



IPIN 2022

TWELFTH INTERNATIONAL CONFERENCE ON

**INDOOR POSITIONING
AND INDOOR NAVIGATION**

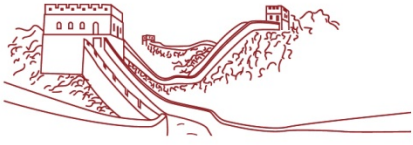


IPIN competition

Francesco
Potortì

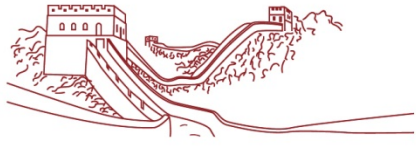


Aerospace Information Research Institute,
Chinese Academy of Sciences



Edition		On-site		Off-site		Overall	
Year	Location	Tracks	Competitors (submissions)	Tracks	Competitors (submissions)	Tracks	Competitors (submissions)
2014	Busan (KR)	1	7 (11)			1	7 (11)
2015	Banff (CA)	2	6 (8)	1	4 (4)	3	10 (12)
2016	Alcalá (ES)	2	12 (14)	2	7 (9)	4	19 (23)
2017	Sapporo (JP)	2	10 (18)	2	10 (11)	4	20 (29)
2018	Nantes (FR)	2	15 (17)	2	19 (22)	4	34 (39)
2019	Pisa (IT)	2	10 (16)	3	20 (26)	5	30 (42)
2020	online			5	22 (32)	5	22 (32)
2021	Lloret (ES)			3	13 (26)	3	13 (26)
2022	Beijing (CN)			6	26 (29)	6	26 (29)





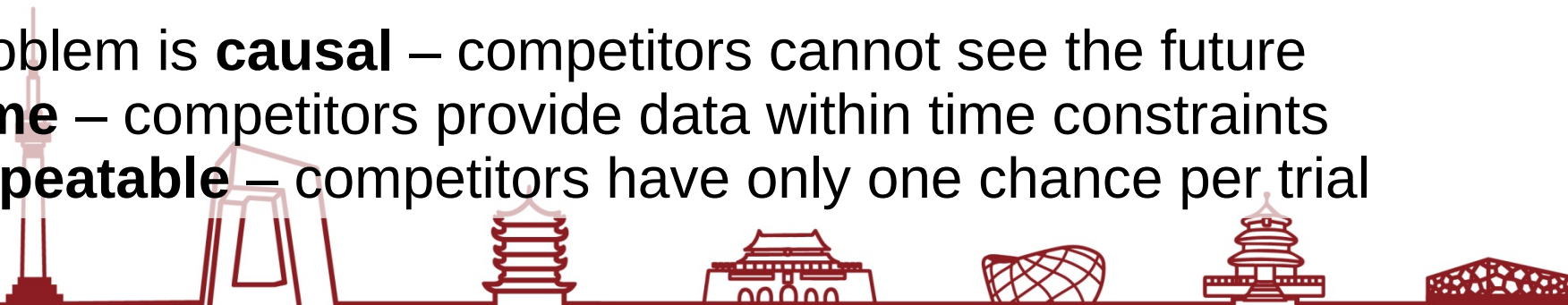
Off-site versus on-site

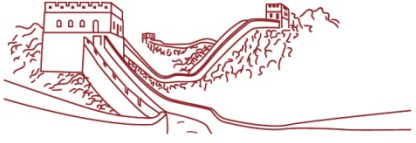
From 2015 to 2020, competitors in off-site Tracks **got a list of sensor readings** for the whole path and were expected to **provide a list of position estimates**.

More and more, competitors saw this as **a problem of global optimisation**, rather than the emulation of a real-time system as seen for on-site Tracks.

Systems competing in on-site Tracks see a flow of sensor data and provide a concurrent flow of position estimates.

- The problem is **causal** – competitors cannot see the future
- **real-time** – competitors provide data within time constraints
- **non-repeatable** – competitors have only one chance per trial





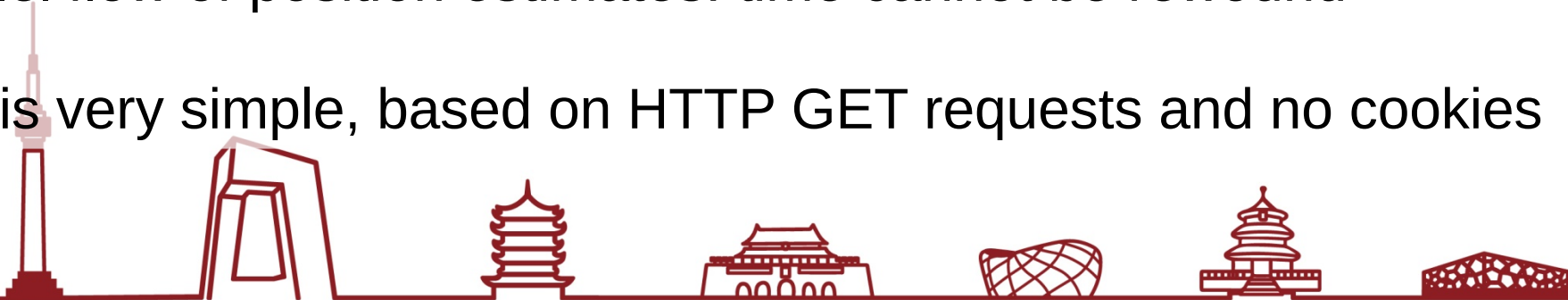
EvaalAPI

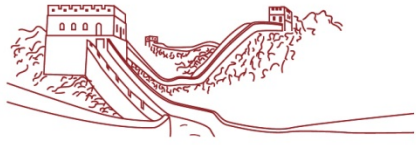
In 2021 and 2022, we used a **web API** where a competing system must provide an estimate for the current emulated time before receiving the next batch of sensor data and advancing the emulated time.

This way the problem becomes

- **causal** – competitors provide an estimate before seeing the next sensor reading
- **real-time** – estimates must be provided within time constraints
- **non-repeatable** – while the sensor data flow is provided, competitors provide a parallel flow of position estimates: time cannot be rewound

The API is very simple, based on HTTP GET requests and no cookies





EvaalAPI usage

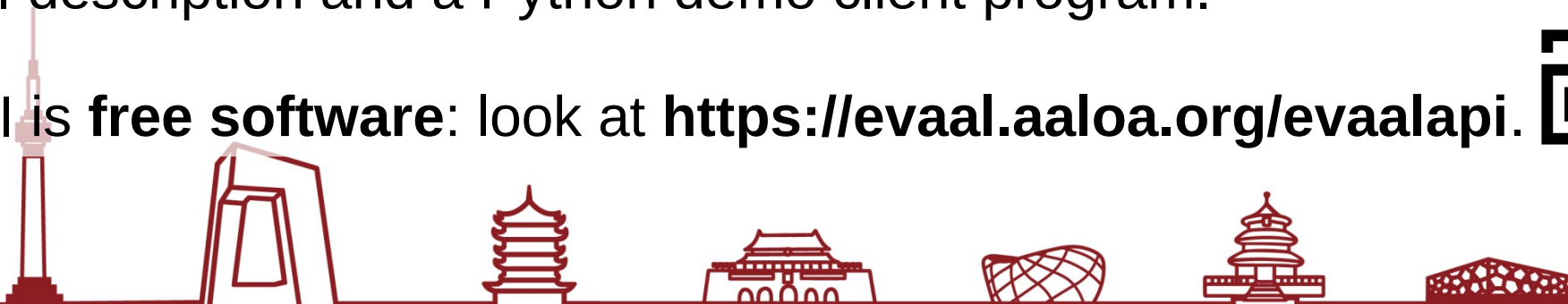
In normal usage, a flow of repeated HTTP request like this is required:

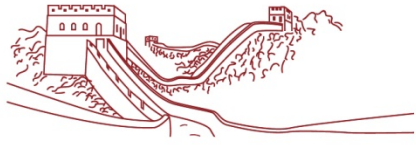
```
GET /TRIAL/nextdata?position=10.422057,43.718278,1
```

It **sets the position estimate** for the current emulated time, **gets the next sensors data** in a time window 0.5 s long as response and **advances the emulated time** by 0.5 s

The web interface EvaalAPI comes with source code (AGPL), docs, OpenAPI description and a Python demo client program.

EvaalAPI is **free software**: look at <https://evaal.aaloa.org/evaalapi>.



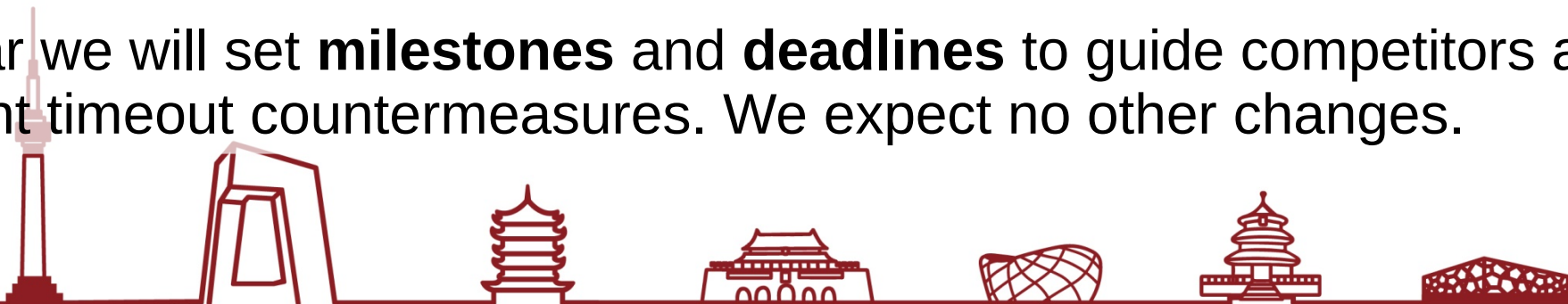


Outcomes

Off-site competitions based on EvaalAPI are **as hard as on-site** ones from an algorithmic point of view. We should better clarify this, as it appears that many competitors **underestimated the challenge**.

- Results of Track 2 were comparable to on-site results of 2019.
- In 2021 results of Tracks 3 and 4 were **similar** to on-site Tracks 1 and 2 and **more realistic** than those of previous years, but in 2022 results were **worse**.
- Results of Track 7 **more realistic** than 2021, when EvaalAPI was not used.
- Results of other Tracks look realistic too, even if no comparison is possible.

Next year we will set **milestones** and **deadlines** to guide competitors and document timeout countermeasures. We expect no other changes.





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谢谢观赏

