Lingbo Jin | Curriculum Vitae

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Education

Rice University   **Houston, TX**
Graduate Student in Electrical and Computer Engineering,   *2018–present*

Carnegie Mellon University   **Pittsburgh, PA**
Bachelor of Science in Electrical and Computer Engineering,   *2014–2018*
Additional Major in Biomedical Engineering
Graduated with University Honor, Department Honor

Papers

Lingbo Jin, Yubo Tang, Yicheng Wu, Jackson B. Coole, Melody T. Tan, Xuan Zhao, Hawraa Badaoui, Jacob T. Robinson, Michelle D. Williams, Ann M. Gillenwater, Rebecca R. Richards-Kortum, and Ashok Veeraraghavan. *"Deep Learning Extended Depth-of-field Microscope for Fast and Slide-free Histology."* Proceedings of the National Academy of Sciences (2020).

Tejas Sudharshan Mathai, **Lingbo Jin**, Vijay Gorantla, and John Galeotti. *"Fast vessel segmentation and tracking in ultra high-frequency ultrasound images."* In International Conference on Medical Image Computing and Computer-Assisted Intervention, pp. 746-754. Springer, Cham, 2018.

Skills

Programming Languages: MATLAB, Python, Java, C, LaTeX, JavaScript, HTML/CSS, Assembly

Software: Tensorflow, OpenCV, Android Studio, ITK/SimpleITK, Git

Languages: Mandarin, English

Research

Monoscopic 3D endoscopy   **Houston, TX**
Graduate Student at Rice Computational Imaging Lab   *October 2020-Present*
Endoscopy and laparoscopy are frequently used for medical diagnosis and surgical guidance. With the rise of minimally invasive surgeries, there is an increased need for 3D endoscopy. However, most of the commercially available 3D endoscopic imaging systems are stereo-based, which requires the scope to have a larger diameter. We are proposing a monoscopic 3D endoscopy based on wavefront encoding and deep learning. This can enable 3D imaging through narrow spaces or with capsule endoscopy. The goal of the project is to simultaneously recover the surface feature and the depth of the tissue at a high depth resolution.

Extended Depth-of-field Microscopy for rapid surface scanning   Houston, TX
Graduate Student at Rice Computational Imaging Lab   *April 2019-November 2020*

Microscopes are frequently used in medical examinations to determine if excised tissue has clean, cancer-free margins. The standard pathology procedure requires the tissue to be thinly sectioned. It is a time-consuming procedure, and only a small fraction of the tissue can be sampled. Examine the specimen without slicing can avoid the high sampling error. However, the uneven surface of the tissue results in out-of-focus regions that are challenging to deblur in post-processing. We are proposing an extended depth-of-field microscope with depth-insensitive point spread functions. When used in conjunction with the deblurring algorithm, we can increase the depth-of-field of a fluorescent microscope 5-fold without sacrificing light throughput or resolution. The paper has been accepted by PNAS.

Structured Illumination for Low Scattering Imaging in Low-cost Microscopy   Houston, TX
Graduate Student at Rice Computational Imaging Lab   *January 2019-May 2019*

Micro-endoscopy is a GI cancer screening tool that can provide cellular resolution images in real-time. It works in conjunction with endoscopy and can reduce the need for biopsy. However, subsurface tissue scattering creates undesirable background on the image, reducing the contrast. While there are many systems such as point- scanning confocal and 2-photon microscopy that can reject scattering background, these systems are typically very slow and expensive due to the optomechanical parts. We are proposing a structured illumination microscopy that is able to reject scattering while acquiring images in real-time. We test the background rejection ability of our system both theoretically and experimentally and show that it provides low scattering images while costing a fraction of the price of a traditional confocal system.

Vessel Tracking in Ultra-high Frequency Ultrasound Imaging   Pittsburgh, PA
Research Assistant at Galeotti Group   *January 2017-May 2018*

Studied literature and self-taught on Kalman Filter, vessel segmentation methods, and ultrasound speckle models. Implemented an Extended Kalman Filter (EKF) to improve vessel segmentation accuracy in images with high speckle noise and presence of shadow. The project is done under the supervision of Professor Galeotti and its result published in MICCAI 2018.

Projects

Marco: an Indoor Localization Tool   Pittsburgh, PA
Android Deployment   *January 2017-May 2017*

Created an android application that determines the indoor location using visual features. In order to actualize SURF feature detection and extraction in real-time, I developed a C++ image processor using a custom-built OpenCV library and Android NDK. This was a capstone project done in collaboration with two teammates, Ani Sridhar and Nikhil Choudary.

Midsagittal Plane Extraction in MR Images   Pittsburgh, PA
Personal Project   *April 2017*

Implemented the paper by Teverovskiy et.al (2006) to extract midsagittal plane from MR images. The volume was pre-processed using SimpleITK and the extraction algorithm was written in Python3 using the Numpy library. This was a term project for the graduate-level course Medical Imaging Analysis.

Vessel Detection in the Radon Domain   Pittsburgh, PA
Member   *November 2016-December 2016*

Devised a circle recognition algorithm utilizing Radon transform and RANSAC. The algorithm is robust with a sampling rate as low as 7 angles and a Signal-to-Noise Ratio as low as 15. This is a term project done in collaboration with Ani Sridhar for the graduate-level course Image and Video Processing.

Experience

ELEC 447/546: Computer Vision **Houston, TX**

Teaching Assistant *January 2020-May 2020*

Worked under Professor Ashok Veeraraghavan to design final projects, lead office hours, and prepare homework solutions for the graduate-level course.

18-793: Image and Video Processing **Pittsburgh, PA**

Teaching Assistant *August 2017-December 2017*

Worked under Professor Aswin Sankaranarayanan to teach recitation sessions, lead office hours, and prepare homework solutions for the graduate-level course.

Fellowship

President's Prize **Houston, TX**

granted by Rice University *Fall 2018*

John Clark, Jr. Fellowship Award **Houston, TX**

granted by Rice University *Fall 2018*

Summer Undergraduate Research Fellowship **Pittsburgh, PA**

granted by Carnegie Mellon University Undergraduate Research Office *Summer 2017*

Carnegie Heart Fellowship **Pittsburgh, PA**

granted by Carnegie Mellon Biomedical Engineering Department *Summer 2016*

Leadership

Research Experience for Teachers **Houston, TX**

Graduate Student Mentor *July 2020*

Introduced front edge research on computer vision and machine learning to K12 teachers from Houston. Designed a gaze detection project for the teachers to implement. Held weekly office hours and weekly seminars to help the teachers bring these interesting concepts into the classroom.

Biomedical Engineer Society **Pittsburgh, PA**

Research and Project Chair *August 2015-May 2018*

Organized monthly research seminars that inform students about exciting projects and foster interest in research. Coordinated the annual BMES research fair, providing a platform for students to connect with graduate researchers and professors.

CMU Emergency Medical Service **Pittsburgh, PA**

Responder *September 2014-May 2018*

Coordinated closely with team members to provide the best care in critical time and space limits. Kept a calm patient rapport while communicating with the CMU police department and city paramedics.