San Francisco World: Leveraging Structural Regularity for Indoor 3-DoF Visual Compass

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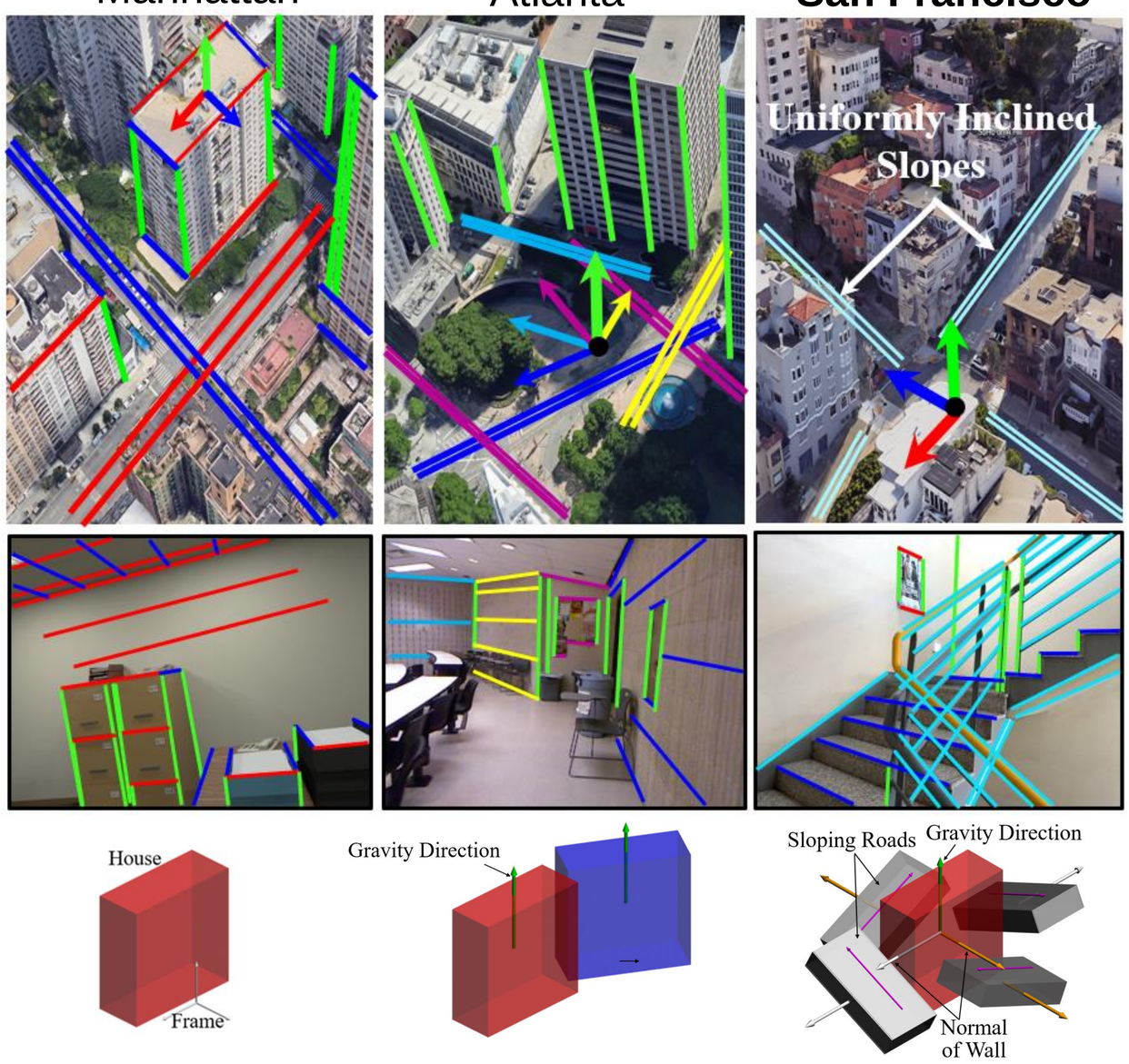
Motivation

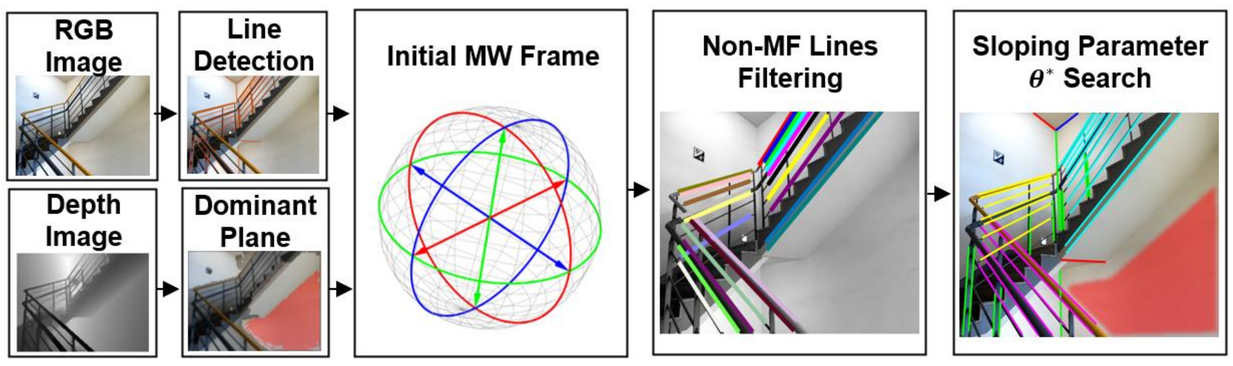


Contributions

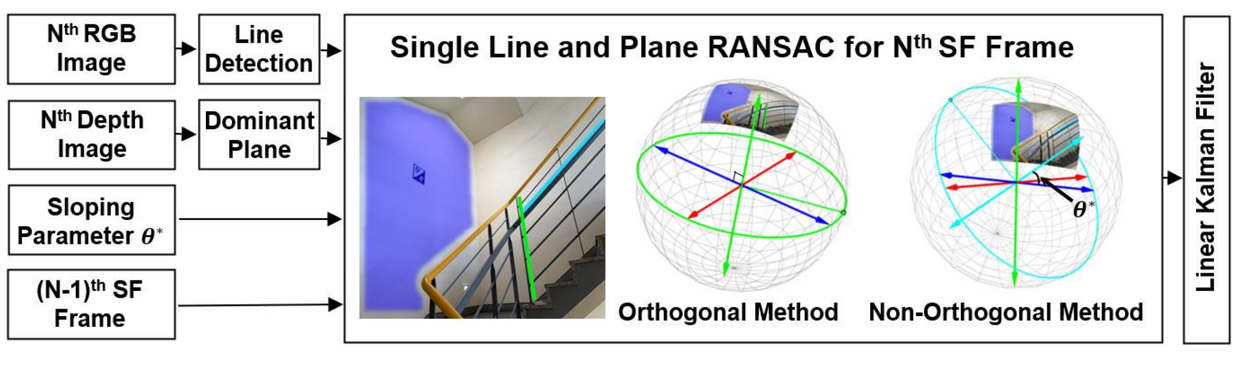
1. **A new and novel structural model, San Francisco world (SFW)** for structured environments with **uniformly inclined slopes**
2. **Drift-free rotational motion tracking** in SFW from **a single line and plane,** leveraging structural regularities
3. Evaluation on **our GIST-SFW dataset, the first dataset of sequential images in SFW, and TAMU staircase dataset.**

Our GIST-SFW RGBD Dataset

San Francisco World Detection

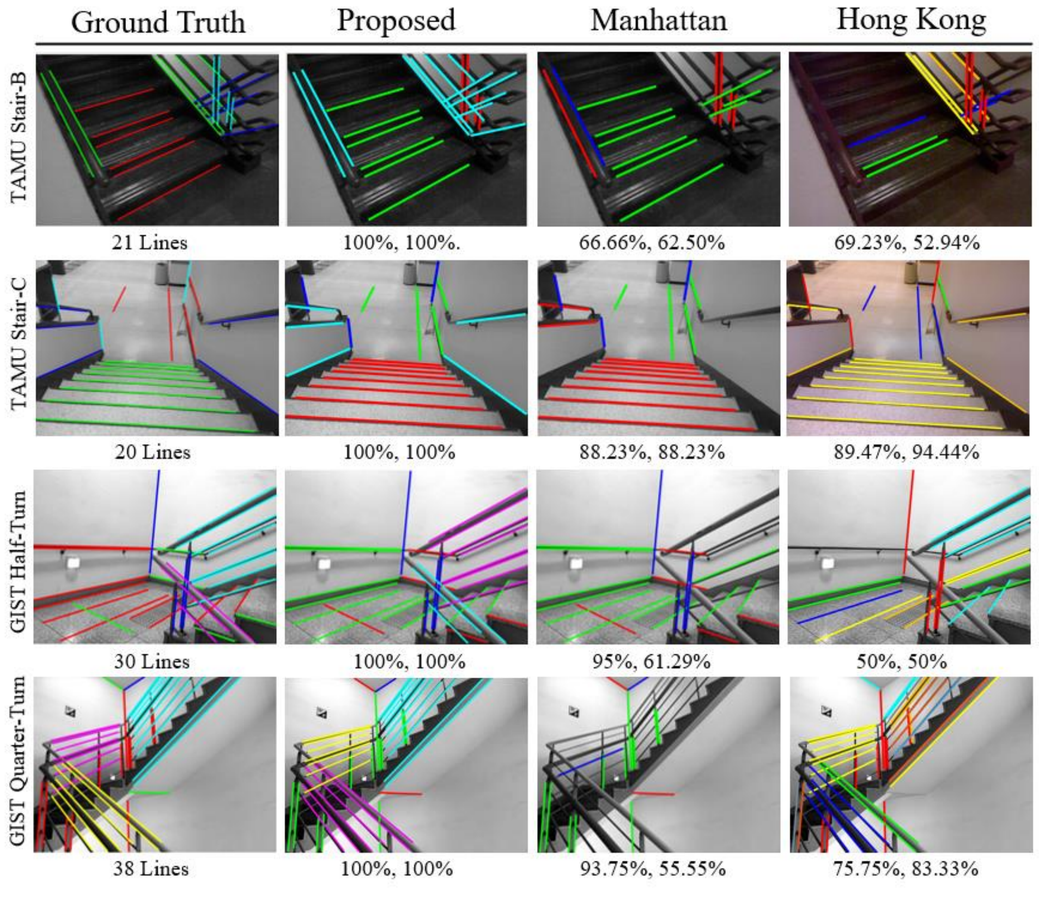


Visual Gyroscope in SFW



Evaluations

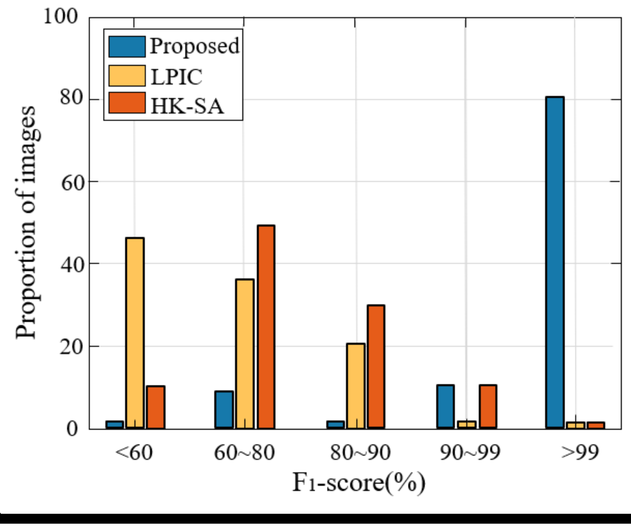
- Vanishing Point Detection & Line Clustering



- Quantitative Results - Absolute Rotation Error (ARE)

Proposed	LPVO	HK-SLAM	ORB-SLAM3	DROID-SLAM	LIMAP
0.68	×	×	5.45	2.07	1.00
1.19	×	×	16.08	4.09	1.92
0.96	×	×	10.67	3.13	1.02
1.21	×	×	15.98	5.76	1.79
1.18	×	×	27.52	12.10	×

- F1-Score of Line Clustering



- Statistical Distribution of ARE