LifeSpin: Comprehensive Water Purification and Transportation via Induced Turbulent Flow in Conjunction with Faraday's Law of Induction

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Despite industrialization, Sub-Saharan Africa’s water infrastructure leaves ~341 million people without access to potable water. In addition to water purification problems, transportation problems include that women and children spend ~140 million hours collecting water daily, with adverse musculoskeletal implications that compound medical ramifications of contaminated water. By harnessing the energy produced by a rolling barrel, a purification system can be powered. A cylindrical polyethylene vessel streamlines water purification and the rolling transport process. Research shows exposure to UV light and Activated Carbon is effective in purification. The challenge is to integrate these technologies in hydro-transport systems. For UV light, the electrical source, rotational energy, was harnessed by magnet and coil. As the barrel rotated, electrical output averaging 79.97W was produced, approximately 50% more energy than required to power the UV light. For effective purification, water must turbulently circulate. Two vessels were rotated at 50RPMs, one with 3D-printed fins, and one with none. Water and modelling beads were added to indicate flow patterns. In the finned vessel, circulation of headspace air and chaotic dispersion of beads showed increased fluid friction. This compared favorably against fin-less rotation. Each of these systems are integrated into a 90L polyethylene barrel to simultaneously apprehend water purification and transportation challenges.

Awards Won:

First Award of $5,000

Drexel University: Full tuition scholarship $194,000

University of Arizona: Tuition Scholarship Award

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