# E-Rocket Report 2 - 1 Degree of Freedom Controller

Master in Computer Science and Engineering
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*I declare that this document is an original work of our own authorship and that it fulfills all the requirements of the Code of Conduct and Good Practices of the Universidade de Lisboa (https://nape.tecnico.ulisboa.pt/en/apoio-ao-estudante/documentos-importantes/regulamentos-da-universidade-de-lisboa/).

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# 1 Objective

Now that the team can read sensor data and actaute the sensors and motors, it can start development on a software architecture, with a controller. To start of, the team decided to use a simple 1 degree of freedom controller, to ensure the rocket maintains a desired orientation. Independent tests of pitch and roll are performed, in order to evaluate the performance of the controller using the inner beam, or outer ring.

Objectives:

- Implment a software architecture containing a state-machine, mission planner and controller
- Use a 1 degree of freedom control algorithm

# 2 Background

# 3 Architecture

# 4 Setup

The message `VehicleAngularVelocity` is not supported by default [1].

```
# - topic: /fmu/out/vehicle_angular_velocity
#   type: px4_msgs::msg::VehicleAngularVelocity
```

**Listing 1:** Message Not Supported for uXRCE DDS Client Module in PX4

In order to use the message, the team had to add it to the `dds_topics.yaml` file, as part of the PX4 uXRCE DDS client module. Afterwards, the team flashed the PX4 firmware to the flight controller, and used the `ros2 topic echo` command to check if the message was being published.

[1] https://github.com/PX4/PX4-Autopilot/blob/main/src/modules/uxrce_dds_client/dds_topics.yaml

## 5 Demo

# 6 Results

# 7 Conclusion