

IPIN competition 2016 - Track 4

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Indoor Mobile Robot
Positioning
Chairs: M^a Carmen Pérez
Cristina Losada
Co-Chairs: Felipe Espinosa
Javier Macias-Guarasa



International Conference
on Indoor Positioning
and Indoor Navigation

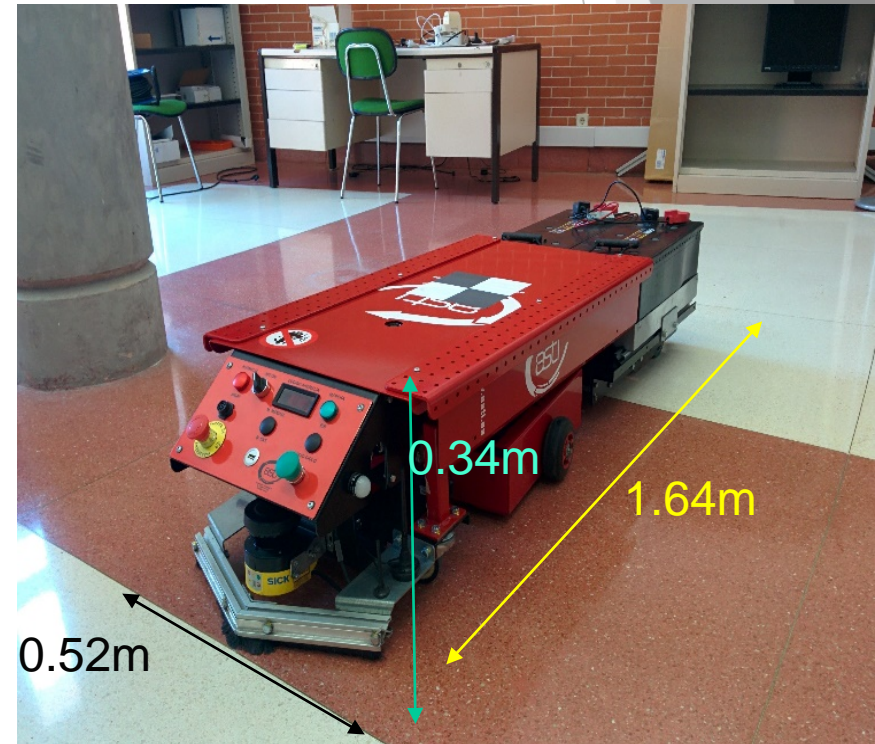


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TRACK 4 PRESENTATION

- ▶ GOAL: estimate the trajectory followed by a mobile robot along a predetermined track inside an indoor area.
- ▶ COMPETITION SET-UP:
 - ▶ Robot: EASYBOT of ASTI
 - Magnetic guidance system.
 - The robot speed does not exceed 0.5m/s, but it is not uniform during the trajectory.
 - Reference point to be localized in the middle of the robot.
 - No possibility of interaction with the mobile robot.
 - The trajectory (ground truth) is not able to be seen for competitors.

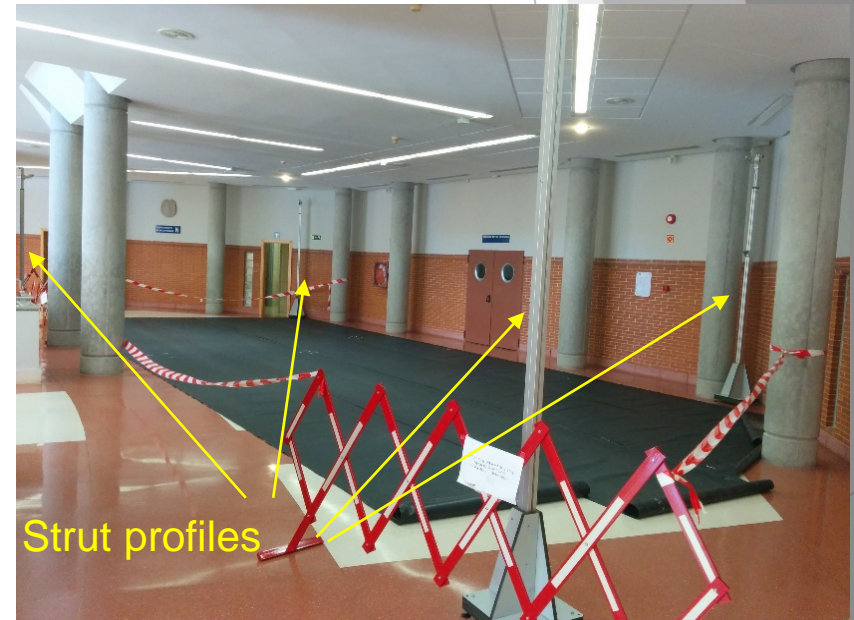


TRACK 4 PRESENTATION

► COMPETITION SET-UP:

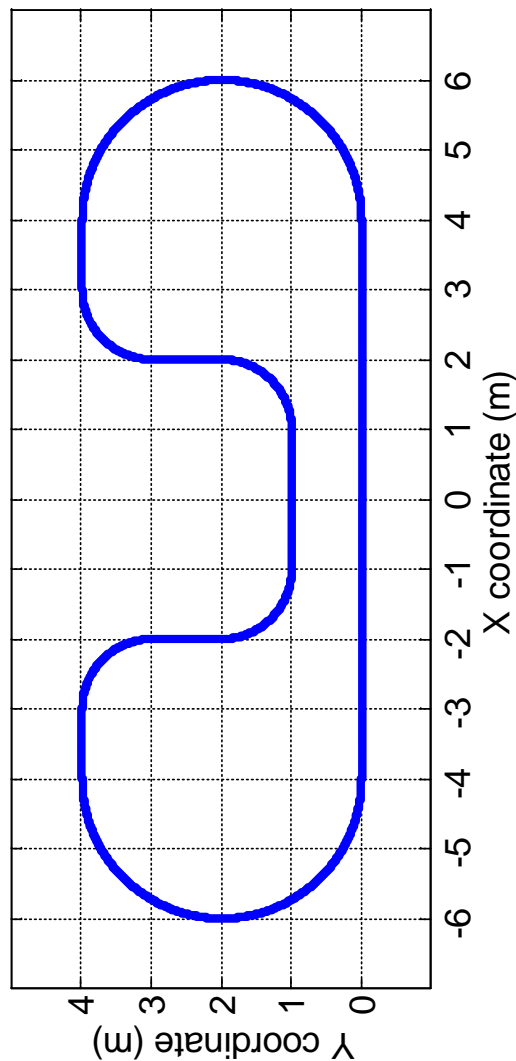
► Navigation area:

- Area 12m x 6m.
- 4 strut profiles where participants can place their equipment. Adjustable height up to 315cm.
- No limitation in the number of sensors to be located in the strut profiles.
- 3 positions provided in advance for calibrating purposes, including the (0,0) of the robot starting point.
- 30 minutes set-up (45min in practice).
- Test duration: 3-4 minutes. Two loops.
- Order of participation by drawing lots.



TRACK 4 PRESENTATION

► Ground truth:

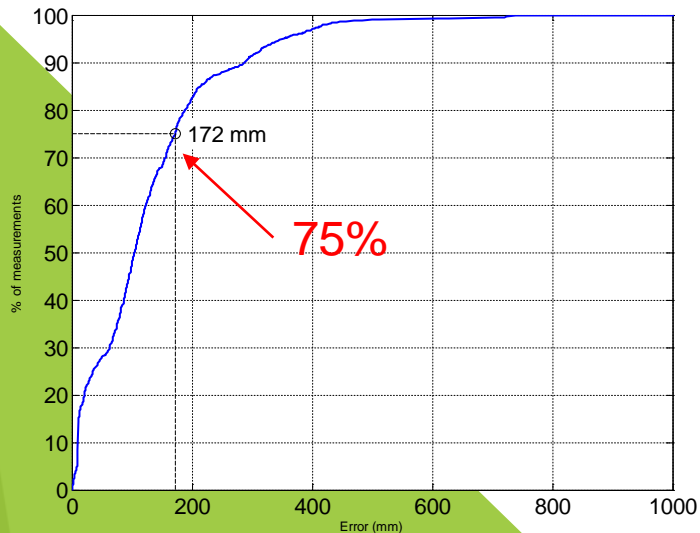
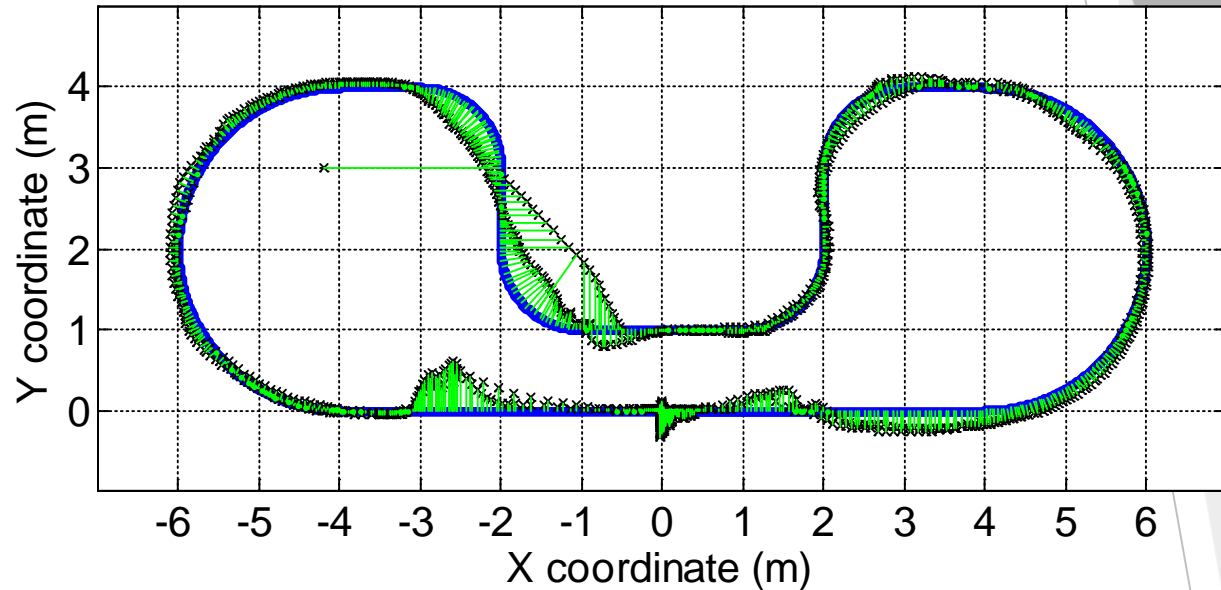
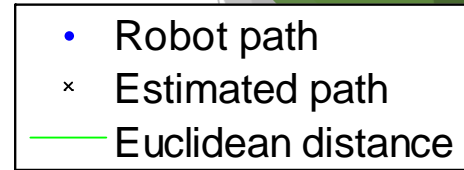


Participants have to report the trajectory:

- X coordinate (mm)
- Y coordinate (mm)
- Timestamp (ms)
- Minimum frame-rate: 0.1s

TRACK 4 PRESENTATION

► Evaluation method:



- Euclidean distance between the estimated positions and the ground truth.
- The order of the measurements is considered.
- Final scores are computed considering the third quartile (CDF at 75%).

Competitors of Track 4

- ▶ Janis Tiemann, Fabian Eckermann and Christian Wietfeld, "ATLAS - An Open-Source TDOA-based Ultra-Wideband Localization System", TU Dortmund University, Communication Networks Institute (CNI), Germany.

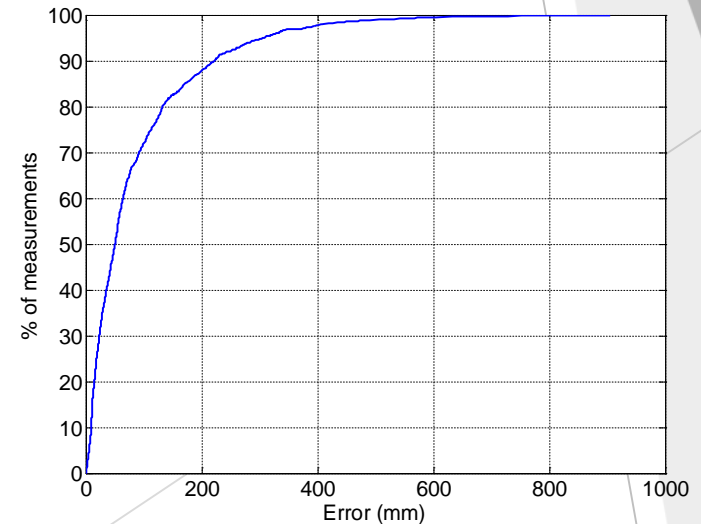
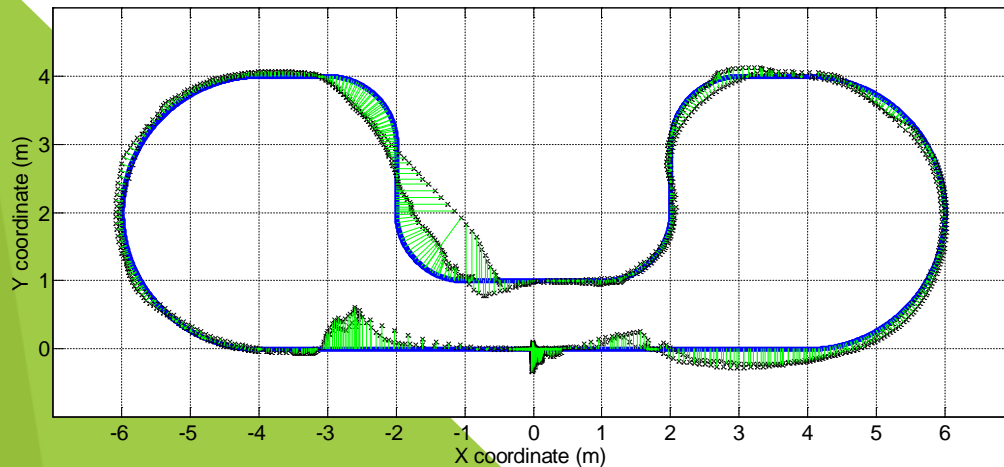
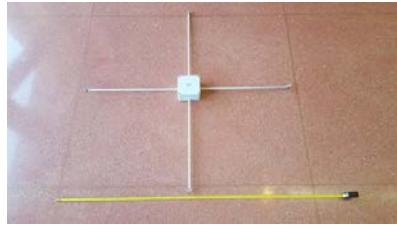


- ▶ Maxim Katkov and Sergey Huba, "TOPortIs TPM UWB wireless system", R&D Dept, TopoRTLS, Belarus/Sandwich, MA, USA.



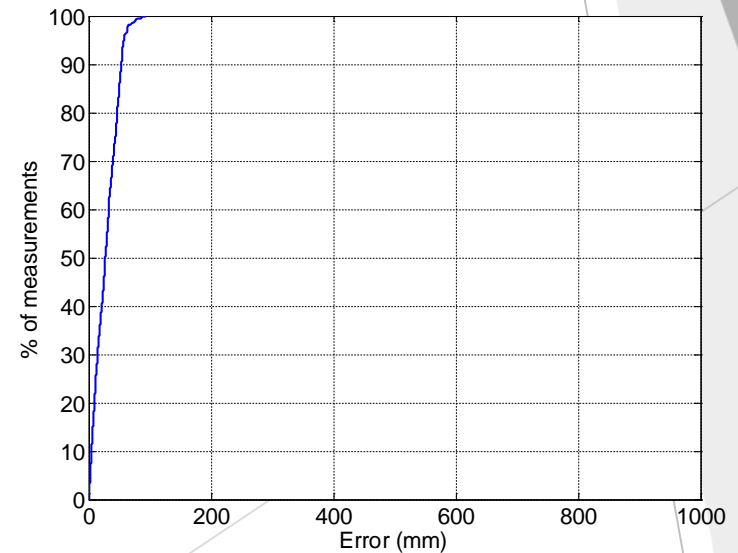
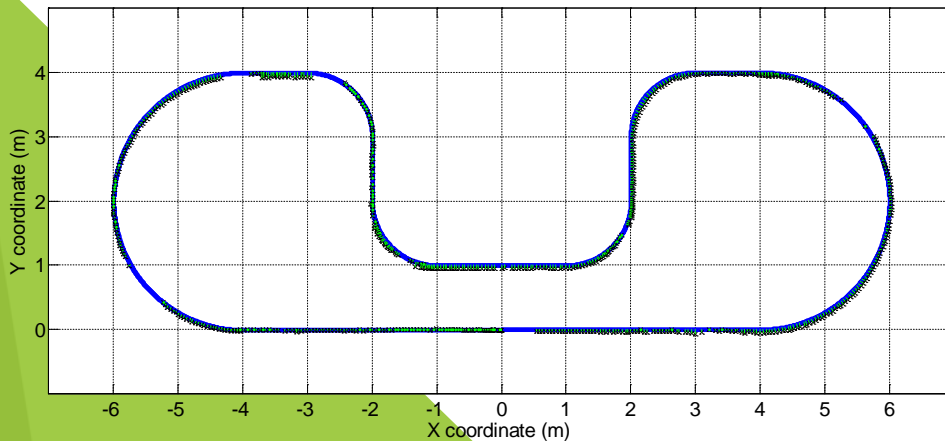
Competitors of Track 4- Out of Competition

- ▶ J. Ureña, J. M. Villadangos, D. Gualda, M. C. Pérez, A. Hernández, J. J. García, A. Jiménez, J. C. García, J. F. Arango, E. Díaz, "Locate-US: an Ultrasonic Local Positioning System based on Encoded Beacons", Electronics Department, University of Alcalá.



Competitors of Track 4- Out of Competition

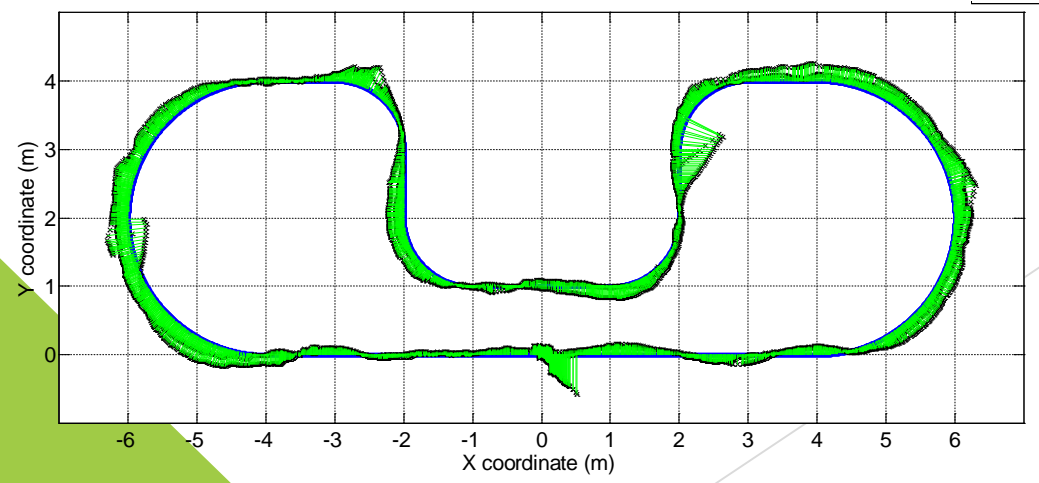
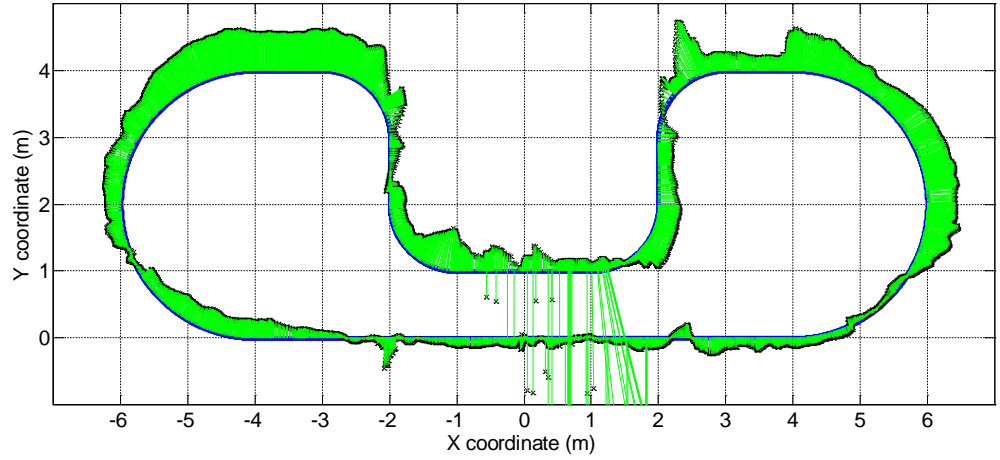
- ▶ R. Nieto, E. Santiso, P. López, M. Martínez, F. Espinosa. "Laser scanner network for indoor positioning and tracking", Electronics Department, University of Alcalá.





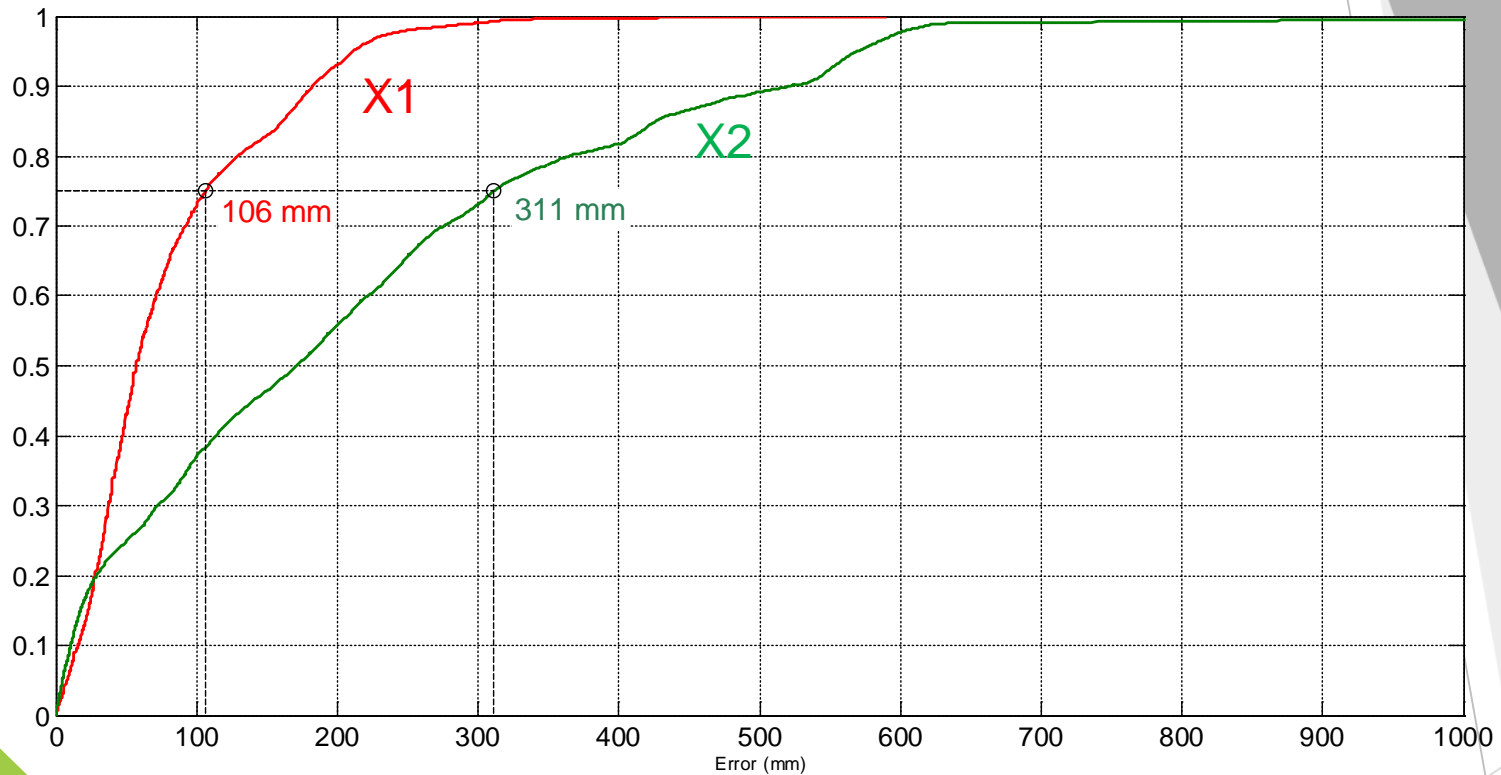
RANKING

- ◆ Robot path
- × Estimated path
- Euclidean distance



RANKING

► Cumulative Distribution Function of the Euclidian error



Participant	CDF 75%	Average Error
X1	106mm	80.12mm
X2	311mm	220.46mm

THE WINNER



1500€ cash prize

CDF(75%)=106mm



Janis Tiemann, Fabian Eckermann, and Christian Wietfled

ATLAS