Mapping formats/algorithms and map construction using Flowdep

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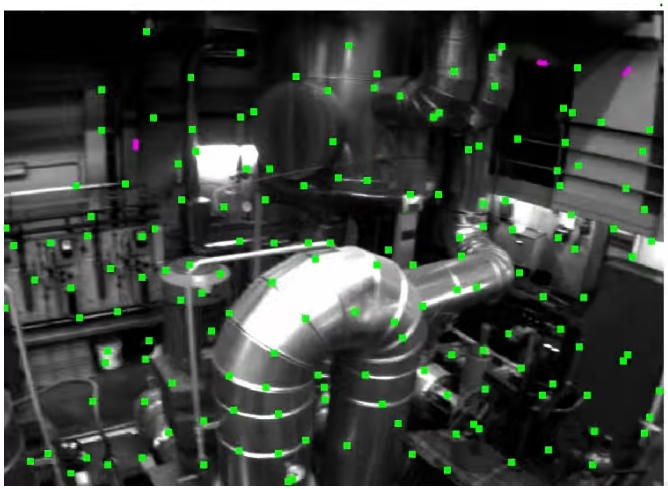
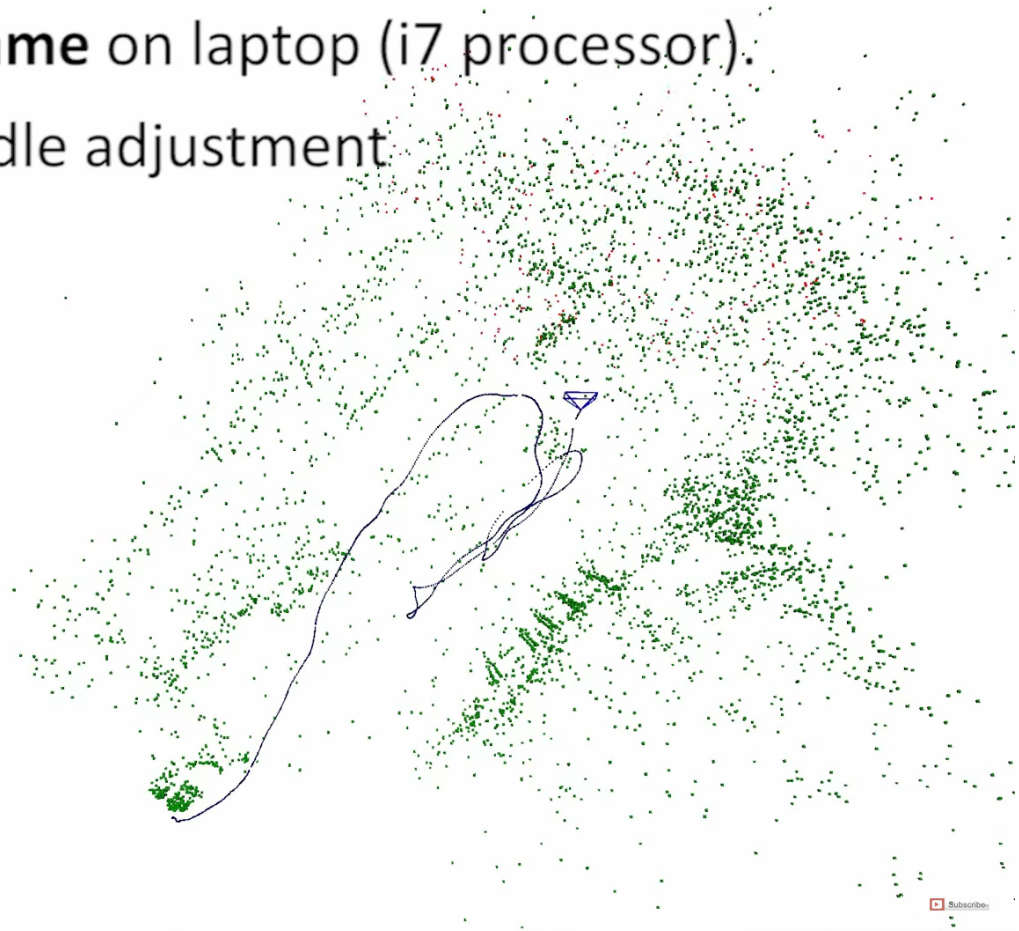
Map format – point cloud

- sparse
- easy to maintain
- good for localization
- cannot tell if certain voxels are occupied

2.5 milliseconds per frame on laptop (i7 processor).

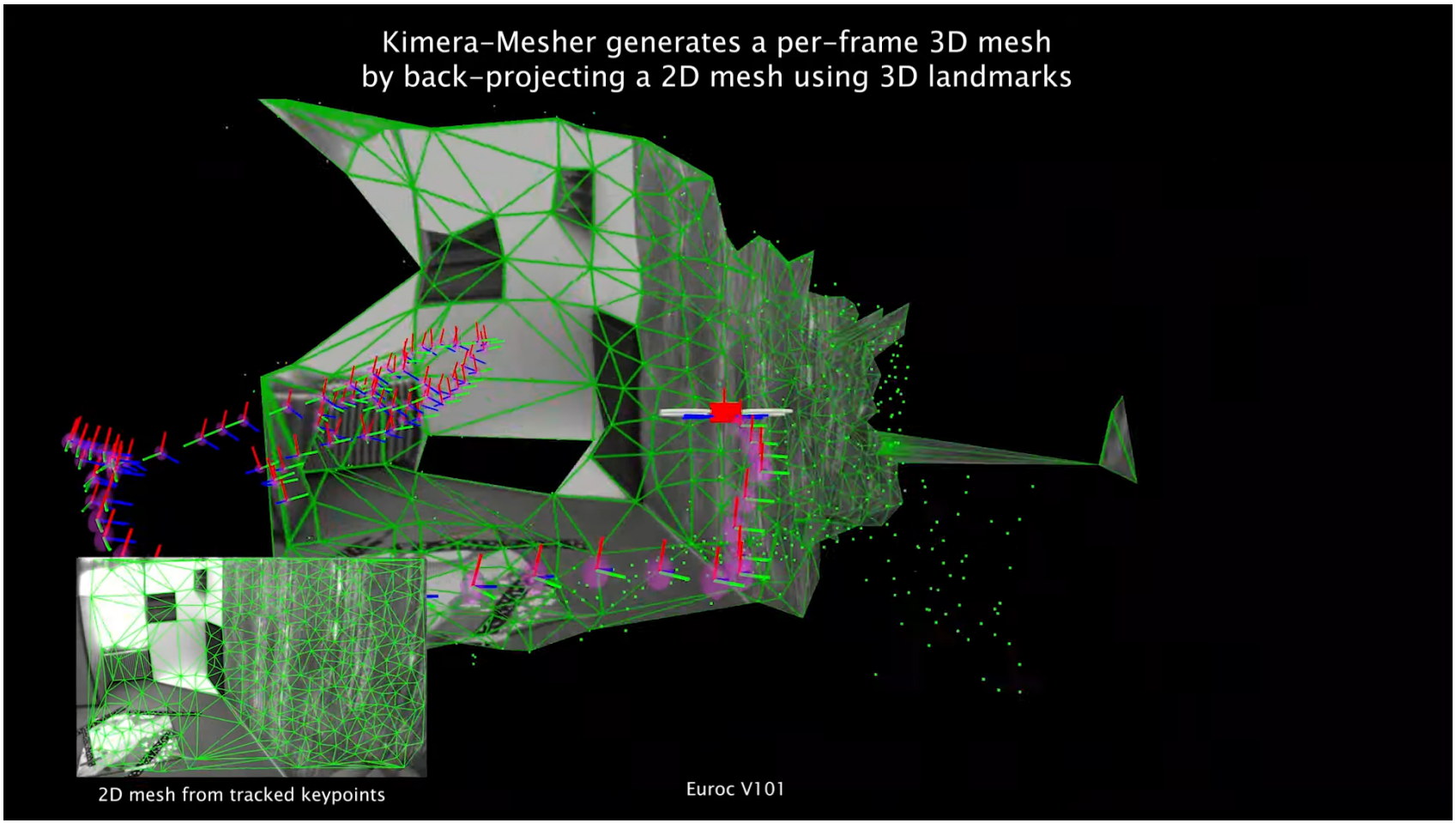
No loop-closure or bundle adjustment





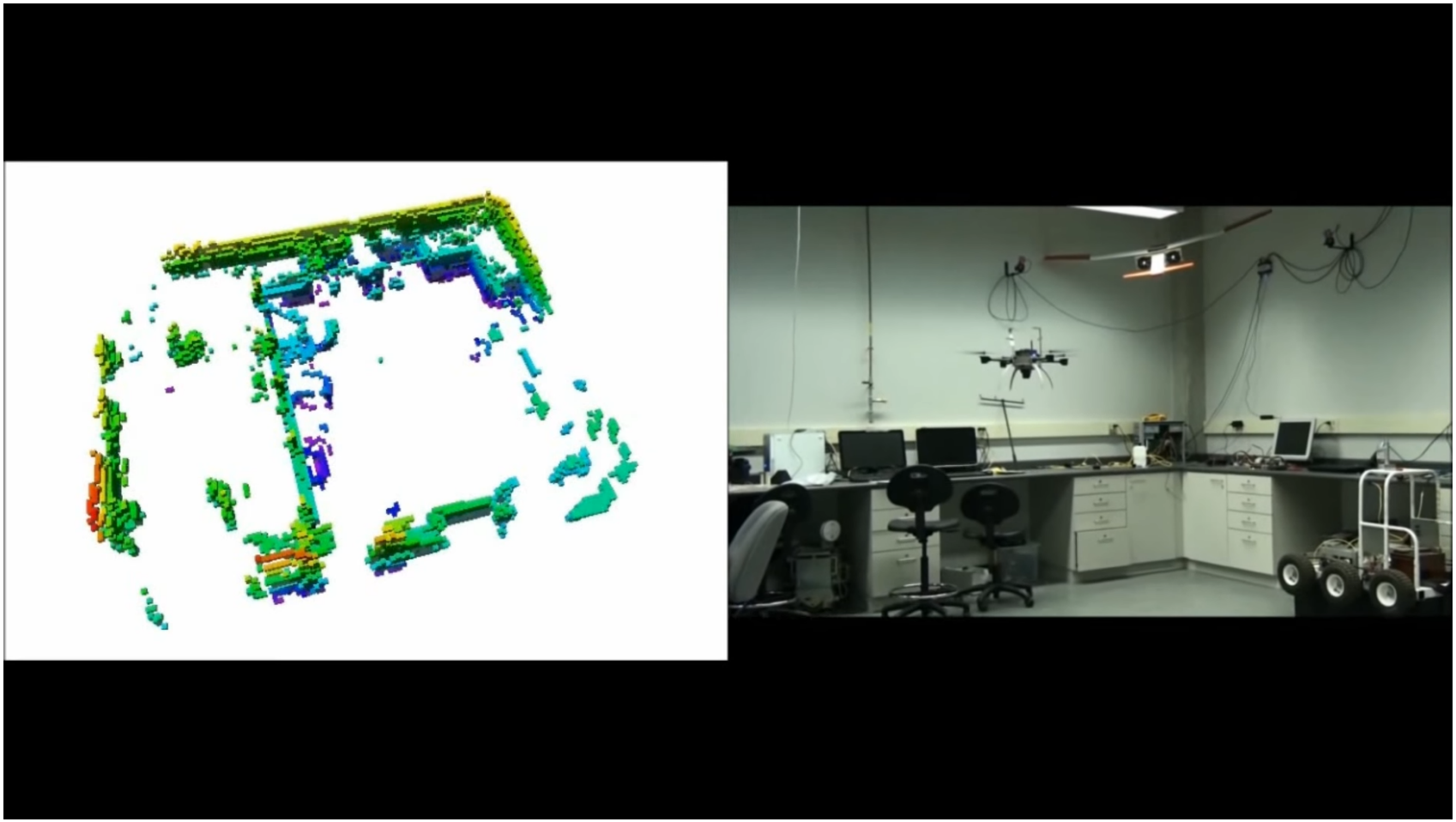
Map format – 3D mesh

- easily generated from point cloud map
- can be used for navigation
- becomes large once map points are too many



Map format – Octomap

- a tree with 8 children (octo tree)
- insert leaf nodes only if necessary
- update voxel occupancy by log-odds

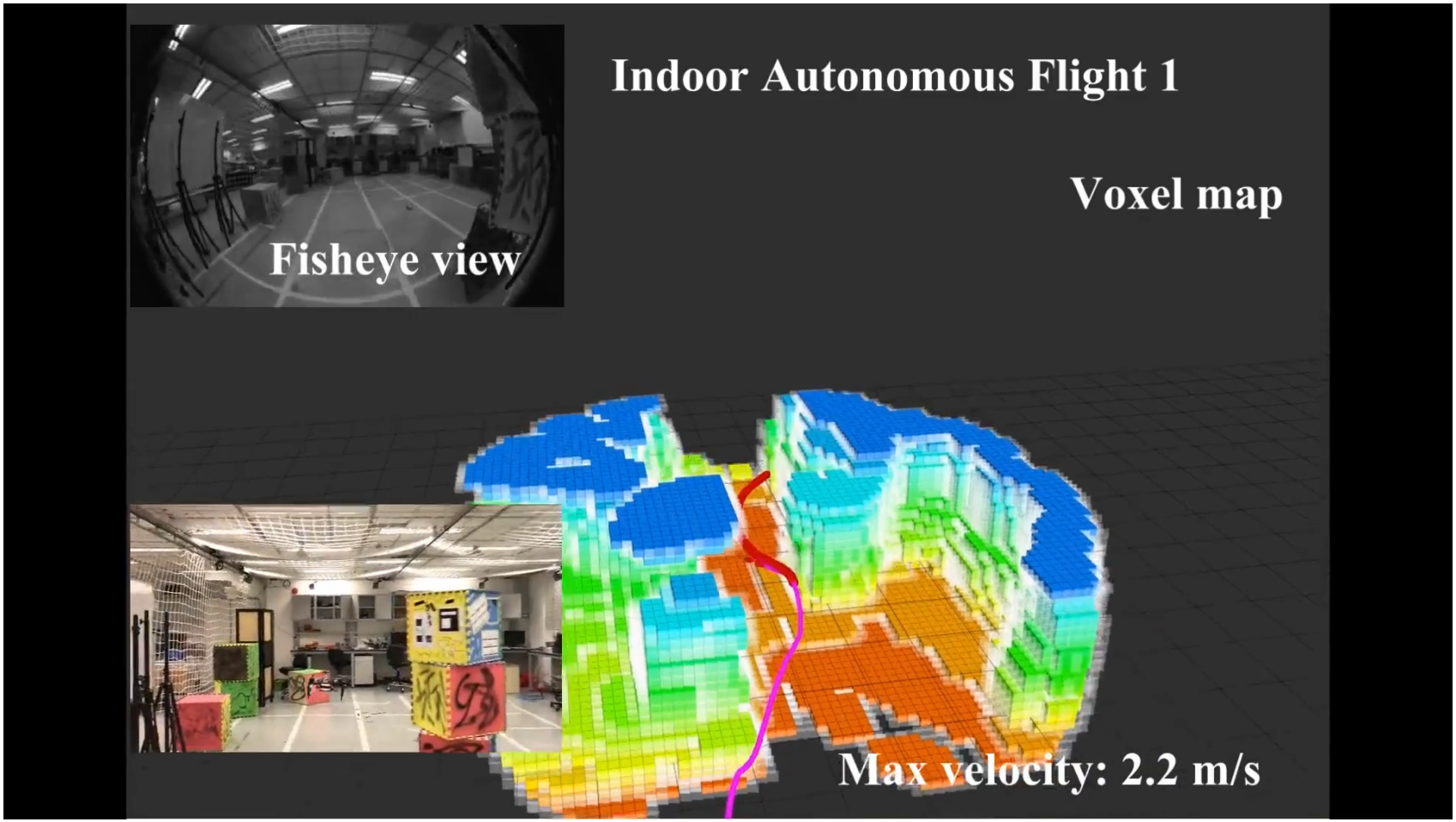


Another example: stereo camera

Map format – TSDF

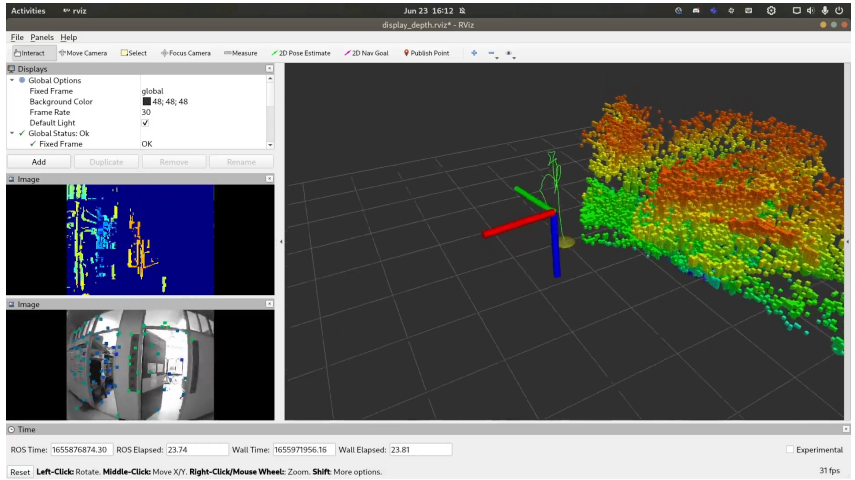
TSDF (Truncated Signed Distance Function)

- only cares about the surroundings
- good for map refinement
- needs a GPU



Map construction using Flowdep & Octomap

We first convert Flowdep depth image into point cloud, then feed it along with camera pose to the octomap server.



Conclusion:

- Flowdep is not good for detailed mapping
- but accurate enough to see obstacles

Future works:

- Investigate navigation algorithms
- Construct a standard test environment
- Algorithm compatibility with our hardware setup