REMORA: Autonomous boat capable of powering and operating aerial and underwater drones for offshore windfarm inspection

From Knowledge to Competitiveness

Portugal-US Partnerships 2026 Summit

MIT Portugal Program

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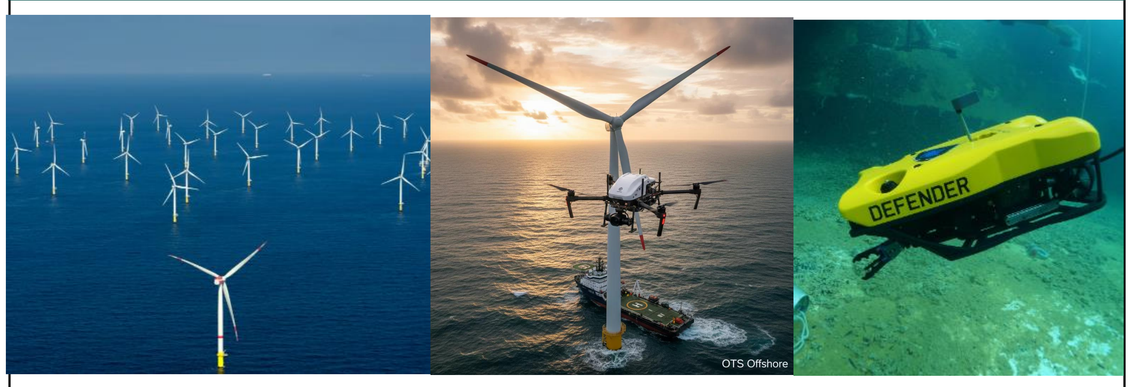
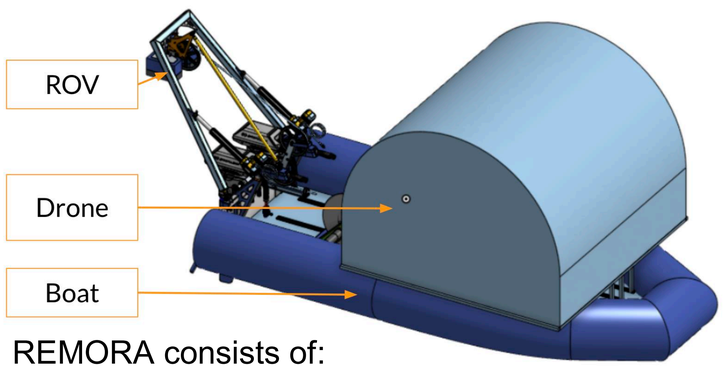
Earth Systems: Oceans to Near Space

Motivation



- >15,000 offshore wind turbines. Power for 60 million homes.
- 30% of the world's oil/gas is produced offshore
- Without frequent inspection, these structures are corroded away.
- Current inspections are expensive – boat, personnel, fuel means simple aerial drone/underwater ROV inspection costs $15k/day.

Overview of REMORA



REMORA consists of:

1. **Boat**: 15ft autonomous electric vessel
2. **ROV**: System to power, operate, launch, and recover a tethered underwater vehicle
3. **Drone**: Dock where drones land, recharge, take off, and are stored

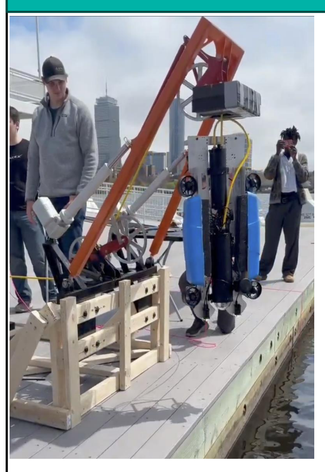
Benefits of REMORA

	REMORA Inspection	**Current Inspection**
Humans Needed	1 (onshore)	>5
Boat	15ft unmanned vessel	>50ft Crew Transfer Vessel
Daily cost	$2k / day	$15k / day

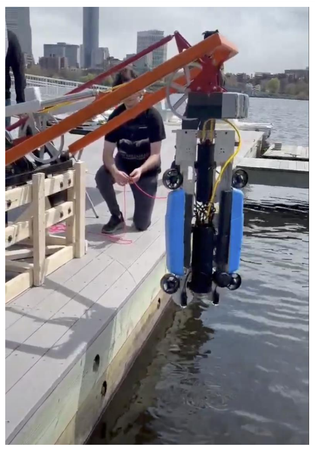
Boat

Boat autonomy uses Jetson Orin / Pixhawk 6X. Electrically powered via lithium-ion batteries. Using Starlink, we are able to control this boat from anywhere in the world.

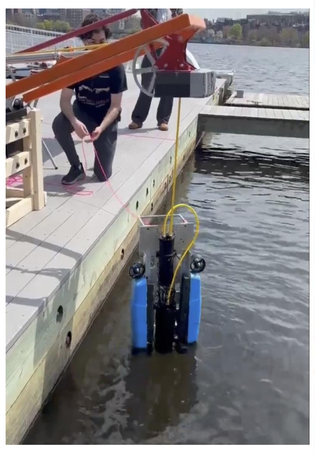
Remotely Operated Vehicle (ROV)



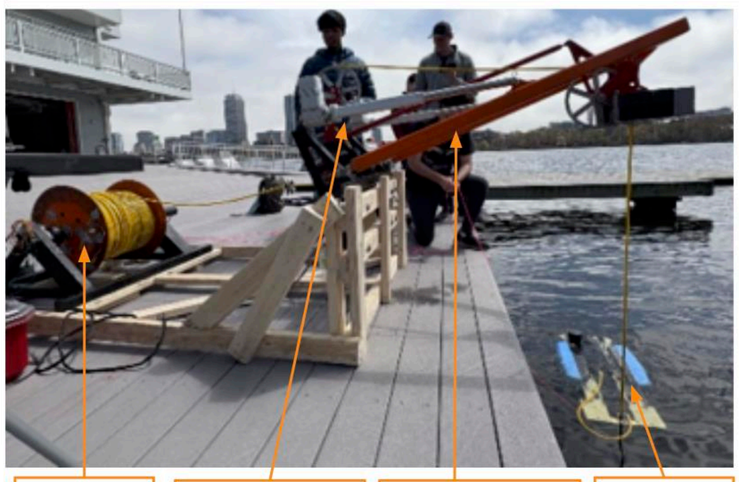
1. ROV LARS



2. A Frame lowers ROV

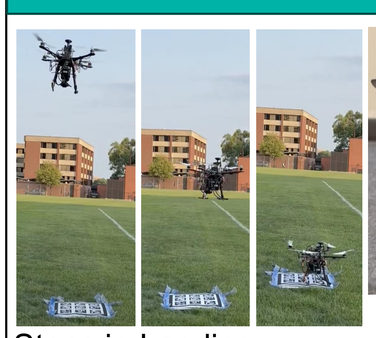


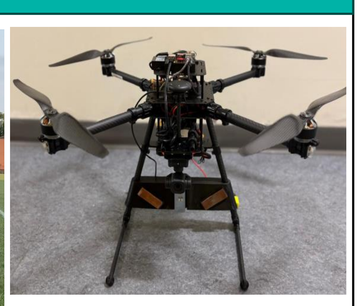
3. Reel unwinds, lowers ROV into water



4. ROV deployed. Reel slip ring gives power/comms

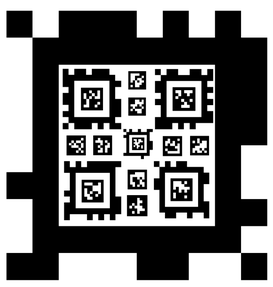
Drone: Precision Landing





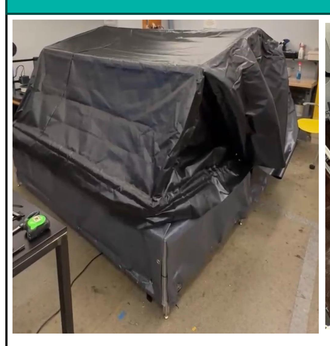
Steps in Landing:

1. Drone approaches boat using GPS
2. Drone spiral searches for April Tag array
3. Drone uses April Tag Array to estimate its relative position and land

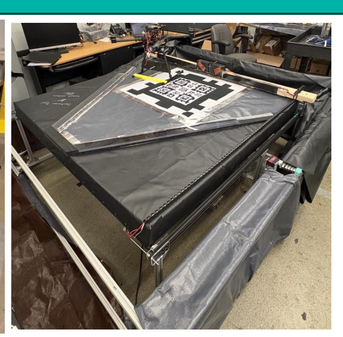


April Tag Array

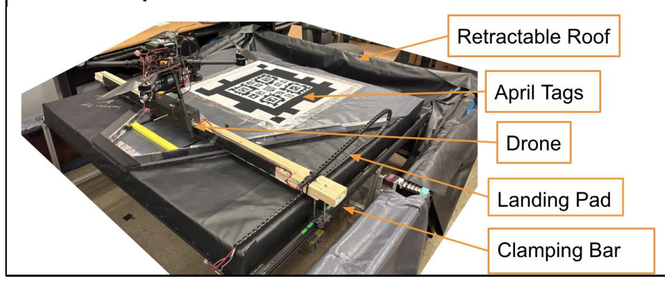
Drone Dock: Steps in Operation

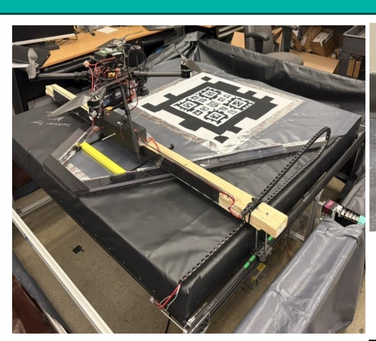


1. Roof opens



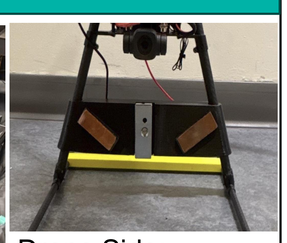
2. Drone lands





3. Moving bar secures, charges drone

4. Roof closes



Drone Side: Passive magnet, charging pads

Bar Side: Electromagnet, charging pads

Conclusion

Demonstrated:

- Dry test of boat EE/SW
- Autonomous precision landing of Drone in winds up to 8 m/s with 10" accuracy,
- Development of robust drone station
- Validation of ROV LARS system on Charles River

Next Steps:

- Integrate drone dock, boat electronics, and ROV LARS onboard
- Test full system in realistic Sea States

Funded by:

MIT Portugal Program

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