**NEXUSS CDT Research Experience Placement 2019**

***The timings on this proposal need to revised slightly. Project will be for 30 hours a week over an 8 week period. New outline to be uploaded soon. Any questions please direct to*** [***G.D.Weymouth@soton.ac.uk***](mailto:G.D.Weymouth@soton.ac.uk)

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| Lead Supervisor: | G. Weymouth |
| Email: | [G.D.Weymouth@soton.ac.uk](mailto:G.D.Weymouth@soton.ac.uk) |
| University/Research Organisation: | UoS, Fluid Structure Interactions Group |
| Department: | Faculty of Engineering and Physical Sciences |
| Project Title: | Bio-inspired Drag Reducing Surfaces and Propulsion for Unmanned Underwater Vehicles |
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| Total Student Support Costs: £ | ***Students will receive an hourly pay of £8.44 per hour. You will be required to work for 30 hours a week over an 8 week period.*** |
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| Proposed Start Date:  **Monday, 1 July 2019** | Proposed End Date:  **Friday, 6 September 2019** |
| *Projects should run over the summer vacation and we recommend that projects will have terminated by 25 September 2019.* | |
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| **Brief Summary – please provide a brief summary (maximum 300 words) of the project.**  *This should include:*   * *Project outline;* * *Links to staff/School/Centre activity as appropriate;* * *Supervisory arrangement;* * *How space/equipment/supporting resource demands will be met;* * *Elements of the project that will incorporate elements other than computer/modelling e.g. fieldwork and data collection;* * *How the project will enhance the skills of the appointed student;* * *Any intellectual property rights concerns that may arise from the work.*     The employment of small-scale Unmanned Underwater Vehicles (UUVs) is becoming ubiquitous in marine operations. In the attempt to establish persistent survey of man-made offshore and coastal submerged structures, as well as natural marine environments, the design of UUVs is steering towards small-sized, highly maneuverable vehicles. At the Fluid Structure Interaction (FSI) Group of the University of Southampton, the Maritime Robotics Lab has been involved in designing bio-inspired aquatic robots for navigation in complex marine scenarios.  These kinds of vehicles rely on biomimetic propulsors (i.e. flapping foils and pulsed-jet thrusters) for which a precise characterization of the thrust generation routine is necessary. These vehicles also need to reduce their drag and using designs inspired from sharkskin and fur. The candidate will explore the use of these techniques on our existing vehicles. This will involve reviewing literature, performing preliminary simulations or designing simple experiments, as well as working on the vehicle hardware.  The student will thus be exposed to the whole design process, from problem statement to final testing; she/he will gain significant experience with fast prototyping tools, open-source microcontroller coding and sensor reading. At project completion, the student will be given the chance to measure the change in speed and maneuverability on a real bio-inspired vehicle.  The student will be hosted in the FSI Group, in Boldrewood Campus, and will have access to the Maritime Robotics Lab and to the Multiphase Flow Lab in Building 185, where some of the best facilities for hydrodynamics experimentation of the University of Southampton are hosted. The student will be followed in her/his project by Dr. G. Weymouth and by a number of postgraduate students currently working in this department. | |
| **Please give an indicative timescale for the student’s work over the length of the project: (maximum 150 words).**  *This should include:*   * *The broad tasks the student will undertake;* * *An indicative timescale for these tasks.*   The temporal work outline will be as follows:  - Week 1 to 2: introduction to the department and the supervisors; familiarization with biomimetic propulsors and drag reducing surfaces and how they are implemented.  - Weeks 3 to 5: Preliminary design and prototyping. Testing the prototype with a simple computational or experimental case.  - Weeks 6 to 10: Redesign and application to the bioinspired aquatic vehicle. Carry out A/B vehicle speed tests. Report the experimental outcome in a document and present the results to an audience of postgraduate from the FSI group. | |
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| **Proposed procedure for appointing students, including selection criteria:**  *Please identify specific criteria that should be considered for the selection of placement students e.g. specific quantitative skills that may be required, subject knowledge etc. If a student has been pre-selected, or the research area has been led by the student, please provide the student’s contact details, and a summary of their suitability for the NEXUSS CDT REP programme.*  The suitable candidate for this internship should have some degree of familiarity with engineering design and testing. Fundamental understand of fluid mechanics and an interest in biologically-inspired engineering would be advantageous. | |