# A V-REP plugin for paparazzi-controlled quadricopter swarm simulation

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*Abstract*—This paper describes a framework for integrating the native paparazzi control-loop for UAVs into the 3D virtual-robot experimentation platform v-rep, created for the simulation of the quadricopters in the Otto-Von-Guericke University swarm-lab.

## I. Introduction

The OVGU swarmlab is a robotic lab in which experiments applying the theory of swarm intelligence are performed, mainly using custom-built quadricopters called FINken. To complement the live experiments, a 3D simulation software was needed. Simulation allows for faster creation of experimental data and reduces the risk of severely damagin the copters in the lab. The real FINken in the swarmlab use paparazzi, an open-source software for the control of multicopters and other UAVs. As paparazzi already provides a Simulator, the New Paparazzi Simulator (NPS), which allows for custom backends to providing a flight dynamics model (FDM), it seemed the best do create such a backend to integrate into the customizable virtual robot experimentation platform V-REP. This provides the advantage of implicit portability between the real FINken running paparazzi and the V-REP - paparazzi simulation. To this end, a custom VREP-plugin was developed in C++ to enable the exchange of data between the two softwares. This paper describes the basic architecture of the framework created to establish this, and provides some evaluation data on the accuracy of the V-REP simulation loop.

## II. Framework Architecture

The base of the combined Simulator is based on a client-server architecture, with the paparazzi controller acting as a client to the VREP-plugin. In the FDM of the paparazzi simulator, a connection to a server representing the controlled simulated copter in V-REP is established. Using a multi-threaded model, multiple copters could be simulated at any point in time. Once the connection is established, simple data packets are exchanged depending on the source:

[FIGURE of the architecure]

Paparazzi provides data regarding the commands for the control of the FINken-motors, while V-REP provides data regarding the position and attitude of the FINken needed in the FDM to compute those controls.

### A. Paparazzi backend

[STUFF THE FDM does]

### B. V-REP plugin

[STUFF the plugin does]

## III. Evalution

[once the copters finally work, fly a circle or something and check if all checkpoints are met]

## IV. Acknowledgment

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