

Bachelor Thesis/Project Work

« Integration and detection of aerial objects in a simulation environment for air taxis »

Background

This thesis is associated with the project ULTRAS (German for Urbane Lufttransportsimulation) which analyses the usage of air taxis as a means of passenger transport in urban environments. These air taxis traverse the low-altitude air space. Thus, detecting other aerial objects that occupy the same air space is prominent in making control and navigation decisions for the air taxi. To this end, we want to extend our simulation environment to integrate these aerial objects and detect them by simulating a sensor system inside the air taxi model. It is expected that the sensors capture the state (position and speed) of these objects in the simulation environment.

The entire system is modeled using OMNeT++ simulator and we make use of the INET and simu5g frameworks. Regarding the sensor simulation, so far in the project, we have implemented a mechanism to detect the state of neighboring air taxis that are communicating with each other. However, there could be other unexpected stationary and mobile aerial objects such as birds, balloons, and drones that do not communicate with the air taxis and we want to simulate sensing of such objects in our simulation environment. You can refer to an implementation of sensors in a ground vehicular network in the artery framework which is also based on OMNeT++ (<https://github.com/riehl/artery>).

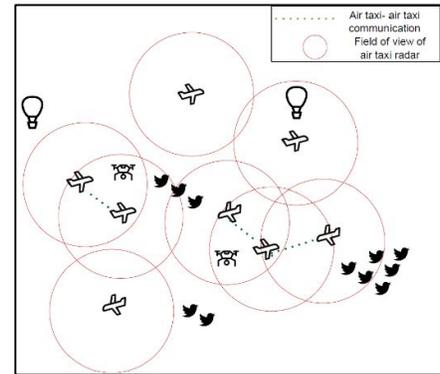


Figure: Scenario to be modeled

Your Tasks

- Modeling mobile and stationary obstacles (birds, balloons, drones) in the simulation environment.
- Simulating the functionality of the sensors (lidar for example) to detect the objects in the air space.
- Reporting gathered sensor information to the control module inside the air taxi.
- Writing the thesis report

Your Profile

- Knowledge and experience in C++ programming language.
- Basic knowledge in working with OMNeT++ discrete event simulator

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