

## SenSIP Seminar Series

### Survey of Deep Visual 3-D Reconstruction Towards Dense, Real-Time Mapping in the Wild

Presenter: David Ramirez, General Dynamics

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#### Abstract

Structure from motion (SfM), visual-SLAM, photogrammetry, reconstruction and other related computer vision techniques observe 2-dimensional imagery and estimate 3-D structure. The current state of the art V-SLAM techniques can run on live video in real-time at the computational edge, but the 3-D mapping quality is sparse in detail. None of these SLAM techniques consider multiple agent perspectives in real-time. When high-quality 3-D mapping is the focus, modern SfM techniques must run on a static corpus of data and usually takes hours to calculate, even when run on scaled cloud compute infrastructure. There exists a gap in modern approaches for real-time dense 3-D reconstruction from video, especially from multiple agent perspectives. This technology would enable many new applications for augmented reality, safety, and security. We are investigating techniques for real-time, large-scale, multi-agent 3-D reconstruction. We propose a data simulation and evaluation pipeline for building and testing such algorithms. This presentation will give a brief overview of the problem and a survey of the current state of the art.

#### Biography:



David Ramirez is a Ph.D. student in computer engineering at Arizona State University (ASU) and a Machine Learning Engineer at General Dynamics Mission Systems (GDMS). He received his Masters and Bachelors degrees both in electrical engineering from ASU, focusing in digital signal processing. He has worked at GDMS since 2017 and is a senior engineer in the Deep Learning Analytics Center of Excellence. He served in the United States Marine Corps and supported peaceful military operations in 11 countries. His research interests focus on detection and surveillance for geospatial intelligence, military training, and augmented-reality.

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