

# Universal jamming gripper: experimental analysis on envelope and granular materials

A.J. López López; I. de Rodrigo Tobías; J. Belart Sigüero

## Abstract-

This article presents a materials optimization for the universal jamming gripper, one of the most versatile tools for robotic grasping. For this purpose, we analyze both the granular interior material and its surrounding deformable envelope. We combine four different granulate sizes (glass balls ranging from 0.2 to 1 mm) with four envelope materials (three silicones and latex), resulting in 16 prototype combinations. We use a tensile test machine to recreate the robot's vertical movement in a real scenario situation. Thus, we can have precise control of the gripper's immersion depth, forces, and displacements. Thanks to the tensile test, we extract the critical parameters to evaluate every material combination and the gripper's performance. Therefore, we provide an experimental guide to selecting the right materials and rule out bad combinations for soft robots and specifically for the universal jamming gripper.

**Index Terms-** universal jamming gripper; jamming effect; soft robotics

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