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Electronics, Controls, and a 3D-printed Soft Actuator Design for a Travel-Sized Fluid Power Demonstrator

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ABSTRACT

A 3D-printed soft actuator is developed as a critical subsystem for a miniature forklift. The scope of this project gears towards increasing students' interest in STEM education, particularly in the fluid power field. The actuator is made in a stereolithography-type 3D-printer (Formlabs' Form2 and Autodesk's Ember), and is composed of different resin types which will provide the adequate actuation motion. This project tries to do material analysis for the mixed resins and then compared to the published data from Formlabs. The device explores the capabilities and limitations of 3D printing in the fluid power field, as well as serve as an educational tool for students interested in pursuing an STEM career. In the future, the project will explore the possibilities of integrating sensors into the system during the 3D printing process, avoiding the need for further assembly. The miniature forklift will be controlled by Arduino and multiple sensors. An App will be created based on an Android platform to achieve remote control via Bluetooth.

KEYWORDS

3D printing, Soft actuator, Bluetooth communication, self-mixed material for 3D printing, Fluid power demonstrator