Underwater Robotics

Mark Rowzee
Naperville North H.S.
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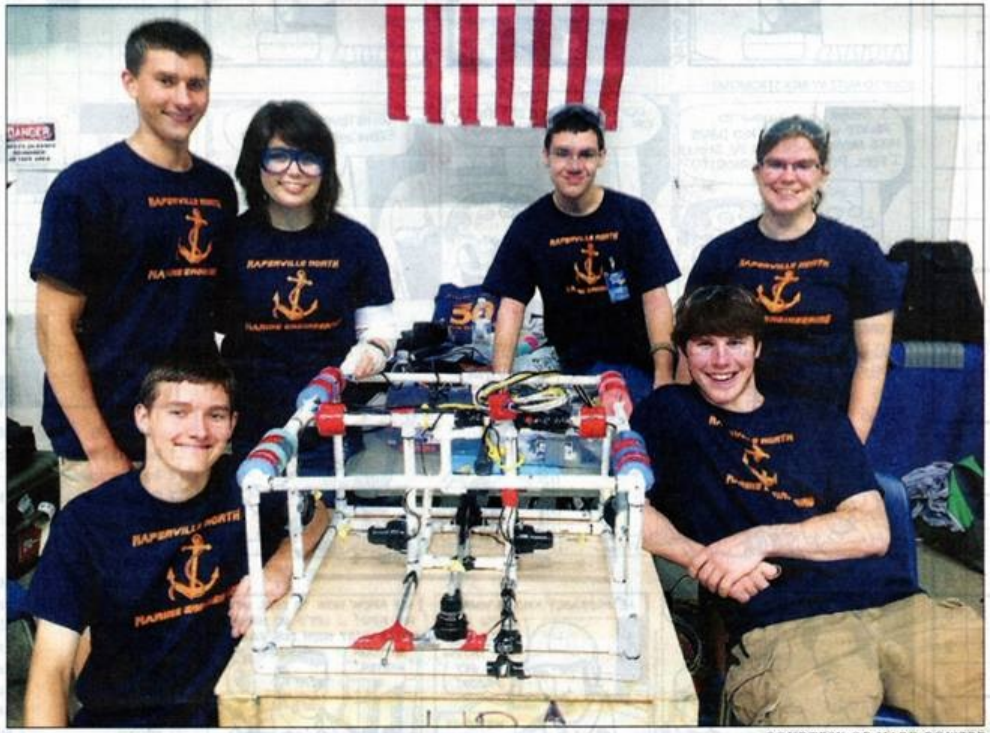
QuarkNet

What is ‘underwater robotics’?

- Tethered control of a student-designed, student-built, remotely-operated vehicle (ROV)
- Camera-eye view operation
- Design & build durable vehicle and/or appendages to complete specific tasks
  - Interact with underwater structures (props)

It's sink or swim



COURTESY OF MARK ROWZEE

Naperville North High School's marine engineering team, a subsection of the physics club, is Stuart Houston, Isaac Heine, Carissa Cesarotti, Dylan Coupe, Julie Ozols and Konrad Hausman. The team built a remotely operated vehicle to complete scientific tasks underwater in an international competition in June.

Naperville North team learns through underwater robotics

By Marie Wilson
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Knowledge is more important than money.

Duct tape, floating pool noodles and PVC piping can solve plenty of problems.

It takes a variety of skills to form a successful team.

Putting electrical components in water can be fun!

Finishing 19th in the world ain't bad.

A group of Naperville North High School students learned these lessons and more while competing in an international competition that gave them 15 minutes to steer a handmade underwater vehicle around a pool, completing as many assigned tasks as possible.

"It mimics an oceanographic underwater science lab," said Mark Rowzee, a physics teacher who mentors the students on North's marine engineering team, a subsection of the physics club. "It's a simulation of underwater scientific tasks that have to be performed remotely."

The competition has a mouthful of a name — the Marine Advanced Technology Education International Underwater Remotely Operated Vehicle Competition — but it brought about 30 high school teams and a few hundred college teams from across the world to test their expertise at building and operating underwater robotic vehicles.

Naperville North's six-member team finished 19th in the high school-level contest, which also included a technical presentation on the operation of their ROV, or remotely operated vehicle, and a sales pitch to judges about its qualifications to perform tasks such as changing data cables, placing temperature gauges or attaching power cables — all while submerged.

After the school's second year building and competing with an ROV, team members say they're proud of their performance and a few ways they set themselves apart — mainly in their vehicle's low-budget nature and their team's independent spirit.

"Our team was very independent," said Stuart Houston, one of two team members who will return to compete another year. "Mr. Rowzee was less hands-on as

See **NORTH** on **PAGE 3**


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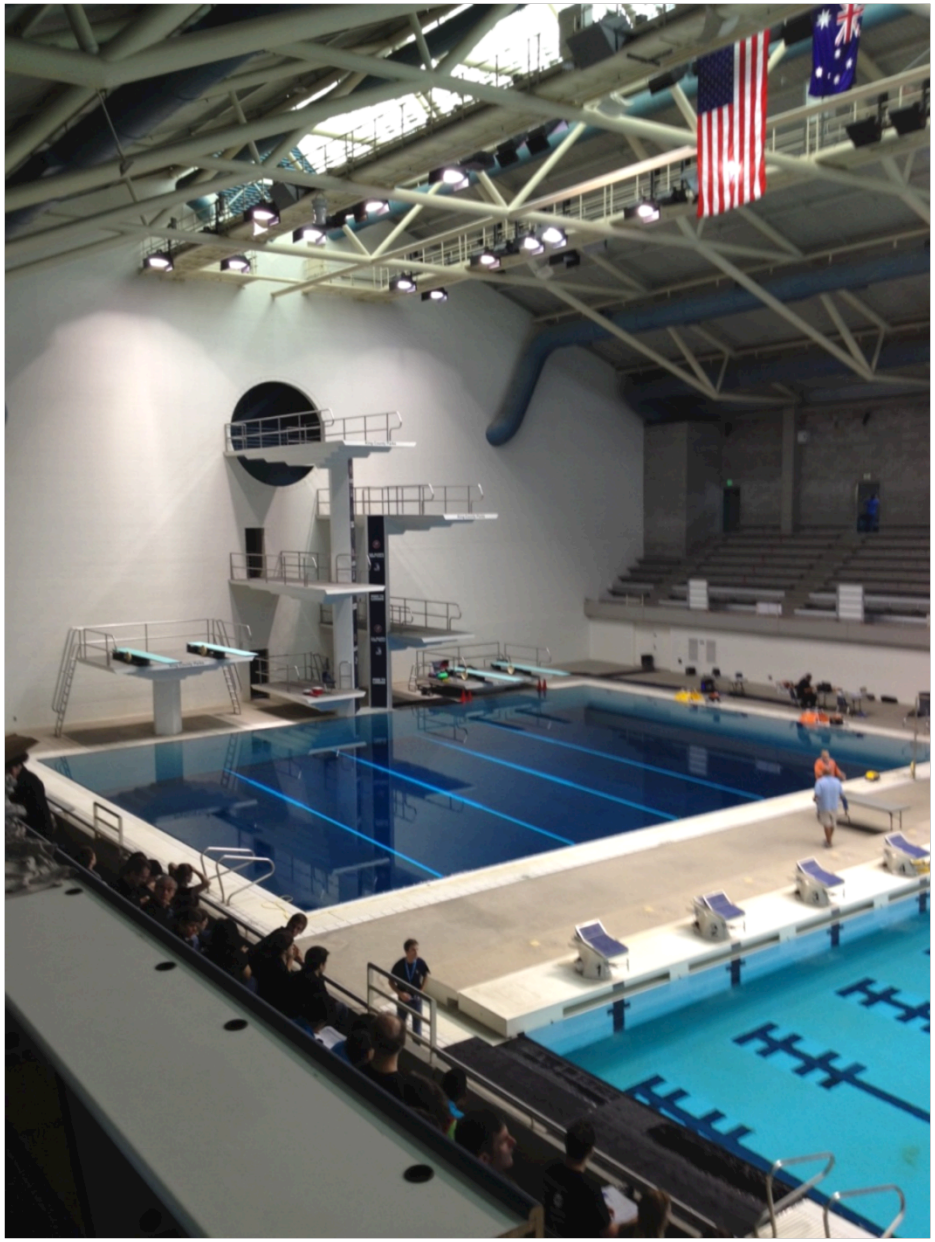
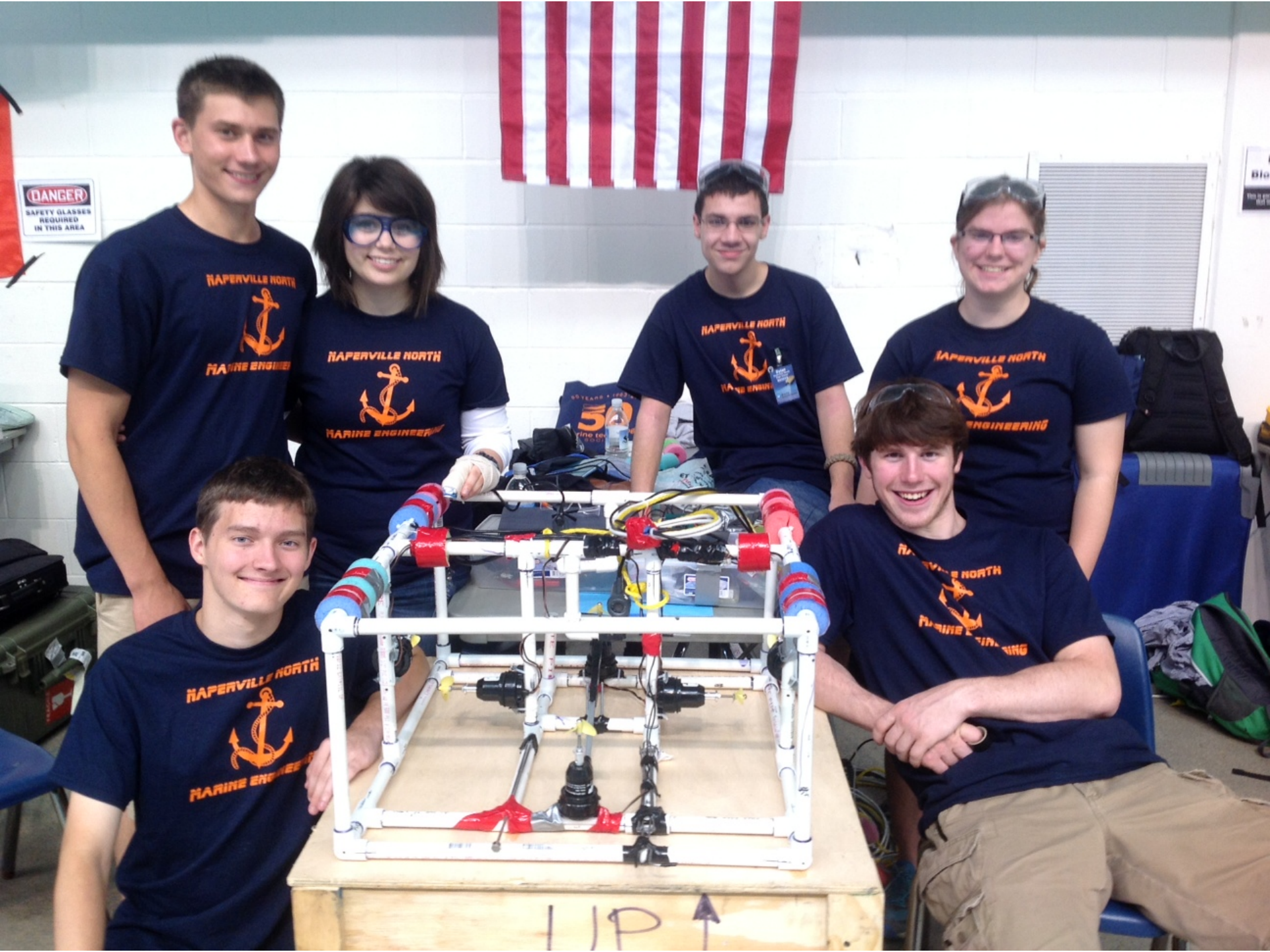


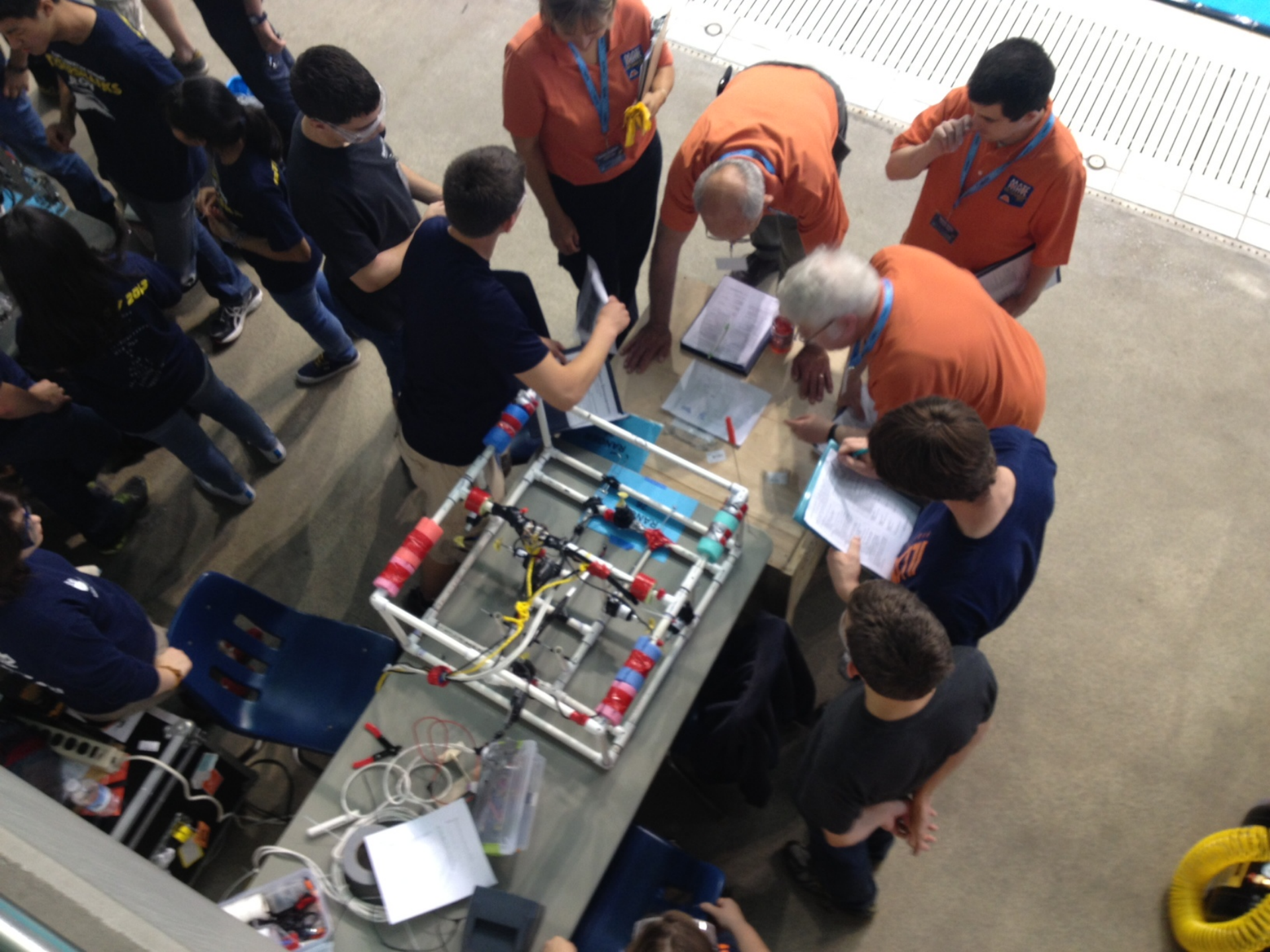
Remotely Operated Vehicles (ROVs)

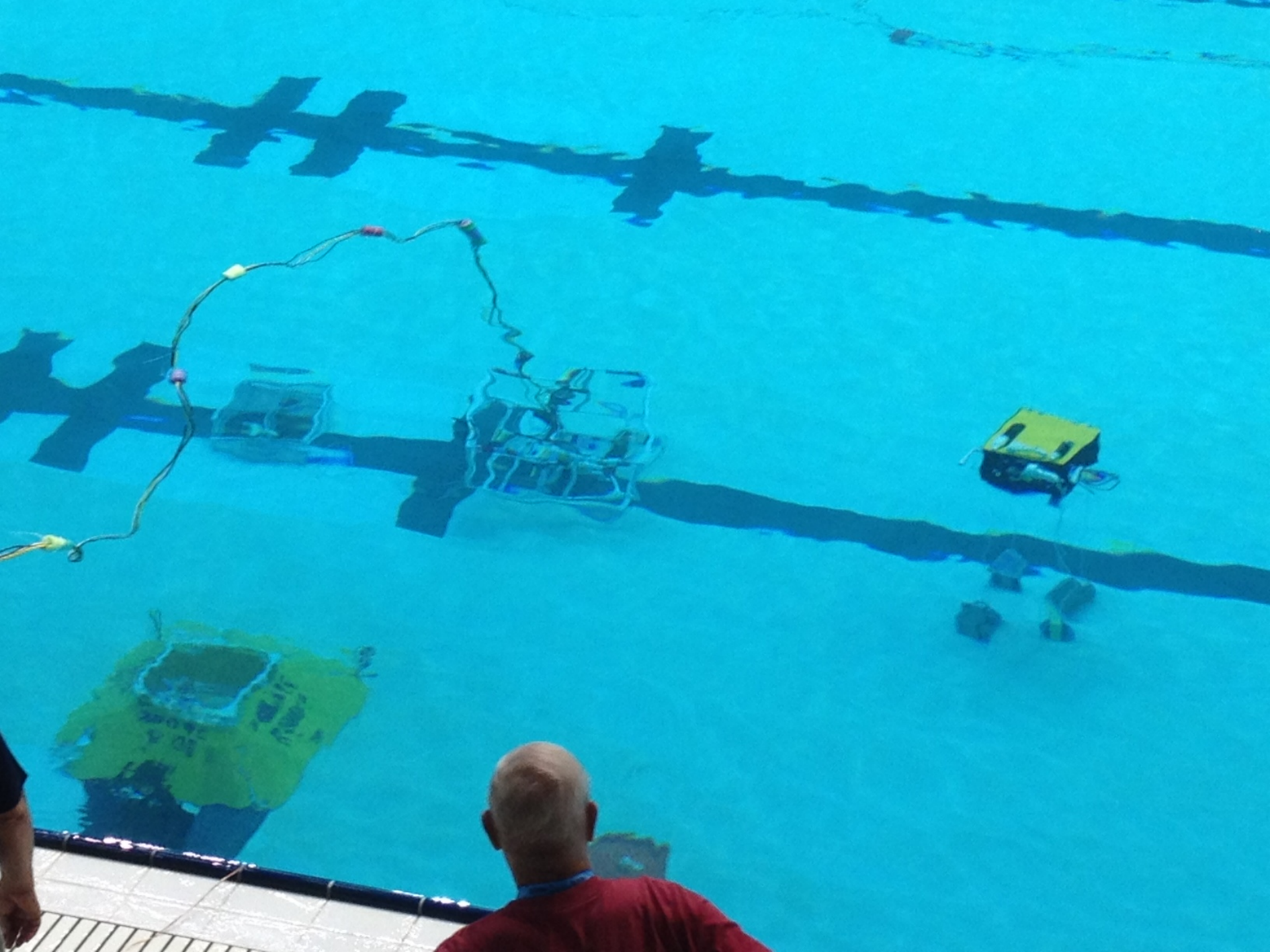
- Perform underwater tasks/simulations
  - Service offshore drilling platforms
    - Sampling, turn valves
  - Shipwreck/archeaological scene
    - Underwater mapping, collection
    - Place lift bags, environmental surveys
  - Underwater science laboratory service
    - Change batteries/data modules
    - Floating elevators
    - Change cables

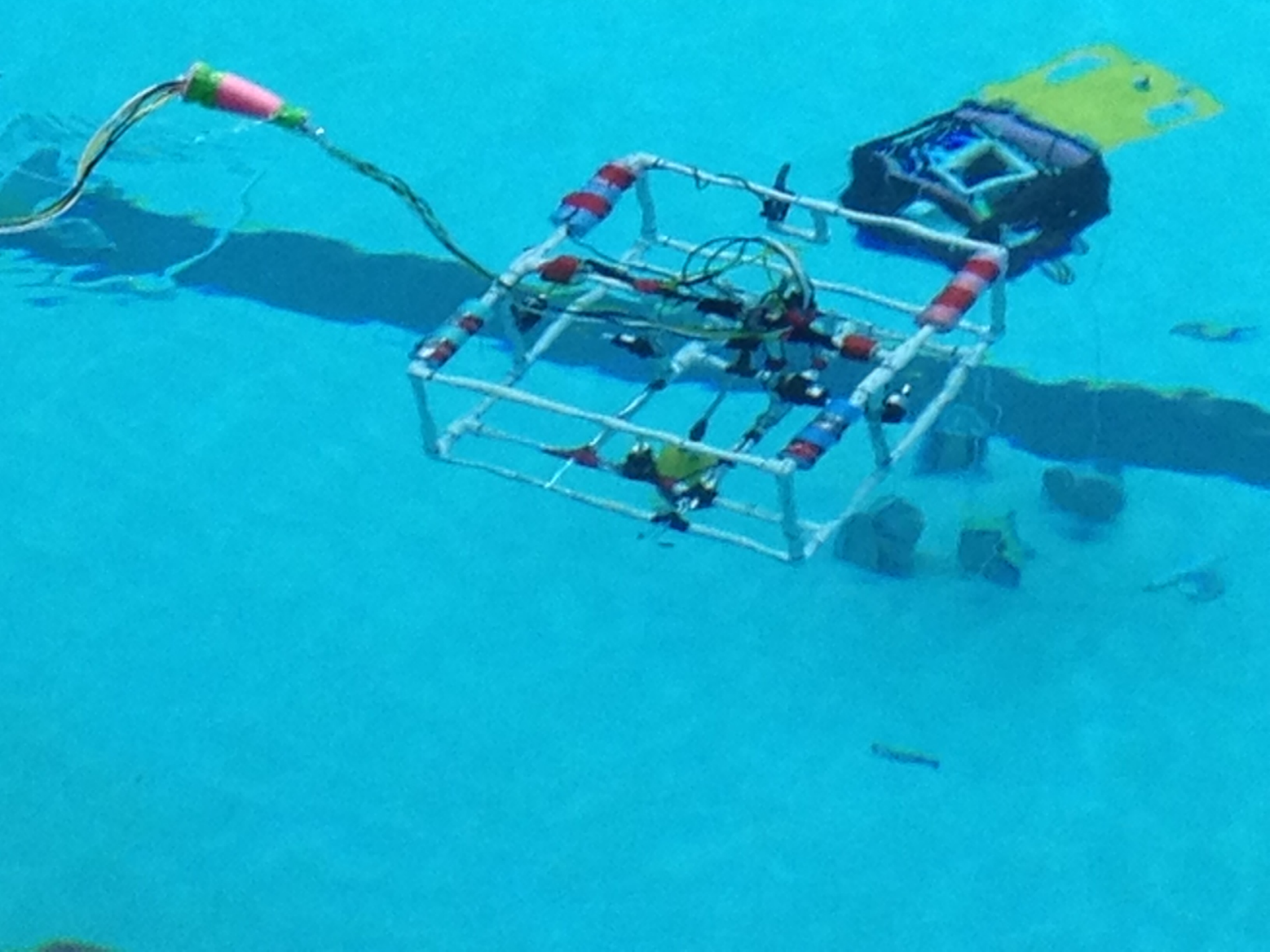
Parts

- Basic
  - PVC frame
  - Bilge pump motors w/ propellers
  - 8-strand control wire/ rope tether
  - Drive switches
  - Camera feed, battery power
- Advanced
  - Thrusters, joystick control, frame materials, miniature cameras, ballasting tanks, manipulators, lights, motor controllers

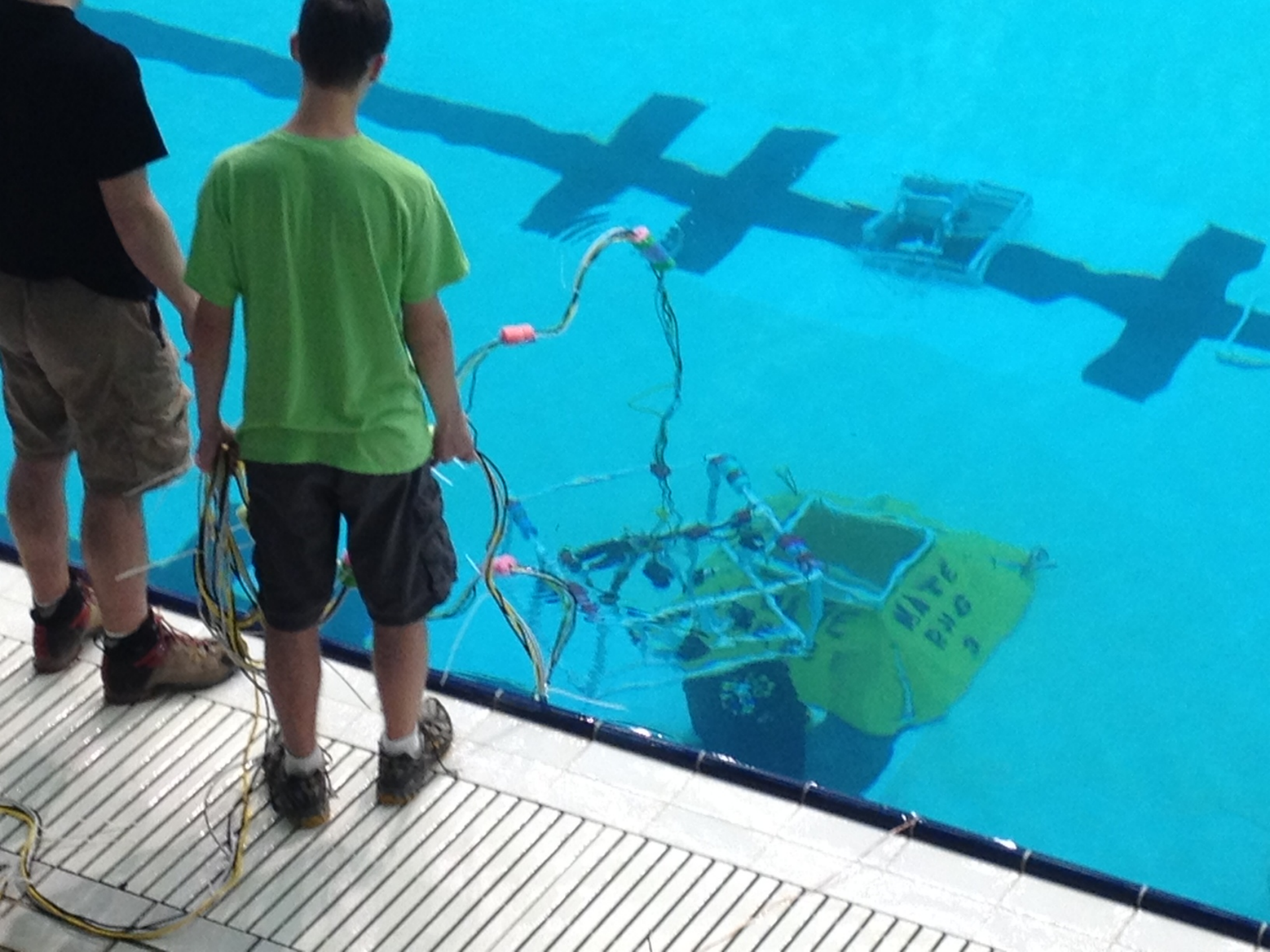

DANGER
SAFETY GLASSES
REQUIRED
IN THIS AREA
NAPERVILLE NORTH
MARINE ENGINEERING
UP








RANGER
26

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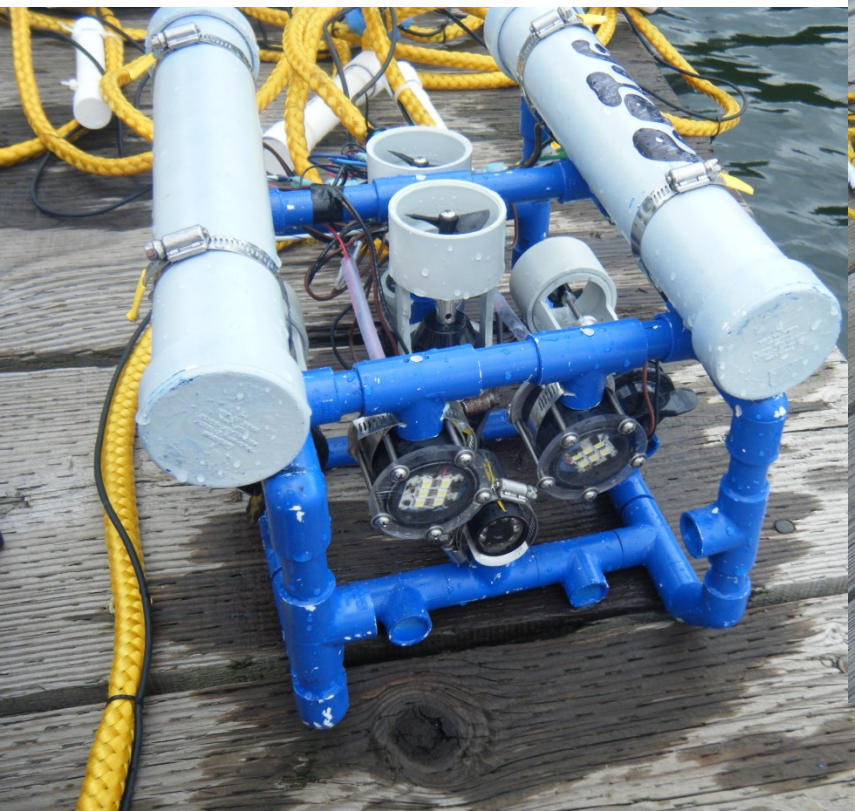
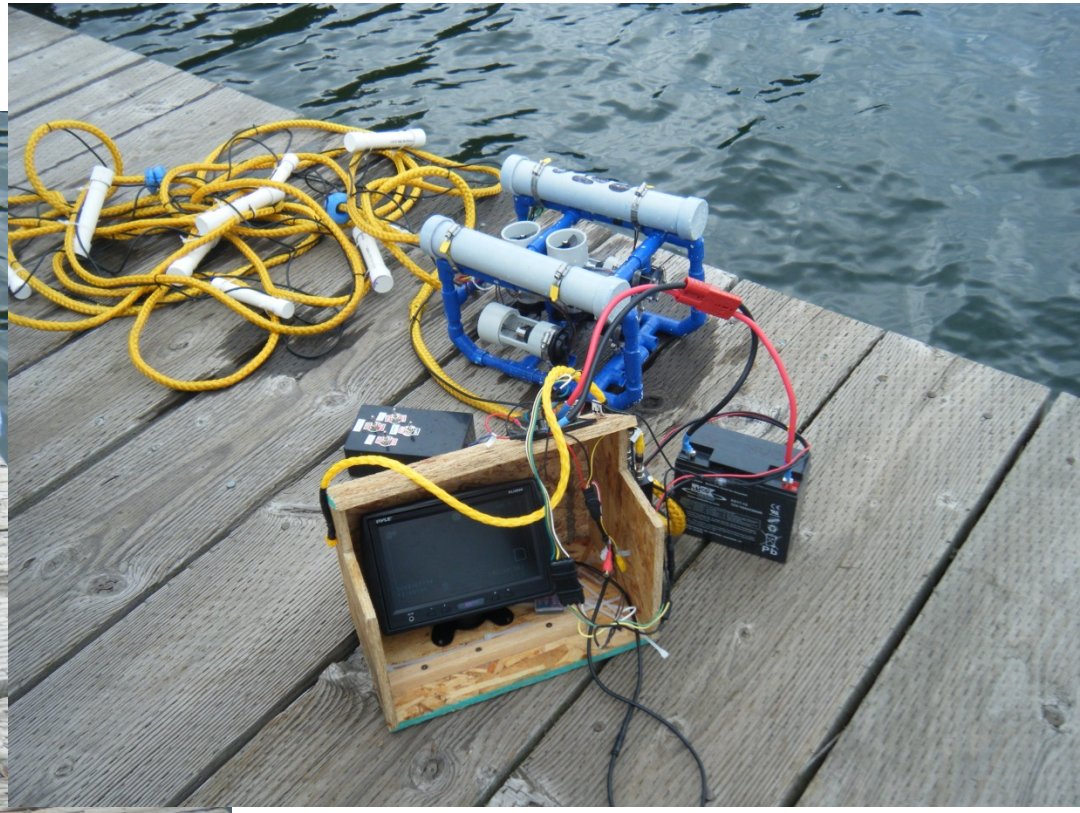
Concepts

- Physics
  - Buoyancy, center of mass, torque
- Chemistry
  - Water chemistry
- Earth Science
  - Tectonics, currents, geology
- Engineering
  - Electronics, wiring, waterproofing, aquadynamics, structural

Application

- Isle Royale N.P.- Windigo Ranger Station
  - Zebra Mussels!!





DIY ROV Resources

- www.marinetech.org
- http://www.luke.maurits.id.au/blog/post/building-a-diy-rov.html
- http://www.instructables.com/id/Underwater-ROV/
- www.diyrov.net
- www.homebuiltrovs.com
- www.openrovs.com
- (Just search DIY ROVs)