you!

