Ning Zhang

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Education Background

2019——2025 **Electrical Engineering**, *Ph.D.*, Brown University, Providence, USA

2017——2019 **Biomedical Engineering**, *Sc.M*, Brown University, Providence, USA

Thesis, Nurmikko Lab, Brown University

<A Novel Near Infrared Diffuse Optical Spectroscopy System for Stroke Prediction and Diagnosis on the Neck>

2011——2016 **Electrical Engineering**, *B.E.*, Zhejiang University, Hangzhou, China

Thesis, Biomedical Engineering Lab, Mass General Hospital/Harvard Medical School

<Research on the Embedded System of Wearable Medical Device for Unobtrusive Multi-modality Continuous Blood Pressure Monitoring>

Publications

2022 **Sub-mm resolution tomographic imaging in turbid media by an ultra-high density multi-channel approach**, **Zhang, N.**, Zhang, Q., Nurmikko A., *Biomedical Optics Express*

2022 **Ultra-High Density Diffuse Optical Tomography for Dynamical High-Resolution Imaging in Thick Turbid Media**, **Zhang, N.**, Zhang, Q., Nurmikko A., *Optics and the Brain*

2018 **Technology Development for Simultaneous Wearable Monitoring of Cerebral Hemodynamics and Blood Pressure**, Zhang, Q.,**Zhang, N.**, Strangman, G., et al., *IEEE Journal of Biomedical and Health Informatics*

2015 **Pilot Development of BP-Glass for Wearable Ambulatory Blood Pressure Monitoring**, Zhang, Q.,**Zhang, N.**, Hu G., et al., *Global Connected Health Symposium(12th), Boston, MA*

Research Experience

2019.09- **Research Assistant**, *3N Laboratory (Nurmikko Group)*, Brown University

Topic: **Ultra-High Density Diffuse Optical Tomography for Imaging in Thick Turbid Media**

- Develop optical method (visible light to near infrared light) to image targets that are inside the human tissues (for example, breast tumor imaging or cerebral vasculature imaging). Current biomedical imaging techniques such as CT and MRI are either ionized radiation (can be harmful to body) or very expensive. Optical imaging methods such as diffuse optical tomography do not have radiation problem, and can be very affordable. But the current main limitation for optical imaging methods is relatively low spatial resolution. Because biological tissues are usually strong diffusive media for light (think about seeing a car through dense fog). So how to extract the useful information from the scattered light is the major topic in my research. I am trying to design a new imaging system and use advanced algorithms to get clearer biomedical images.

2017.09- **Research Assistant**, *3N Laboratory (Nurmikko Group)*, Brown University

2019.05 **Topic**: **Wearable Near Infrared Spectroscopy System for Stroke Prediction on the Neck**

- System Development: Non-invasive Wearable NIRS System for Emboli Detection and Stroke Prediction;
- Experiments: Multi-layer Heterogeneous Tissue Mimicking Phantom: With Optical, Acoustic, Mechanical Properties;
- Simulations: Monte Carlo Simulations of Embolic Events on Multi-layer Heterogeneous Tissue (Neck);
- Algorithms: Machine Learning Methods to Remove Unrelated Hemodynamic Interference and Improve Accuracy.

2015.02- **Research Assistant**, *BME Lab/ Neural System Group*, Massachusetts General Hospital/HMS,USA
2016.02 **Topic**: **Pilot Development of BP-Glass for Wearable Ambulatory Blood Pressure Monitoring**

- Designed the functional structures at system level of the device;
- Developed the embedded system including the hardware and software for the medical device. Hardware includes analog board (derived,conditioned and pre-processed twenty channels of analog signals from three modalities: Tonometry, PTT, Hemodynamics) and digital board (converted analog signals into digital for digital signal processing,stored data and transported data to laptop and phone). Software includes the embedded system programs, real-time software on computer and APP for mobile device.
- Researched on the sensor tests and calibrations. Applied ultra thin multi-nanowires-based pressure sensor and step motor with a 3D print mechanical structure to calibrate the measurement.
- Collected data using the device for long-term continuous blood pressure monitoring and analyzed the output.
- Co-worked out the integrated head-mounted structure of the wearable device.

Topic: **The Harvard and NFL Football Players Health Program**.

- Investigated and debugged the wearable device for near-infrared spectroscopy neurophysiology which monitors the brain activities and intracranial movements while players are in games.

2013.09- **Research Assistant**, *Advanced Embedded System Lab*, Zhejiang University,China
2015.01 **Topic**:**The Bionic Mechanical Arm System based on Kinect and Labview**

- Designed the bionic arm that can imitate operator's arm actions accurately in real time without contacting and recognize the specific targets & catch them automatically. Applied control and real-time image processing algorithms based on Labview and Kinect;
- Programmed the visual codes of the system on Labview.The systems included robotic motion trajectory planning and stabilization methods using forward and inverse kinematics models;
- Built the visual recognition and automatic capture function. Developed the study ability for any specific targets in the camera. Combined it with robotic capture.

Awards

2022 Graduate School Travel Award, Brown University
2021 Elected to SIGMA XI (Scientific Research Honor Society), Brown University
2019 The Sc.M. Achievement Award, Brown University
2017 Fellowship of Brown University Breakthrough Lab
2017 Fellow of Masschallenge Pulse@ Program
2017 Fellow of Garage+ Startup Global Program in Taipei, Taiwan
2017 NECINA Innovation& Entrepreneurship Competition, Finalist,Team leader
2016 MIT-China CHIEF Business Plan Competition, The Third Prize, Team Leader
2015 The Excellent Graduation Thesis of Zhejiang University
2014 Intel Global Challenge(Intel)in UC-Berkeley, Finalist
2014 National Instrument Global Innovation and Design Competition, The Best Prize
2014 Intel-Tsinghua National Innovation Challenge, The Special Prize(Top 3)
2014 Harvard-China Thinks Big(CBT), Finalist
2014 Tianfu Scholarship for Outstanding College Student
2014 The First Scholarship in Research and Innovation at Zhejiang University
2014 The Scholarship in Social Practice at Zhejiang University
2014 The Third Class Scholarship in Academic at Zhejiang University
2014 National Instrument(NI) Virtual Instruments Competition,The Second Prize

Work Experience and Social Activities

2016.04-07 **Intern Engineer**, ***Philips****(Ultrasound)*, Shanghai,China

Professional Associations

2016- Student Member of IEEE (Institute of Electrical and Electronics Engineers)
2016- Student Member of BMES (Biomedical Engineering Society)
2022- Student Member of SPIE
2022- Student Member of Optica

Skills

Computer : C, Labview, Python, R, HTML, Spark, SQL, Assembly Language, Matlab, UNIX/LINUX