Robotic Sensor Networks

Why robots?

I would like to do _____ ,

but I don’t have enough _____ .

Why robots?

I would like to do ____geology on Mars_____ ,

but I don't have enough ___ways to get home____.

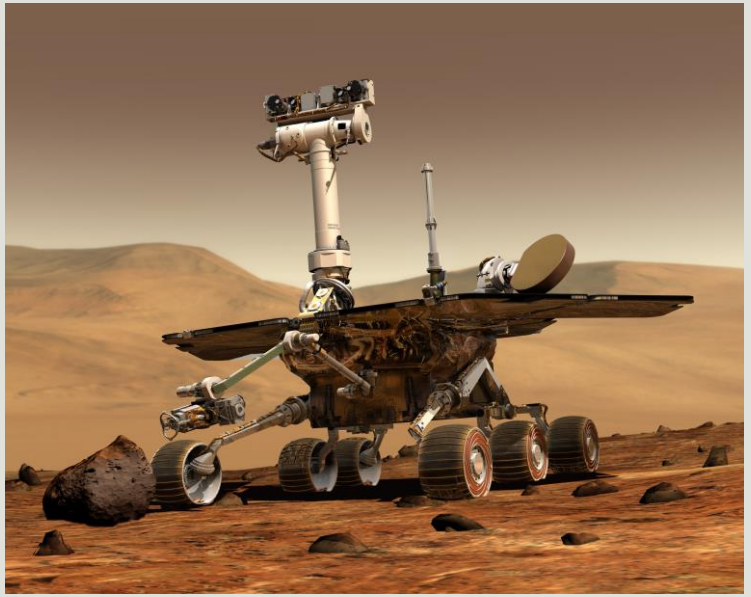


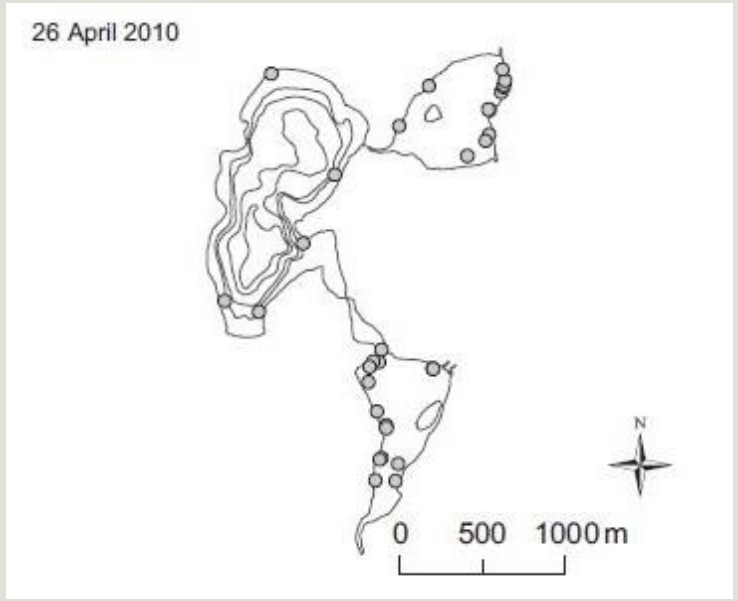
Image: Creative Commons

Invasive Species Monitoring

Once located, an aggregation of invasive fish can be effectively and safely removed

Invasive Species Monitoring

Aggregations!



Aggregations occur unpredictably, requiring constant vigilance.

Images: P Bajer, C Chizinski, P Sorensen. Using the Judas technique to locate and remove wintertime aggregations of invasive common carp. *Fisheries Management and Ecology.* Oct, 2011

Why robots?

I would like to do Invasive Species Monitoring ,

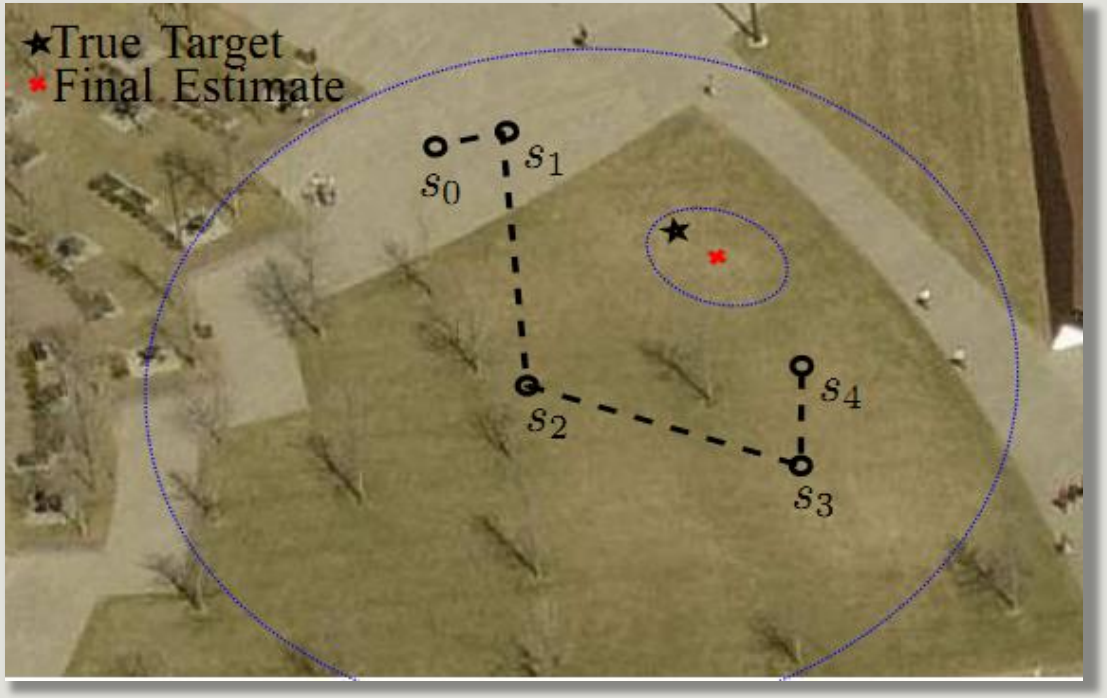
but I don't have enough ___of these guys_____ .

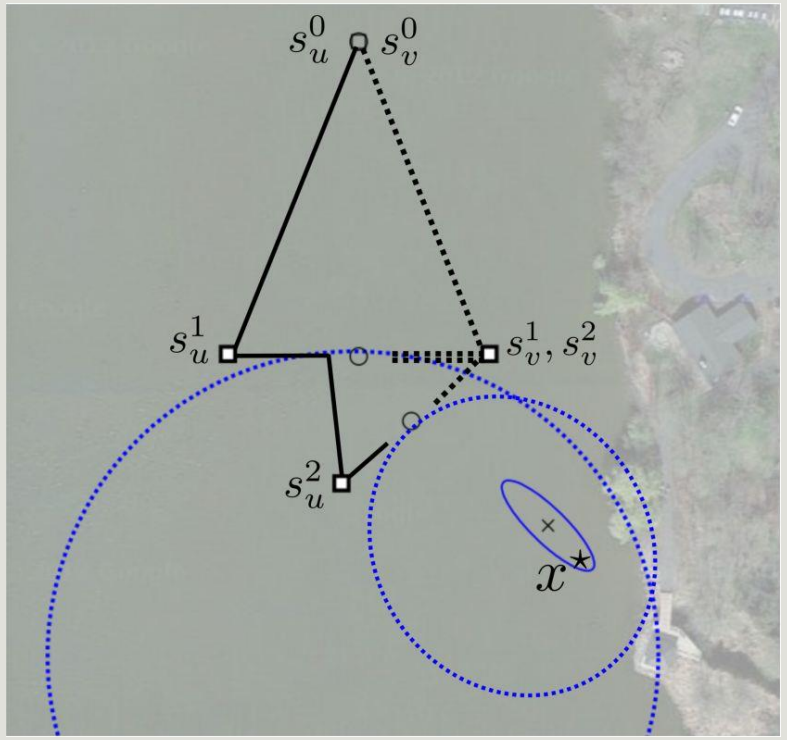
How we solve

1. Abstract the problem *using a useful mathematical formulation*
2. Solve the abstracted problem *and provide guarantees of quality*
3. Verify the abstraction *in the field, extensively*

Example Solution

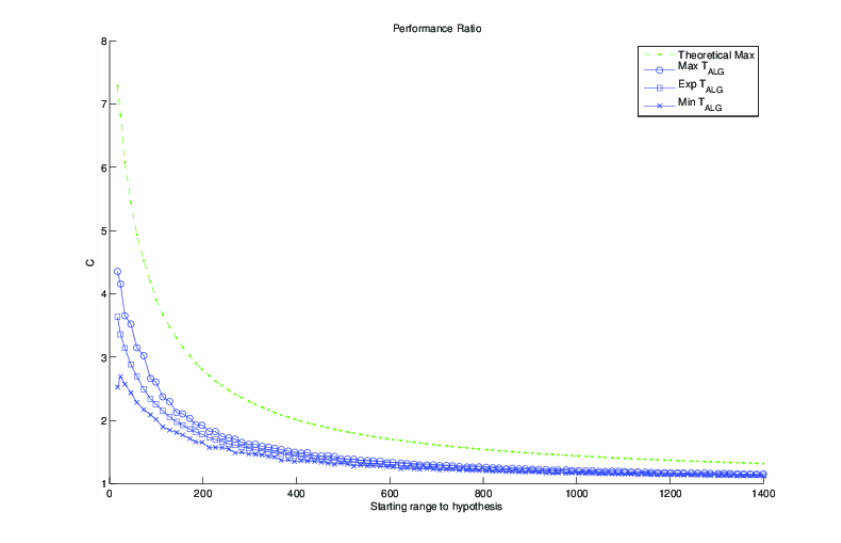
1. Novel Active Measurement Strategy to locate stationary fish (i.e., in an aggregation)

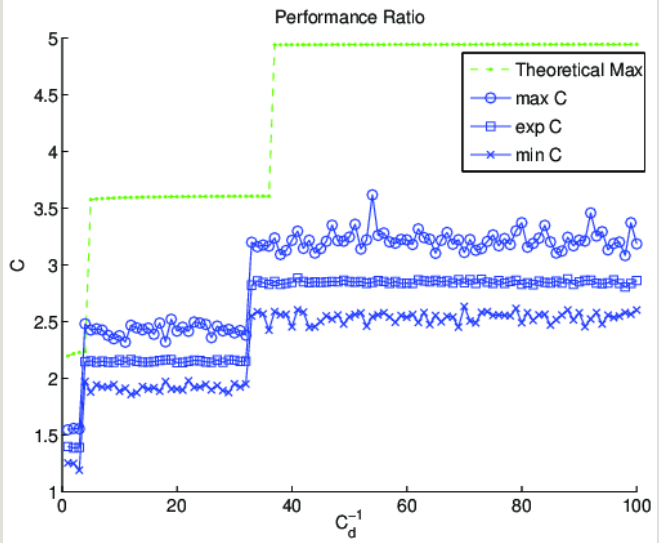




Example Solution

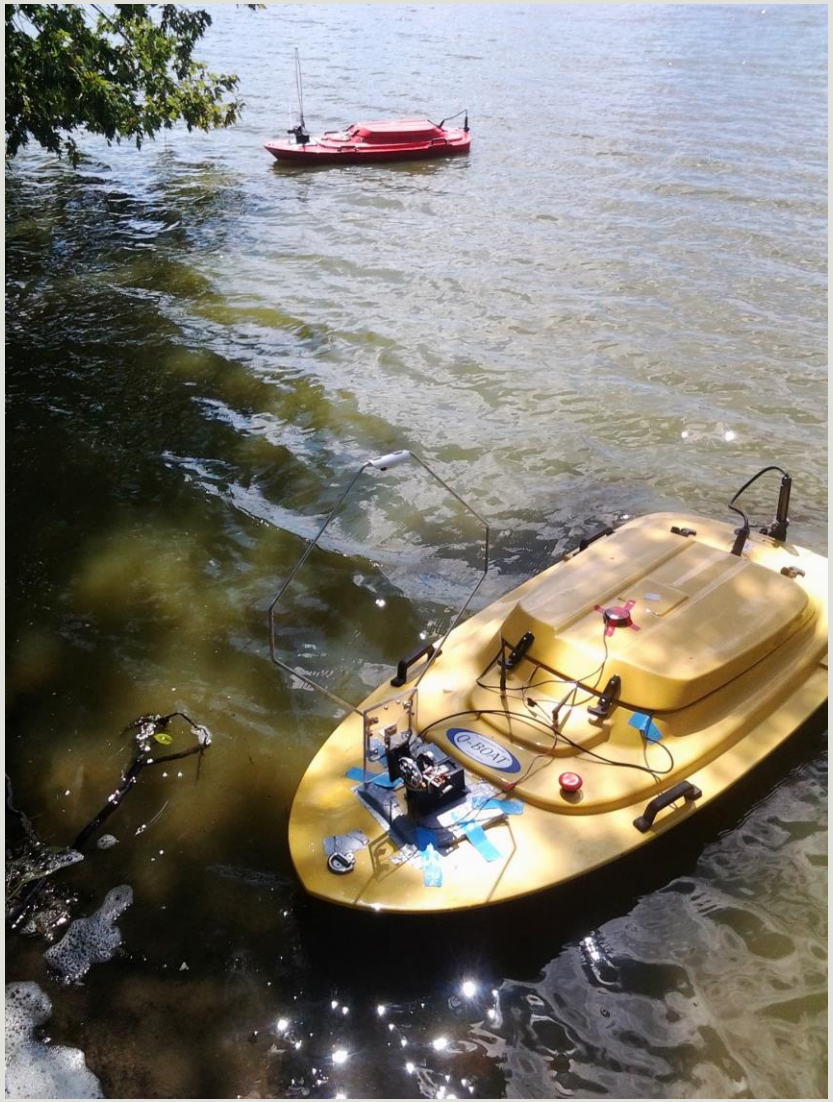
1. Novel Active Measurement Strategy
2. Provided the first lower and upper bound on time to localize





Example Solution

1. Novel Active Measurement Strategy
2. Provided the first lower and upper bound on time to localize
3. Documented three years of field experiments …


Q-BOAT

Thanks!