



URBAN TURTLE

ENES100: OSU PROTOTYPE REVIEW

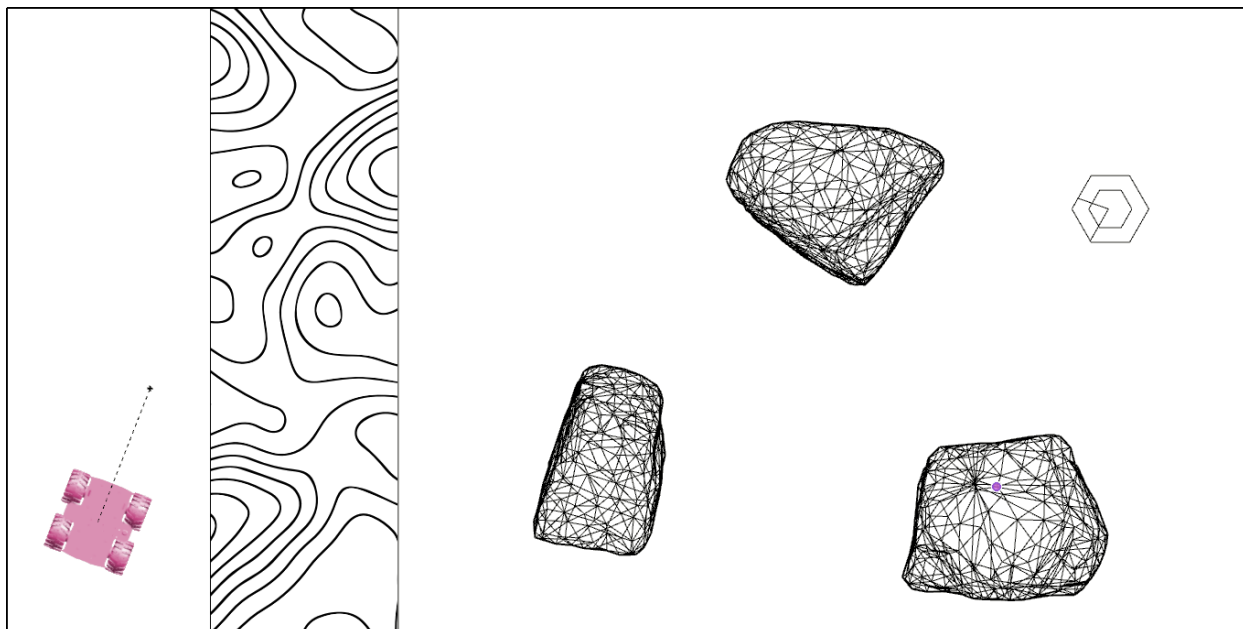
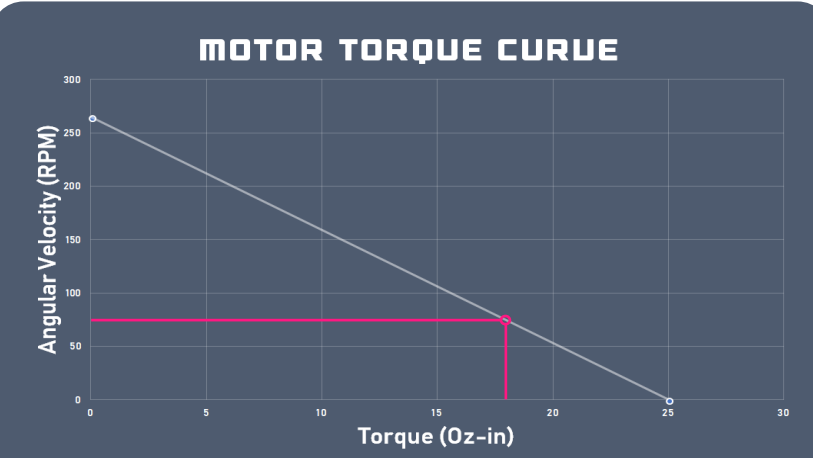
PROJECT DETAILS: WATER

OBJECTIVES

- > Navigate to mission site
- > Transmit water type
- > Collect small water sample
- > Transmit pool depth

GEN. CONSTRAINTS

- > Max weight 3 kg
- > 350mm x 350mm footprint
- > Replication cost < \$350



INITIAL SCHEDULE

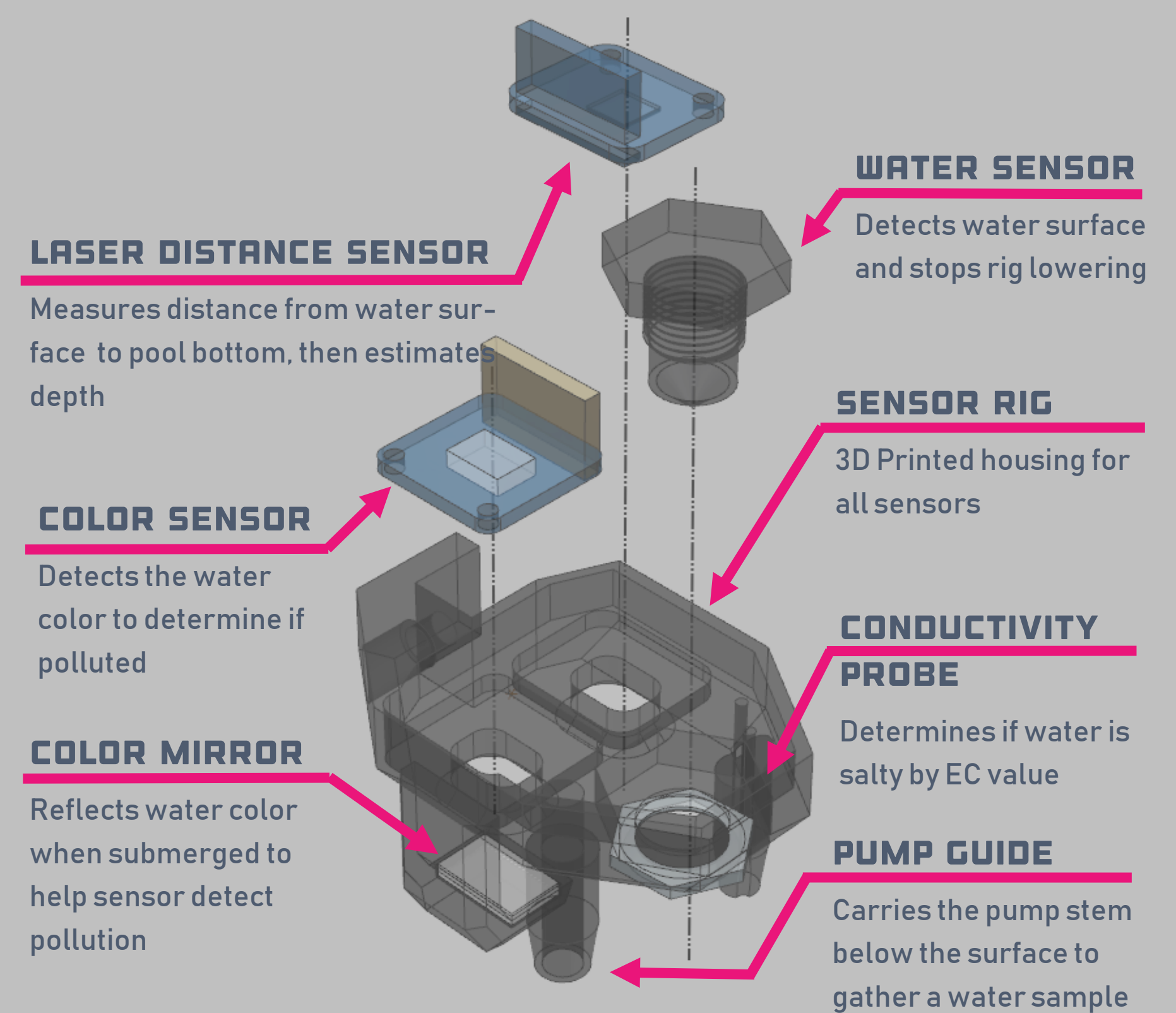
- > March 6—Prototype **Complete**
- > March 17—Sensor Rig **Complete**
- > April 21—Final CAD **Shipped**
- > May 7—Final Demonstration **Passed**

OSU DETAILS

- > Motors spec'd to use ~70% of torque when turning @ 170 RPM
- > Battery (2000 mAh) lasts for 20 mins at full current draw (~6A)
- > Final weight: 2.3kg
- > Final BOM Cost: \$300



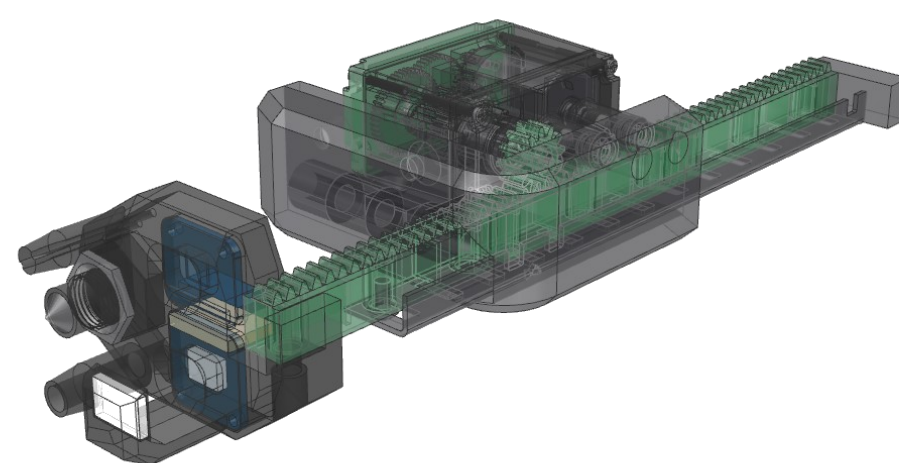
SENSOR BREAKDOWN



DESIGN

SENSOR RIG

- Carries sensors and pump stem below water surface
- Designed to operate on a hinge for packaging
- Motor, rack and pinion actuation system



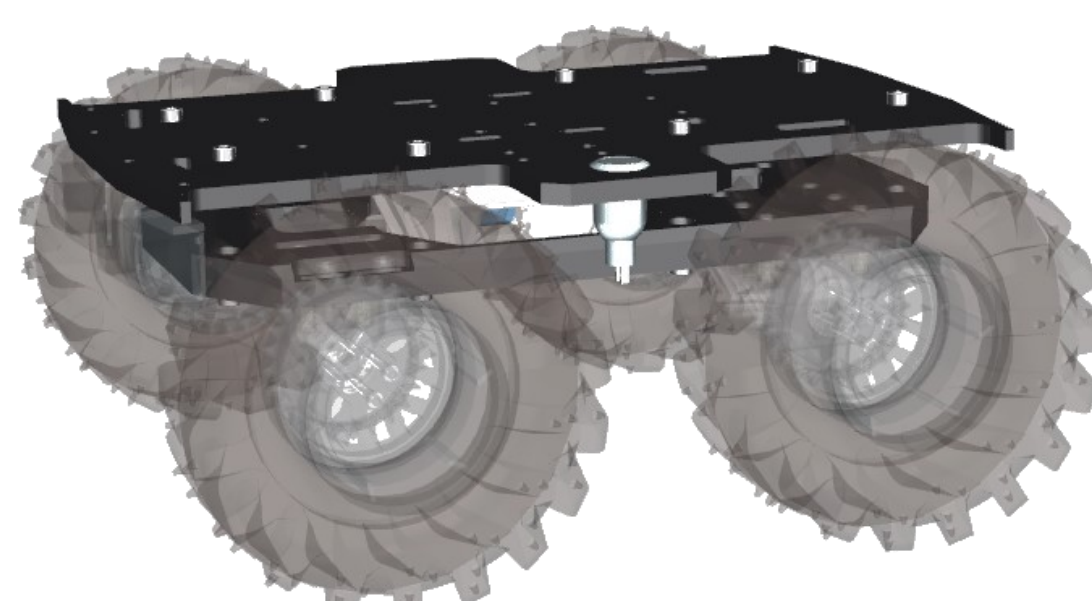
DRIVETRAIN

- Differential Chain Drive
- Custom 3D-printed axle assembly
- Estimated speed over sand: 0.65 m/s



STRUCTURE

- CNC'ed UHMW Baseplate
- Lasercut wood electronics board
- Access hole for battery replacement
- Threaded inserts for secure mounting



OSU PERFORMANCE

- **Successfully** navigated over rocky terrain
- **Successfully** lowered sensor rig and detected water type
- **Failed** to accurately navigate to the mission site
- **Failed** to collect water sample (pump was never installed)

LESSONS LEARNED

- Turning torque is a much tighter constraint than driving torque
- Electronics requires the most troubleshooting time in robot prototyping
- Communicating work done is crucial to production efficiency
- When creating initial design schedules, you have to consider shipping lead time