Robotic Fish

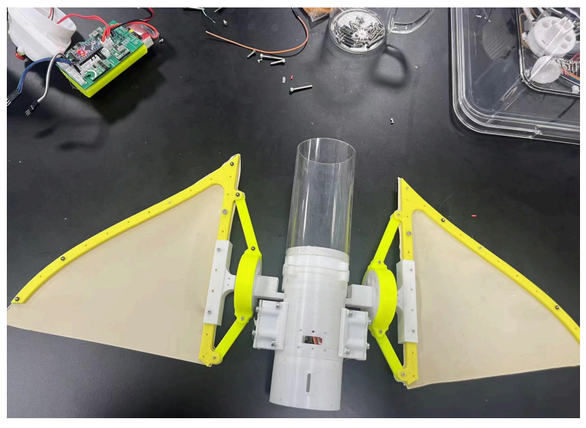
Jada Rue , Ryan Zhang, Ryan Hu, Steven Andrade
18 Shilongshan Rd, Xihu District Hangzhou, 310024 China 600 Dunyu Rd, Xihu District Hangzhou, 310030 China

Introduction

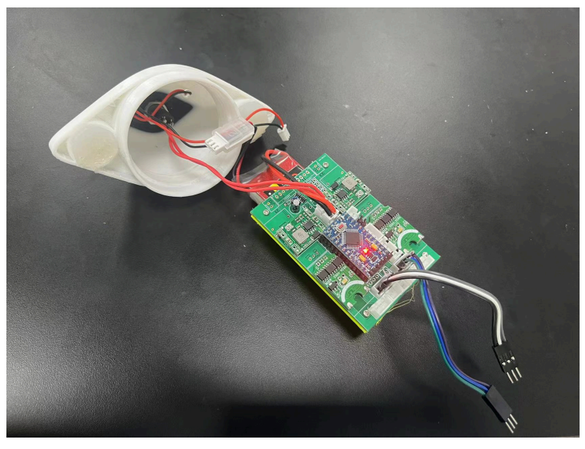
Robotic fish represents a fascinating intersection of biology and technology, designed to mimic the hydrodynamics of real world aquatic creatures. In the early stages of development, engineers focused primarily on creating mechanical models that could swim underwater with some degree of realism. These early prototypes were often bulky and limited in their capabilities, relying on basic programming and simple mechanical systems. Today, robotic fish are used in a variety of applications, ranging from environmental monitoring to underwater exploration and surveillance. Their ability to navigate complex underwater environments with agility and precision makes them valuable tools for scientific research and industrial purposes. As technology continues to evolve, robotic fish are poised to play an increasingly important role in our understanding of aquatic ecosystems and in enhancing our capabilities in underwater exploration.

Process/Challenges

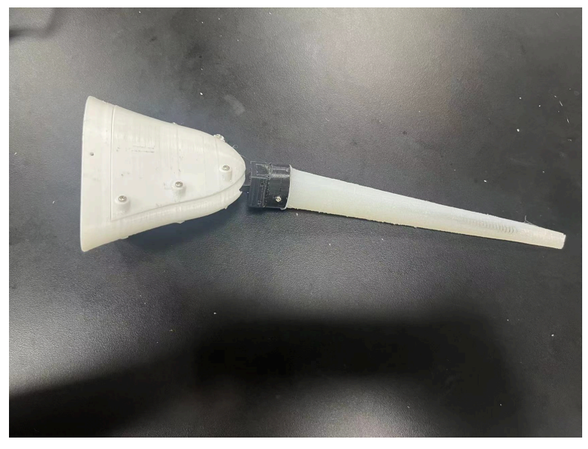
Wings



- **Shaping and cutting the rubber fabric**



Arduino board, battery, activation button, numerous jumper wires, and two servo motors.
Understanding the code
Wiring
Understanding how circuit boards work and how the components fit into place.
Understanding where the puzzle pieces fit together



A tail molded from silicone gel
Learning how to calculate the volume of the mold of the silicone gel tail and portioning it out
Leakage of the mold

What we Learned

Binary coding

Coding

Volume

Improvising based on a pre made model

What we Learned

a. Binary coding
b. Arduino & C++
c. Waterproofing
d. Molding
e. Soldering
f. Coding
g. 3D Printing
h. Improvising based on a premade model
i. Dividing and conquering
j. Soldering, coding, wiring, and assembling

Conclusion

The integration of ROVs and biomimetic robotic fish into marine research and exploration represents a significant advancement in our ability to understand and protect the ocean. These technologies not only enhance our capacity to explore and exploit underwater environments sustainably but also contribute to critical scientific discoveries that can shape our future. By minimizing environmental impact and expanding the frontiers of exploration, ROVs and robotic fish are indispensable tools for preserving the health of our oceans and advancing human knowledge.

Reference

1. **Faria, Jolyon J., et al. “A Novel Method for Investigating the Collective Behaviour of Fish: Introducing “Robofish.”” Behavioral Ecology and Sociobiology, Vol. 64, no. 8, 2010, pp. 1211–1218, www.jstor.org/stable/40792927?searchText=robotic+fish&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Drobotic%2Bfish%26so%3Drel%26efqs%3DeyJjdHkiOlsiYW05MWNtNWhiQT09II19&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3A9a705b6927f9f43f59e2b25de98d422c. Accessed 18 July 2024.**
2. **Conner-Simons, Adam. “Soft Robotic Fish Swims alongside Real Ones in Coral Reefs.” MIT News | Massachusetts Institute of Technology, 21 Mar. 2018, news.mit.edu/2018/soft-robotic-fish-swims-alongside-real-ones-coral-reefs-0321.**
3. **Research - World’s First Biomimetic Submersible to Dive to 2,000 Meters Westlake University .” En.westlake.edu.cn, 19 June 2023, en.westlake.edu.cn/news_events/westlakenews/research/202306/t20230619_34028.html. Accessed 18 July 2024**