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Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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DEVELOPMENT OF "EMU" OPENSOURCE HIGH ALTITUDE BALLOON FOR MICROGRAVITY EXPERIMENTATION

Abstract

Easy access to low-cost microgravity environments is an important asset for both industry and research groups. This paper gives an overview of the opensource freefall-capable "Emu" High Altitude Balloon (HAB) under development by the UWA Aerospace team at the University of Western Australia. The proposed design is in the shape of an upside-down rocket and will provide up to 40 seconds of freefall from an altitude of 30 kilometres. Although parabolic flights, sounding rockets and even other HAB projects have been conducted, none are simple or cost effective enough to find regular, widespread use. "Emu" will bridge this divide. The proposed design will carry a 2U CubeSat-like payload.

"Emu" features a custom-built, low-cost flight computer; easy-to-fabricate high-strength fuselage; and 2-stage supersonic recovery mechanism. As of March 2020, all components have been designed and tested in isolation. This includes wind tunnel, cold box and electrical tests. Upcoming experiments will focus on integration before a full run with 10km freefall drop scheduled for June of this year. Instructions will be published online to coincide with the October 2020 International Astronautical Congress in Dubai.

The decision to make "Emu" opensource and easy to fabricate was inspired by the IAC's theme of "Inspire, Innovate Discover for the Benefit of Humankind". This project has great potential to allow all groups to have access to the microgravity environment; facilitating industry innovations, academic discoveries and inspiring students from around the globe.