

Dingkang Wang

noplaxochia@ufl.edu +1-352-281-8843 136 Larsen Hall, Gainesville, FL, USA32611

EDUCATION

- **Ph.D. in Electrical & Computer Engineering** (GPA: 3.7), Apr. 2021, University of Florida (UF). Research Area: Solid-state LiDAR
 - The Best Student Paper Award, IEEE NEMS, 2018
 - Invited Talk, "Miniature LiDAR Based on Electrothermal MEMS Scanning Mirrors", IEEE RAPID 2019.
 - Core Graduate-level Courses: Semiconductor Fabrication, Design of MEMS, Machine Learning I & II, Statistics
- **B.S. in Mechanical Engineering** (top 3%), 2016, Jilin University, China
 - The State Scholarship Fund for International Research, China Scholarship Council & Canada Mitacs, 2015.

RESEARCH EXPERIENCE

Ph.D. Student, Aug 2016-present

Dept. of Electrical & Computer Engineering, UF

- **MEMS mirrors design and fabrication for LiDAR**
 - **Designed and performed simulation** on 2-axis scanning electrothermal/electromagnetic MEMS mirrors with wide scanning angle, fast scanning frequency, and forward scanning for compact and ultra-small LiDAR
 - **Fabricated** electrothermal & electromagnetic MEMS devices including front/backside lithography, thin film growth and deposition, lift-off, wet etch, RIE and DRIE(Oxford and Bosch process)
- **Motion Compensated MEMS LiDAR system**
 - Demonstrated real-time motion-compensated MEMS LiDAR system to compensate for the vibration on the robot.
 - **Design and prototyped MEMS-based LiDAR system**, including optical design and simulation, multi-channel TDCs based timing circuit, APD bias, and amplification circuit, MCU programming, PCB design, and assembly.
 - Conduct UAV SLAM LiDAR simulation with compensated LiDAR in AirSim.
 - Sampled 9-axis IMU data with I2C/RS232, and use EKF for filtering; Achieved real-time point cloud with pyqtgraph.
- **Data Analysis in LiDAR**
 - Design and build a predictive model using polynomial regression on micro-controllers and random forest regression in python for the ToF-distance calibration algorithm. Achieve a mean square error of 3cm with respect to the ground true distance. Visualized 3D point cloud using Matplotlib.
 - Develop the directionally control 3D LiDAR point cloud algorithm. Used **k-mean for smart scanning and clustering objects in the region of interest (ROI)**, LiDAR image edge detection with gradient-based processing.
- **Machine Learning Projects**
 - Developed handwritten numbers and alphabets recognition with based on MNIST dataset and with pytorch CNN model, achieved 95% accuracy on numbers and 75% for alphabets.
 - Developed music genre recognition system for progressive-rock vs. pop songs. Build an MIR (Music Information Retrieval) system for batch-and-vote algorithm and use deep neural network with LSTM model for training. Achieve an average of 82% accuracy for a dataset with 80 songs.
- **Sensor Fusion Udacity Nano Degree**
 - LiDAR obstacle detection utilizing PLC library.
 - 3D Object Tracking utilizing OpenCV YOLO and the fusion of LiDAR & camera data to compute time-to-collision.
 - Use UKF and constant-turn-rate-and-velocity model, combine LiDAR and Radar data to track the states of moving cars in simulation.

WORK EXPERIENCE

Resolution Enhancement Technology Intern, Jun – Aug 2020

Texas Instruments, Dallas, TX

- Work on resolution enhancement for DUV lithography process.
- Calibrate analytical lithographic model to achieve good fits and to predict lithographic process.

Project Manager-MEMS LiDAR, May 2019-Sept 2019 *LeiShen Intelligent System Co., Ltd., Shenzhen, China*

- Designed and prototyped the **MEMS Solid State LiDAR products**.
- Designed and manufactured the patented large aperture automotive grade 2-axis micromirrors for the next generation low cost, wide angle, and 200m-distance LiDAR.
- Lead in the device design, manufacture, assembled, driver circuit and control method design
- Characterized MEMS LiDAR under automotive-grade vibration, shock and temperature test

Sensor Engineering (LiDAR) Intern, Jun – Aug 2018 *Tusimple Autonomous Driving Inc, Tucson, AZ*

- Developed and executed 3D LiDAR benchmark for autonomous trucks.
- Implemented LiDAR IMU-GPS calibration based on Iterative closest point (ICP) algorithm on trucks and cars.
- Implemented point-cloud Simultaneous localization and mapping (SLAM) protocol and algorithm.

Teaching Assistant, Sept 2018 – Dec 2019 *University of Florida*

- **Lead 5 students on the design, fabrication and characterization of photodiodes**, MOS and MEMS device during the Lab Assistant for Semiconductor Device Fabrications.
- Invited lectures on MEMS actuators design and fabrication.

SELECTED PUBLICATIONS

- **Dingkang Wang**, S. Koppal and H. Xie. “Motion Compensated LIDAR Scanning for Small Robots”, *ICRA 2021*, under peer review.
- **Dingkang Wang**, C. Watkins, H. Xie. “MEMS Mirrors for LiDAR: A review”, *Micromachines*, 2020.
- **Dingkang Wang**, L. Thomas, S. Koppal, H. Xie. “A low-voltage, low-current, digital-driven MEMS mirror for low-power LiDAR”, *IEEE Sensors Letter*, 2020.
- **Dingkang Wang**, S. Strassle, A. Shuping, Z. Tasneem, S. Koppal and H. Xie "An integrated forward-view 2-axis MEMS scanner for compact 3D LiDAR." *Nano/Micro Engineered and Molecular Systems (NEMS)*, *IEEE 2018*. (THE BEST STUDENT PAPER AWARD)
- **Dingkang Wang**, X. Zhang, L. Zhou, M. Liang, D. Zhuang, H. Xie. “An ultra-fast electrothermal micromirror with bimorph actuators made of copper/tungsten”, *IEEE Optical MEMS and Nanophotonics 2017*
- Z. Tasneem, C. Adhivarahan, **Dingkang Wang**, et al. “Adaptive fovea for scanning depth sensors”, *The International Journal of Robotics Research*, 2020.
- Z. Tasneem, **Dingkang Wang**, et al. “Directionally controlled time-of-flight ranging for mobile sensing platforms.” *Robotics: science and systems*, 2018.

COMPUTER SKILLS

- COMSOL, Python (TensorFlow/keras, scikit-learn, numpy, matplotlib, pyqtgraphic), C++, Matlab, Linux, AirSim