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APPLICATIONS OF ARTIFICIAL INTELLIGENCE ENHANCED CUBESATS IN FUTURE MARTIAN MISSIONS

Abstract

Data collection and communication are essential to establishing a permanent human presence in a hostile environment such as Mars. However, due to the difficulty of deploying medium size satellites on Mars, CubeSats offer a cost effective and convenient way to launch a network of satellites into Martian orbit. CubeSats can be transported to Mars and deployed at a fraction of the cost and time as medium sized satellites. Due to this, a network of artificial intelligence (AI) enabled CubeSats can be used to collect valuable data and communicate across Mars, aiding humanity in predicting weather anomalies threatening human technology and settlements, and also providing an effective satellite communications system on Mars.This publication focuses extensively on the applications of AI in CubeSats, and how a similar-to-earth weather monitoring and communications system can be established within a quick time frame. Advantages of CubeSats lie in relatively short development and implementation processes. Using AI, mission crews will be able to rapidly prototype and deploy a fleet of CubeSats for specific missions. In the near future man plans to journey to Mars. Having a satellite constellation above the martian atmosphere could be of great benefit to these future colonies. Some of the largest hazards present on Mars include solar flares as well as dust storms. Solar flares have been known to impart lethal doses of radiation. Dust storms are of utmost concern as first colonies will likely generate energy through solar cells and solar cells covered in dust are incapable of providing energy to an efficient degree. Due to the devastating effects of both solar flares and martian dust storms, this paper will explore the use of AI enhanced CubeSats to accurately predict and ultimately plan for such events. We will focus on AI algorithms and how they can identify patterns and trends to predict solar flares, coronal mass ejections, and other weather events that can endanger missions on Mars. This publication will also focus on the reduced reliance on earth's communications, and establishing a local satellite enabled communication service on Mars. Because of Mars' limited satellite network, cost effective and conveniently deployed AI enabled CubeSats could create a platform of technology humans need to thrive on another planet. Services such as global positioning systems, communication systems, and weather data could be available in all corners of Mars, and will lay the groundwork for future missions and possibly permanent settlements on Mars.