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Class Standing: Senior

Department: Electrical Engineering

College: Engineering

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Presentation Type: Oral presentation

Project Title: Towards Building an Automated Rock Classifier for Planetary Rover Missions

Synopsis: A progress in work that uses machine learning algorithms to classify rocks based on spectroscopic data.

Abstract: Building upon our previous work on an automated mineral classifier, we are working to extend its functionality towards classification of rocks. The work in progress focuses on analyzing the mineral compositions associated with various types of igneous rocks with Raman spectroscopy. The ability to identify minerals in igneous rock samples provides important information on their composition that will give us insight towards the history and formation of a site from where the samples were obtained. The classifier is developed in three stages. First, we acquire a database of mineral/rock spectra using Raman Spectroscopy. Second, we apply unique preprocessing techniques in order to reduce noise and dimensionality of the spectral data to optimize classification. Lastly, we utilize an artificial neural network algorithm - the multi-layer perceptron - to learn and classify rocks from the database of labeled Raman spectra. As intended for on site operation in planetary missions, the classifier has the potential to help further understand and learn from geological samples on extraterrestrial planets.