Erqun Dong

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PURPOSE

Looking for challenging internship in AI, robotics, and state estimation.

EDUCATION

Ph.D. student, School of Computer Science, McGill University **2020-**
Supervisor: Prof. Xue Liu

Master's Degree, School of Software, Tsinghua University, Beijing, China **2017 - 2020**
GPA: 3.8/4. Ranking: 7/98
Supervisor: Prof. Zheng Yang, Prof. Yunhao Liu
Research Topic: Indoor localization with visual method, Visual SLAM, Mobile Computing

Bachelor's Degree, Department of Automation, Tsinghua University, Beijing, China **2013 - 2017**
GPA: 88/100. Ranking: 12/145

PUBLICATIONS

[1] **Erqun Dong**, Jingao Xu, Chenshu Wu, Yunhao Liu, Zheng Yang. "Pair-Navi: Peer-to-Peer Indoor Navigation with Mobile Visual SLAM". IEEE INFOCOM 2019. **Best In-Session Presentation Award**. Acceptance rate 19.7%.

[2] Jingao Xu, Hengjie Chen, Kun Qian, **Erqun Dong**, Min Sun, Chenshu Wu, Yunhao Liu, Zheng Yang. "iVR: Integrated Vision and Radio Localization with Zero Human Effort". ACM IMWUT 2019.

[3] **Erqun Dong**, Jianzhe Liang, Zeyu Wang, Jingao Xu, Longfei Shangguan, Qiang Ma, Zheng Yang, Improving the Applicability of Visual Peer-to-Peer Navigation with Crowdsourcing. IEEE ICPADS 2020.

[4] Jingao Xu, **Erqun Dong**, Qiang Ma, Chenshu Wu, Zheng Yang, "Smartphone-Based Indoor Visual Navigation with Leader-Follower Mode", ACM Transactions on Sensor Networks 2021.

[5] Can Chen, Shuhao Zheng, Xi Chen, **Erqun Dong**, Xue Liu, Hao Liu, Dejing Dou, "Generalized Data Weighting via Class-Level Gradient Manipulation", NeurIPS 2021. Acceptance rate 26%

INDUSTRY EXPERIENCES

Meta (Facebook) Reality Labs, Redmond, Washington, USA **June - December 2021**
- Research and develop new state estimation algorithm on AR glasses with visual-inertial-GPS fusion
- Algorithm developed provides new benchmarking for other research at company

Powervision Tech Inc, Beijing, China **April - June 2019**
- Developed visual SLAM on drone with a stereo camera. In ARM Embeded System, debugged with cross-platform GDB
- Runtime memory compaction to 200 MB. Efficiency optimization with on-chip hardware Intelligent Video Engine (IVE)

Datang Mobile Communication Equipment Co., Ltd, Beijing, China **July - August 2016**
- Developed the anti-collision algorithm for multiple RFID ISO15693 cards and a single RFID reader
- Designed a new printed circuit board (PCB) Antenna with Altium Designer. Realized longer transmitting range (from 1cm to 10cm) and multiple-card power support (from 2 to 4) by optimizing impedance matching

ACADEMIC PROJECTS

Ph.D. Projects

Generalized Data Weighting in Supervised Learning (Publication [5]) **March - August 2021**
- Manipulate gradient descent with class-level weights to better handle mis-labeling and class imbalance
- Use meta-learning to acquire the weights

Indoor Localization with Visual Methods. Master's Projects

Crowdsourcing-based Indoor Peer-to-peer Navigation (Publication [3]) **June - October 2019**
- Mobile application of indoor peer-to-peer navigation based on visual-inertial odometry. Mapping by crowdsourcing.

Indoor peer-to-peer Navigation with Mobile Visual SLAM (Publication [1]) **May - July 2018**
- Mobile application of indoor peer-to-peer navigation based on ORB-SLAM, Mask R-CNN for non-rigid context culling
- Navigation success rate of 98.6%, remaining 83.4% after two weeks, outperforming state-of-the-art by > 50%

Indoor Localization with Surveillance Cameras (Publication [2]) **May - July 2018**
- Indoor localization with surveillance cameras, Wi-Fi fingerprinting and pedestrian dead-reckoning
- Localization accuracy 0.7m, outperforming state-of-the-art by >70%.

Stereo Visual Tracking of Object for Viscous Grab Using Robot Arm **December 2017**
- Developed real time object tracking via salient color tracking on stereo camera, depth error less than 5 mm, 2%

Robot Control. Bachelor's Projects

Self-balancing Two-wheeled Vehicle. Supervised by Prof. Mingguo Zhao **Sept - Dec 2015**
- State estimation with accelerometer and gyroscope, and self-balancing control using PID. Programmed with LABVIEW
- Built from scratch, including mechanical structure, motor driver circuit design, motor calibration, IMU calibration

Robot Arm Pencil Sketch System. Supervised by Prof. Zongying Shi **May 2016**
- Developed a pencil sketch system with Robot Arm with C++ and Matlab hybrid programming
- Motion planning using inverse kinematics. Visual outline extraction with Laplacian Filter.

PROFESSIONAL SKILLS

Visual SLAM Open Source Projects
- ORB-SLAM2, VINS-Mono, and MSCKF

GPS State Estimation Open Source Projects
- RTKLIB

Open Source Libraries
- Pytorch, NumPy, OpenCV (C++), Eigen (C++ matrix computation), Sophus (C++ Lie algebra), Ceres (C++ nonlinear optimization), PCL (C++ pointcloud)

Programming Languages
- Experienced in C++, C, Matlab, Python, and Android (Java)

AWARDS

- Excellent Graduate of School of Software, Tsinghua University, Top 10%, July 2020
- Tsinghua-VMware Scholarship, Top 10%, Oct 2019
- Tsinghua University Scholarship for comprehensive performance, Top 20%, Oct 2018
- Excellent Graduate of Department of Automation, Tsinghua University, Top 10%, July 2017
- MCM/ICM (Mathematic Contest In Modeling/ Interdisciplinary Contest In Modeling), Meritorious Winner, Top 10%, Apr 2016
- Tsinghua-Weichai Scholarship, Top 10%, 2016
- Tsinghua University Academic Excellence Award, Top 20%, 2014, 2015
- Electronic Design Contest 3rd prize in Tsinghua University, Top 20%, Nov 2014
- Tsinghua University Sports Exellence Award, Top 7%, 2015. Tsinghua University Social Word Award, Top 7%, 2015

MAIN COURSES

- **Mathematics**: Probabilistic Graphical Models, Convex Optimization, Matrix Analysis, Stochastic Process, Numerical Analysis, Operations Research, Complex Function Theory, Calculus, Linear Algebra, Probability Theory and Statistics, Discrete Mathematics
- **Computer Science**: Statistical Computer Vision, Machine Learning in Real-world Applications, Reinforcement Learning for Robotics, Parallel Program Design, Information Visualization (Javascript D3 Library)
- **Control Theory**: Classic Control Theory, Signals and Systems Analysis, Modern (Linear) Control System, Robot Arm Control, Electric Traction System