YorRobots Summer Internship Report

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1 Title of Work

Implementation and Evaluation of Central Pattern Generator Locomotion for Robofish Prototype.

2 Technical Description of the Main Results

This project is focused on enhancing the Robofish prototype, an Autonomous Underwater Vehicle (AUV) designed for efficient underwater tasks. The main achievement was implementing the Central Pattern Generator (CPG) to improve the Robofish's locomotion. CPG, a neural network that produces rhythmic motor patterns, was integrated to mimic the eel's agile and energy-efficient movements. The project involved comparing RoboFish's performance under CPG and sinusoidal control by modifying key parameters like amplitude, frequency, offset, and phase. The results demonstrated that control based on the Central Pattern Generator (CPG) enhances both the adaptability and stability of the RoboFish's movement, contributing significantly to its efficiency and practicality in underwater tasks. However, the complexity of CPGs posed challenges in fine-tuning, affecting performance in certain scenarios.

3 Plans for Future Work

Future efforts will aim to utilize RoboFish swarms for applications like seafloor mapping and marine archaeology. This involves addressing challenges in un-

derwater protocols for acoustic localization, navigation, and real-time data collection. Additionally, there are plans to develop a more compact and modular RoboFish model with magnetic joints to facilitate experimental studies in hydrodynamic settings and enhance data validation processes.

4 Gratitude and Future Aspirations

This year, the scholarship has been a pivotal factor in my academic progress at the University of York, particularly in my work on the RoboFish project in the field of bio-mimetic robotics. The financial support provided by the scholarship relieved me of the stress associated with educational expenses, allowing me to focus my energies on in-depth research. This focus has led to substantial advancements in my studies, especially in the development and implementation of Central Pattern Generator (CPG) based locomotion strategies for the RoboFish prototype. The scholarship also enabled me to access advanced laboratory equipment and resources, which were crucial in conducting my experiments and achieving meaningful results. Being able to utilize these facilities has significantly enhanced the quality of my research, offering practical experience and insights that were invaluable for my project. The scholarship's support in providing these academic resources and enabling hands-on experience in a state-of-the-art research environment has been essential in broadening my academic skills and contributing to my professional growth.

I extend my heartfelt gratitude for your generous scholarship. Your support has been a cornerstone in my academic journey, enabling me to delve into groundbreaking research at the University of York. It has opened doors to invaluable opportunities, significantly enhancing my educational experience. Your belief in my potential has been a source of continuous inspiration, driving me to strive for excellence in my field. This scholarship is not just a financial aid; it's a testament to your commitment to fostering education and empowering students like me to achieve our aspirations. Thank you for investing in my future.

The scholarship has been a crucial element in my academic development, providing much more than financial assistance. It has enabled me to engage deeply in my research without financial worries, leading to meaningful contributions in the field of biomimetic robotics. The scholarship has also opened doors to professional development opportunities, allowing me to connect with experts and enhance my understanding and skills. This support has been fundamental in paving my path towards a promising career in autonomous systems, highlighting the scholarship's role not just as a financial resource, but as a key enabler of academic and professional growth.