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Chuchu Chen

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

[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^2) 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`

[O1] **RPNG AR Table Dataset:** Indoor AR Table Visual-Inertial Datasets [ICRA23] https://github.com/rpng/ar_table_dataset

Technical Report

[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

[T8] Y. Peng, **C. Chen**, and G. Huang" Ultrafast Square-Root Filter-based VINS" 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

[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

[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

[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

[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

[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

[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

Presentations & Talks

[P6] Fast and Consistent Covari- ance 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

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

Professional Membership

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