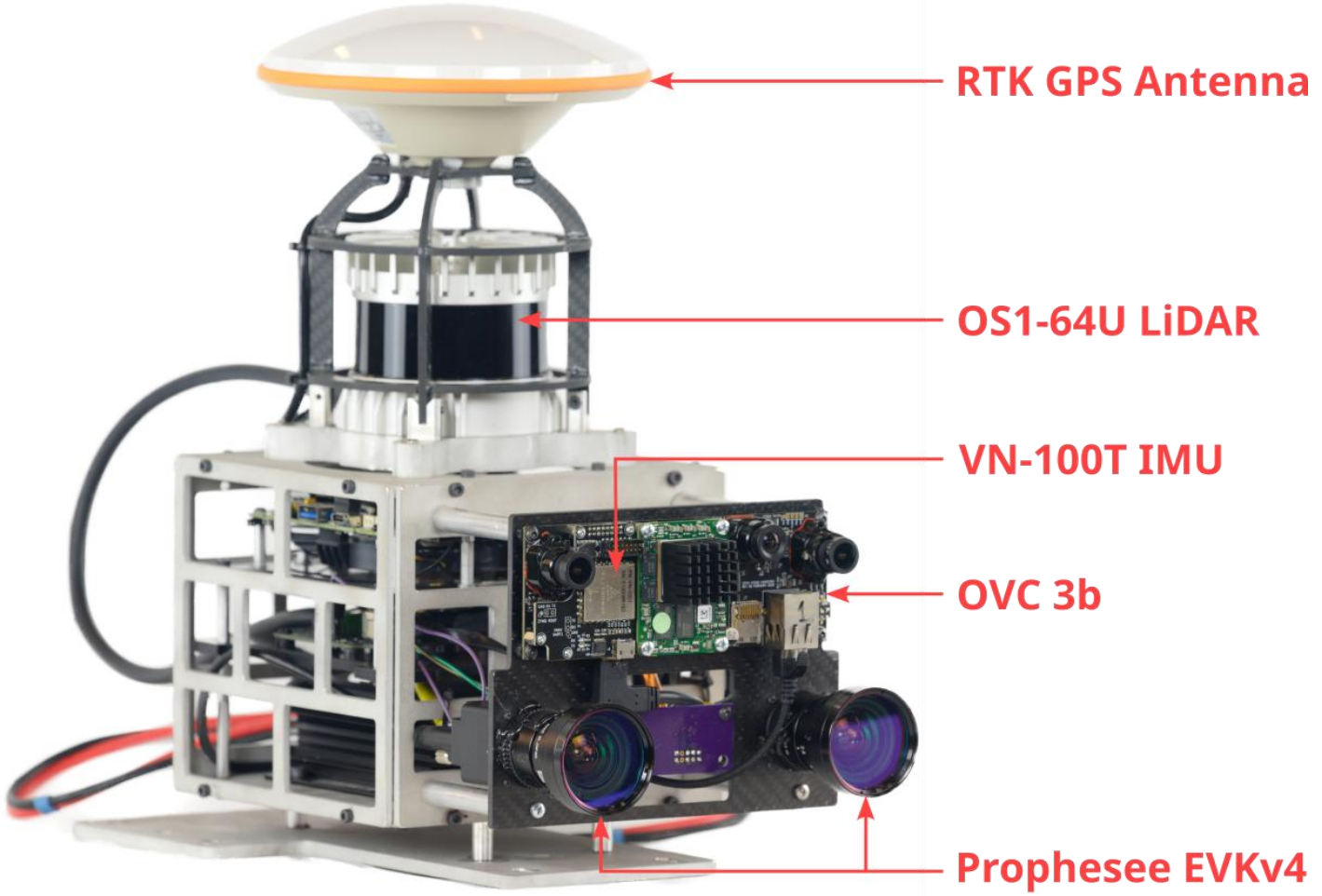
M3ED SLAM Challenge

Fernando Cladera, Kenneth Chaney,
M. Ani Hsieh, Christopher Korpela, Vijay Kumar, CJ Taylor, and Kostas Daniilidis
GRASP Lab - University of Pennsylvania

Dataset Overview

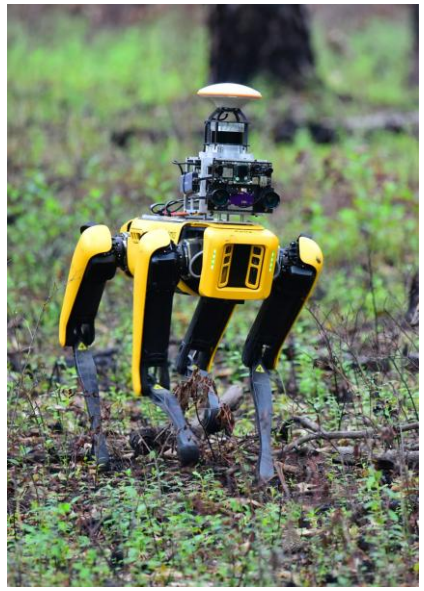
- High-quality HW synchronized:
  - Ouster LiDAR OS1
  - OVC - 1280x800x25FPS
  - VN-100 IMU
  - RTK (when available)
  - 2x HD event cameras
- 3 different platforms, same sensor stack.
  - Falcon 4 UAV
  - Car
  - BDI Spot
- 3 Environments:
  - Forest
  - Indoors
  - Urban

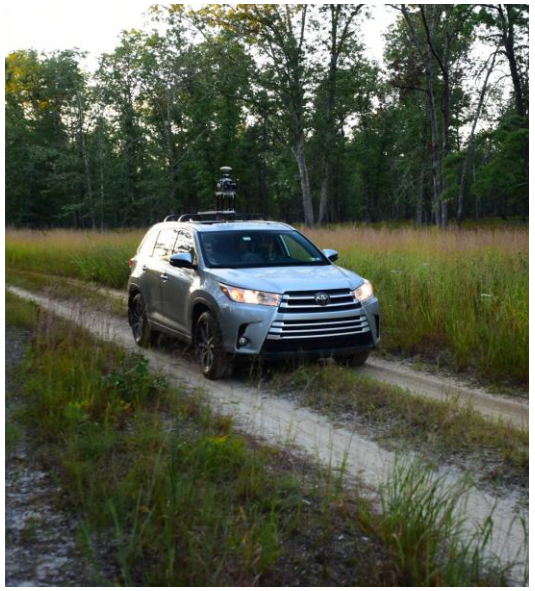


Chaney et al., M3ED: Multi-Robot, Multi-Sensor, Multi-Environment Event Dataset, CVPRW 2023.

Dataset Overview

- High-quality HW synchronized:
  - Ouster LiDAR OS1
  - OVC - 1280x800x25FPS
  - VN-100 IMU
  - RTK (when available)
  - 2x HD event cameras
- 3 different platforms, same sensor stack.
  - Falcon 4 UAV
  - Car
  - BDI Spot
- 3 Environments:
  - Forest
  - Indoors
  - Urban

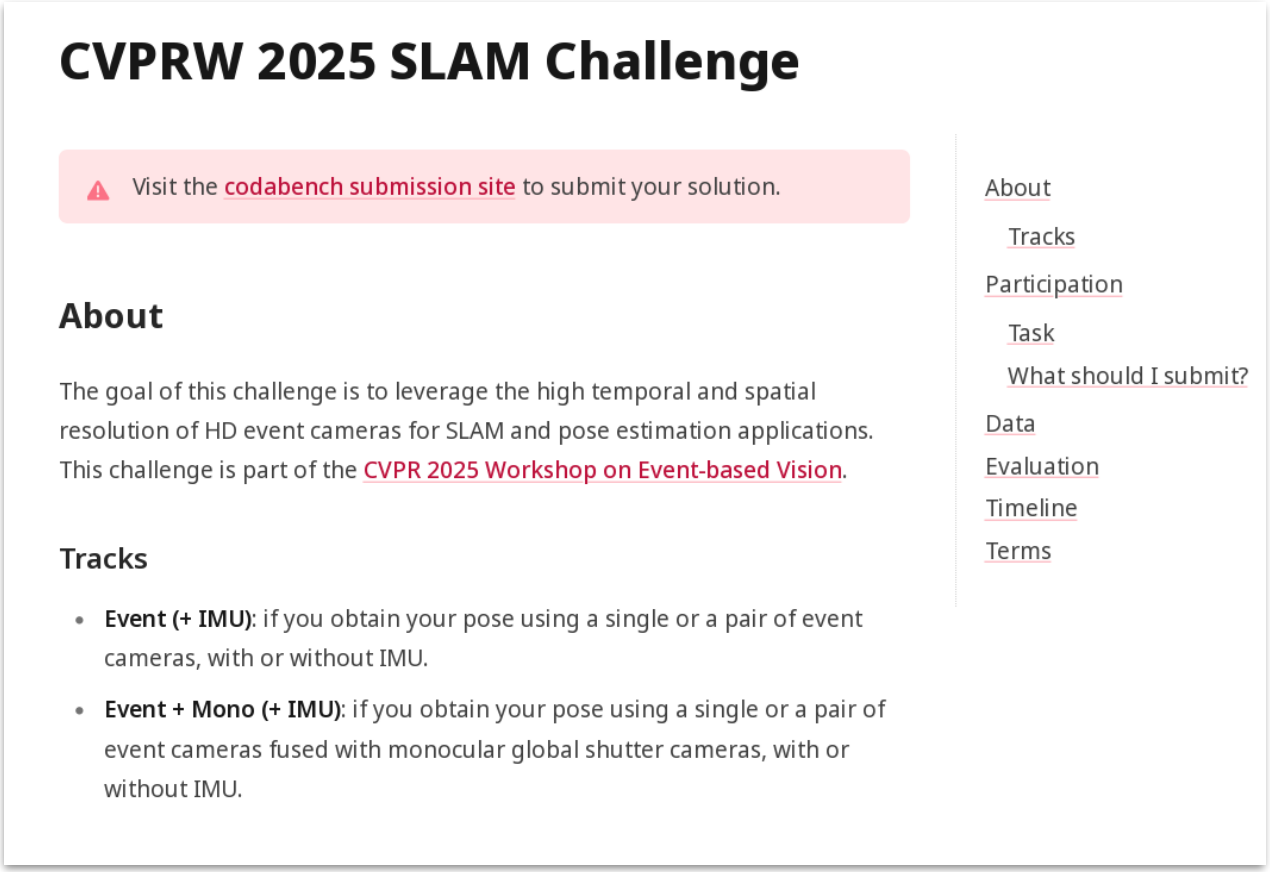




Chaney et al., M3ED: Multi-Robot, Multi-Sensor, Multi-Environment Event Dataset, CVPRW 2023.

The Challenge

- **Goal:** generate the pose of the reference event camera for a set of given timestamps.
- Three *short* sequences, three platforms.
- Evaluated using evo, compute absolute position error (APE).
- APE of the three sequences added towards final score.



CVPRW 2025 SLAM Challenge

⚠ Visit the codabench submission site to submit your solution.

About

The goal of this challenge is to leverage the high temporal and spatial resolution of HD event cameras for SLAM and pose estimation applications. This challenge is part of the CVPR 2025 Workshop on Event-based Vision.

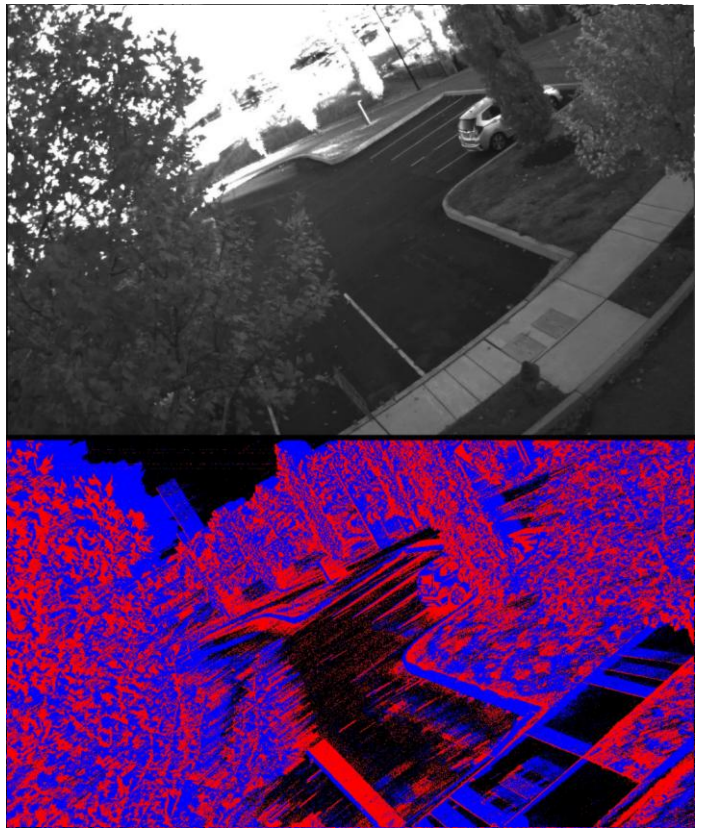
Tracks

- **Event (+ IMU)**: if you obtain your pose using a single or a pair of event cameras, with or without IMU.
- **Event + Mono (+ IMU)**: if you obtain your pose using a single or a pair of event cameras fused with monocular global shutter cameras, with or without IMU.

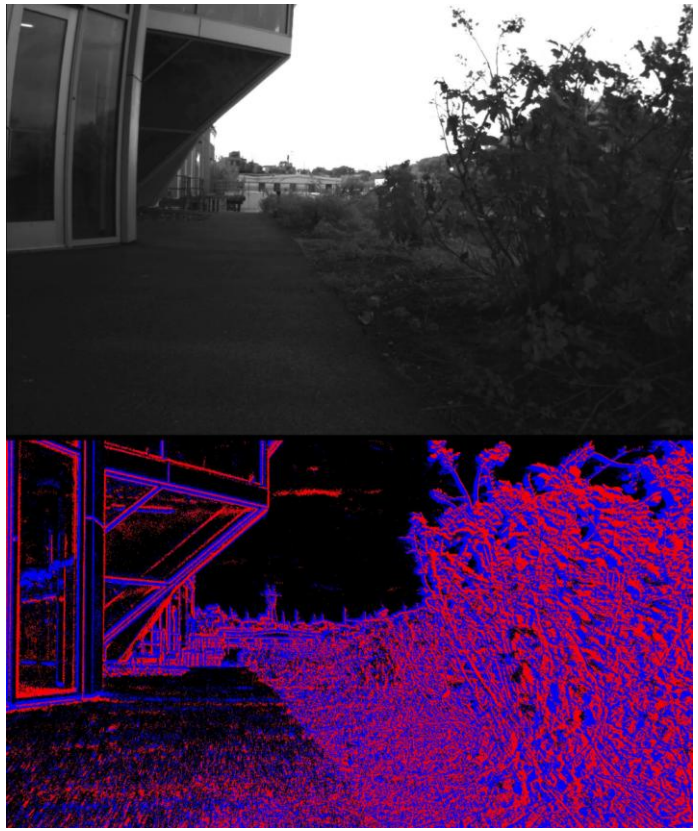
Chaney et al., M3ED: Multi-Robot, Multi-Sensor, Multi-Environment Event Dataset, CVPRW 2023.

Challenge Sequences

Car



UAV



Spot

Chaney et al., M3ED: Multi-Robot, Multi-Sensor, Multi-Environment Event Dataset, CVPRW 2023.

Outcome

Lessons learned

- The challenge was *hard.*
- Total of 25 participants, 2 leaderboard submissions.
- Multiple conversations with participants on how to improve user experience with the dataset.
- Open benchmark for future SLAM research with event cameras.

Penn Engineering
University of Pennsylvania

m3ed.io