

Multi-Robot Ground Texture SLAM with Communication-Efficient Data Sharing

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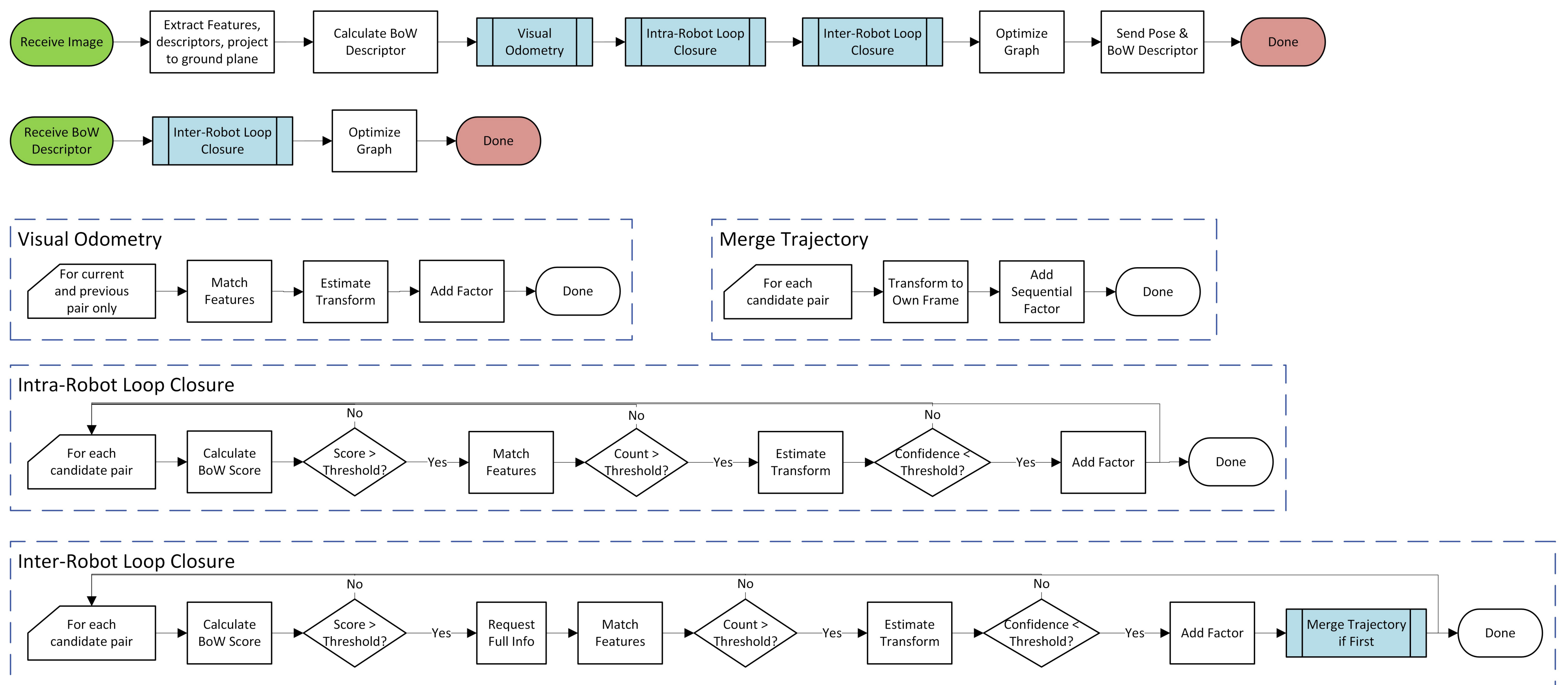
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Shipboard Visual SLAM



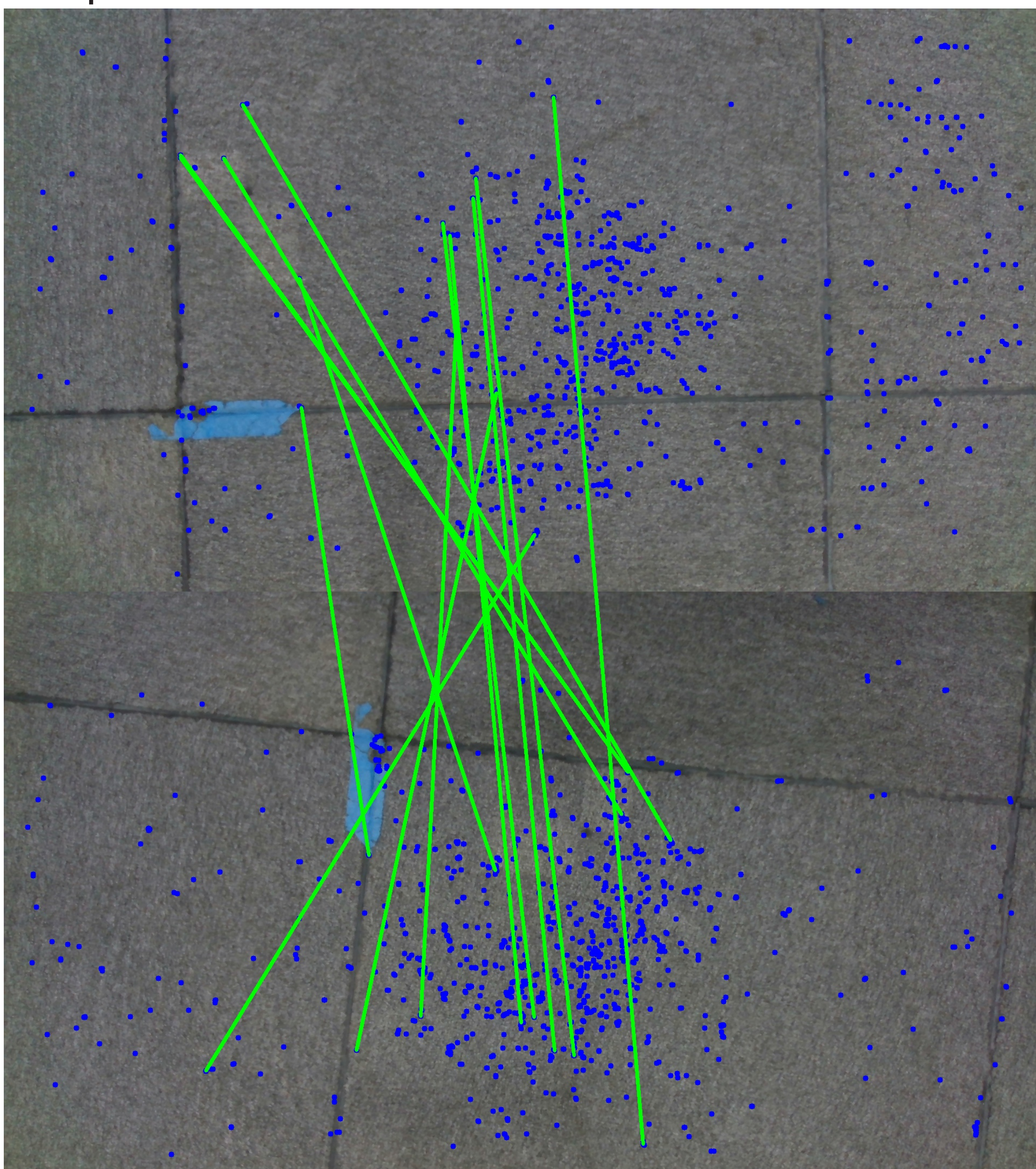
- No outward features
- No IMU or GPS
- Large operating area
- Many cooperative robots

Architecture

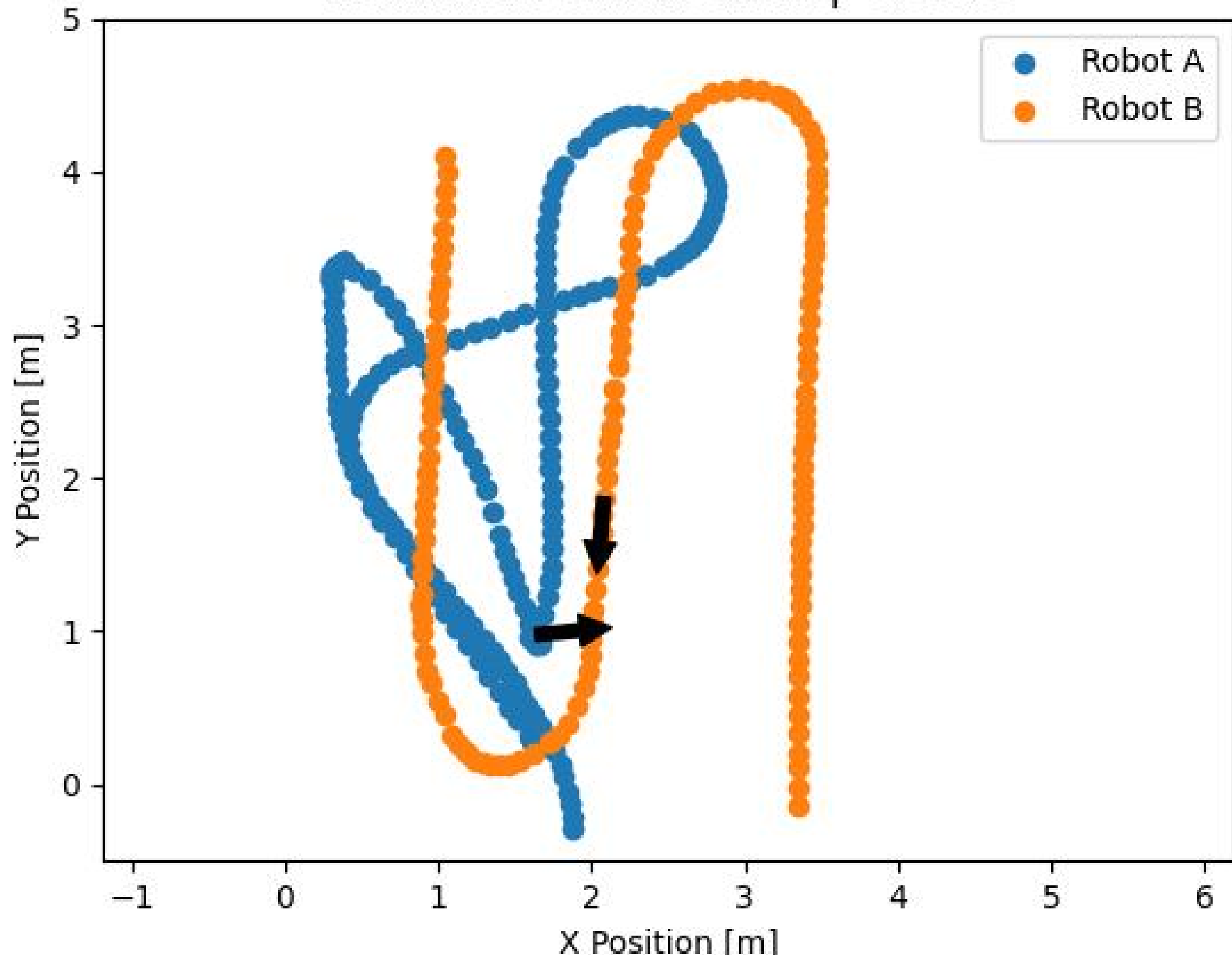


Representative Data

Robot with a downward-facing camera and motion capture markers is placed in environment to emulate multi-robot setup.

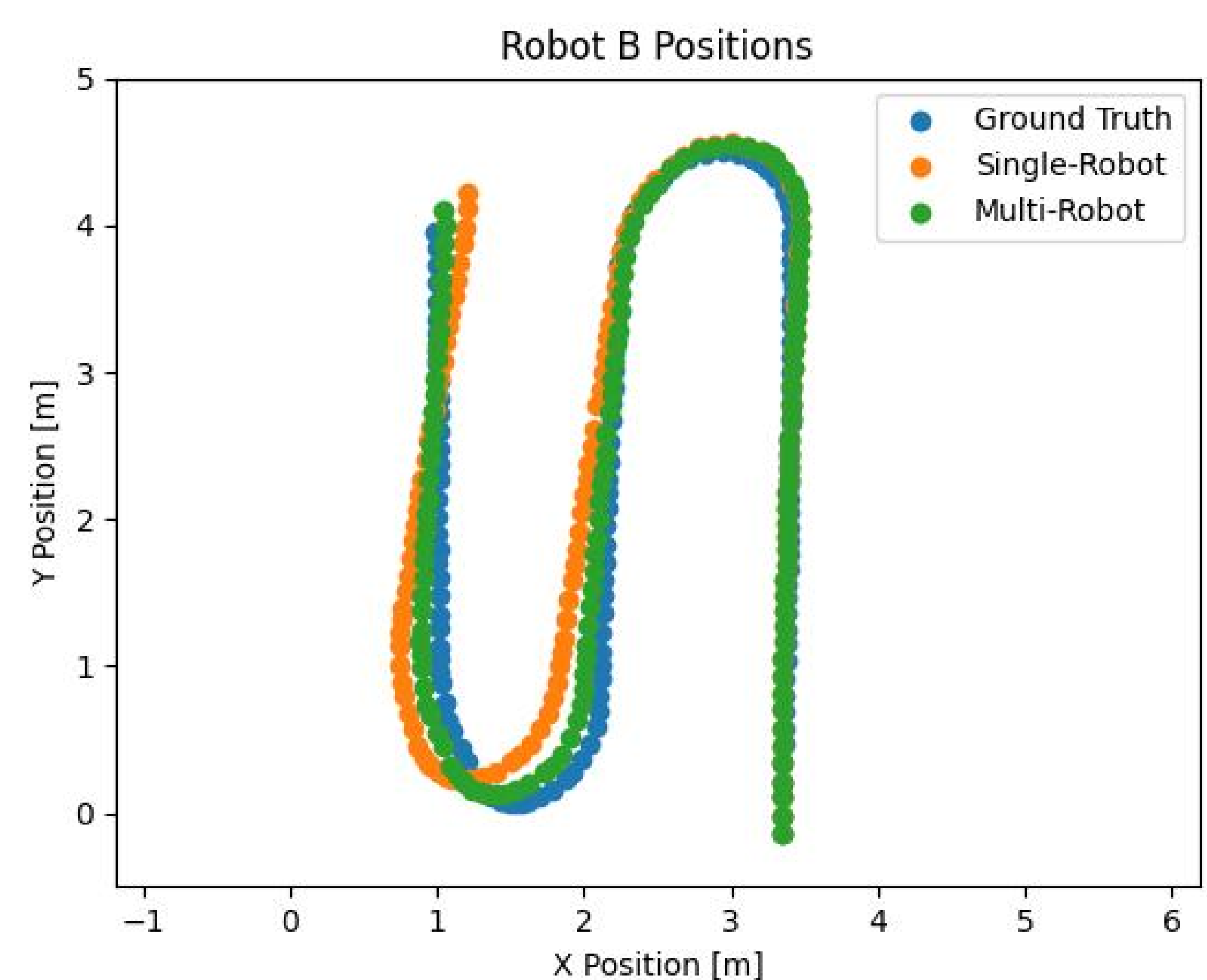
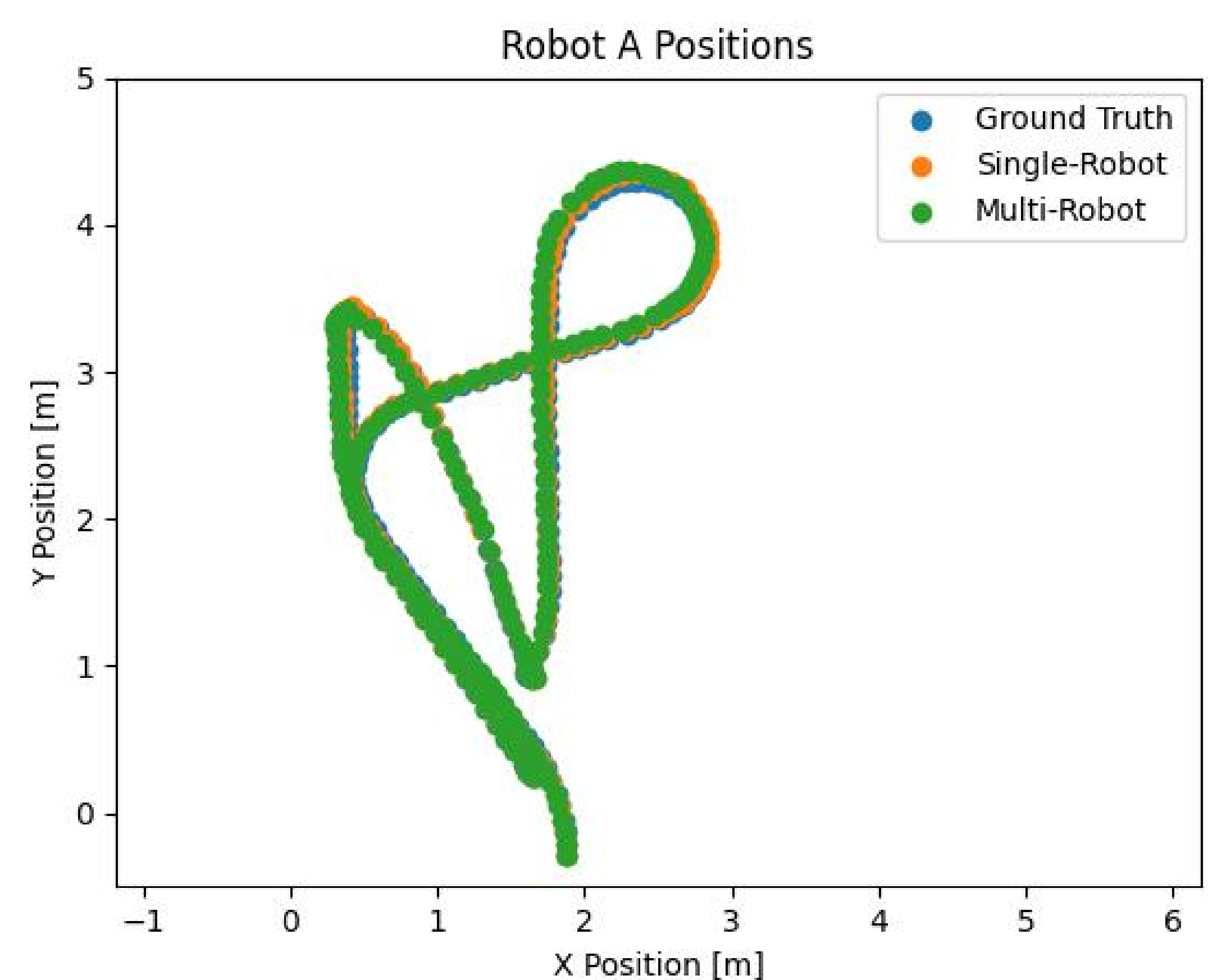


Estimated Positions at Loop Closure



Results

Compare SLAM accuracy with vs without information sharing. Ground truth via motion capture allows high-precision evaluation. Information sharing permits Robot B to improve accuracy despite no self loop closures.



Robot	Method	RMSE Position [m]	RMSE Orientation [rad]
A	Single	0.031	0.007
A	Multi	0.043	0.017
B	Single	0.249	0.121
B	Multi	0.114	0.056