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NEPAL'S IN-ORBIT TECHNOLOGY DEMONSTRATION MISSION OF REPURPOSING PX4 DRONE AUTOPILOT AS A CUBESAT OPERATING SYSTEM

Abstract

Studies show that the majority of CubeSat either does not use Operating System (OS) or are running customized software. There is no standard OS available. This leads to extended development time, and in some cases, missed launch dates. Furthermore, 1U CubeSat designed by educational institutions has a success rate of only 29%. Having a dedicated OS would allow institutions and companies to focus more on payload design and integration, environment testing, and long-duration tests to identify failure points ahead of launch. This paper proposes a CubeSat OS which is based on a mature, highly popular, and open-source drone OS called PX4 Autopilot. PX4 Autopilot is a complete drone software that allows a complete beginner to build a drone, load the OS and operate it in minutes. This paper highlights the work done to repurpose PX4 Autopilot for in-orbit CubeSat OS demonstration aboard Nepal's Danfe Space Mission scheduled for launch in 2022. The mission uses PX4 compatible hardware combined with sensors supported by a modified PX4 and is run on flight-proven STM32F4 MCU series. If successful, CubeSat OS based on PX4 has the potential to cut down software development time by almost 80%. Much like in drones, the open-source CubeSat OS will allow more individuals and institutions to plan, build and launch a plug-and-play-like satellite where more development time is spent on payload rather than on satellite's software.