

# *IPIN Competition*

## Track 3: Smartphone based (off-site)

Sponsored by



Chaired by

**J. Torres, A. R. Jiménez**  
G. M. Mendoza, F. Seco, R. Montoliu, A. Perez  
and J. Huerta

Organized by



International Conference  
on Indoor Positioning  
and Indoor Navigation



**EvAAL**

# Track3: Smartphone-based (off-site)

- The goal:
  - To localize a pedestrian walking under realistic conditions:
    - in several multi-floor buildings
    - using a conventional smartphone and its available signals (WiFi, inertial, magnetic, GPS, pressure, light,...)
- Competitors:
  - Calibrate their algorithms with some logfiles data recordings with inserted ground truth marks (~2000 marks, 32 logfiles)
  - Compete using new unreferenced data (~500 marks, 7 logfiles)
- Award:
  - TOPCON awards approx ¥150.000 cash prize to the winner

# Challenges (1/2)

- Multiple buildings:



CAR (ID 10)  
1 floor



~~UAH (ID 20)  
4 floors~~



UJIUB (ID 30)  
6 floors



UJITI (ID 40)  
4 floors

- Multiple sources of information:

- WiFi RSS, Inertial data (Accelerometer and Gyroscope), Magnetic, GPS, AHRs, Pressure, Temperature, Humidity, Sound intensity and Light intensity

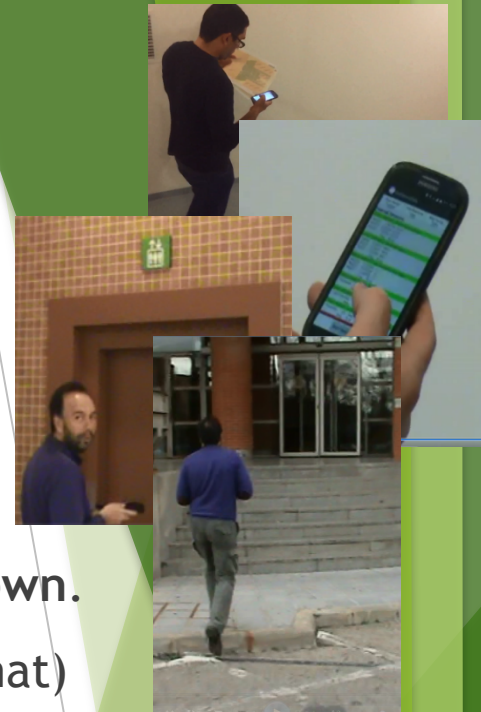
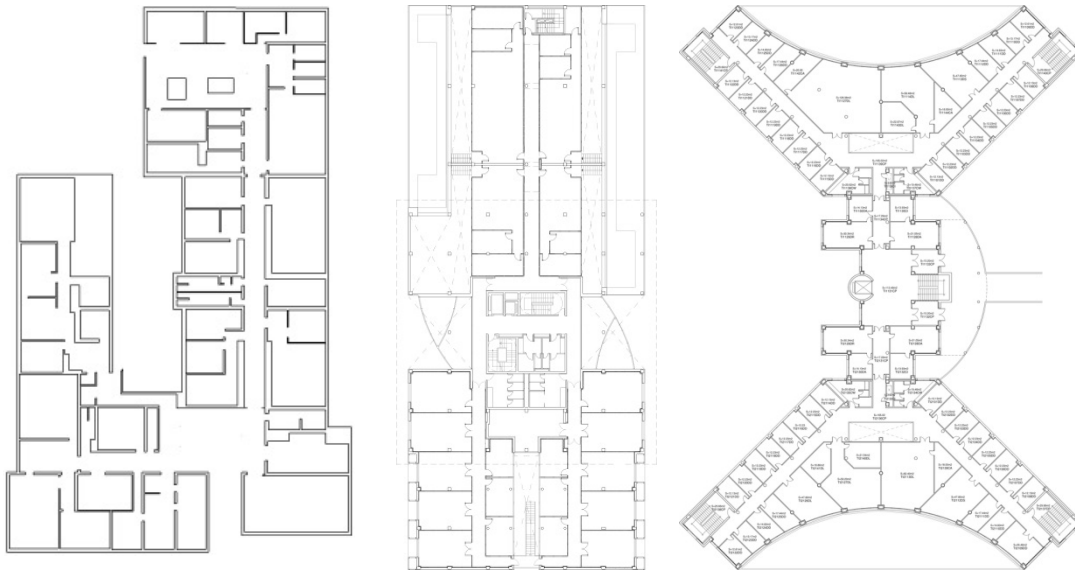
- Continuous motion & recording:

- Different sampling time (WiFi every~6s),
- Acc (~50Hz), different for others

```
GYRO;4.410;-0.03726;-0.16860;-0.17318;3
AHRs;4.410;28.7201;0.4508;177.5888;0.00141;0.24804;0.96855;-106
LIGH;4.410;4767.0;0
ACCE;4.411;-0.67995;4.85544;8.30309;3
MAGN;4.411;1.26000;-39.48000;-17.76000;3
PRES;4.419;948.5206;0
GYRO;4.420;-0.04948;-0.13347;-0.16463;3
AHRs;4.420;28.7140;0.5296;177.4918;0.00095;0.24800;0.96855;122
LIGH;4.420;4748.0;0
ACCE;4.421;-0.69911;4.90333;8.35098;3
MAGN;4.421;1.26000;-39.36000;-17.76000;3
GYRO;4.430;-0.06017;-0.09407;-0.13347;3
AHRs;4.430;28.6960;0.6096;177.4190;0.00043;0.24786;0.96858;-3
ACCE;4.432;-0.70868;4.88417;8.34140;3
MAGN;4.432;1.38000;-39.42000;-17.64000;3
LIGH;4.432;4748.0;0
WIFI;4.432;eduroam;00:0b:86:27:36:c0;-73
WIFI;4.432;portal-csic;00:0b:86:27:36:c1;-74
WIFI;4.432;eduroam;00:0b:86:27:32:e0;-65
WIFI;4.432;portal-csic;00:0b:86:27:32:e1;-65
WIFI;4.432;eduroam;00:0b:86:27:35:90;-82
WIFI;4.432;portal-csic;00:0b:86:27:35:91;-80
WIFI;4.432;WiFiArganda;00:0d:97:00:d2:55;-89
WIFI;4.432;eduroam;00:0b:86:27:35:80;-97
WIFI;4.432;portal-csic;00:0b:86:27:35:81;-95
GYRO;4.440;-0.06353;-0.05528;-0.08460;3
AHRs;4.440;28.6667;0.7015;177.3758;-0.00026;0.24763;0.96863;-68
LIGH;4.441;4748.0;0
```

# Challenges (2/2)

- **Realistic walking style:**
  - Mainly forward, also lateral/backwards, turns 90° & 180°, elevators/stairs, giving way to other people.
- **Limited info of buildings:**
  - Multiple WiFi AP, but position of each AP is unknown.
  - Geo-referenced floor-map **bitmaps** (no vector format)





**Competitors**

**Arara**

**UMinho**

**Yai**

**HFTS**

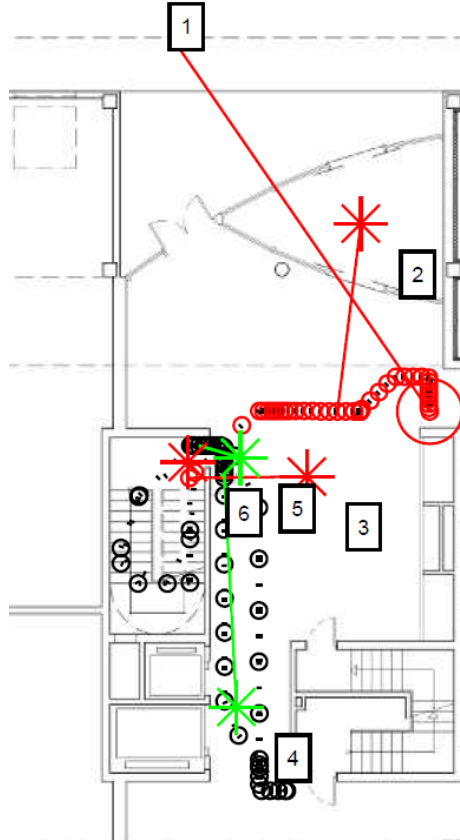
**Marauders**

# Results: Evaluating results

Floor:0



Floor:0

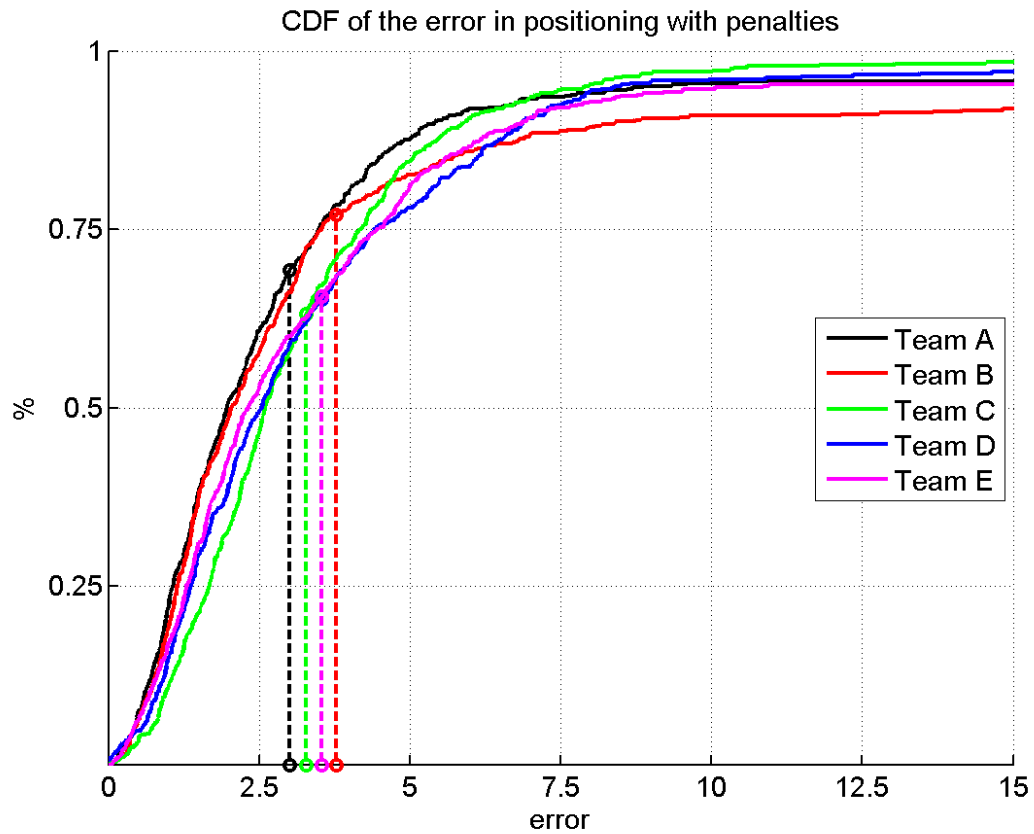


Example of competitor's trajectory estimation & error w.r.t GT

## Results: General Stats (1/3)


	Floor Hit Rate	Max. Error
Arara	<97.5%	>20m
HFTS	<97.5%	>20m
Marauders	98.61%	17.91m
UMinho	<97.5%	19.58m
Yai	99.01%	>20m

# Results: Position estimation errors (2/3)



# Results: Position estimation errors (3/3)

Podium – Track3 Smartphone-based off-site:

	#	Competition metric	
	1 <sup>st</sup>	3.4754 m	UMinho
	2 <sup>nd</sup>	3.5267 m	AraraDS
	3 <sup>rd</sup>	4.1588 m	Marauder

Sponsored by

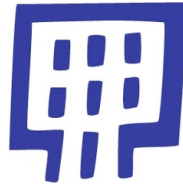


# The winner of Track 3 IPIN 2017 is.....

A. Moreira, A. Costa,  
F. Meneses and M. J. Nicolau



Universidade do Minho



Centro de  
Computação Gráfica

Parabens!

Sponsored by



International Conference  
on Indoor Positioning  
and Indoor Navigation (IPIN)