

KYUNGMIN (JOHN) JUNG

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EXPERIENCE

Voyis

Sep 2021 – Present

Graduate Student Researcher (Manager: Ryan Wicks)

Waterloo, ON, Canada

- Engineered a real-time visual-inertial SLAM system fusing camera, DVL, IMU, and depth sensors within a continuous-time estimation framework for high-precision autonomous navigation.
- Deployed a deep-learned visual front-end accelerated via the ONNX runtime, significantly increasing local feature tracking reliability under severe visual degradation.
- Developed robust non-convex optimization strategies and 3D feature descriptors to improve ICP-based point cloud registration for subsea laser SLAM.
- Architected an end-to-end 3D spatial reconstruction pipeline leveraging visual odometry and dense stereo depth estimation within a Signed Distance Field (SDF) implicit map framework.

ARA Robotique

Sep 2019 – Aug 2021

Graduate Student Researcher (CTO: Guillaume Charland-Arcand)

Montreal, QC, Canada

- Designed and implemented a tightly-coupled LiDAR-inertial-visual SLAM state estimator for UAVs utilizing factor graph optimization.
- Formulated IMU preintegration on Lie groups (manifolds) and implemented consistent visual feature marginalization techniques to preserve map consistency and bounded runtime.
- Executed multi-sensor spatial/temporal intrinsic and extrinsic calibration routines via Kalibr, along with Allan variance stochastic modeling for IMU noise calibration.

Bell Flight

May 2018 – Aug 2018

Airframe Fatigue and Stress Analysis Intern (Manager: Pierre Drouin)

Montreal, QC, Canada

- Evaluated structural fatigue life and multi-axial stress concentrations on composite bolted joint assemblies under flight loads.
- Analyzed bypass and bearing stress distribution profiles across diverse composite laminate configurations.
- Developed an automated structural analysis tool to accelerate joint fatigue verification workflows for airframe design engineers.

PUBLICATIONS

- K. Jung, A. Bajwa, J. Yoo, A. D. C. Bernal, J. R. Forbes, “DIVO: Continuous-time DVL-Inertial-Visual Odometry for Unmanned Underwater Vehicles,” 2026, arXiv:2607.04615
- K. Jung, T. Hitchcox and J. R. Forbes, “Performance Evaluation of 3D Keypoint Detectors and Descriptors on Coloured Point Clouds in Subsea Environments,” in *Proc. 2023 IEEE International Conference on Robotics and Automation (ICRA)*, London, United Kingdom, 2023, pp. 1105-1111, doi: 10.1109/ICRA48891.2023.10160348.
- K. Jung, T. Hitchcox and J. R. Forbes, “An Adaptive Graduated Nonconvexity Loss Function for Robust Nonlinear Least-Squares Solutions,” in *IEEE Transactions on Robotics (T-RO)*, vol. 40, pp. 4207-4221, 2024, doi: 10.1109/TRO.2024.3434169.

TECHNICAL SKILLS

Languages & Tools: C++, Python, MATLAB, CUDA, ONNX Runtime, Linux, ROS/ROS2, CMake, Docker

Core Domains: SLAM, Multi-Sensor Fusion (LiDAR / Camera / IMU / Depth / DVL), Continuous-Time Estimation, Factor Graph Optimization (GTSAM and Ceres), 3D Reconstruction (SDF), Non-Convex Optimization, Sensor Calibration (Kalibr), Deep Learning Inference

EDUCATION

McGill University

Sep 2021 – Present

Doctor of Philosophy - Mechanical Engineering

Montreal, QC, Canada

Advisor: James Richard Forbes