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Author: Ms. Katherinne Herrera
Guatemala

Mr. Fredy España
Guatemala
Dr. Pamela Pennington
Guatemala
Dr. Luis Zea
University of Colorado Boulder, United States

DEVELOPMENT AND VERIFICATION OF A LOW-BUDGET CLINOSTAT BUILT BY UNDERGRADUATE STUDENTS IN A DEVELOPING COUNTRY

Abstract

Space travel can be expensive and hard to accomplish. Because of this, clinostats and other devices - which use rotation to attempt to nullify some effects of gravitational pull - are commonly used on ground-based investigations to simulate certain of the effects of microgravity. However, commercially available clinostats can be too expensive for academic institutions in developing countries. With the interest of establishing life sciences research in Guatemala and lacking equipment or a budget, two undergraduate students - one with a microbiology and another with an engineering background - at Universidad del Valle de Guatemala (UVG) developed a low-budget clinostat. With external advice on the biological and engineering requirements, three iterations were built and tested. The final iteration's functionality was verified by replicating a published microbial study on fungal morphological changes under simulated microgravity. This was followed by an experiment to interrogate a type of oregano oil's functionality as a potential fungicidal against *Candida albicans* under simulated microgravity. The availability of a clinostat subsequently encouraged more students to become involved in space life sciences research, served to support two space microbiology workshops, and galvanized the foundation of a space exploration student group at UVG. An in-house built, low budget clinostat serves as an innovative solution to some of the challenges that come up from lack of financial resources in institutions in developing countries, encourages students to follow space life sciences, and enables researchers to perform their own scientific studies. We here describe the guiding requirements, the development and verification process, and scientific results.