Multifunctional Origami Packaging

Abdulrahman Almessabi*[1], Amin Jamalimehr[1], and Damiano Pasini†[1]

[1]McGill University – Canada

Abstract

Packaging is essential for product distribution and protection but often relies on plastic and single-use monofunctional materials, significantly contributing to environmental waste. In this work, we present a paper-based packaging that leverage origami principles to attain reconfigurability, multifunctionality and reusability. Its hallmarks include adaptive shape conformability, multistable locking, and protective cushioning, all integrated into one multifunctional origami packaging. Multistable snapping of origami panels is proposed to generate a grasping function that can hold a cargo in place without resorting to any additional bracing materials. In addition, a tendon-driven folding mechanism is integrated into strategically selected origami panels to reprogram the force-displacement response under uniaxial quasi-static and impact loads, as well as to adapt to various shapes and sizes of the cargo. Our preliminary findings show that our origami packaging can secure the cargo position, and offer protective cushioning to fragile products during transportation, stacking, and handling, paving the way to the attainment of sustainable multifunctional packaging.

*Speaker

†Corresponding author: damiano.pasini@mcgill.ca