Robot Fish

Report Name	Robot Fish
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1.   Project description

This project is about further developed a fish robot that is to test biological hypotheses. While this project is not about develop and build a full fish robot, my task for this project is to develop and test different tails for the fish robot. For this there will be developed a test bench for easily swapping out for different tails that are 3D printed to test different tail constructions and their propulsive force, to support this there is going to be develop a test platform where these experiments can be done. Do achieve this I'm going to be using some key technologies, and the two most key technologies for making this are going to be Arduino and 3D printing.

Arduino is an open-source microcontroller that is capable for this project to control the different motors that is going to be used for movement for the fish robot, the Arduino is not going to be used only for the movement but be used as the brain for this robot.
3D printing is going to be used for this project as well, 3D printing is going to be used to design and construct the test platform where we can mount the hardware and the tail, where the tail is going to be underwater to accurate test the tail in a water environment.

2.   Proposed tasks

For this project there will be some reading in the first and reading up on past project around the fish robot[1], where the first task to complete for this project is figuring out the hardware that is needed for making the test platform to perform test on different 3d printed tails. For the hardware there is going to be an Arduino based, where the coding for the different motors, this will then be coded in C.

After when the reading for this project is done and the hardware selection, the next step in the project is to make the test platform where all the hardware and the fish tail will be mounted on. This is firstly going to be done by 3D printing the platform, the platform is going to consist of and overwater area where the hardware is to be mounted (Arduino, motors, sensors, etc) and there is also a part of the platform that is going to be underwater. The underwater part is going to consist of no electronics and just the fish tail, so the fish tail can be tested in its environment. To make this work there is to be designed a drive train from the over water platform to the underwater platform so the Arduino can control the fish tail and make the fish tail move accordingly. On this platform there will need sensor to measure the propulsive force of the fish tail that is mounted underwater[2], this is needed when we in later stages are going to design different tails to research what type of material suits best.

When the test platform is working, the idea of designing and 3D printing different fish tails can then be done. There is then time to try out different materials for the fish tail, some of this is for example flexible 3D printing. This is something that can then improve the fish robots movement in the water and make its movement closer to a biological fish, another idea to make different fishtails is to 3D print a mould where we can cast a fish tail in silicon. There will also be mounted an overhead camera to caption the motion of the different tails, for comparing them to each other and to visually see their movement in the water comparing to a biological fish.

I am going to use a personal GitHub for this project, this is going to be used as version control for the project and be used as a cloud storage. There is going to be 2 meetings with

the supervisor each week with this project, the first meeting is going to be a personal meeting with the supervisor and a group meeting.

3.   Project deliverables

- **Mid-Project Demonstration –** For the mid-project demonstration there will be notes produced and the hardware layout and the platform would be produced. This would also go forward to the final report
- **Platform software –** The platform software will be operating on the Arduino that is mounted to the test platform, these files will be provided as the part of the technical submission.
- **Final Report –** This is a full document that will discussing the work that have been done, the test that have been done. While also comparing the findings that had be done under the project. In this document there will also be acknowledged any 3rd programs and libraries that have been used to make this project.
- **Final Demonstration –** There will be no additional documents for this demonstration, while this is the final demonstration and a show of what the project have become.

4.   Initial annotated bibliography

[1] 'The Development of a Modular 3D Printed Autonomous Robotic Fish'. Marcus Alexander Tjomsaas (mat80@aber.ac.uk), May 07, 2021.
[2] 'Arduino - Force Sensor | Arduino Tutorial', *Arduino Getting Started*. https://arduinogetstarted.com/tutorials/arduino-force-sensor (accessed Feb. 10, 2022).