

## June 6

Andrew:

Finished progress cleaning up all code on the boat to remove unnecessary functions and comments.

Dan:

Cleaned up boat and controller

Team:

Cleaned up our lab area

## June 5

Andrew

Removed unnecessary functions in the Boat code that are no longer used.

Kara:

Cleaned up Bosyn code, removed unused functions, states, and variables.

## June 4

Andrew

Made some final changes to the chomp logic that address missing events. Still need to go through and clean up the rest of the code to remove unnecessary functions and comments.

# May 31

Andrew

Updated the direction pins for the motors and incorporated a MAX\_PWM for scaling of the motor PWM. The motors are now moving in the correct direction and logic is working for tuning. All pairing is working as expected in the lab, but we are still having issues with pairing range when in the fountain.

Kara:

Replaced faulty Yaw potentiometer.

Dan:

Fixed faulty boat motor, replaced fuses with stronger 20A ones, fixed motor direction issue in the wiring, max PWM is set at full value to enable better speed control in the water.

Team:

Presentation day! We successfully won a round in the competition, being the last remaining PREI and successfully evading numerous HUNTRs. We also successfully controlled another team's boat and had another team's BOSYN control ours despite still having some unpairing issues.

# May 30

Andrew:

Changed the pin that the OC is on, as the previous one wasn't working. There may be a conflict with a different pin, but changing the OC fixed the issue. Also updated PWM for the motors to max at a user defined value, but the input PWM is not scaled linearly between the minimum and max PWM (it's only capped). Will need to update the PWM to be linearly scaled and need to double check the direction of the motors.

Kara:

Updated Yaw with new potentiometer. Both motors working, added unpairing functionality with the pair button (dual purpose button).

Dan:

Fixed wiring, replaced faulty boards and recrimped connectors to finalize boat for check-off.

Team:

We had a check-off today. Everything worked well this morning with the motors, although slightly unbalanced. We were able to get to about  $\frac{3}{4}$  of the fountain length before we unpaired. We had some issues with pairing during the check-off and with a motor dragging, so we aren't too sure what changed. We are moving the Xbee of the boat to the surface to try to improve communication range.

## May 29

Andrew:

Added functionality to prevent transmitting until receiving is done. We no longer have the issue of receiving nacks after a certain amount of time, so we are now getting proper transmission of command and status frames without any timeout issues. Still need to add in unpairing logic, but motors are working and we did our first test in the fountain. We need to remap some pins so that we're going in the correct direction and double check the PWM calculations.

Kara

Wired and tested both bosyn servos with bosyn software, servos are now fully integrated and functional. Working towards resolving Nacks - swapped out several transmissions for test transmits but still getting nacks :(

Dan

Re-soldered some boat connectors, created a separate protoboard for the boat xbee and electronics with transistor circuitry for switching of the shark/fish servos

## May 28

Kara

Soldered protoboard for bosyn XBee, moved all bosyn electronics from lab bench into bosyn and then spent time debugging electrical errors from that transmission.

## May 27

Kara

Finished CAD for wall supports, eyes, and lever mounts for the thrust / yaw potentiometers. 3D printed and integrated these components.

## May 26

Kara

Finalized Bosyn CAD. Laser cut and assembled the main body of the Bosyn and added levers, pairing button, boat select potentiometer, and pairing servo. Added blue vinyl for decoration. Still need to finish CAD for 3D printed components.

Dan

Re-made laser-cut boat base and got a bigger container for the boat electronics

## May 25

Andrew

Made miscellaneous improvements to servos and buttons. Also made some minor changes to receiving logic, but spent most of the time trying to debug the weird unpairing issue. Current theory is that our transmit is getting in the way of the receive since our transmit uses a small amount of blocking code and our Rx is in an event checkr instead of an interrupt.

Kara

Began working on CAD for bosyn. Decided to laser cut the main body, 3D print additional wall supports, and 3D print the eyes. CAD for body drafted, need to find a pair of calipers to measure the servos and potentiometers in order to finalize CAD model. Acquired potentiometers, servos, and levers.

Dan

Reprinted motor mounts and finalized assembly of v2 boat.

## May 24

Andrew

Did initial integration and testing with Kara between the Boat and Bosyn. Got the boat to successfully pair with the controller, send a proper pairing ack, receive command frames, and send back status frames. We were also able to get chomp commands, but it's not properly sending back chomp status. Also having weird issue where we lose communication after about a minute of doing nothing.

Kara

Successfully debugged command, status, pairing, and pair ack frames between the boat and bosyn. Issues with indexing incoming data and with timing the status frames were resolved.

Dan

Fixed issue on chomp mechanism retraction using rubber bands and redesigned motor mounts to enable propellers to spin more freely

## May 23

Andrew

Did some miscellaneous debugging on the PWM mapping to receive 0-255 and convert to proper rotation and direction. Primary effort was on taking code from Kara on the UART receiving and pairing state machine and adapting to the boat. Did initial pass through everything but still need to debug and test for robustness.

Kara

- Added analog inputs to Bosyn to read from potentiometers. Ready to test with hardware.
- Finished debugging Tx from the Bosyn. Tx now working, ready to test with the boat.

- Sketched several possible concepts for mechanical design of Bosyn, narrowed down to stingray design. Sketched full mechanical layout of Bosyn, ready to draw in CAD.

Dan

Finalized boat CAD and printed additional miscellaneous mounts for the boat and chompcon

## May 22

Andrew

Finished up the self-contained chomping and team-servo code. We have proper chomping logic via a button and team indication with a manual limit switch. Also posting chomp events in anticipation for communication integration.

Kara

- Implemented Bosyn SM, currently debugging.
- Wrote first draft of Rx Service. Service is currently set up to parse incoming transmission into different data bytes, ready for testing and debugging.
- Added paired indicator servo service to Bosyn.

Dan

Final revisions to the communications protocol to standardize boat behavior amongst all teams

## May 17

Andrew Yates

Added in the chomping logic to limit chomping. Also restructured the code to allow for easy implementation with the Bosyn through the comm protocol. Still need to debounce the chomping switch and allow for early retraction of the chomper.

Kara

Implemented Xbee transmission, working towards first successful transmission. Trying to send a text packet from pilot to receiver. Currently have Tx going from PIC to XBee, but no response from receiving XBee yet.

Dan

Tested motor mounts and motor drivers, assembled high-current motors and controllers and other boat electronics

## May 15

Kara

Finalized Bosyn state machine. Eliminated separate error-checking state, and incorporated error checking into the Rx service.

Dan

Got high-current motor driver boards working (both enables need to be pulled high)

Team

Successfully popped a balloon, using a screwdriver attached to a servo. Ran first water test for propellers.

## May 12

Andrew

Created necessary services to test all mechanical functionality on a single PIC. Got a large servo implementing a biting motion in response to a button press read by an event checker. Also added a pin for reading the hunter/prey state that is implemented into oscillation of our team servos (one for the fish and one for the shark).

Kara

Forked events and services framework and began work on the Bosyn code. Completed initialization functions for ControllerMain. Drafted Bosyn state machine.

Dan

Made first prototype of boat

# May 9

Andrew:

Began planning for the boat code and wiring. Started implementation on the PWM.

Software Overview and Planning for boat:

1. Analog Inputs (2x)
  - a. Speed
  - b. Direction
2. Digital Inputs
  - a. Limit switch
  - b. Chomp
3. PWM Outputs
  - a. Motors (2x)
    - i. Left PWM
    - ii. Right PWM
  - b. Servos (3x)
    - i. Fish Servo PWM
    - ii. Shark Servo PWM
    - iii. Chomp Servo PWM

Order of Operations for the Next Few Days:

1. PWM Outputs
  - a. Motor Service
    - i. Step 1: Hardcoded frequency and PWM. Check with O-Scope
    - ii. Step 2: Wire single motor and check function
    - iii. Step 3: Copy code for second motor, check on O-Scope
    - iv. Step 4: Pass in events from main service
  - b. Status Servo Service
  - c. Chomp Service

# May 8

Team:

Planned out how to meet all the requirements for the BOAT and Bosyn. Discussed implementing all software with a FSM instead of HSM, finalized design review slides.



# May 7

Andrew

Created the boat project and did the initial population of files.

Dan

Met with communications committee to plan out communications protocol