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Design and Development of ResiClean: An Automated Resin 3D Printing Post-Processing System

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Abstract

Resin 3D printing is widely utilized at the Aquatic Germplasm and Genetic Resources Center (AGGRC) for producing high-precision components. However, the current post-processing workflow relies on manual washing, rinsing, and drying operations that are labor-intensive, time-consuming, and difficult to standardize. Additionally, isopropyl alcohol (IPA) used during cleaning is often discarded after limited use, increasing chemical waste, operational costs, and user exposure to hazardous materials. To address these challenges, the ResiClean system was developed as an integrated post-processing solution that automates key stages of resin print finishing. The system combines washing, drying, and ultraviolet (UV) curing processes within enclosed chambers while incorporating a closed-loop IPA filtration subsystem designed to extend solvent usability and reduce waste generation. A conveyor-based transfer mechanism and autonomous door system further enhance user safety by minimizing direct interaction with chemicals and moving components. The system was designed using chemically resistant materials to ensure durability in an IPA-intensive environment while accommodating multiple build-plate sizes and attachment configurations. By consolidating multiple post-processing stages into a single automated platform, ResiClean improves workflow consistency, operational efficiency, and user safety. The project provides AGGRC with a reliable and standardized post-processing solution while demonstrating the potential for automation and sustainable practices in additive manufacturing environments.

Keywords
Resin 3D Printing, Automation, Additive Manufacturing, IPA Filtration, Post-Processing

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Biographies
Bershell Reynaud is expected to graduate in Fall 2026 with a Bachelor of Science in Biological Engineering and a minor in Robotics. Her interests include tissue engineering, regenerative medicine, and medical devices.

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Mya Alford is expected to graduate in Fall 2026 with a Bachelor of Science in Biological Engineering. She participates in the Medtronic Clinical Engineering Co-op Program and serves in the Louisiana Reserve. Her interests include clinical engineering and medical technologies.

Amaya Simpson graduated in Spring 2026 with a Bachelor of Science in Biological Engineering. She enjoys working in laboratory settings and applying engineering solutions to biological challenges.

Chiemeka Osiagwu is expected to graduate in Fall 2026 with a Bachelor of Science in Biological Engineering. Her plans to pursue medical school following graduation and is interested in the intersection of engineering and medicine.