ISDN2400 Physical Prototyping

Important Announcements

By Rob Scharff

May 2025

Competition Day Program

- 13:00-13:30 – Welcome and 1-minute pitches in Rm 4223
- 13:30-15:00 – Knock-out tournament at the pool
- 15:00-16:30 – Timed BL/s runs at the pool
- 16:30-16:45 – Award ceremony at the pool

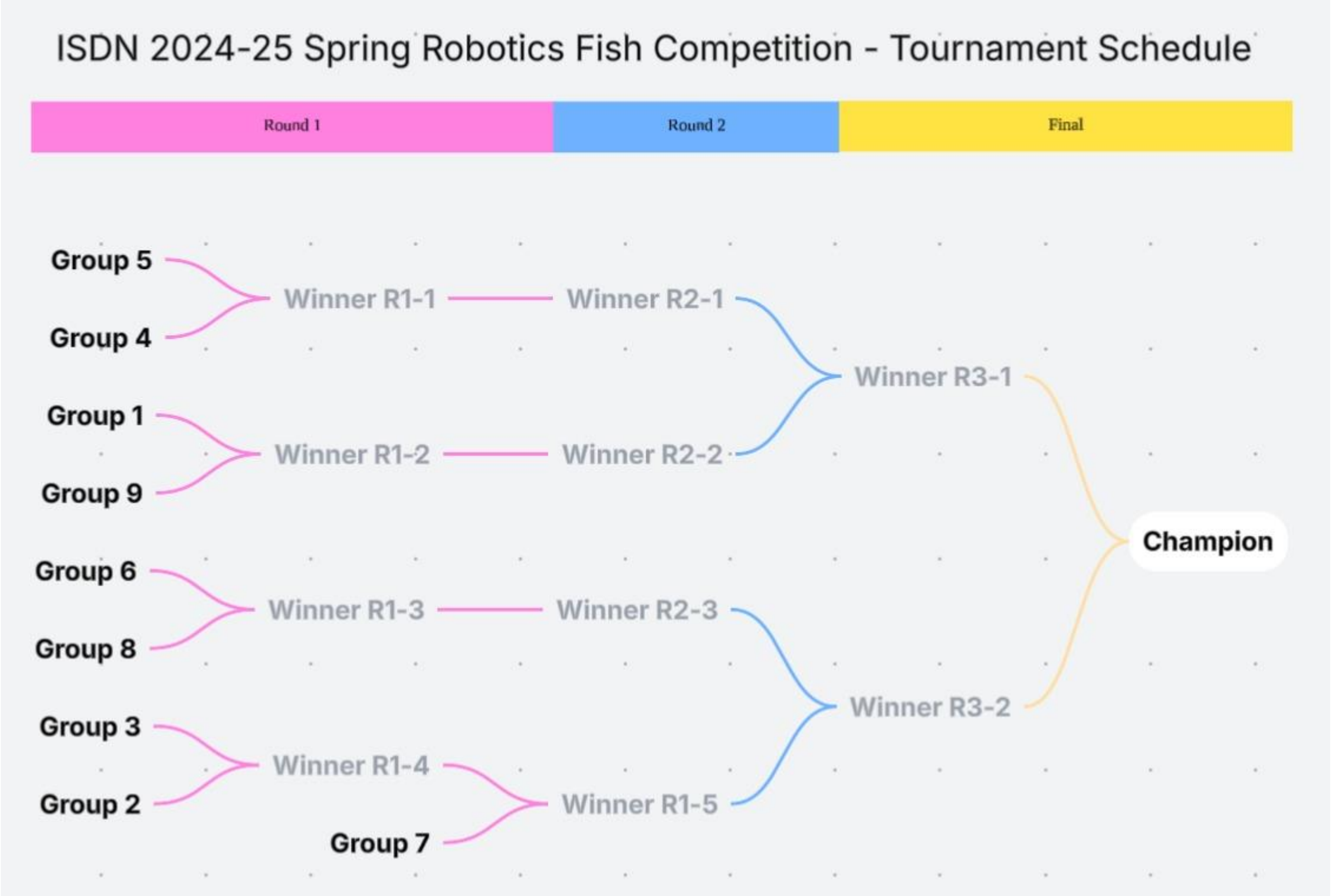
1-Minute Pitches

- Single slide to be uploaded on Canvas before Saturday 10:00am
- Buzzer at 60 seconds
- Example slide on Canvas

Knock-Out Tournament

- 2 teams will race each other in the pool
  - Heads of the fish aligned
  - Single attempt
  - First to touch the other side of the pool wins

Knock-Out Tournament

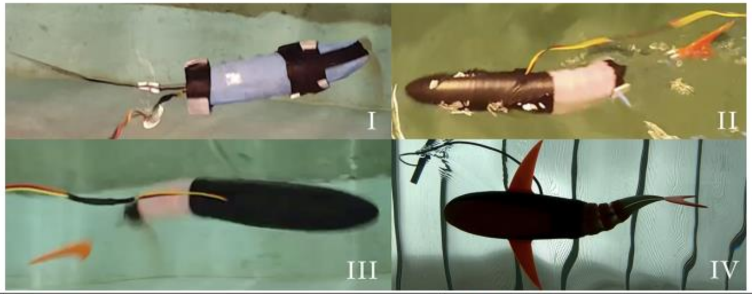


Timed BL/s Runs

- Book a timed BL/s run slot with the TA
  - Fish length will be measured
  - Time will be measured
- You can have as many attempts as we can manage (group with fewest attempts gets priority)

Report

- Step by step build instructions with videos, images, and files
- Example report on Canvas
- Logbook with prototype iterations and lessons learned in table format
- Deadline: Monday May 19



Prototype	Description	Performance
I	Driven by servomotor	~ 0 bodylengths per second (BL/s)- Significant head sway, minimal bending of the passive compliant tail
II	Extension piece between the head and the tail to move the center of buoyancy and center of mass from the active tail into the passive head, and increase the surface area on the anterior portion of the fish.	~ 1.0 BL/s Improved forward motion and stability. Still significant head sway and roll instability.
III	Redistribution of mass and volume to the anterior part of the robotic fish. Increased caudal fin height and reduced chord width	1.2 BL/s - Sufficiently stable in all directions for continuous forward swimming. Minor head sway and minimal roll is observed.
IV	Servomotor replaced by a DC motor with gearbox. Width and length of the body increased – thunniform head shape.	2.0 BL/s - Stable and high speed swimming. Bending of the passive compliant tail creates a S-shaped tail for more efficient swimming

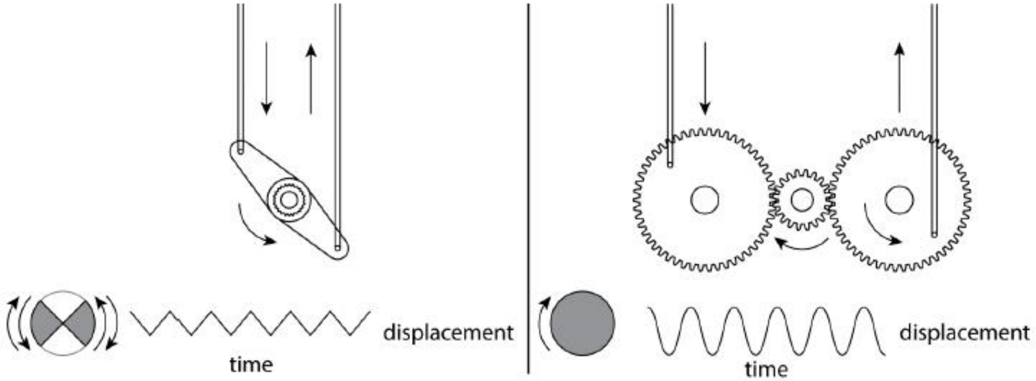


Figure 6.2: On the left a servo driven design, on the right the basic principle of the DC motor driven design. A graph of vertical displacement of the wires over time is depicted underneath both illustrations.

			
	Changes Anchoring does not put pressure on the gears or shaft anymore.	**Changes** Size of the system is increased to enable better anchoring. Ball Bearings are introduced to turn more smoothly.	**Changes** A right angle gearbox is used to reduce the height of the system allowing very large motors to be implemented if needed. An extra overhang is used with ribs to increase stiffness and decrease movement of the gearbox at high rotations.
Results Barely ran, too much play when bolts are not tightened enough. Does not turn when bolts are tightened.	**Results** Significant undesired movement within the gearbox. Needs more anchoring.	**Results** Steering system works successfully. No undesired vibrations. Stable and fluent motion of the gearbox. The four anchoring point on the outside of the gearbox make it too large.	**Results** Gearbox runs very smooth.

Questions?