Soft Bio-Mimetic Caterpillar Robot

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Abstract – In contrast to the rigid and skeletal design of traditional robots, soft robots are bionic prototypes that emulate soft and flexible creatures in nature (such as caterpillars and octopuses) by using elastic materials which minimize the damage to their surroundings and to themselves. This paper presents the design, fabrication, and experimentation of the Soft Biomimetic Caterpillar Robot, a caterpillar-inspired robot. The robot's body is primarily composed of silicone rubber, and it is actuated using a string control system. The flexible silicone material allows the soft robot to withstand extreme deformity and function in a range of different environments. The string control system includes two sets of servo motors driving the contraction of nylon strings that are threaded through the robot's body. The Soft Biomimetic Caterpillar Robot is capable of resembling the crawling motion of a caterpillar and achieving directional movement through the repeating process of contraction and release. Resistance materials are applied to both ends of the soft robot to increase the efficiency of the robot's forward drive. Through the experimentation of the soft robot, this paper explores the potential of the medium of silicone rubber and the method of increasing the efficiency of the soft robot by incorporating friction mechanisms. This robot demonstrates some key advantages of soft robots over traditional robots, namely: bionic qualities, energy efficiency, and flexibility.

Awards Won:
King Abdulaziz &amp
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