

Towards Educational Kits for Soft Robotics applied to Medical Device Design

Panagiotis Polygerinos^{†*}, Donal Holland^{§*}, Gareth J. Bennett[§] and Conor J. Walsh^{†**}

[†]Wyss Institute for Biologically Inspired Engineering, Harvard University, Cambridge, MA, ^{*}School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, [§]Department of Mechanical and Manufacturing Engineering, Trinity College Dublin.
^{**}walsh@seas.harvard.edu

The potential for applications of soft robotics arises by combining linear and bending actuators into soft robotic structures allowing the design of complex motions at a very low computational and mechanical cost [1]. The development of new concepts for soft robots generally occurs today via an iterative, experimental approach. Research is often conducted in relative isolation. In order to accelerate progress in the field, it is necessary to pool resources and facilitate better sharing of results. The history of technology development from steel production to personal computers shows that a process of “collective invention”, the open discussion and sharing of design work, is often an essential part of technological advances and the formation of new industries [2].

Similarly, engineering students learn design skills through trial and error [3]. However, time and budget constraints present severe limits to the amount of experimentation that can be undertaken during a typical semester-long course [4]. Student learning could be improved by providing hardware and software prototyping tools and information on design, manufacturing and analysis techniques.

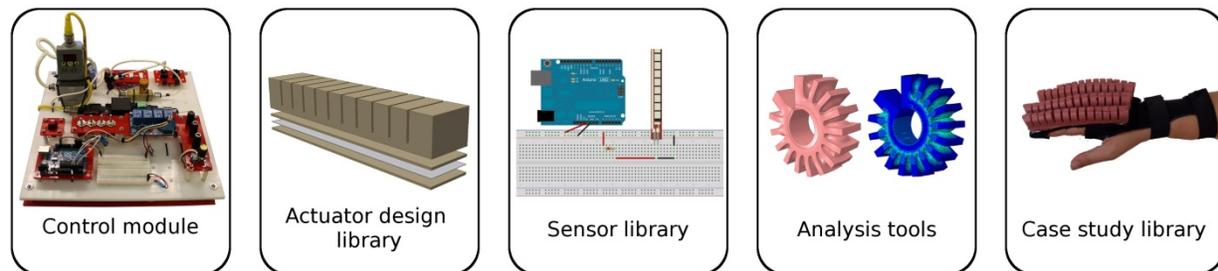


Figure 1: Toolkit contents

In order to meet these needs, we are developing a set of hardware designs and software tools that can enable customized fluidic-based soft robots to be rapidly designed and fabricated. These tools will be shared via an online portal through which high-school students, undergraduates and researchers can learn from what others from across the globe are doing in this field so that the entire robotics and educational communities can benefit.

In this poster we describe the contents of the toolkit and the results of initial evaluation of its use in a project-based mechanical design course in which student teams worked with clinicians to design, prototype and test a soft robotic device to meet a clinical need. The planned future work is described, and researchers in the field are invited to participate in the collective development of a resource which could prove beneficial for the field at large.

References

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