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Precision controls for the Virtual Telescope for X-ray Observations (VTXO) REZA PIRAYESHSHIRAZINEZHAD, Department of Mechanical Engineering, University of New Mexico, New Mexico USA, SANDRA BIEDRON , Department of Mechanical Engineering,Department of Electrical and Computer Engineering,University of new mexico, Element Aero, Chicago, Illinois USA, JORGE DIAZ CRUZ, MANEL MARTINEZ, SALVADOR SOSA, Department of Electrical and Computer Engineering, University of New Mexico, New Mexico USA, AI FOR CONTROLS TEAM — The Virtual Telescope for X-ray Observations (VTXO) is a mission exploiting two 6U-CubeSats operating in a precision formation. The goal of the VTXO project is to develop a space-based, X-ray imaging telescope with high angular resolution precision. X-rays are linked to the Universe's highest energy phenomena and an order of magnitude increase in the spatial resolution would provide a window to the underlying physical processes of the high-energy universe. This technology would enable high-resolution imaging of the X-rays from solar flares and the detailed mapping of the X-ray production in energetic objects such as Active Galactic Nuclei. In this scheme, one CubeSat carries a diffractive lens and the other one carries an imaging device to support a focal length of 1 km. In this mission, attitude control and relative position control algorithms are required to keep the formation of the two spacecraft in alignment with the Crab Nebula observations. To meet the attitude control goal, the attitude measurements from the gyros and the star trackers are used in conjunction with controls and machine learning algorithms (ML) to hold the CubeSats in a precise formation with the required high attitude accuracy using minimal power.

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