Data collection in surface water environments using a small-scale autonomous boat

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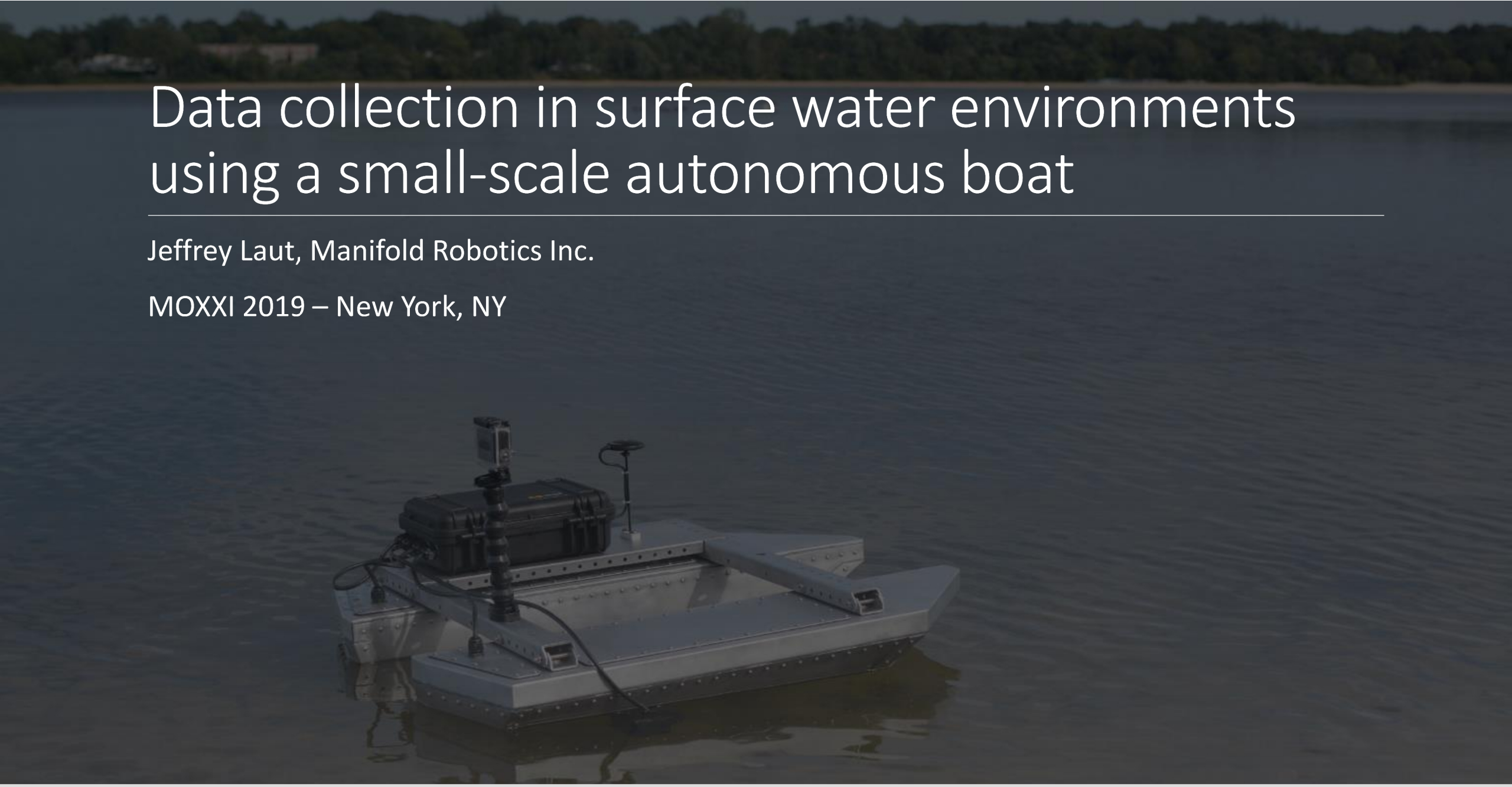
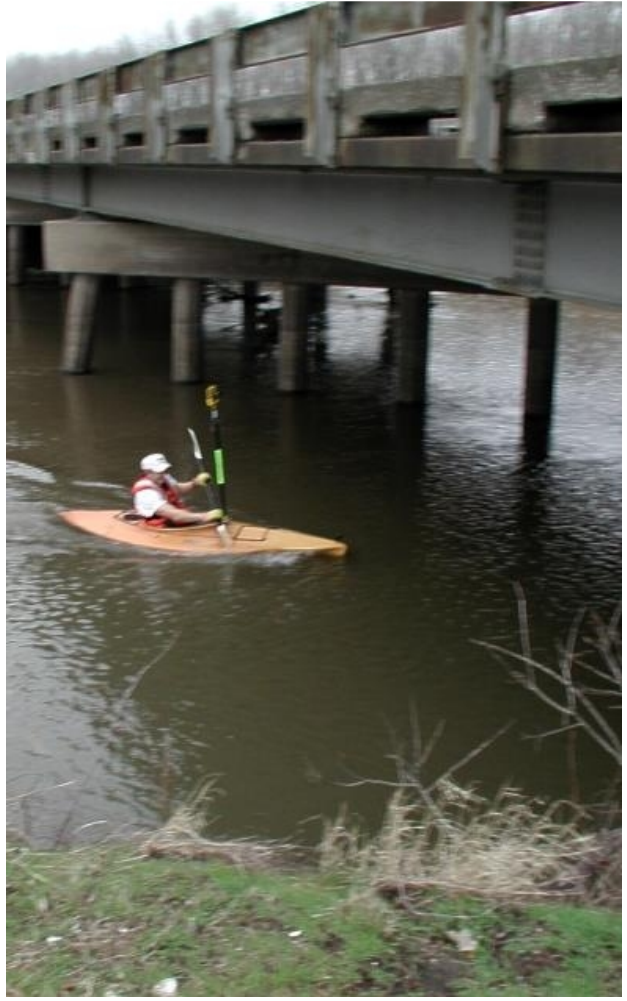


Origins in NSF-supported research project at NYU “Brooklyn Atlantis”






Why small, unmanned boats?

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Our autonomous boat

- 86 cm long, weighing 16 kg
- Two fixed thrusters for propulsion and differential steering
- Adjustable width
- Durable, aluminum construction
- GPS-based autonomy
- Optional LiDAR for obstacle avoidance

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Example application: Pre/Post Dredge Surveys

Peconic Bay, Long Island

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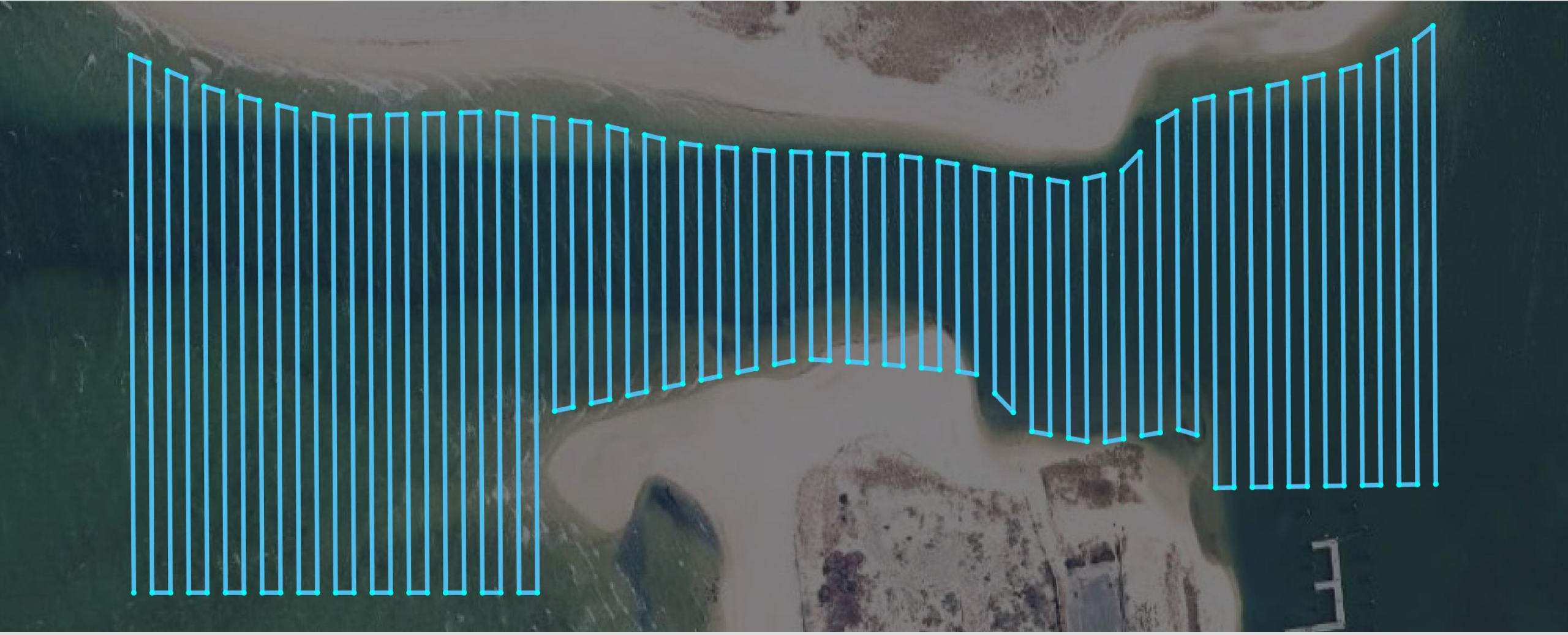

Mission parameters:

- 144 waypoints
- Transect spacing: 5 m (16.4 ft)
- Total area: 2600 m^2 (6.5 acres)
- Total distance: 6 km (3.7 miles)

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Mission parameters:

- 144 waypoints
- Total area: 2600 m^2 (6.5 acres)
- Total distance: 6 km (3.7 miles)
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Mission stats:

- Total time: 74 minutes
- Avg speed: 4.8 km/h (3 mph)
- Over 8,000 depth measurements

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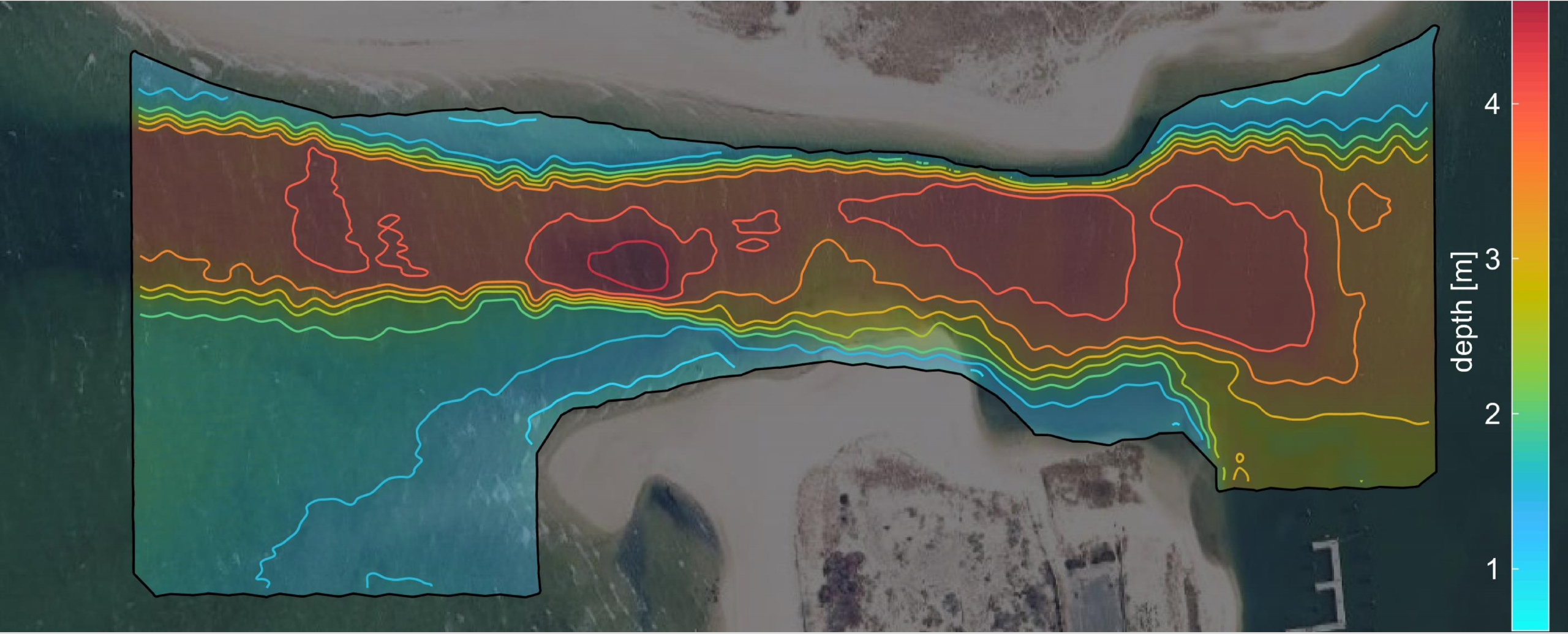

Bathymetric map of collected data

Autonomy Challenges: Uncertain shoreline locations

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Autonomy Challenges: Uncertain shoreline locations

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Autonomy Challenges: Unforeseen obstacles

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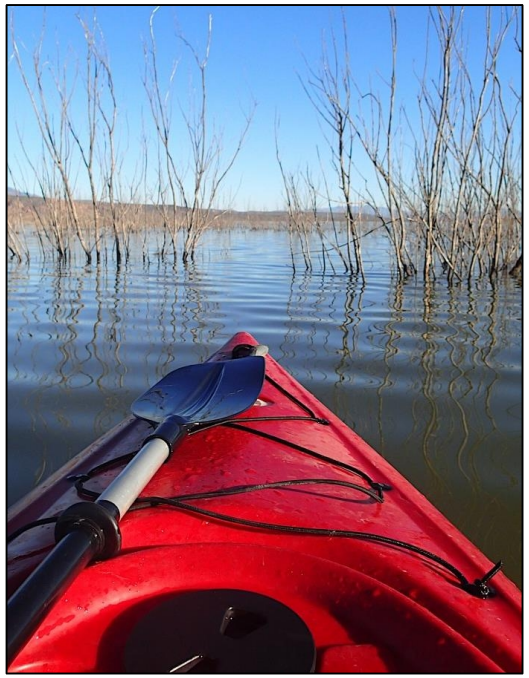
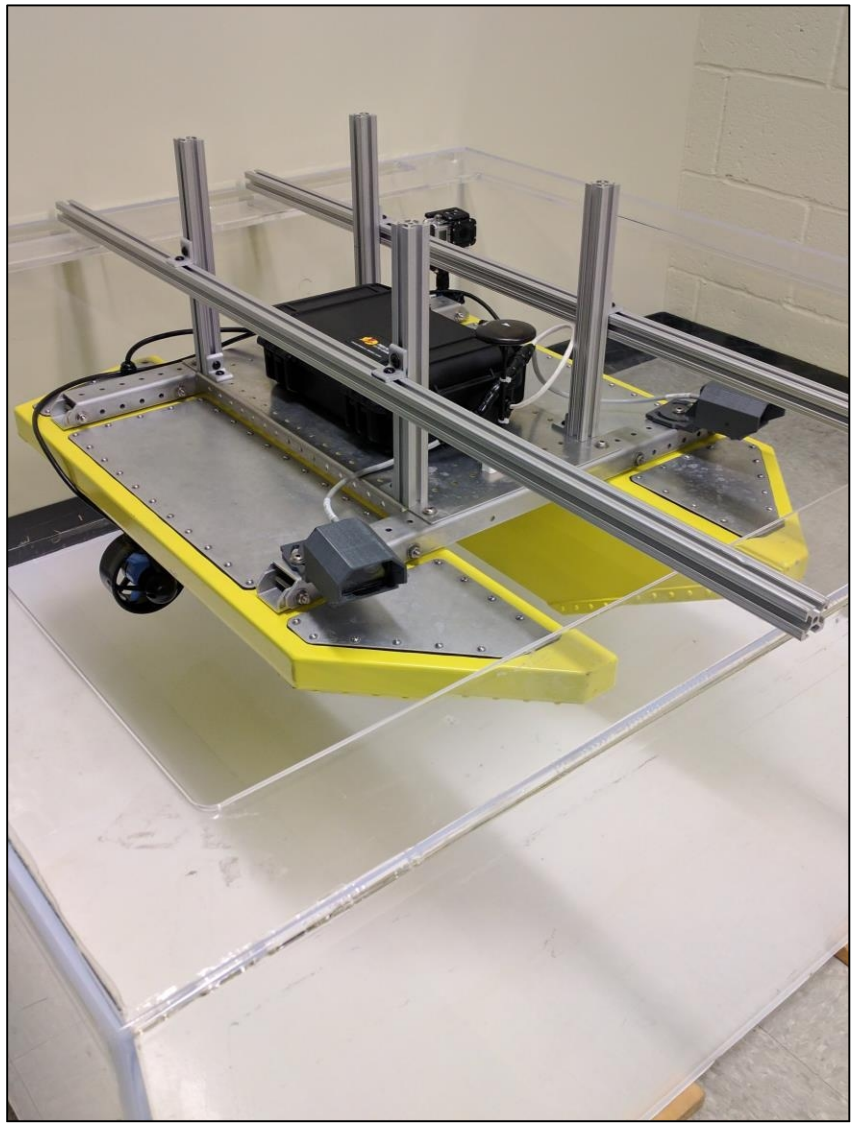


Barriers to adoption

- Floating obstructions or other unforeseen obstacles
- Uncertain shoreline and shallow water area locations
- Ship or boat traffic, or recreational boaters, canoers, and kayakers
- Vegetation not visible from aerial photos or from the shoreline
- Training and setup time for autonomy



Working towards a robust solution

- Shallow water area detection using echosounder
- LiDAR and sonar for obstacle avoidance
- Computer vision and machine learning for intelligent obstacle characterization
  - Recently awarded SBIR grant from National Science Foundation to develop these solutions

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Acknowledgements

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POWERBRIDGE NY

NSF