Hackerboat

An Autonomous Boat Project from Hackerbot Labs

Pre-history

- In early 2011, 3ric Johansen proposed building an autonomous boat to circumnavigate the world.
- Various members of Hackerbot, including Lisa Lafleur, Jeremy Ruhland and Ben Bloss, worked on planning various aspects of the trip and boat development.
- This never moved beyond the planning stages.

Rebirth of the Hackerboat

- I proposed bringing it back as a staged project, i.e. building more and more capable boats to develop our capabilities.
- First goal: demo at Toorcamp 2016
- Purchased & refurbished the cheapest two-person fiberglass kayak on Craigslist...











Reborn Hackerboat Architecture

- Solar-electric propulsion
 - Donated solar panels & batteries from Myles Conley
 - \$100 re-manufactured Minn Kota trolling motor
 - Waterproof servo with gearing to steer
- Control System
 - Beaglebone for high level navigation & decision making
 - Arduino Mega for low level steering, throttle, and health monitoring
- Communications
 - 900 MHz Ethernet bridge for ship to shore
 - 2.4 GHz WiFi for onboard communications



" " the second of the --Photo courtesy Becki Brotman

Photo courtesy Becki Brotman



Photo courtesy Becki Brotman



Mechanical Improvements

- Improved battery retention
- New mast
- External start/stop buttons
- Warning horn
- External status lights
- Improved hatch retention/keying

















Software Improvements

- MAVLink and QGroundControl don't work very well...
 - Security? LOL...
 - Difficult to configure ground control software
 - Highly crash prone
- Replacing it with a REST interface
 - Passes seamlessly through most networks
 - Latency is a minor issue for a boat
 - Lots of tools for security, management, etc.











The Future

- Self-tending wingsails for propulsion
 - Free to rotate
 - Angle of attack (i.e. power & direction) set by a tail
 - Require only one actuator per sail to drive the tail

Sailwings.net

• Two wingsails mean no rudder to foul or break













Next Steps

- Better sails for the sailing pathfinder
- 4m autonomous sail boat for:
 - World Robotic Sailing Championship
 - Microtransat
 - Puget Sound/West Coast ocean testing
- 7m autonomous sail boat for:
 - Trans-pacific
 - Circumnavigation
 - Marine sensing etc.

More Information & Help Needed

- •We need programming help!
- Hackerbot Labs blog: http://www.hackerbotlabs.com/category/hackerboat/
- Hackaday.io site: https://hackaday.io/project/8522-hackerboat
- Github: <u>https://github.com/JeremyRuhland/hackerboat</u>
- •We need money!
- Paypal: hackerboatproject@gmail.com

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- Arduino.cc