Morpheus - A Highly Maneuverable A-Size UUV


Morpheus is an A-Size unmanned underwater vehicle (UUV), based on the MK-39 EMATT hull. MIT has created new internal electronics, retractable dorsal fins, modified servo-driven tail-cone and optimized nose-cone, together with a new software stack to create a highly maneuverable platform for a more general mission set. Morpheus has a unique capability to dynamically vary the directional stability of the vehicle using its tuna-inspired retractable dorsal fins. This allows Morpheus to travel straight with higher stability, and destabilize the body during maneuvers to achive extreme turning rates

Size:	0.9 m length, 0.12 m diameter
Sensors:	GPS, IMU, external pressure/depth and temperature sensor, internal pressure sensor, wifi, GSM, and tetrahedral hydrophone array with acoustic data acquisition system
Top Speed:	4.0 meters/sec
Top turn rate:	20 - 30 deg/sec
Software:	Autonomy System: MOOS-IvP Navigation System: HydroMAN, piUSBL Frontseat software: moos-ivp-frontseat
Projects:	https://oceanai.mit.edu/pavlab/proj/morpheus https://oceanai.mit.edu/pavlab/proj/perseus

Recent Publications

2022 (1 item)

1. Supun Randeni, Emily M Mellin, Michael Sacarny, Skyler Cheung, Michael Benjamin, and Michael Triantafyllou. Bioinspired morphing fins to provide optimal maneuverability, stability, and response to turbulence in rigid hull auvs. *Bioinspiration & Biomimetics*, 17(3), April 2022.

2021 (1 item)

2. Supun Randeni, Emily Mellin, Michael Sacarny, Skyler Cheung, Michael Benjamin, and Michael Triantafyllou. Bioinspired dorsal fins to provide optimal maneuverability, stability, and response to turbulence in rigid hull auvs. Submitted and Under Review, 2021.

2020 (2 items)

3. Toby Schneider, Henrik Schmidt, and Supun Randeni. Self-adapting under-ice integrated communications and navigation network. In *2020 Underwater Communications and Networking Conference (UComms)*. IEEE, 2020.
4. Supun Randeni, Erin Fischell, and Henrik Schmidt. An AUV dynamic model, based on the conservation of energy, for underwater navigation aiding. *IEEE Journal of Oceanic Engineering (Under Review)*, 2020.

References

[1] Supun Randeni, Erin Fischell, and Henrik Schmidt. An AUV dynamic model, based on the conservation of energy, for underwater navigation aiding. *IEEE Journal of Oceanic Engineering (Under Review)*, 2020.

[2] Supun Randeni, Emily Mellin, Michael Sacarny, Skyler Cheung, Michael Benjamin, and Michael Triantafyllou. Bioinspired dorsal fins to provide optimal maneuverability, stability, and response to turbulence in rigid hull auvs. Submitted and Under Review, 2021.

[3] Supun Randeni, Emily M Mellin, Michael Sacarny, Skyler Cheung, Michael Benjamin, and Michael Triantafyllou. Bioinspired morphing fins to provide optimal maneuverability, stability, and response to turbulence in rigid hull auvs. *Bioinspiration & Biomimetics*, 17(3), April 2022.

[4] Toby Schneider, Henrik Schmidt, and Supun Randeni. Self-adapting under-ice integrated communications and navigation network. In *2020 Underwater Communications and Networking Conference (UComms)*. IEEE, 2020.