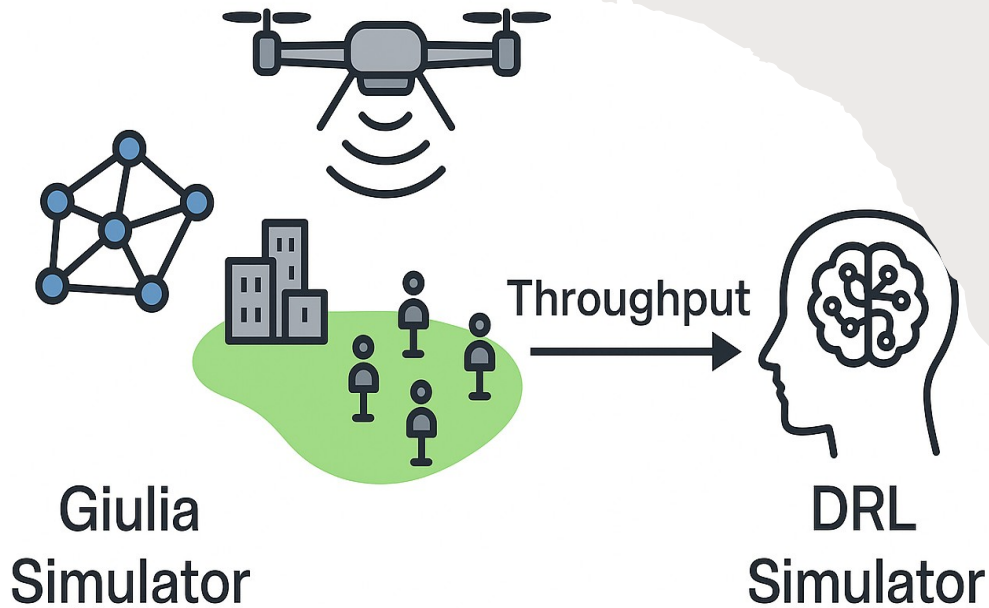
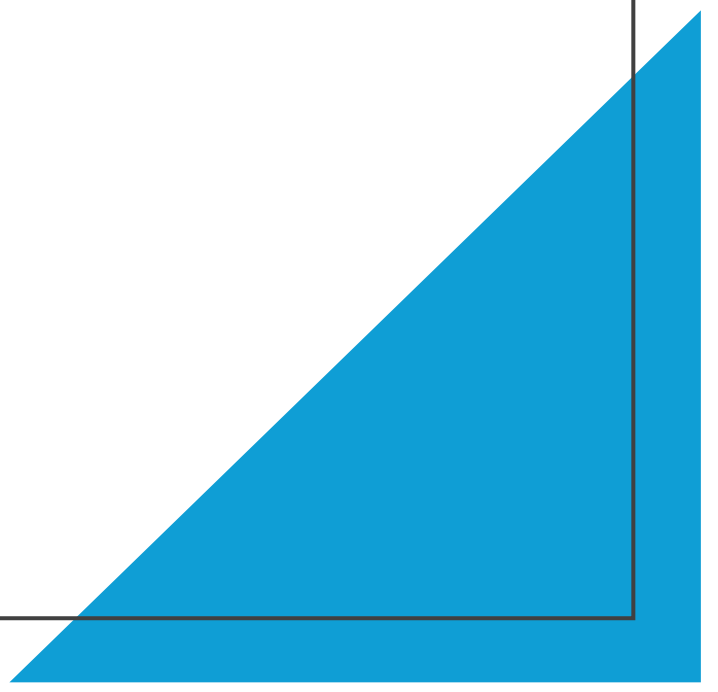


Introduction

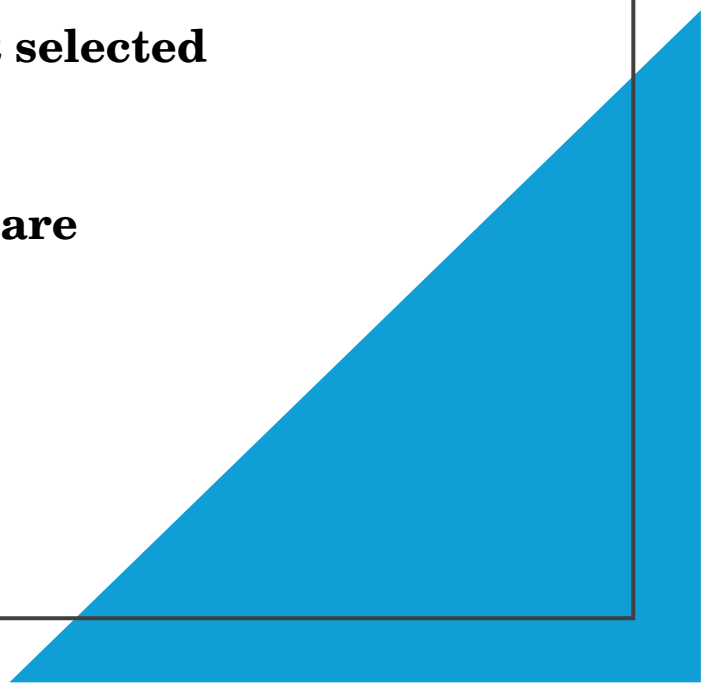
- **Project Overview:** DRL-Based UAV Positioning and Mobility optimization
- **Simulation Tools**
 - **Giulia Simulator**
 - Computes KPIs:
 - Throughput (TP)
 - Signal-to-Interference-plus-Noise Ratio (SINR)
 - Angle of Arrival (AoA)
 - **DRL Simulator:** We present the **Deep Reinforcement Learning (DRL)** simulation results for multiple scenarios involving three UE hotspots and UAVs deployed within a playground.
- **Objective:** The objective is to develop a DRL framework that optimizes UAV positioning and mobility to serve multiple UE hotspots by maximizing the reward and enabling each UAV to learn optimal trajectories for efficient coverage.



Section 2: Scenarios and Results

- **Scenario 1: Mobile HSs in Straight-walk**
 - **Scenario 2: Mobile HSs in Circular-walk**
 - **Scenario 3: Mobile HSs in Cosine-walk**
- 
- A large blue right-angled triangle is positioned in the bottom right corner of the slide, with its hypotenuse facing the top-left.

General Explanation

- In each scenario, we consider a specific case where UAVs learn to follow UE hotspots moving along a defined trajectory.
 - To assess the agents' training performance, we measure the mean reward during both the training and evaluation phases at selected position.
 - Hotspots are represented by red user groups, while UAVs are depicted as blue flyer-shaped icons.
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- **Scenario 1: Mobile HSs in Straight-walk**
Key configuration parameters

Parameter	Value/status
Playground size	400×1200m ²
UE distribution	Uniform with hotspot
Radius of hotspots	0.1m
Number of hotspots	3
Number of UE per hotspots	10
Movement direction	R2L & L2R
UE mobility	Straight walk-Circular-Cosine
Link direction	Downlink
UE velocity	15 km/h
Number of UAVs	3
Initial UAV velocity	30 km/h
UAV initial movement direction	L2R

Straight walk: Evaluation at $[(-180,180,-180),(380,-380,0)]$

Positions at Timestep 0



Positions at Timestep 0



Circular walk: Evaluation at $[(-180,180,-180),(180,-180,0)]$

Positions at Timestep 0



Positions at Timestep 0



Cosine walk: Evaluation at $[(-180,180,-180),(180,-180,0)]$

Positions at Timestep 0



Positions at Timestep 0

