SBFT Tool Competition 2026

UAV Test Case Generation Track





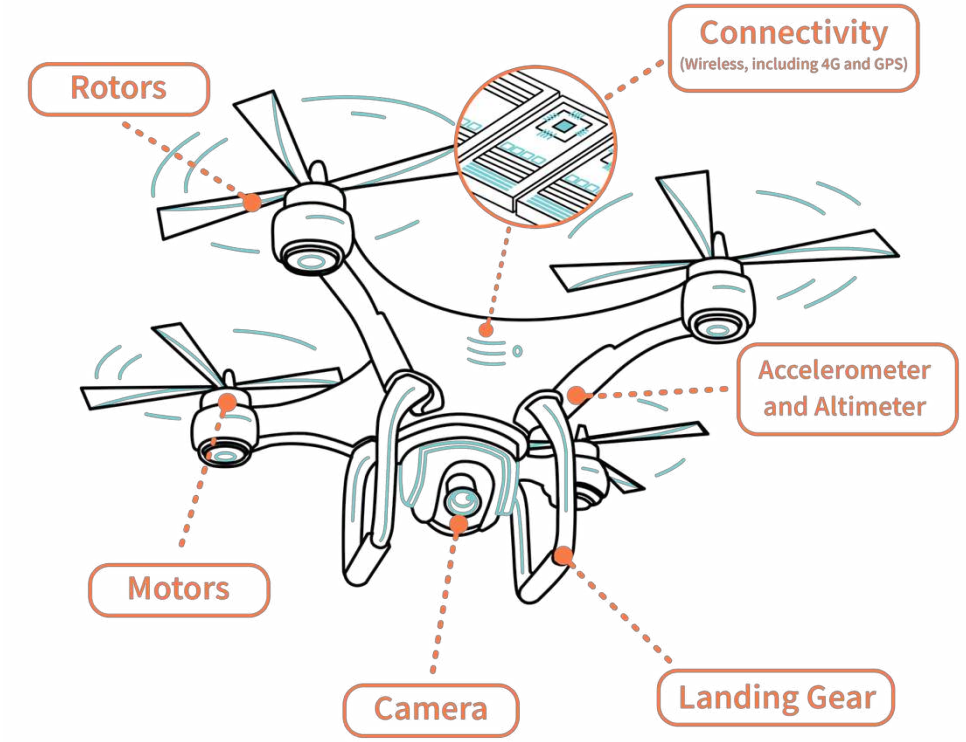


Erdem Ramazan Ali Javadi Prakash Aryan Aren Babikian Dmytro Humeniuk Sajad Khatiri Sebastiano Panichella

SBFT 2026 - The 19th International Workshop on Search-Based and Fuzz Testing
Sunday April 12 2026, Rio de Janeiro, Brazil



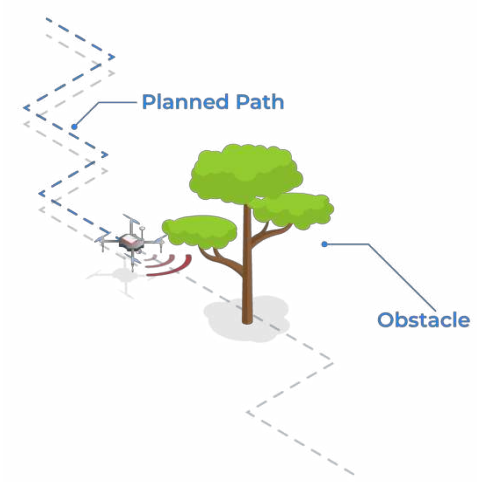

Unmanned Aerial Vehicles (UAVs)

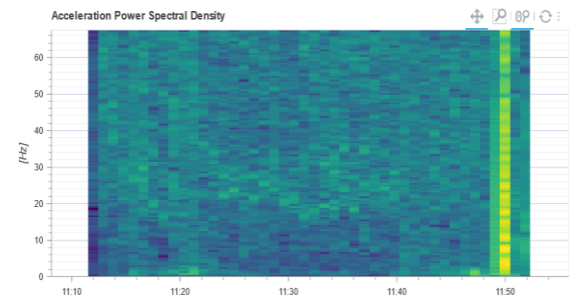



PX4 / PX4-Autopilot Public

Notifications | Fork 13.1k | Star 7.5k

Code | Issues 1.3k | Pull requests 456 | Actions | Projects | Security 4 | ...



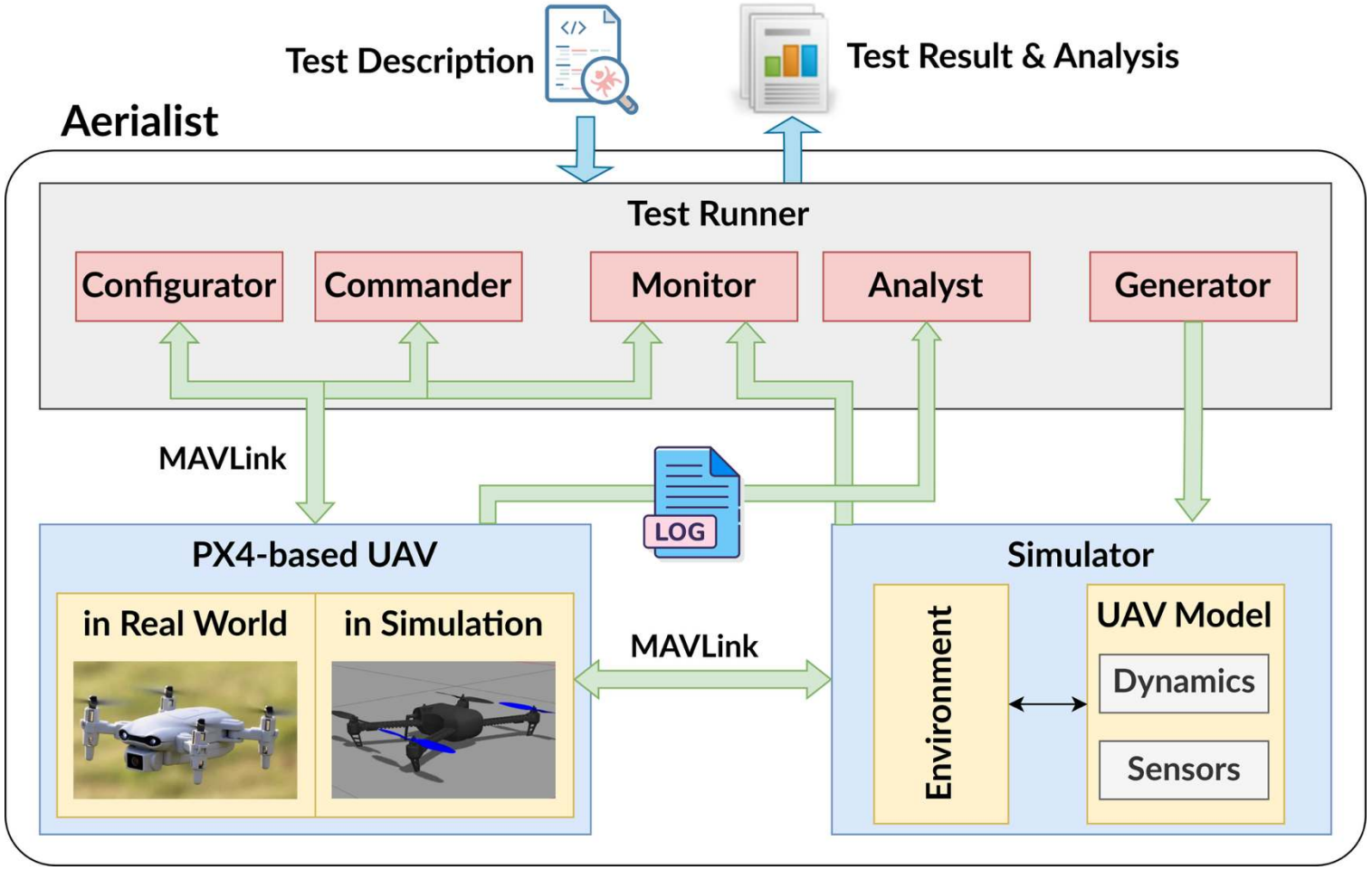


Aerialist

UAV Test Bench

Test Description

- UAV Config.
- Env. Config.
- Commands
- Expectation

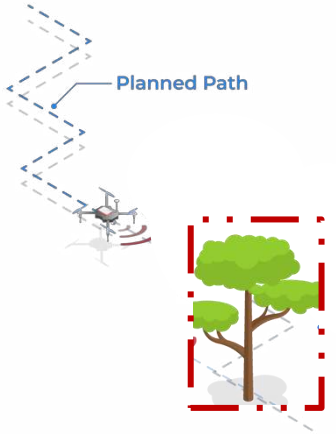


"*Simulation-based testing of unmanned aerial vehicles with Aerialist*", ICSE 2024
Khatiri, Sajad, Sebastiano Panichella, and Paolo Tonella

github.com/skhatiri/UAV-Testing-Competition

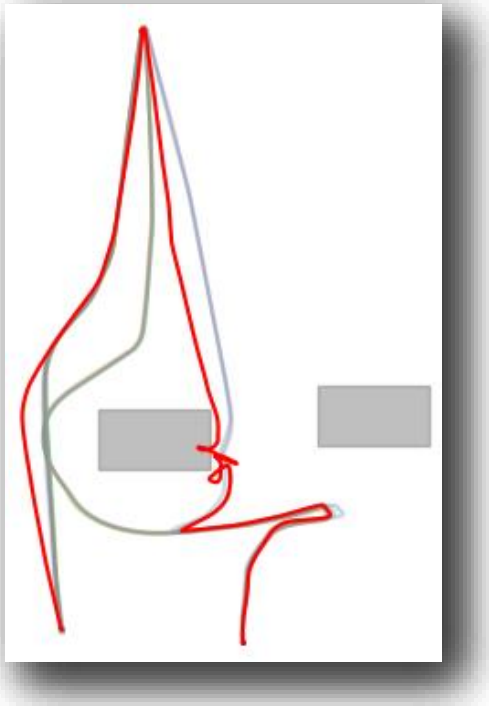
github.com/skhatiri/Aerialist

Test Generation



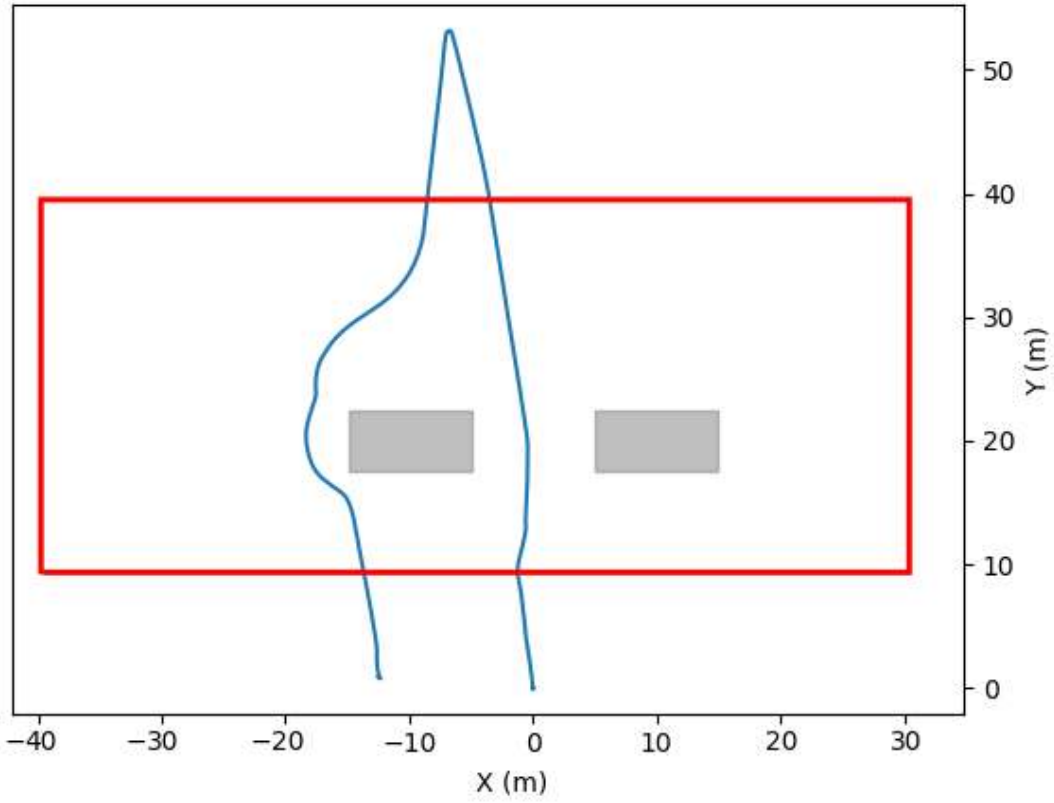
Given an **autonomous UAV flight mission**

Generate test cases that **violate safety distance** to the obstacles by **placing obstacles** in the environment



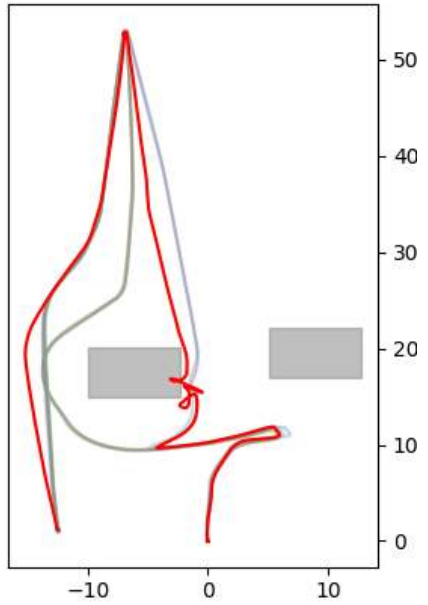
Competition Rules

- **Use** the provided **platform** for test definition
- **Test Generation** using a **Search-based approach**
- Place **up to 4 box-shaped obstacles**
  - Size (length, width, height)
  - Position (x, y, z)
  - Orientation (r)
- **Obstacles should**
  - Keep the mission **physically possible**
  - Fit in the **predefined area**
  - Be **Taller** than the flight altitude (**10m**)
  - **(What is new?) Experiment with wind**



Evaluation

- **1 competing** test generation tools (1 submitted)
- **1 baseline** approach
- Generated tests for **4 flight missions**
  - With **100 Simulation Budget**
  - Using our **K8S evaluation platform**
  - **Report** the **failing** ones
- **20 Tests** from each test suite were evaluated
  - Simulated **3 times**
  - Assign **points** to **each execution**
  - Assign **score** to **each test case**
  - **Estimate** **Test Suite Score**



$$point(sim) = \begin{cases} 5, & \text{if } min\_dist(sim) < 0.25m \\ 2, & \text{if } 0.25m \leq min\_dist(sim) < 1m \\ 1, & \text{if } 1m \leq min\_dist(sim) < 1.5m \\ 0, & \text{if } min\_dist(sim) \geq 1.5m \end{cases}$$

$$test\_score(t) = \frac{avg\_point(t) \times 10}{\#obst(t)^2 \times avg\_time(t)}$$

$$suite\_score(s) = (\sum_t test\_score(t) + rest\_score(s)) \times sim\_pen(s)$$

Tests Count

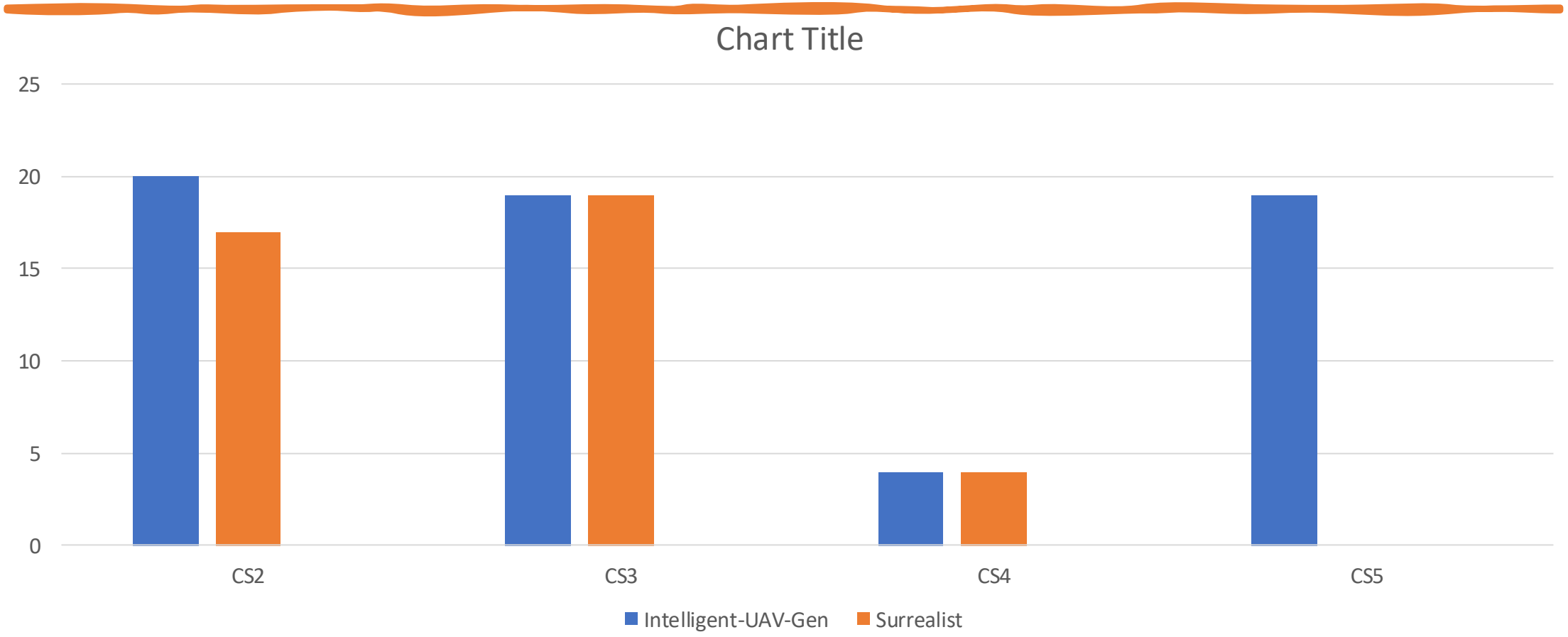
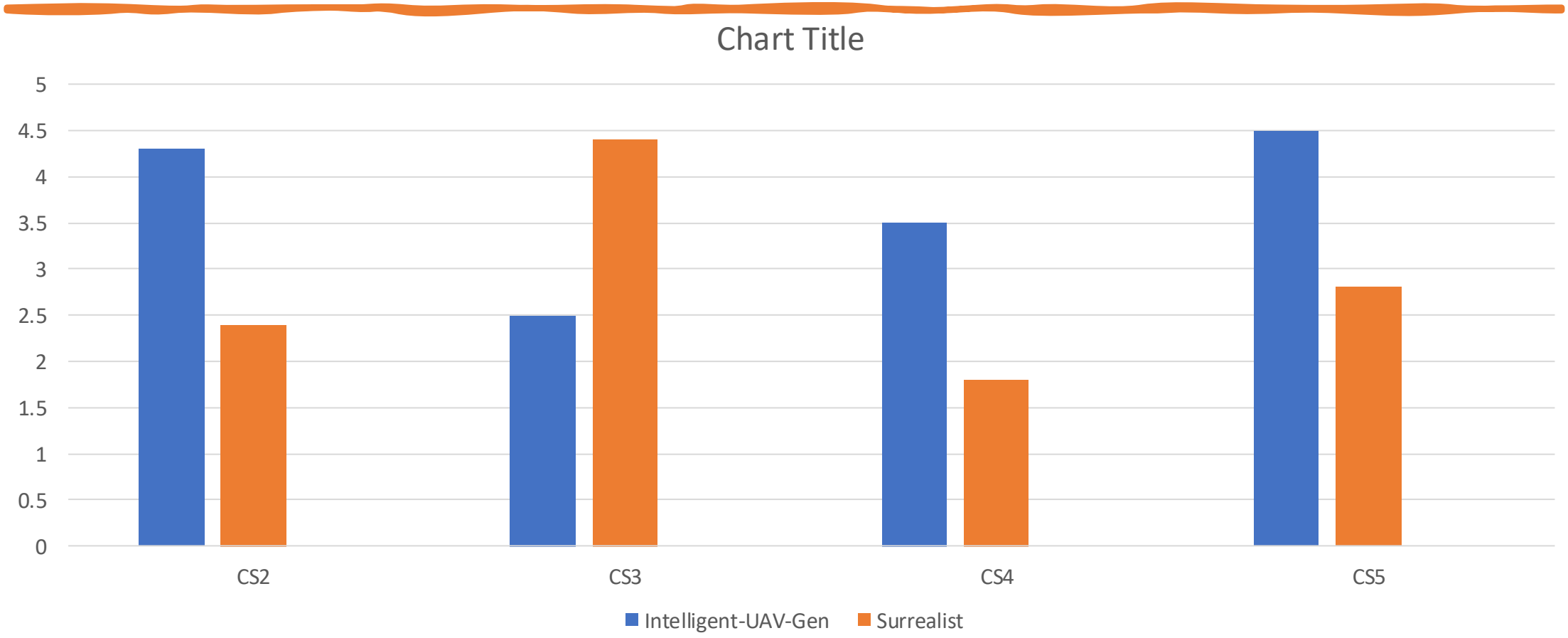
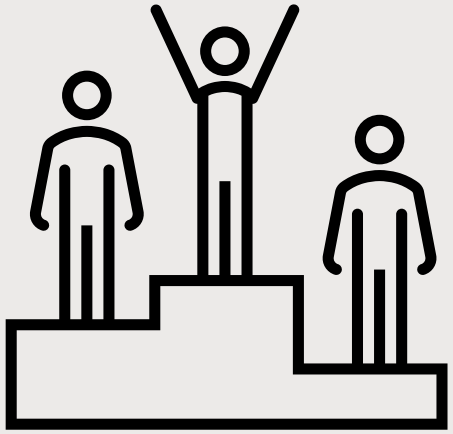


Chart Title
25
20
15
10
5
0
CS2
CS3
CS4
CS5
Intelligent-UAV-Gen
Surrealist

Test Suite Score

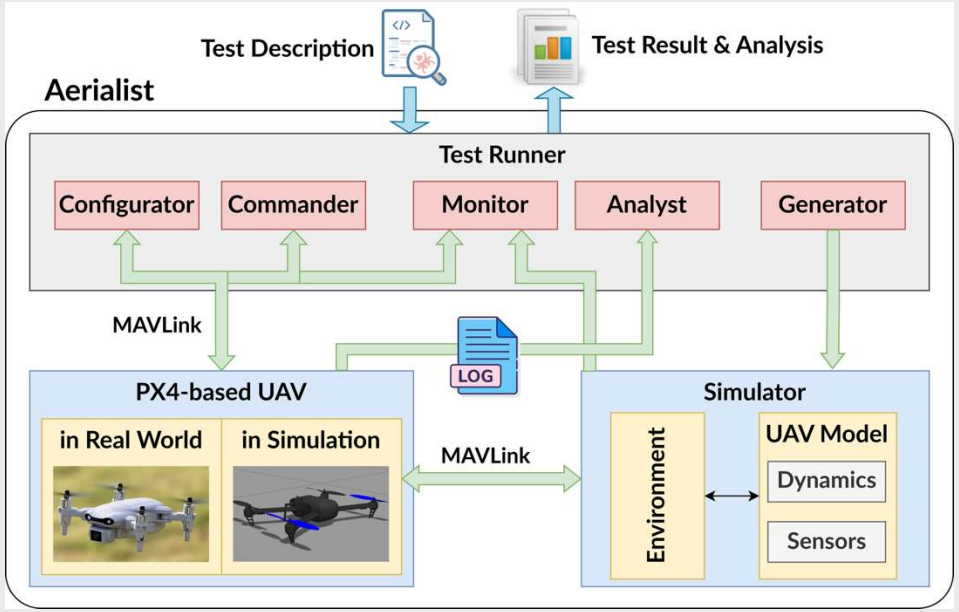




Ranking

Total Score

1. **Intelligent-UAV-Gen**
2. **Surrealist [baseline]**



Total Score

1. **Intelligent-UAV-Gen**
2. **Surrealist [baseline]**

github.com/skhatiri/UAV-Testing-Competition

github.com/skhatiri/Aerialist

IEEE Software Special Edition

Taking Flight: Software for Small Uncrewed Aerial Systems

Foundational and emerging challenges in engineering software-intensive sUAS.

- Software development life-cycle for sUAS (Requirements, Design, Build, Test, Deploy)
- Socially responsible engineering for sUAS

Papers due: 8th May 2026

More info: https://tinyurl.com/software-uas

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Open Positions

- We are currently recruiting for multiple exciting research roles in **Software Engineering, Robotics, and AI Systems**:
  - **Two Postdoctoral Researchers in Software Engineering & Robotics**
    Apply: https://app.ncoreplat.com/jobsharingredirect/776160/postdoctoral-researcher-in-software-engineering-amp-robotics-it/research-and-development-ideals?type=1&platform=19&sharing=5074820
  - **Research Fellow (and PhD) – Software Engineering for Robotics (or AI-enabled Cyber-Physical Systems)**
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  - **Research Fellow (and PhD) – Software Engineering for Human-Centered Robotics**
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  - **Research Fellow (and PhD) – Generative AI for AI-Enabled and Life Engineering Systems**
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- **PhD Opportunity Pathway**
  - For **Research Fellow positions**:
    Strong performers will have the opportunity to transition into a **fully funded PhD position**, supported by AI4I in collaboration with a prestigious Italian university.

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Thank you!







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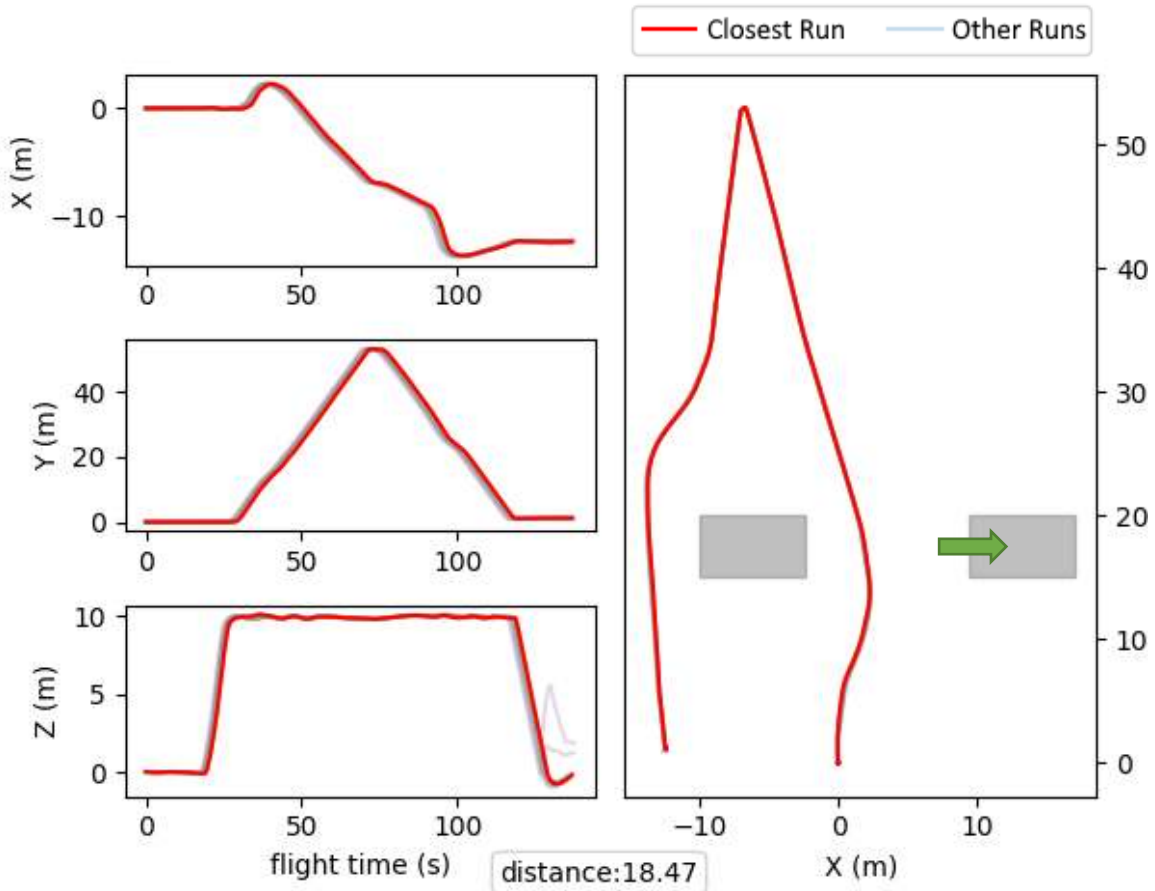
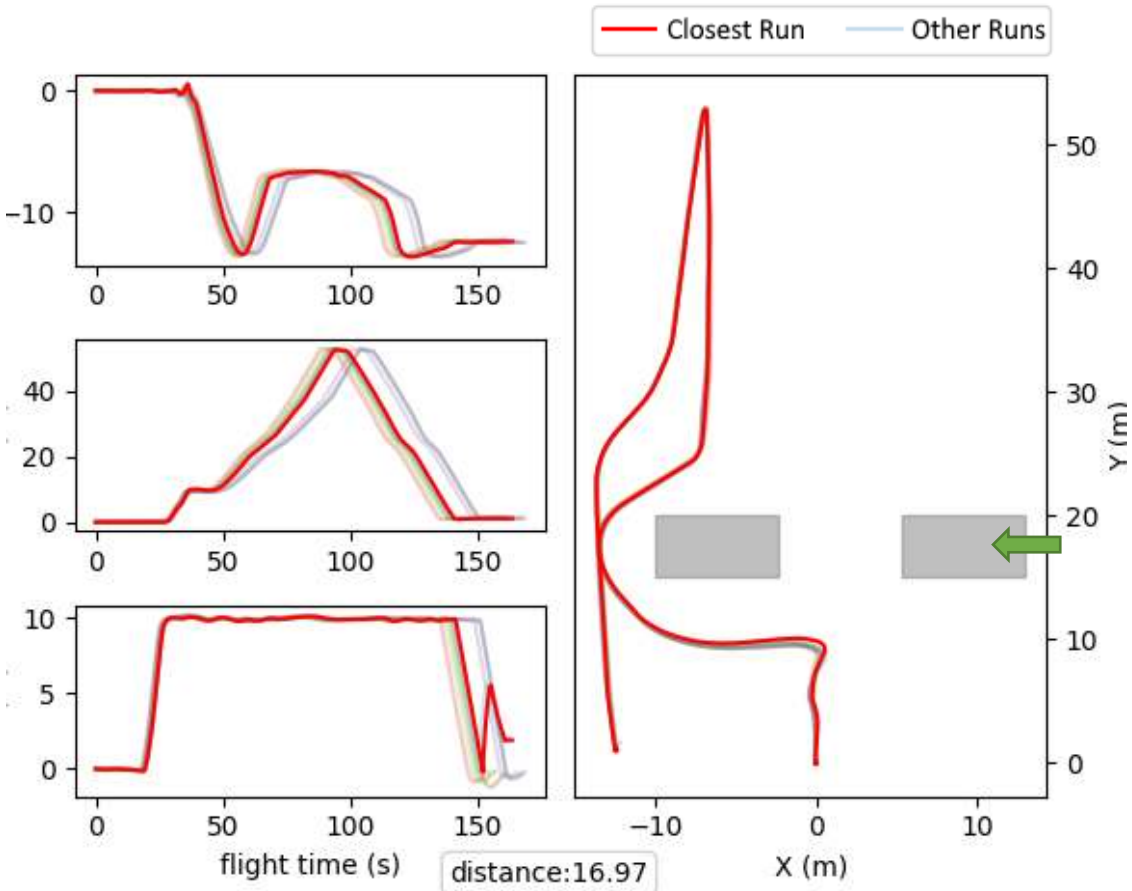
Obstacle **Move** (Δx = **-4**)



Obstacle **Move** (Δx = **-8**)



UAV System Test

UAV Configurations	Autopilot Parameter Config Files (mission plan)
Environment Configurations	Weather Condition Surrounding Objects
Runtime Commands	Radio Controller Commands Starting Mission
Expected Behavior	Flight Trajectory Safety Requirements

UAV System Test

manual1-replay-k8s.yaml

samples > tests > manual1-replay-k8s.yaml

```yaml
drone:
  port: sitl #{sitl, ros, cf}

simulation:
  simulator: gazebo #{gazebo,jmavsim,ros}
  speed: 1
  headless: true

test:
  commands_file: samples/flights/manual1.ulg
  speed: 1

assertion:
  log_file: samples/flights/manual1.ulg
  variable: trajectory

agent:
  engine: k8s # {k8s, docker, local}
  count: 5
  path: https://filer.cloudlab.zhaw.ch/remote.php/webdav/test/
  id: yaml-test
```