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Chemico-physical and multispectral Data fusion for Adriatic sea monitoring by autonomous vessel

A low-cost, autonomous approach to marine environmental monitoring

Luca Gemolotto, University of Udine, Department of Mathematics, Computer Science and Physics

EMRA ‘25, Trondheim

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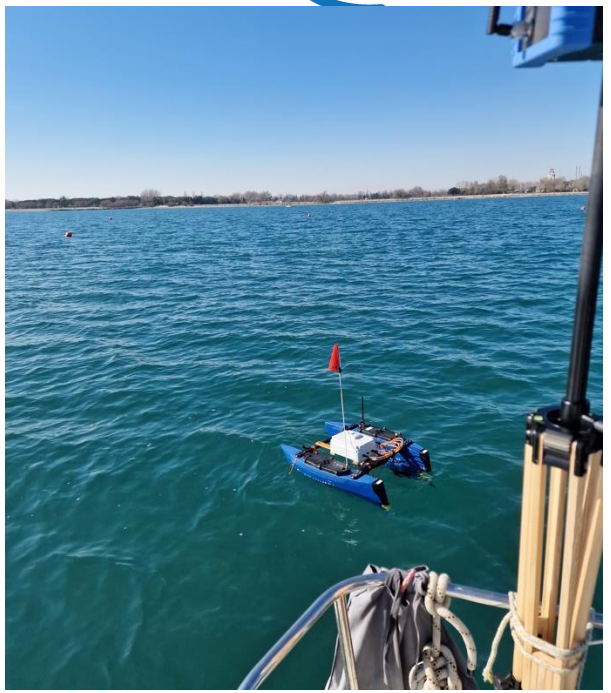
An Overview

- Fusing chemical-physical and multi-spectral data, with an autonomous vessel
- Making field samplings more efficient
- Ensuring image overlap
- Easily repeatable samplings



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Our ASV

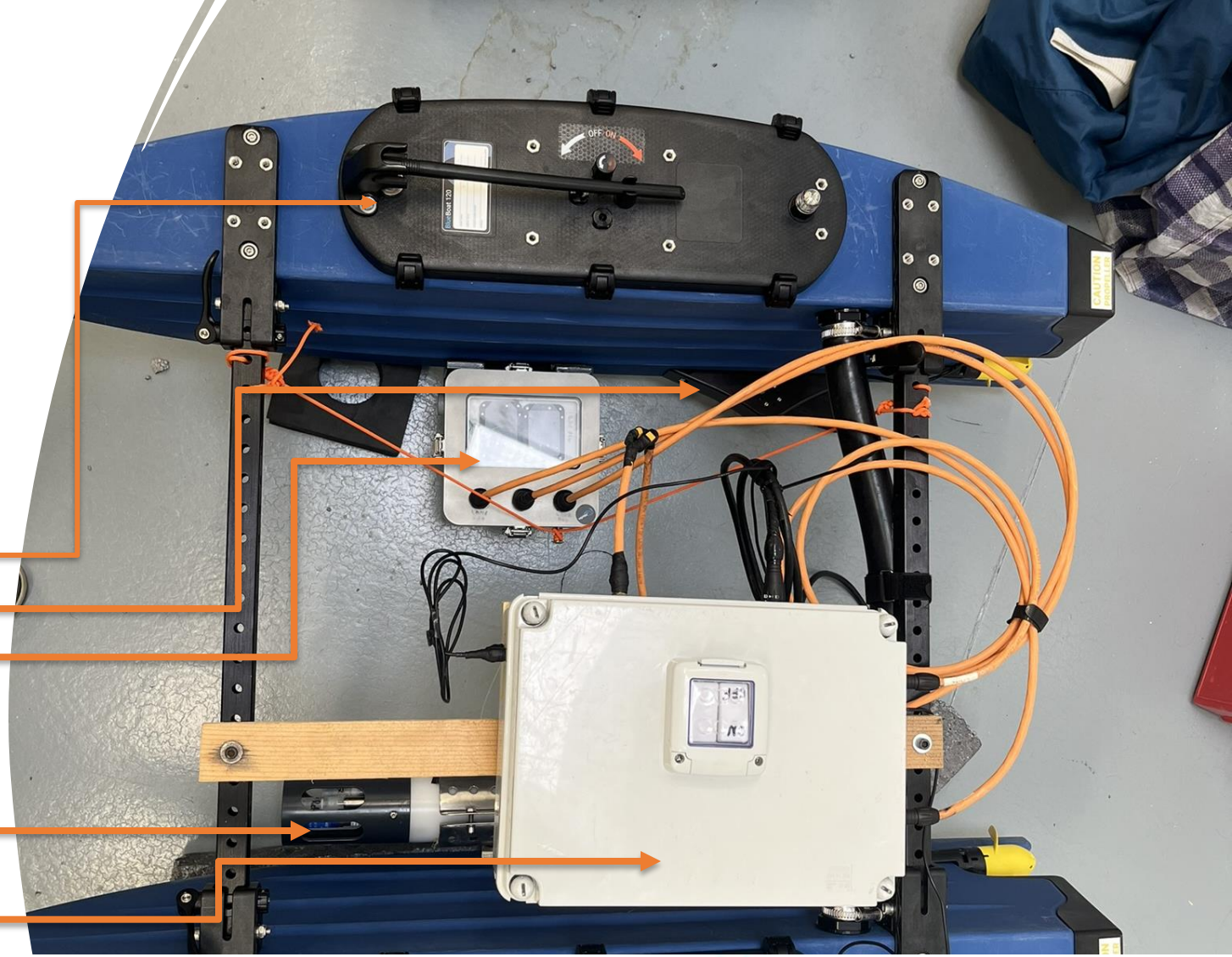
Autonomous sailing computer

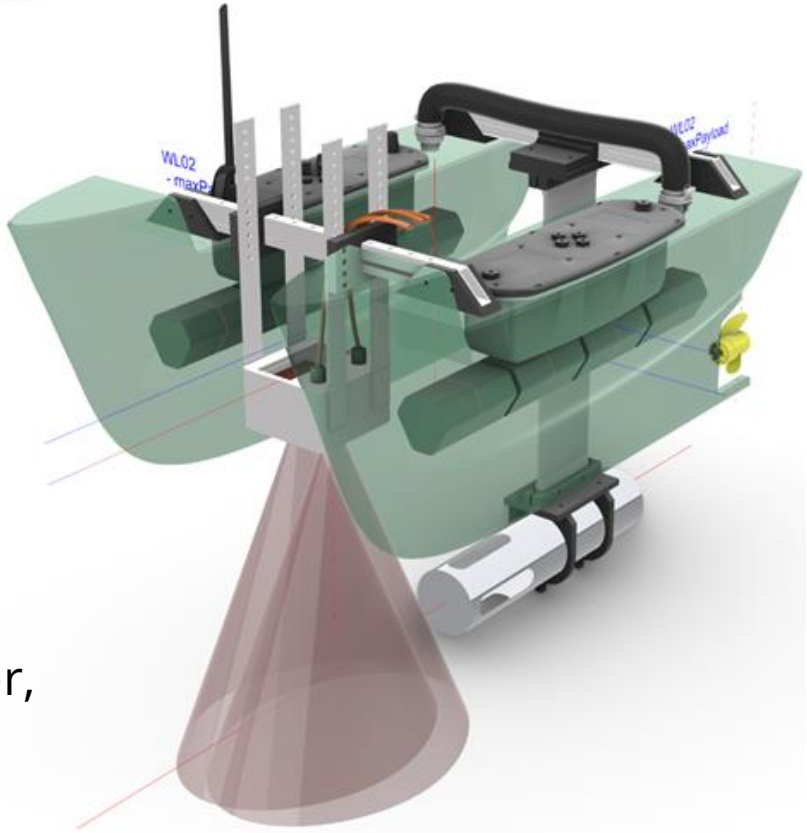
BlueRobotics PingSonar

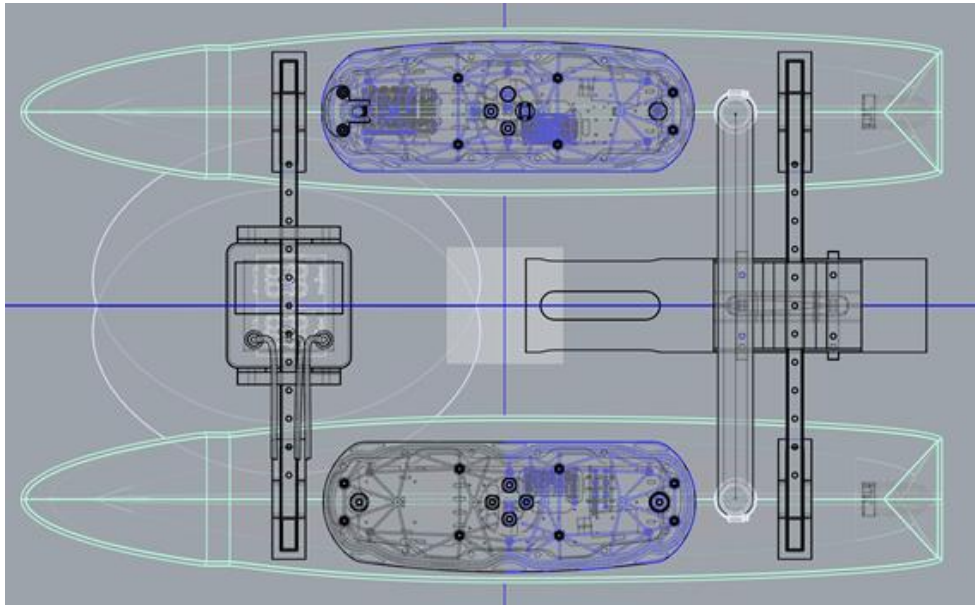
Micasense RedEdge MX Dual spectral cameras

IDRONAUT Ocean Seven 310 Multiparameter CTD

Data Acquisition Computer







New Prototype

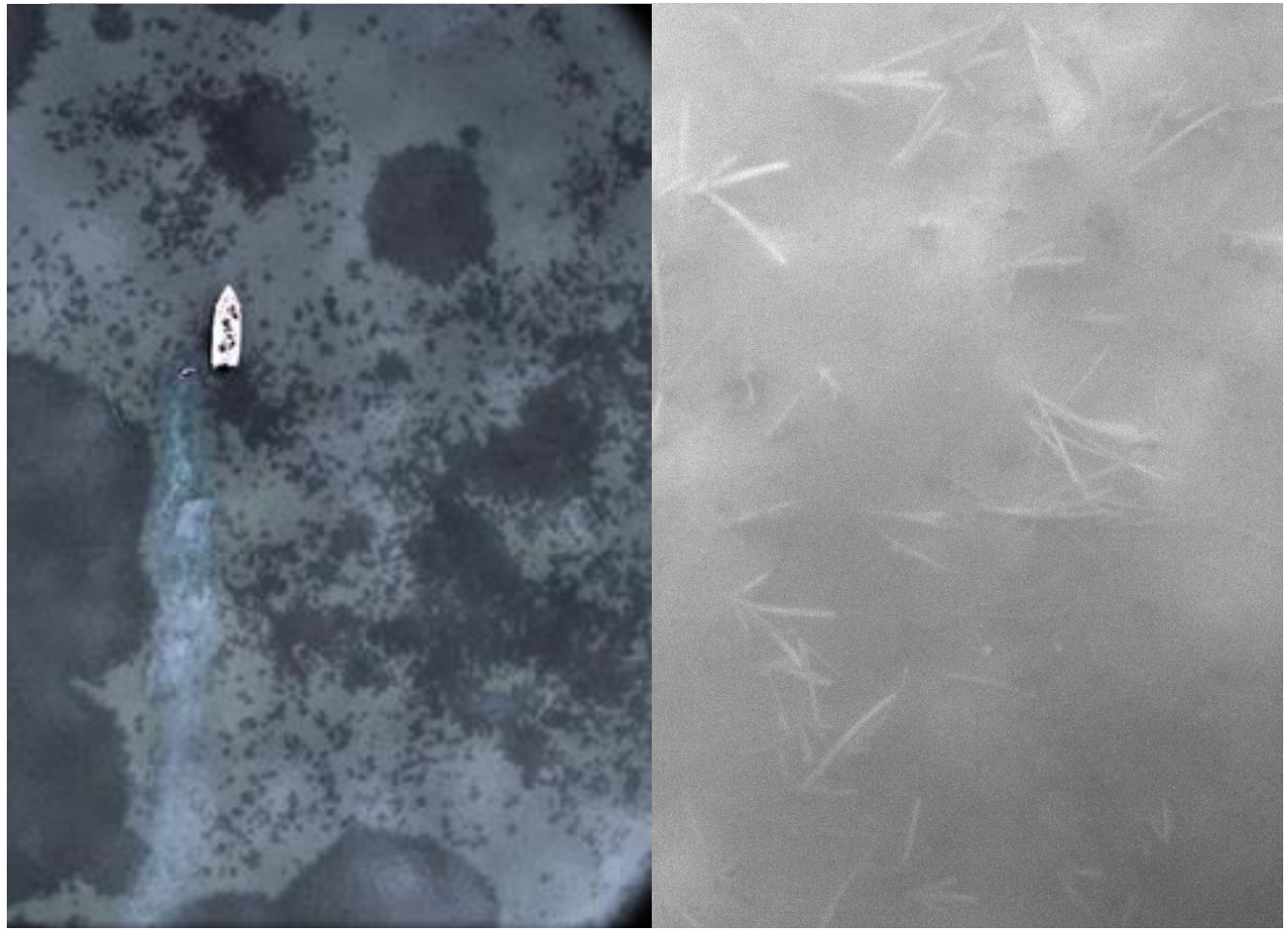
- Current one based on BlueRobotics' Blue Boat
- New Prototype has smaller, improved hulls, made of fiberglass

Monitoring via spectral images

- Remote sensing from satellites to close quarters
- Punctual data of the exact sampling sites

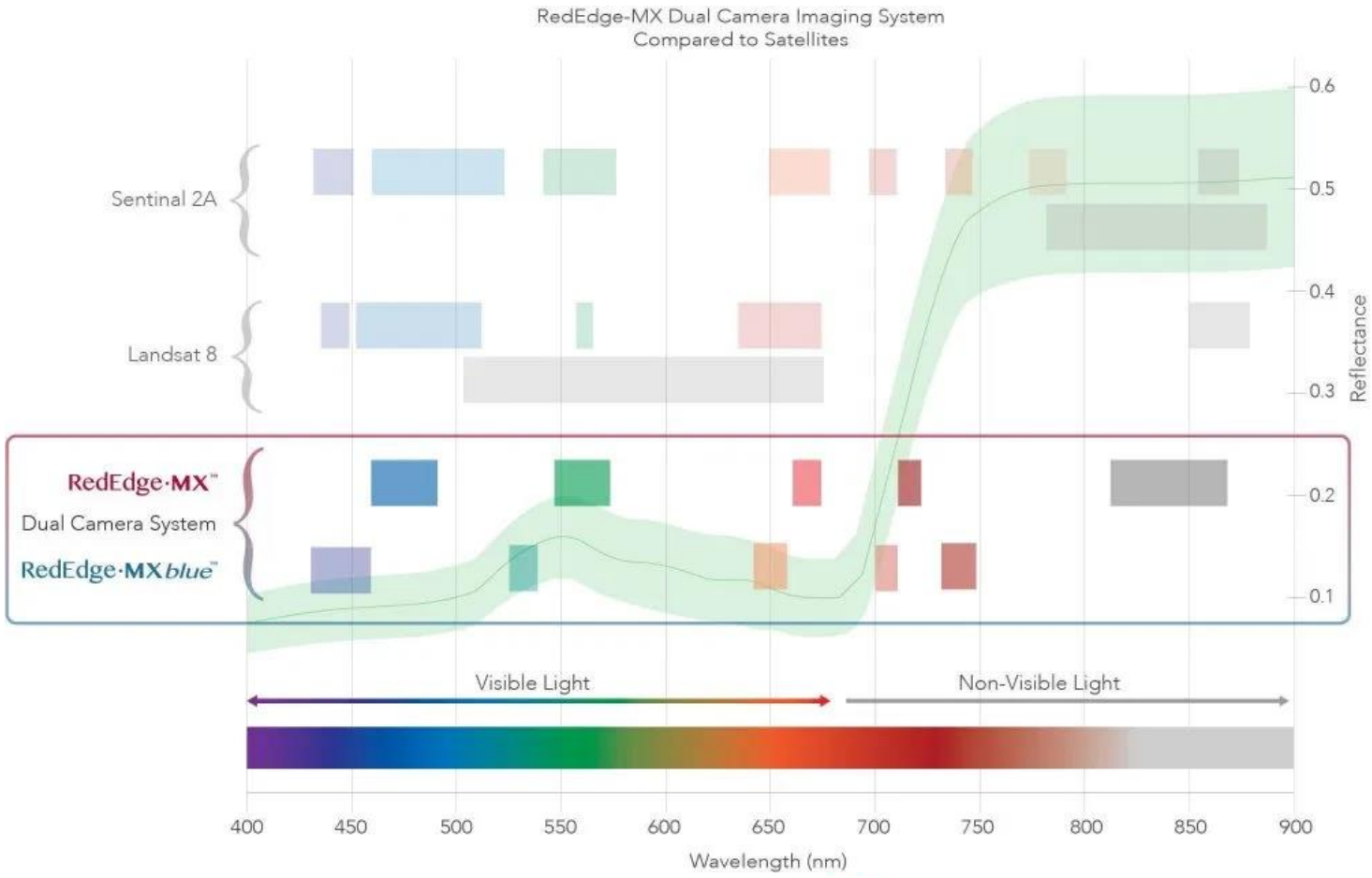
Challenges:

- Mosaic of the underwater photos
- Underwater illumination for near IR bands
- Restrictive depth range



Spectral bands

Band Name	Wavelength	Band Name	Wavelength
Blue	475 ± 32 nm	Coastal Blue	444 ± 28 nm
Green	560 ± 27 nm	Green	531 ± 14 nm
Red	668 ± 14 nm	Red	650 ± 16 nm
RedEdge	717 ± 12 nm	RedEdge	705 ± 10 nm
Near IR	842 ± 57 nm	RedEdge	740 ± 18 nm



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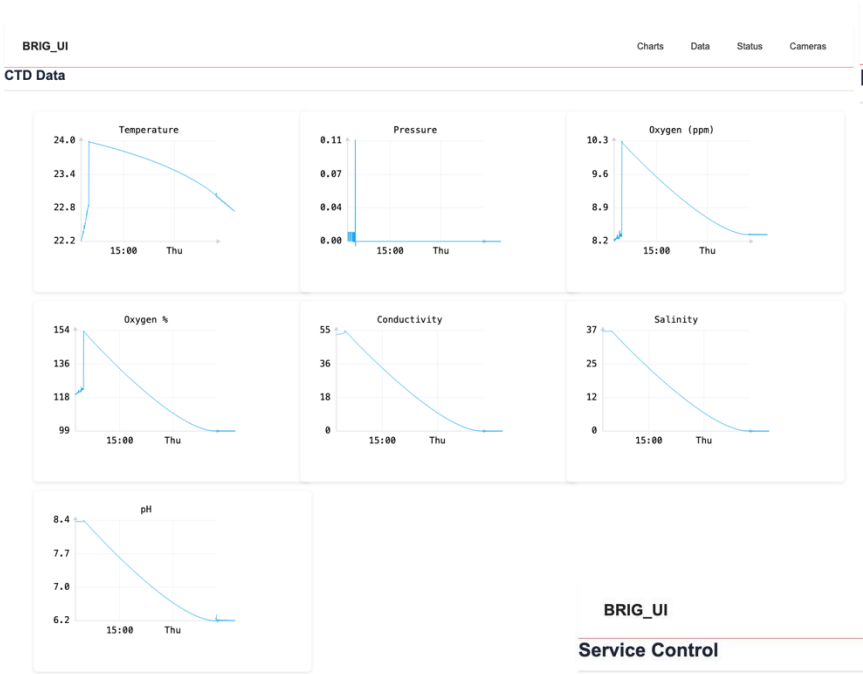
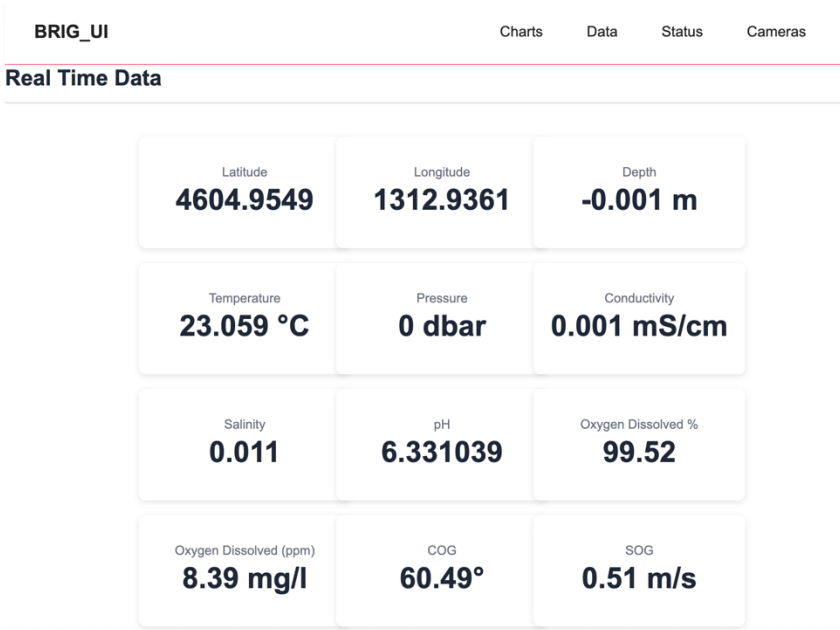
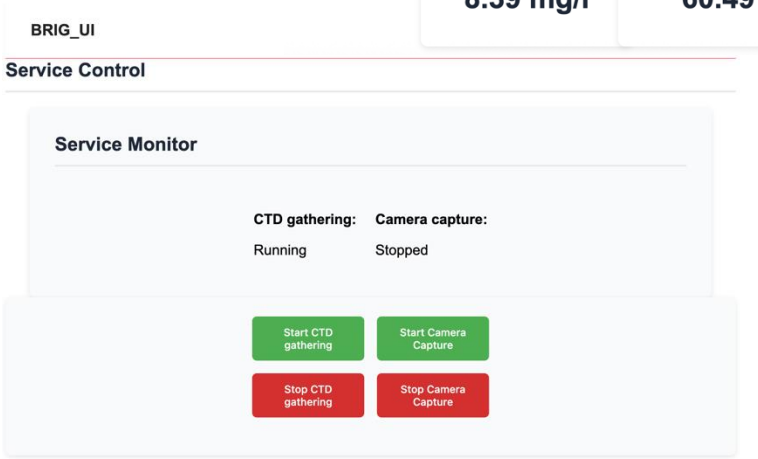
Facilitating usage by anyone

- Easy access to system controls
- All data needed by users and researchers can be accessed from the same place
- RT data and charts of the last day, to get a glimpse of the data on the field







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