

PATRICK F. GENEVA

(410) · 299 · 5502 ♦ pgeneva@udel.edu

<https://pgeneva.com/>

<https://github.com/goldbattle/>

EDUCATION

University of Delaware, Department of Computer Science

May 2025

Doctor of Philosophy Degree in Computer Science

Research in Robotics, State Estimation, and Computer Vision

University of Delaware, Department of Mechanical Engineering

May 2017

Bachelor Degree in Mechanical Engineering

Computer Science & Mathematics Minors

RESEARCH EXPERIENCE

University of Delaware - Dr. Guoquan Huang

Co-Advisor Dr. Christopher Rasmussen

June 2017 - May 2025

Graduate Research Assistant

Newark, DE

- Key study area in simultaneous localization and mapping (SLAM)
- Developing efficient localization algorithms for deployment on resource constrained devices.
- Exploring integration of machine learning with visual-inertial navigation systems (VINS)

University of Delaware - Dr. Guoquan Huang

May 2015 - May 2017

Undergraduate Researcher

Newark, DE

- Design and implement of visual-inertial navigation systems (VINS)
- Studied robotic 6 DoF localization and multi-session mapping.
- Worked with team to deliver localization system for autonomous vehicles

Jug Bay Wetlands Sanctuary - Dr. Patricia Delgado

June 2014 - August 2014

Research Assistant

Lothian, MD

- Assisted with representative sample collection for national climate change research
- Identified and recorded aquatic plant and biological species
- Collected data for ongoing state stream water chemical monitoring

WORK EXPERIENCE

Apple

June 2020 - September 2020

Internship

(Remote) Cupertino, CA

- Developed and improved state-of-the-art visual-inertial SLAM algorithms used in Apple products.
- Worked under supervision of Stergios Roumeliotis along with other team members to implement features within the codebase.

N3RDFUSION, Inc

July 2015 - August 2017

Web Designer & Developer

(Remote) Seattle, WA

- Designed and implemented a charity system, receiving \$1.2M in total donations
- Integrated and coordinated with remote team and external sponsors
- Deployed and managed PHP-based system in a production environment ($\approx 35k$ LOC)

University of Delaware Student Centers

September 2013 - July 2015

AV Technician

Newark, DE

- Provided video-audio technical equipment support for the execution of events
- Coordinated with clients and resolved unforeseen problems during events

Soartex Fanver / Invictus Graphics

May 2012 - September 2015

Web Designer & Developer

(Remote) Global

- Created a Minecraft modded texture system for applying texture patches
- Design and implemented a CMS, user system, and continuous integration build system

Jug Bay Wetlands Sanctuary

June 2014 - August 2014

Web Designer & Developer

Lothian, MD

- Co-lead for QR-code project developed to introduce an enhanced trail experience
- Design and developed a lightweight mobile website for serving visual-audio elements
- Created and edited training videos on both QR-code system and main website

OPEN SOURCE RESEARCH CODE

MINS: Efficient and Robust Multisensor-aided Inertial Navigation System 2025

- Source repository: <https://github.com/rpng/MINS>
- Open sourced state-of-the-art Multisensor-aided Inertial Navigation System (MINS) which employs a continuous-time state representation reducing computational complexity.
- Can support VINS (mono, stereo, multi-cam), GPS-IMU (single, multiple), LiDAR-IMU (single, multiple), and Wheel odometry all with full state state calibration and robust estimation.

ov_plane: Vicon-IMU fusion for groundtruth trajectory generation 2023

- Source repository: https://github.com/rpng/ov_plane
- Released dataset: https://github.com/rpng/ar_table_dataset
- Real-time visual-inertial odometry (builds on OpenVINS) which detects environmental planes and then leverages them for applying planar regularities across sparse point features.

vicon2gt: Vicon-IMU fusion for groundtruth trajectory generation 2020

- Source repository: <https://github.com/rpng/vicon2gt>
- Utilities which fuses 6 DoF poses and inertial information to generate groundtruth trajectories for evaluating visual-inertial algorithms.
- Spacial-temporal calibration parameters between the two sensors is performed along with estimate of the motion capture world frame to gravity aligned.

OpenVINS: An open source platform for visual-inertial navigation research 2019

- Source repository: https://github.com/rpng/open_vins
- Open-source modular on-manifold visual-inertial sliding window extended Kalman filter.
- Supports monocular and stereo, SLAM features, First-Estimates Jacobians, visual-inertial simulator, evaluate suite, camera intrinsic and extrinsic calibration and IMU-camera time offset.

- Heavy documentation to support rapid development and research on top of the codebase and detailed derivations of implementation: <https://docs.openvins.com/>

CPI: Closed-form Preintegration for Graph-based Visual-Inertial Navigation 2018

- Source repository: <https://github.com/rpng/cpi>
- Open-source IMU preintegration code from “Closed-form Preintegration Methods for Graph-based Visual-Inertial Navigation” published in the International Journal of Robotics Research.
- Contains a simulator to test existing discrete method to the proposed different preintegration models.

LIPS: LiDAR-Inertial 3D Plane Simulator 2018

- Source repository: <https://github.com/rpng/lips>
- Open-source LiDAR-inertial simulator from “LIPS: LiDAR-Inertial 3D Plane SLAM” published in the International Conference on Intelligent Robots and Systems..
- Contains simulator for generating LiDAR clouds and inertial measurements in an indoor environment.

HONORS AND AWARDS

- Delaware Space Grant (DESG) Graduate Fellowship
NASA DE Space Grant/NASA DE EPSCoR 2019, 2022
- University Doctoral Fellowship Award
University of Delaware 2021
- IROS 2019 FPV Drone Racing VIO Competition – 1st Place
University of Zurich, Switzerland 2019
- Mary and George Nowinski Award for Excellence in Undergraduate Research
University of Delaware 2017
- ASME Outstanding Senior Design Award - Team FSAE Chassis
University of Delaware 2017
- University of Delaware Dean’s List
University of Delaware 2013 - 2017
- University of Delaware Scholar Scholarship
University of Delaware 2013 - 2017
- Undergraduate Research Summer Scholars
University of Delaware 2015 - 2016
- Eagle Scout
Boy Scouts of America 2010

TECHNICAL STRENGTHS

Computer Languages	C++, CUDA, PHP, Python
Markups & APIs	HTML, CSS, JSON, REST, SQL
Data Processing	MATLAB, Microsoft Excel
Tools & Externals	Git, Github, Microsoft Office Products

RESEARCH PUBLICATIONS

Journal Papers

- [J8] Lee, W., **Geneva, P.**, Chen, C., Huang, G., “MINS: Efficient and Robust Multisensor-aided Inertial Navigation System”. In: *Journal of Field Robotics* (2025). URL: <https://github.com/rpng/MINS>.
- [J7] Merrill, N.*, **Geneva, P.***, Katragadda, S., Chen, C., Huang, G., “Fast and Robust Learned Single-View Depth-aided Monocular Visual-Inertial Initialization”. In: *International Journal of Robotics Research* (2024). *equal contribution.
- [J6] Yang, Y., **Geneva, P.**, Zuo, X., Huang, G., “Online Self-Calibration for Visual-Inertial Navigation Systems: Models, Analysis and Degeneracy”. In: *IEEE Transactions on Robotics* (2023).
- [J5] Eckenhoff, K., **Geneva, P.**, Huang, G., “MIMC-VINS: A Versatile and Resilient Multi-IMU Multi-Camera Visual-Inertial Navigation System”. In: *IEEE Transactions on Robotics* 37.5 (2021), pp. 1360–1380.
- [J4] Zuo, X.*, **Geneva, P.***, Yang, Y., Ye, W., Liu, Y., Huang, G., “Visual-Inertial Localization with Prior LiDAR Map Constraints”. In: *IEEE Robotics and Automation Letters* 4.4 (2019), pp. 3394–3401. *equal contribution.
- [J3] Eckenhoff, K., Yang, Y., **Geneva, P.**, Huang, G., “Tightly-Coupled Visual-Inertial Localization and 3D Rigid-Body Target Tracking”. In: *IEEE Robotics and Automation Letters* 4.2 (2019), pp. 1541–1548.
- [J2] Yang, Y., **Geneva, P.**, Eckenhoff, K., Huang, G., “Degenerate Motion Analysis for Aided INS with Online Spatial and Temporal Calibration”. In: *IEEE Robotics and Automation Letters* 4.2 (2019), pp. 2070–2077.
- [J1] Eckenhoff, K., **Geneva, P.**, Huang, G., “Closed-form Preintegration Methods for Graph-based Visual-Inertial Navigation”. In: *The International Journal of Robotics Research* 38.5 (2019), pp. 563–586.

Conference Papers

- [C28] Katragadda, S., Lee, W., Peng, Y., **Geneva, P.**, Chen, C., Guo, C., Li, M., Huang, G., “NeRF-VINS: A Real-time Neural Radiance Field Map-based Visual-Inertial Navigation System”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. 2024, pp. 10230–10237.
- [C27] Burgul, C., Lee, W., **Geneva, P.**, Huang, G., “Online Determination of Legged Kinematics”. In: *Proc. of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. Abu Dhabi, UAE, 2024, pp. 9043–9049.
- [C26] Chen, C., **Geneva, P.**, Peng, Y., Lee, W., Huang, G., “Optimization-based VINS: Consistency, Marginalization, and FEJ”. In: *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2023, pp. 1517–1524.
- [C25] Chen, C.*, **Geneva, P.***, Peng, Y., Lee, W., Huang, G., “Monocular Visual-Inertial Odometry with Planar Regularities”. In: *2023 International Conference on Robotics and Automation (ICRA)*. London, UK, 2023. URL: https://github.com/rpng/ov_plane. *equal contribution.
- [C24] Chen, C.*, Yang, Y.*, **Geneva, P.**, Lee, W., Huang, G., “Visual-Inertial-Aided Online MAV System Identification”. In: *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. Kyoto, Japan, 2022, pp. 6277–6284. *equal contribution.
- [C23] **Geneva, P.**, Huang, G., “Map-based Visual-Inertial Localization: A Numerical Study”. In: *2022 International Conference on Robotics and Automation (ICRA)*. IEEE. Philadelphia, USA, 2022, pp. 7973–7979.
- [C22] Chen, C., Yang, Y., **Geneva, P.**, Huang, G., “FEJ2: A Consistent Visual-Inertial State Estimator Design”. In: *2022 International Conference on Robotics and Automation (ICRA)*. IEEE. Philadelphia, USA, 2022, pp. 9506–9512.
- [C21] Lee, W., **Geneva, P.**, Yang, Y., Huang, G., “Tightly-coupled GNSS-aided Visual-Inertial Localization”. In: *2022 International Conference on Robotics and Automation (ICRA)*. IEEE. 2022, pp. 9484–9491.

- [C20] Zhu, P.*, **Geneva, P.***, Ren, W., Huang, G., “Distributed Visual-Inertial Cooperative Localization”. In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. Prague, Czech Republic, 2021, pp. 8714–8721. **equal contribution*.
- [C19] Merrill, N.*, **Geneva, P.***, Huang, G., “Robust monocular visual-inertial depth completion for embedded systems”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. Xi’an, China, 2021, pp. 5713–5719. **equal contribution*.
- [C18] Yang, Y., **Geneva, P.**, Zuo, X., Huang, G., “Online IMU Intrinsic Calibration: Is It Necessary?” In: *Robotics: Science and Systems XVI. Robotics: Science and Systems Foundation*. Paris, France, 2020.
- [C17] **Geneva, P.***, Merrill, N.*, Yang, Y., Chen, C., Lee, W., Huang, G., “Versatile 3D Multi-Sensor Fusion for Lightweight 2D Localization”. In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. Las Vegas, NV, 2020, pp. 4513–4520. **equal contribution*.
- [C16] Zuo, X., Yang, Y., **Geneva, P.**, Lv, J., Liu, Y., Huang, G., Pollefeys, M., “LIC-Fusion 2.0: LiDAR-Inertial-Camera Odometry with Sliding-Window Plane-Feature Tracking”. In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. Las Vegas, NV, 2020, pp. 5112–5119.
- [C15] Lee, W., Ekenhoff, K., Yang, Y., **Geneva, P.**, Huang, G., “Visual-Inertial-Wheel Odometry with Online Calibration”. In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. Las Vegas, NV, 2020, pp. 4559–4566.
- [C14] **Geneva, P.**, Ekenhoff, K., Lee, W., Yang, Y., Huang, G., “OpenVINS: A Research Platform for Visual-Inertial Estimation”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. Paris, France, 2020, pp. 4666–4672. URL: https://github.com/rpng/open_vins.
- [C13] Ekenhoff, K., **Geneva, P.**, Merrill, N., Huang, G., “Schmidt-EKF-based Visual-Inertial Moving Object Tracking”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. Paris, France, 2020, pp. 651–657.
- [C12] Lee, W., Ekenhoff, K., **Geneva, P.**, Huang, G., “Intermittent GPS-aided VIO: Online Initialization and Calibration”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. 2020, pp. 5724–5731.
- [C11] Zuo, X., **Geneva, P.**, Lee, W., Liu, Y., Huang, G., “LIC-Fusion: LiDAR-Inertial-Camera Odometry”. In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2019, pp. 5848–5854.
- [C10] Yang, Y., **Geneva, P.**, Ekenhoff, K., Huang, G., “Visual-Inertial Navigation with Point and Line Features”. In: *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. Macau, China, 2019, pp. 2447–2454.
- [C9] **Geneva, P.**, Maley, J., Huang, G., “An Efficient Schmidt-EKF for 3D Visual-Inertial SLAM”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. Long Beach, CA, 2019, pp. 12105–12115.
- [C8] **Geneva, P.**, Ekenhoff, K., Huang, G., “A Linear-Complexity EKF for Visual-Inertial Navigation with Loop Closures”. In: *International Conference on Robotics and Automation (ICRA)*. IEEE. Montreal, Canada, 2019, pp. 3535–3541.
- [C7] Ekenhoff, K., **Geneva, P.**, Bloecker, J., Huang, G., “Multi-Camera Visual-Inertial Navigation with Online Intrinsic and Extrinsic Calibration”. In: *International Conference on Robotics and Automation (ICRA)*. IEEE. Montreal, Canada, 2019, pp. 3158–3164.
- [C6] Ekenhoff, K., **Geneva, P.**, Huang, G., “Sensor-Failure-Resilient Multi-IMU Visual-Inertial Navigation”. In: *International Conference on Robotics and Automation (ICRA)*. IEEE. Montreal, Canada, 2019, pp. 3542–3548.
- [C5] Yang, Y., **Geneva, P.**, Zuo, X., Ekenhoff, K., Liu, Y., Huang, G., “Tightly-Coupled Aided Inertial Navigation with Point and Plane Features”. In: *International Conference on Robotics and Automation (ICRA)*. IEEE. Montreal, Canada, 2019, pp. 6094–6100.

- [C4] **Geneva, P.**, Eckenhoff, K., Yang, Y., Huang, G., “LIPS: LiDAR-Inertial 3D Plane SLAM”. In: *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE. Madrid, Spain, 2018, pp. 123–130.
- [C3] **Geneva, P.**, Eckenhoff, K., Huang, G., “Asynchronous Multi-Sensor Fusion for 3D Mapping and Localization”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. Brisbane, Australia, 2018, pp. 5994–5999.
- [C2] Eckenhoff, K., **Geneva, P.**, Huang, G., “Direct Visual-Inertial Navigation with Analytical Preintegration”. In: *IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. Singapore, 2017, pp. 1429–1435.
- [C1] Eckenhoff, K., **Geneva, P.**, Huang, G., “High-Accuracy Preintegration for Visual-Inertial Navigation”. In: *Proc. of International Workshop on the Algorithmic Foundations of Robotics*. San Francisco, CA, 2016.

Workshop Papers

- [W3] Yang, Y., Lee, W., Osteen, P., **Geneva, P.**, Zuo, X., Huang, G., “iCalib: Inertial Aided Multi-Sensor Calibration”. In: *Workshop on Visual-Inertial Navigation Systems*. 2021.
- [W2] **Geneva, P.**, Eckenhoff, K., Lee, W., Yang, Y., Huang, G., “OpenVINS: A Research Platform for Visual-Inertial Estimation”. In: *Workshop on Visual-Inertial Navigation: Challenges and Applications*. Macau, China, Nov. 2019. URL: https://github.com/rpng/open_vins.
- [W1] **Geneva, P.**, Eckenhoff, K., Huang, G., “Asynchronous Multi-Sensor Fusion for 3D Mapping and Localization”. In: *Proc. of the 9th Workshop on Planning, Perception and Navigation for Intelligent Vehicles*. Vancouver, Canada, Sept. 2017.

Technical Reports

- [R24] Katragadda, S., Lee, W., Peng, Y., **Geneva, P.**, Chen, C., Huang, G., *NeRF-VINS: A Real-time Neural Radiance Field Map-based Visual-Inertial Navigation System*. Tech. rep. RPNG-2023-NERF. University of Delaware, 2023. URL: https://pgeneva.com/downloads/reports/tr_nerf.pdf.
- [R23] Chen, C., **Geneva, P.**, Peng, Y., Lee, W., Huang, G., *Optimization-based VINS: Consistency, Marginalization, and FEJ*. Tech. rep. RPNG-2023-GRAPH. University of Delaware, 2023. URL: https://pgeneva.com/downloads/reports/tr_graph.pdf.
- [R22] Burgul, C., **Geneva, P.**, Lee, W., Huang, G., *Leg Kinematic Inertial Navigation*. Tech. rep. RPNG-2022-Kinematic-inertial-navigation. University of Delaware, 2022. URL: https://pgeneva.com/downloads/reports/tr_legged.pdf.
- [R21] Yang, Y., **Geneva, P.**, Zu, X., Huang, G., *Online Self-Calibration for Visual-Inertial Navigation Systems: Models, Analysis and Degeneracy*. Tech. rep. RPNG-2022-FullCalib. University of Delaware, 2022. URL: https://pgeneva.com/downloads/reports/tr_fullcalib.pdf.
- [R20] **Geneva, P.**, Huang, G., *Map-based Visual-Inertial Localization: A Numerical Study*. Tech. rep. RPNG-2022-MAPPING. University of Delaware, 2022. URL: https://pgeneva.com/downloads/reports/tr_mapping.pdf.
- [R19] **Geneva, P.**, Huang, G., *OpenVINS State Initialization: Details and Derivations*. Tech. rep. RPNG-2022-INIT. University of Delaware, 2022. URL: https://pgeneva.com/downloads/reports/tr_init.pdf.
- [R18] Chen, C., Yang, Y., **Geneva, P.**, Huang, G., *Supplementary Materials: Visual-Inertial-aided Online MAV System Identification*. Tech. rep. RPNG-2022-MAV. University of Delaware, 2022. URL: https://pgeneva.com/downloads/reports/tr_mav.pdf.
- [R17] Chen, C., Yang, Y., **Geneva, P.**, Huang, G., *Technical Report FEJ2-EKF: A Consistent Visual-Inertial State Estimator Design*. Tech. rep. RPNG-2022-FEJ2. University of Delaware, 2022. URL: https://pgeneva.com/downloads/reports/tr_fej2.pdf.

- [R16] Yang, Y., **Geneva, P.**, Huang, G., *Multi-Visual-Inertial Sensor Calibration: Algorithm and Analysis*. Tech. rep. RPNG-2021-MVIS. University of Delaware, 2021. URL: https://pgeneva.com/downloads/reports/tr_mvis.pdf.
- [R15] **Geneva, P.**, Huang, G., *vicon2gt: Derivations and Analysis*. Tech. rep. RPNG-2020-VICON2GT. University of Delaware, 2020. URL: http://udel.edu/~ghuang/papers/tr_vicon2gt.pdf.
- [R14] Yang, Y., **Geneva, P.**, Zuo, X., Huang, G., *Supplementary Materials: Online IMU Intrinsic Calibration: Is it Necessary?* Tech. rep. University of Delaware, 2020. URL: https://pgeneva.com/downloads/reports/tr_intrinsic.pdf.
- [R13] Lee, W., Eckenhoff, K., Yang, Y., **Geneva, P.**, Chen, C., Huang, G., *Visual-Inertial-Wheel Odometry with Online Calibration*. Tech. rep. RPNG-2020-VIWO. University of Delaware, 2020. URL: https://pgeneva.com/downloads/reports/tr_wheel-vio.pdf.
- [R12] Zuo, X., Yang, Y., **Geneva, P.**, Lv, J., Liu, Y., Huang, G., Pollefeys, M., *Technique Report of LIC-Fusion 2.0: LiDAR-Inertial-Camera Odometry with Sliding-Window Plane-Feature Tracking*. Tech. rep. Tech Report-2020-LICFusion2. University of Delaware, 2020. URL: https://pgeneva.com/downloads/reports/tr_lic2.pdf.
- [R11] **Geneva, P.**, Eckenhoff, K., Lee, W., Yang, Y., Huang, G., *OpenVINS Performance Evaluation on 2019 FPV Drone Racing VIO Dataset*. Tech. rep. IROS 2019 FPV Drone Racing VIO Competition. 2019. URL: <https://rpg.ifi.uzh.ch/uzh-fpv/IROS2019/reports/Geneva-Delaware.pdf>.
- [R10] Lee, W., Eckenhoff, K., **Geneva, P.**, Huang, G., *GPS-aided Visual-Inertial Navigation in Large-scale Environments*. Tech. rep. RPNG-2019-GPSVIO. University of Delaware, 2019. URL: https://pgeneva.com/downloads/reports/tr_gps-vio.pdf.
- [R9] **Geneva, P.**, Eckenhoff, K., Huang, G., *Complexity Analysis: A Linear-Complexity EKF for Visual-Inertial Navigation with Loop Closures*. Tech. rep. RPNG-2019-LOOP. University of Delaware, 2019. URL: https://pgeneva.com/downloads/reports/tr_loop.pdf.
- [R8] Eckenhoff, K., **Geneva, P.**, Bloecker, J., Huang, G., *Measurement Jacobians for Multi-Camera Visual-Inertial Navigation*. Tech. rep. RPNG-2019-MC. University of Delaware, 2019. URL: https://pgeneva.com/downloads/reports/tr_mc-vins.pdf.
- [R7] Yang, Y., Eckenhoff, K., **Geneva, P.**, Huang, G., *Observability Analysis for Tightly-Coupled Visual-Inertial Rigidbody Target Tracking*. Tech. rep. RPNG-2018-OBSTT. University of Delaware, 2018. URL: https://pgeneva.com/downloads/reports/tr_target.pdf.
- [R6] Yang, Y., **Geneva, P.**, Eckenhoff, K., Huang, G., *Degenerate Motion Analysis for Aided INS with Online Spatial and Temporal Calibration*. Tech. rep. RPNG-2018-CALIB. University of Delaware, 2018. URL: https://pgeneva.com/downloads/reports/tr_calib.pdf.
- [R5] Yang, Y., **Geneva, P.**, Zuo, X., Eckenhoff, K., Liu, Y., Huang, G., *Tightly-Coupled Aided Inertial Navigation with Point and Plane Features*. Tech. rep. RPNG-2018-VINPP. University of Delaware, 2018. URL: https://pgeneva.com/downloads/reports/tr_vinpp.pdf.
- [R4] Eckenhoff, K., **Geneva, P.**, Huang, G., *Continuous Preintegration Theory for Visual-Inertial Navigation*. Tech. rep. RPNG-2018-CPI. University of Delaware, 2018. URL: https://pgeneva.com/downloads/reports/tr_cpi.pdf.
- [R3] **Geneva, P.**, Eckenhoff, K., Yang, Y., Huang, G., *LIPS: Lidar Inertial 3D Plane SLAM*. Tech. rep. RPNG-2018-LIPS. University of Delaware, 2018. URL: https://pgeneva.com/downloads/reports/tr_lips.pdf.
- [R2] **Geneva, P.**, Eckenhoff, K., Huang, G., *Asynchronous Multi-Sensor Fusion for 3D Mapping and Localization*. Tech. rep. RPNG-2017-ASYNC. University of Delaware, 2017. URL: https://pgeneva.com/downloads/reports/tr_async.pdf.
- [R1] Eckenhoff, K., **Geneva, P.**, Huang, G., *High-Accuracy Preintegration for Visual Inertial Navigation*. Tech. rep. RPNG-2016-HAPI. University of Delaware, 2016. URL: https://pgeneva.com/downloads/reports/tr_hapi.pdf.