# The Multi-State Constraint Kalman Filter

Or, an exciting presentation that you should totally stay awake for

Valentin Peretroukhin and Lee Clement

*AER1513 Course Project*

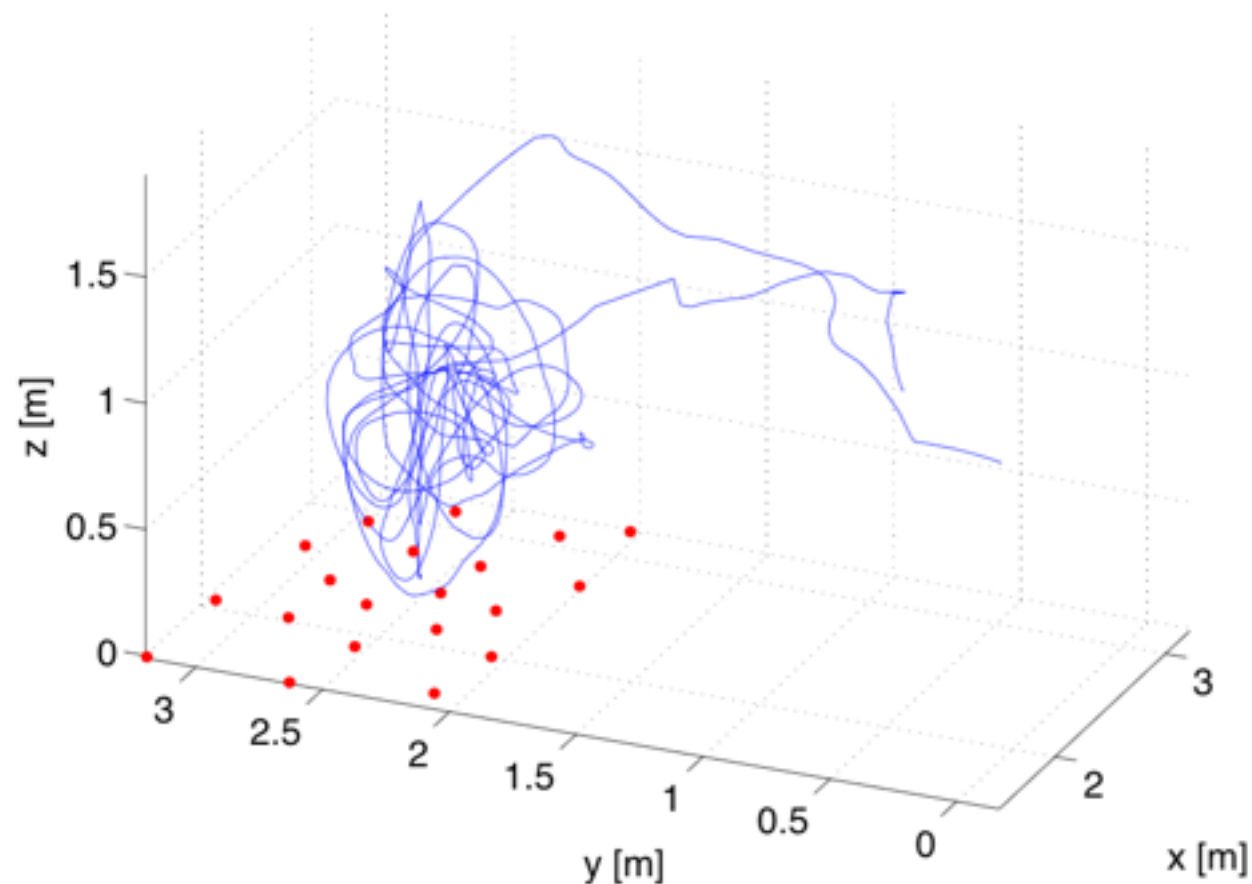Institute for Aerospace Studies
UNIVERSITY OF TORONTO

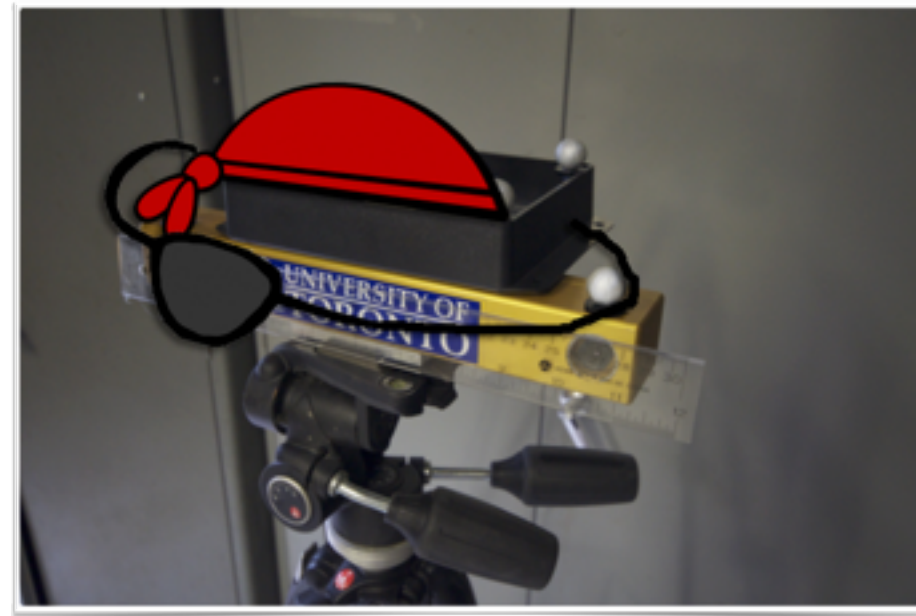# **Problem:** Monocular Visual-Inertial SLAM

Some text
Some other text

# Dataset: Starry Night (Assignment 3)



☑ Perfect data association

☑ Ground truth for landmark positions

☑ Pre-integrated IMU measurements





Institute for Aerospace Studies
UNIVERSITY OF TORONTO

# Algorithm: MSCKF

**Idea**: Pairwise landmark triangulation ignores correlations with other states, so use a hybrid batch/recursive filter

**Batch component**: Wait until all observations of a landmark are available (i.e., feature goes out of view), then compute its position using multi-view geometry

**Recursive component**: Use the batch landmark solutions as measurements in an Extended Kalman Filter

**Advantages over plain EKF**:
- **Optimal pose estimation** by incorporating all constraints
- **Computational complexity is linear** in number of landmarks instead of cubic

# Progress

# Questions?



Institute for Aerospace Studies
UNIVERSITY OF TORONTO