



Thesis Defense

Computer Science Master's Program

“MarsAnywhere: Dataset and Cross-view Diffusion Model for Satellite-to-Ground View Synthesis with Mars Data”

By Benjamin Hinchliff

Abstract:

Satellite-to-ground view synthesis aims to create a realistic ground view image from a corresponding satellite view image. This is a well-studied problem for street level imagery, with good results being achieved by using modern image synthesis techniques such as diffusion models. However, despite the public availability of satellite and ground level imagery on Mars, these techniques have yet to be applied to the domain due to difficulties in collating and processing the data into a usable form. We address this deficiency by creating a dataset consisting of ground view panorama imagery from the Perseverance rover, along with associated satellite view imagery and DEM data from HiRISE collected for Perseverance mission planning. We then apply a Controlnet on Stable Diffusion 2.1 to the image data projected into the rover view. We also apply loss masking based on the conditioning image to help the model build associations between the project view and the target imagery. We compare these results on standard image reconstruction metrics. Our work lays the foundation for future developments in the area, targeting applications to education and rover planning.

Date: Monday, December 8th, 2025

Time: 10:00 AM – 12:00 PM

Location: 14-238b

Zoom: <https://calpoly.zoom.us/j/5072707122?omn=85038857872>

Committee: Dr. Ventura, Dr. Khan, and Dr. Wright

