

# DEVELOPMENT OF A USER INTERFACE FOR MULTI-ENVIRONMENT ROBOT NAVIGATION AND OPERATION IN EXTREME ENVIRONMENTS

## 1. What is the Mission?

The Forel Research Platform<sup>1</sup> requires water samples near glaciers for analysis.

### Problem

The glaciers are hard to get to by boat because of icebergs.

### Solution

**Medusa** - A drone, with a submersible tethered pod, capable of landing on water and sampling.

### Objective

Create a custom UI to control and receive data from medusa, modified from an existing ground control station.

## 2. Ground Control Station

### Required functionalities

- Open-source & cross-platform
- Automatic navigation
- Live drone health and video
- Highly customizable
- Stable

QGroundControl v4.4<sup>2</sup> is the perfect fit.

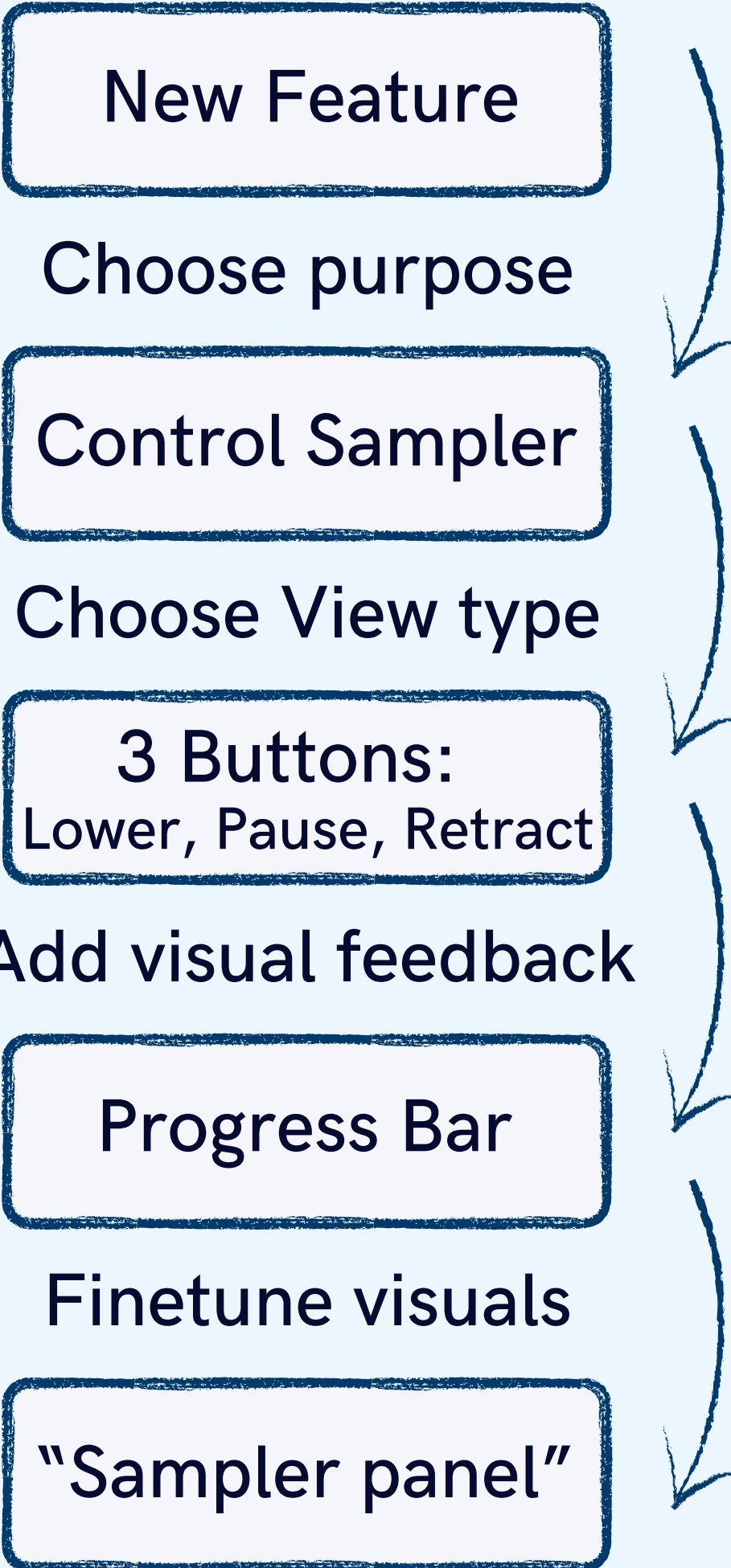
### Development targets

- Communication with the drone & pod
- Displaying new sensors
- Controlling the sampler

## 4. UI Customization

### Designing new UI functionalities

#### Sampler Control Example



### Key features added

- Sampler control panel
- Progress bar
- Attitude and battery status widgets
- Widget visibility button



Figure 2 Custom features added to the UI of QGroundControl.

## 3. Operating Embedded Pod

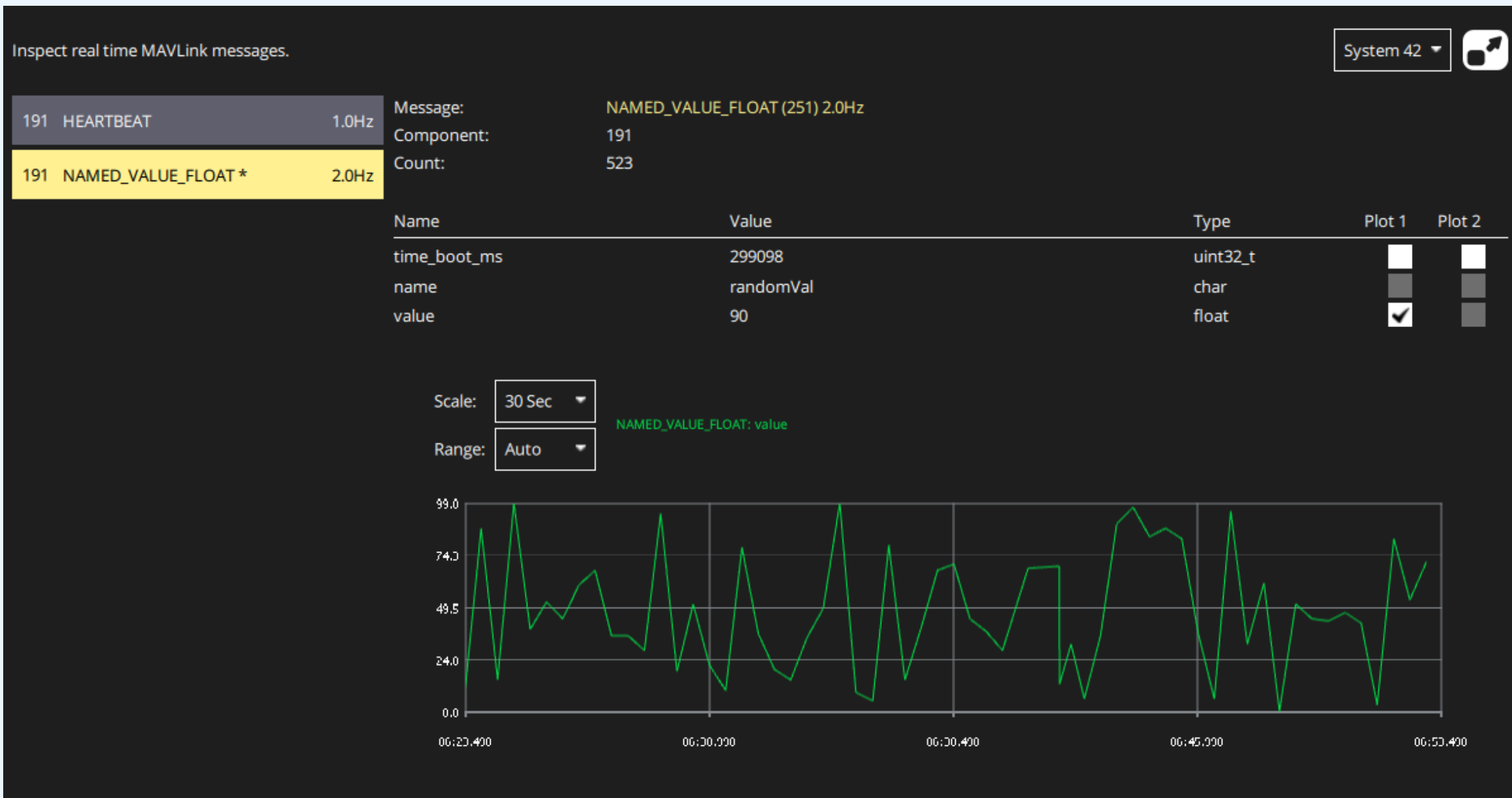
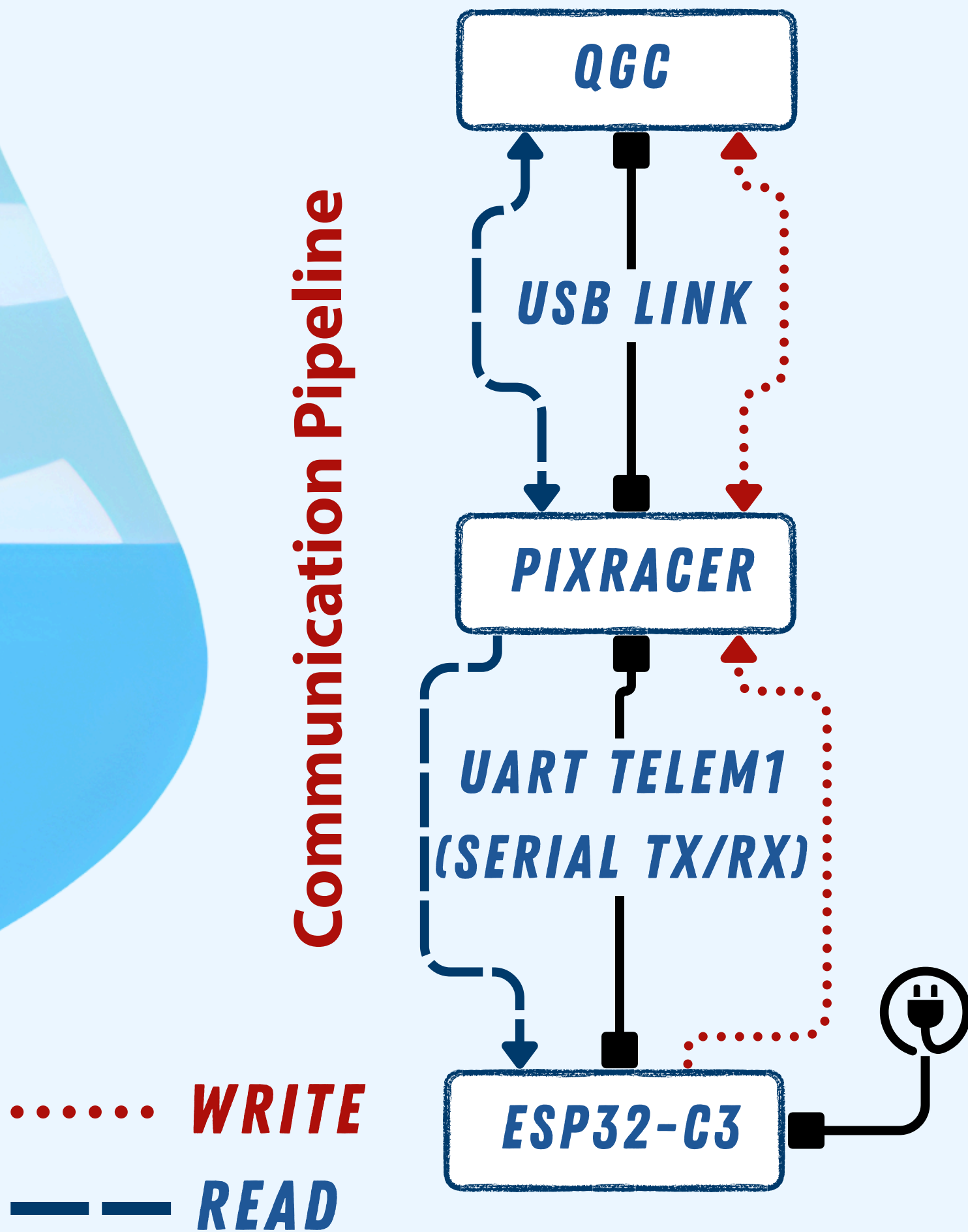


Figure 1 Real-time data exchange in QGC.

### PixRacer - Arduino - QGC link

- Simulated real-time sensor data exchange (write & read)
- Displayed custom telemetry in QGC
- Proof-of-concept for onboard sampling probe control



<sup>1</sup> For more information about the Forel Research Platform

<sup>2</sup> © Dronecode Project, Inc. QGroundControl - Drone Control