

Robotic Sensor Networks

rsn.cs.umn.edu

Josh Vander Hook

Pratap Tokekar, Patrick Plonski, Narges Noori, and Volkan Isler



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Robotic Sensor Network for Monitoring Invasive Carp



Requires domain experts

- Year round?
- Good and bad weather?
- 10k Lakes?

Robotic Sensor Network for Monitoring Invasive Fish



Searching for Aggregations of Fish

Three different target models

- Stationary
- Probabilistic
- Adversarial

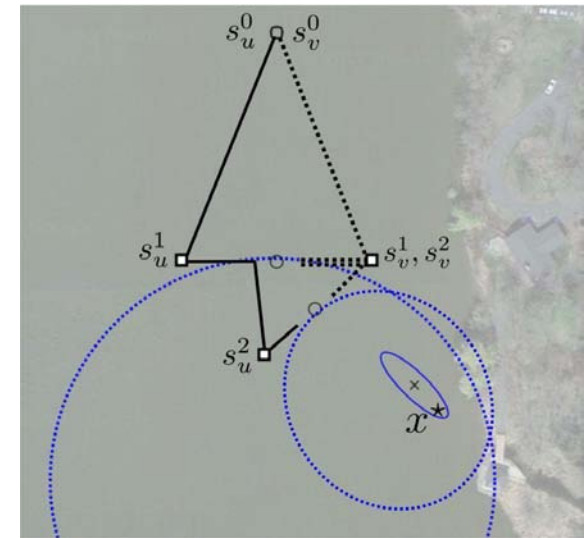
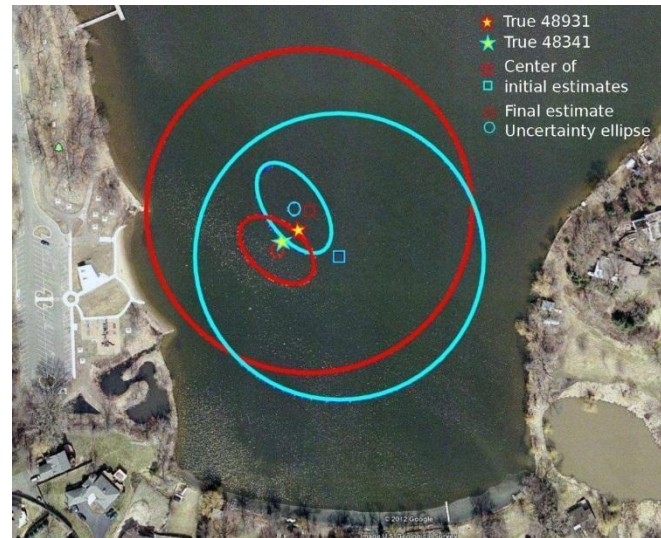
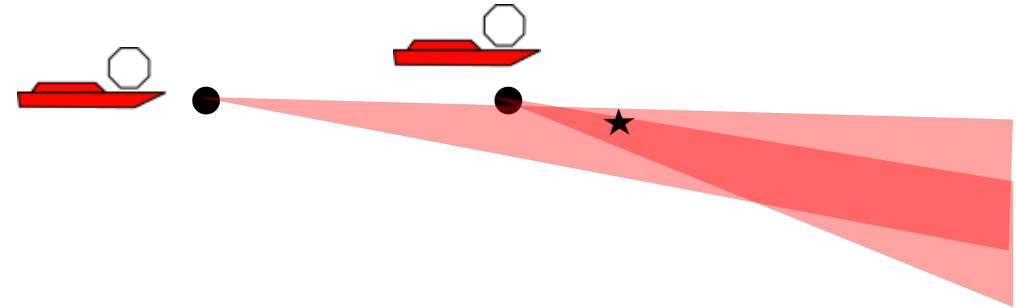


- 1) P. Tokekar, D. Bhaduria, A. Studenski, and V. Isler. **A Robotic System for Monitoring Carp in Minnesota Lakes.** *Journal of Field Robotics*, 2010.
- 2) J. Vander Hook, P. Tokekar, E. Branson, P. Bajer, P. Sorensen, and V. Isler. **Local Search Strategy for Multi-Modal, Multi-Target Active Localization of Invasive Fish.** *13th ISER*, 2012.
- 3) P. Tokekar, E. Branson, J. Vander Hook, V. Isler. **Tracking Aquatic Invaders** *IEEE Robotics and Automation Magazine*. September, 2013.
- 4) N. Noori, A. Renzaglia, J. Vander Hook, V. Isler. **Constrained Probabilistic Search for a One-Dimensional Random Walk.** Submitted to *IEEE Transaction on Robotics (T-RO)*, 2014.
- 5) N. Noori, V. Isler. **Lion and Man Game on Polyhedral Surfaces with Boundary.** Submitted to *IROS*, 2014.

Collaborative Localization with Communicating Robots

Accurately locating tags as quickly as possible.

- With communications constraints between robots
- Possibly mobile targets



- 1) P. Tokekar, J. Vander Hook, and V. Isler. **Active Target Localization for Bearing Based Robotic Telemetry.** *Proc. IEEE/RSJ Int. Conf. on Intelligent Robots and Systems*, 2011.
- 2) J. Vander Hook, P. Tokekar, and V. Isler. **Cautious Greedy Strategy for Bearing-based Active Localization: Experiments and Theoretical Analysis.** *ICRA*, 2012.
- 3) J. Vander Hook, V. Isler. **Pursuit and Evasion with Uncertain Bearing Measurements** *IEEE Transactions on Robotics*. In Review.
- 4) J. Vander Hook, P. Tokekar, V. Isler. **Bearing-Only Active Target Localization Strategies for a System of Two Communicating Mobile Robots: Full Technical Report**. 2013
- 5) J. Vander Hook, V. Isler. **Pursuit and Evasion with Uncertain Bearing Measurements** *IEEE Transactions on Robotics*. In Review.



Thank you