Clutch: A Hybrid Electrostatic Dry Adhesive Climbing Robot

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Clutch is a hybrid electrostatic dry adhesive climbing robot, and is a culmination of a research and development project. For the past few decades, researchers have been trying to replicate the gecko's ability to adhere to nearly any surface with an incredible amount of controllability and strength. There have been many attempts by mankind to recreate a controllable adhesive that leverages the same principle that a gecko uses in adhesion, but they typically require expensive micromanufacturing equipment or struggle with low controllability. Using a recently proposed manufacturing technique, the adhesives can be manufactured out of a 3d printer. Gecko-like adhesives also tend to particularly struggle on rough surfaces. This study seeks to significantly increase controllability by polarizing the surface of the gecko-like adhesive with an electrostatic adhesive. In order to demonstrate the feasibility and practicality, Clutch uses these adhesives and can climb walls better than previous designs by major research groups like NASA because of the optimization of electroadhesives and the biomimicry implemented in the climbing robot itself. Overall, the research involved with Clutch and designs are intended to emphasize the utility and ingenuity of a new approach, all while pushing the limits of consumer-grade additive manufacturing technology.

Awards Won:
Fourth Award of $600
Office of Naval Research on behalf of the United States Navy and Marine Corps: The Chief of Naval Research Scholarship Award of $20,000