

# Chuchu Chen

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## Education & Training

- 2020-Present **PhD Mechanical Engineering**, *University of Delaware, Newark, DE.*  
Advisor: Dr. Guoquan (Paul) Huang
- 2021-Present **MS Computer & Information Science**, *University of Delaware, Newark, DE.*  
Advisor: Dr. Guoquan (Paul) Huang, Dr. Bert Tanner
- 2017 **MS Mechanical Engineering**, *University of Delaware, Newark, DE.*  
Advisor: Dr. Bert Tanner
- 2013 **BS Mechanical Engineering**, *Harbin Engineering University, Harbin, China.*

## Professional Experience

- 2020-Present **Research Assistant** *University of Delaware*  
[1] Consistent Visual-inertial Navigation systems (VINS)  
[2] Nonlinear state estimation and optimization theory  
[3] Simultaneous localization and mapping (SLAM)  
[4] Sensor calibration and fusion  
[5] Scene understanding, spatial computing, deep learning
- 2019-2020 **Teaching Assistant** *University of Delaware*  
2019F MEEG 311: Vibration and Control  
2020S/2023S MEEG 677: Estimation I

## Awards & Honors

- 2024 **Best Paper Award Finalist (Robot Vision)**  
International Conference on Robotics and Automation (ICRA)
- 2024 **University of Delaware Doctoral Fellowship for Excellence**  
Significant contributions to the discipline through research and creative projects, often evidenced by awards, intellectual property, and publications.
- 2023 **Best Student Paper Award Finalist**  
Proc. of Robotics: Science and Systems (RSS)

## Publications

### Journal Articles

- [J4] N. Merrill, P. Geneva, S. Katragadda, **C. Chen**, and G. Huang, "Fast and Robust Learned Depth-aided Monocular Visual-Inertial Initialization", *International Journal of Robotics Research (IJRR)*, 2024.
- [J3] W. Lee, P. Geneva, **C. Chen**, G. Huang " MINS: Efficient and Robust Multisensor-aided Inertial Navigation System ", *arXiv*, 2023.

- [J2] C. Wei\*, **C. Chen\***, H. G. Bert " Navigation Functions with non-Point Destinations and Moving Obstacles ", Autonomous Robots, 2023 (\*equally contributed)
- [J1] Y. Yang, **C. Chen**, W. Lee, G. Huang " Decoupled Right Invariant Error States for Consistent Visual-Inertial Navigation", IEEE Robotics and Automation Letters (R-AL), 2022.

### Conference Papers

- [C14] **C. Chen\***, Y. Peng\*, and G. Huang " Visual-Inertial State Estimation with Decoupled Error and State Representations", International Workshop on the Algorithmic Foundations of Robotics (WAFR), 2024.
- [C13] **C. Chen**, Y. Peng, and G. Huang " Fast and Consistent Covariance Recovery for Sliding-window Optimization-based VINS", International Conference on Robotics and Automation (ICRA), 2024.
- [C12] Y. Peng, **C. Chen**, and G. Huang " Ultrafast Square-Root Filter-based VINS", International Conference on Robotics and Automation (ICRA), 2024. [ [Best Paper Award Finalist \(Robot Vision\)](#)]
- [C11] Y. Peng, **C. Chen**, and G. Huang " Quantized Visual-Inertial Odometry", International Conference on Robotics and Automation (ICRA), 2024.
- [C10] W. Lee, **C. Chen**, and G. Huang " Degenerate Motions of Multisensor Fusion-based Navigation", International Conference on Robotics and Automation (ICRA), 2024.
- [C9] S. Katragadda, W. Lee, Y. Peng, p. Geneva, **C. Chen**, C. Guo, M. Li and G. Huang " NeRF-VINS: A Real-time Neural Radiance Field Map-based Visual-Inertial Navigation System", International Conference on Robotics and Automation (ICRA), 2024.
- [C8] **C. Chen**, P. Geneva, Y. Peng, W. Lee and G. Huang " Optimization-based VINS: Consistency, Marginalization, and FEJ", International Conference on Intelligent Robots and Systems (IROS), 2023.
- [C7] N. Merrill, P. Geneva, S. Katragadda, **C. Chen**, and G. Huang " Fast Monocular Visual-Inertial Initialization Leveraging Learned Single-View Depth", Proc. of Robotics: Science and Systems (RSS), 2023 [[Best Student Paper Award Finalist](#)].
- [C6] **C. Chen\***, P. Geneva\*, Y. Peng, W. Lee and G. Huang " Monocular Visual-Inertial Odometry with Planar Regularities", International Conference on Robotics and Automation (ICRA), 2023.
- [C5] **C. Chen**, Y. Yang, P. Geneva, W. Lee and G. Huang " Visual-Inertial-Aided Online MAV System Identification", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.
- [C4] **C. Chen**, Y. Yang, P. Geneva and G. Huang " FEJ2: A Consistent Visual-Inertial State Estimator Design", International Conference on Robotics and Automation (ICRA), 2022.
- [C3] **C. Chen**, L. Li and H. G. Bert " Navigation Functions with non-Point Destinations and Moving Obstacles", American Control Conference (ACC), 2020.
- [C2] P. Geneva\*, N. Merrill\*, Y. Yang, **C. Chen**, W. Lee, and G. Huang " Versatile 3D Multi-Sensor Fusion for Lightweight 2D Localization", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
- [C1] Y. Yang, B. P. W. Babu, **C. Chen**, G. Huang, and L. Ren " Analytic Combined IMU Integration (ACI<sup>2</sup>) for Visual-Inertial Navigation", International Conference on Robotics and Automation (ICRA), 2020.

### Open Source

- [O3] **MINS:** Efficient and Robust Multisensor-aided Inertial Navigation System [arXiv] <https://github.com/rpng/MINS>
- [O2] **ov\_plane:** Monocular Visual-Inertial Odometry with Planar Regularities [ICRA23] [https://github.com/rpng/ov\\_plane](https://github.com/rpng/ov_plane)
- [O1] **RPNG AR Table Dataset:** Indoor AR Table Visual-Inertial Datasets [ICRA23] [https://github.com/rpng/ar\\_table\\_dataset](https://github.com/rpng/ar_table_dataset)

### Technical Report

- [T10] **C. Chen**, Y. Peng, and G. Huang" Supplementary Materials: Visual-Inertial State Estimation with Decoupled Error and State Representation" [to appear]
- [T9] **C. Chen**, Y. Peng, and G. Huang" Technical Report: Fast and Consistent Covariance Recovery for Sliding-window Optimization-based VINS" [https://chuchuchen.net/downloads/reports/tr\\_cov.pdf](https://chuchuchen.net/downloads/reports/tr_cov.pdf)
- [T8] Y. Peng, **C. Chen**, and G. Huang" Ultrafast Square-Root Filter-based VINS" [https://udel.edu/~ghuang/papers/tr\\_srf.pdf](https://udel.edu/~ghuang/papers/tr_srf.pdf)
- [T7] W. Lee, **C. Chen**, and G. Huang" Technical Report: Degenerate Motions of Multisensor Fusion-based Navigation" [https://udel.edu/~ghuang/papers/tr\\_degen.pdf](https://udel.edu/~ghuang/papers/tr_degen.pdf)
- [T6] N. Merrill, P. Geneva, S. Katragadda, **C. Chen**, and G. Huang" Supplementary Materials: Fast Monocular Visual-Inertial Initialization Leveraging Learned Single-View Depth" URL: [https://chuchuchen.net/downloads/reports/tr\\_init\\_depth.pdf](https://chuchuchen.net/downloads/reports/tr_init_depth.pdf)
- [T5] **C. Chen**, Y. Yang, W. Lee ,P. Geneva and G. Huang " Supplementary Materials: Visual-Inertial-aided Online MAV System Identification URL: [https://chuchuchen.net/downloads/reports/tr\\_mav\\_final.pdf](https://chuchuchen.net/downloads/reports/tr_mav_final.pdf)
- [T4] **C. Chen**, Y. Yang, P. Geneva and G. Huang " Technical Report: FEJ2: A Consistent Visual-Inertial State Estimator Design URL: [https://chuchuchen.net/downloads/reports/tr\\_fej2.pdf](https://chuchuchen.net/downloads/reports/tr_fej2.pdf)
- [T3] Y. Yang, **C. Chen**, W. Lee and G. Huang " Supplementary Materials: Decoupled Right Invariant Error States for Consistent Visual-Inertial Navigation [https://chuchuchen.net/downloads/reports/tr\\_dri.pdf](https://chuchuchen.net/downloads/reports/tr_dri.pdf)
- [T2] Y. Yang, **C. Chen**, and G. Huang " Supplementary Materials: Analytic Combined IMU Integration ( $ACI^2$ ) for Visual-Inertial Navigation" URL: [https://chuchuchen.net/downloads/reports/tr\\_aci.pdf](https://chuchuchen.net/downloads/reports/tr_aci.pdf)
- [T1] W. Lee, K. Eckenhoff, Y. Yang, P. Geneva and **C. Chen** and G. Huang " Visual-Inertial-Wheel Odometry with Online Calibration [https://udel.edu/~ghuang/papers/tr\\_wheel-vio.pdf](https://udel.edu/~ghuang/papers/tr_wheel-vio.pdf)

### **Students Mentored**

- 2024 **Jeremy Hsu**, HS Intern, 2D Lidar SLAM.  
Green Lemons: Pennsylvania FTC State Championship
- 2023 **Jonas Ho**, UPenn ME BS, Micro aerial vehicles.
- 2024 **Wenxuan (Owen) Li**, UD Robotics MS, Sensor calibration.

### **Presentations & Talks**

- [P6] Fast and Consistent Covariance Recovery for Sliding-window Optimization-based VINS, International Conference on Robotics and Automation (ICRA), May, 2024

- [P5] Optimization-based VINS: Consistency, Marginalization, and FEJ, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit (MI), USA, Otc, 2023
- [P4] Monocular Visual-Inertial Odometry with Planar Regularities, International Conference on Robotics and Automation (ICRA), May, 2023
- [P3] Visual-Inertial-Aided Online MAV System Identification, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Otc, 2022
- [P2] FEJ2: A Consistent Visual-Inertial State Estimator Design, International Conference on Robotics and Automation (ICRA), Philadelphia (PA), USA, May, 2022
- [P1] Navigation Functions with non-Point Destinations and Moving Obstacles, Jul, 2020

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## Academic Service

### Journal Reviewer

TR-O IEEE Transactions on Robotics

RA-L IEEE Robotics and Automation Letters

TIM IEEE Transactions on Instrumentation & Measurement

### Conference Reviewer

ICRA IEEE International Conference on Robotics and Automation

IROS IEEE/RSJ InternationalConference on Intelligent Robots and Systems

MED Mediterranean Conference on Control and Automation

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## Professional Membership

IEEE, IEEE Robotics and Automation Society, IEEE Control Systems Society