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Ukpik-1: The Western University - Nunavut Arctic College CubeSat Project

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ABSTRACT

The primary goal of the Western University-Nunavut Arctic College 2U CubeSat Ukpik-1, funded through the CSA CCP (Canadian CubeSat project) program, is to provide experiential learning opportunities to university students in the development of space technologies. Ukpik-1's secondary goal is to carry an immersive 360 Virtual Reality (VR) payload, which consists of two cameras provided in-kind by our industry partner Canadensys. These cameras have a 190° FOV, and will be attached on opposite ends of the CubeSat. The resulting images from the cameras would then be stitched together to form a 360° spherical image which can then be viewed through VR goggles. An additional goal being considered for the CubeSat is the acquisition of images immediately after launch (as typically, CubeSats are not allowed to turn on within 30 minutes of launch from the ISS). This would allow the CubeSat to take an unique image, or possibly a video, of the International Space Station as it drifts away. The 360° image of the ISS with the Earth in view will potentially be the first of its kind if this is successfully implemented.

Throughout the design process, the work was done predominantly by 4th year engineering capstone students and undergraduate summer research assistants who were in turn supervised by graduates students acting as system and subsystem leads. This team composition allows more students to be exposed to the CubeSat project and aid in the preliminary goal of capacity building at Western.

Another important aspect in the engagement of our partner Nunavut Arctic College in the education, outreach and development of the CubeSat. The aim is to impart the CubeSat knowledge to the students at Nunavut and engage them in the operations of the CubeSat. In 2019, information sessions and networking events were held at the Nunavut Arctic College and their surrounding communities. The name Ukpik-1, the Inuktitut word for "Snowy Owl" was the result of a naming competition held at Nunavut. The Nunavut Arctic College will also contribute a metal engraving component that will be mounted on the CubeSat.

The design of cubesat consists of both commercial-off-the-shelf (COTS) components and custom components that will be designed and built in-house. COTS components include the onboard computer, electrical and power system, and UHF transceiver from Endurosat. The magnetorquers for attitude control as well as the solar panels will be built and assembled by students at the Western University.

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