

Curriculum Vitae

Mingjun Zhao, PhD

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EDUCATION

Biomedical Engineering, PhD, University of Kentucky (UKY), US 08/2012 -- 07/2019
Biomedical Engineering, BE, Tianjin University (TJU), China 09/2008 -- 06/2012

WORK EXPERIENCE

2020/08 – now Postdoctoral scholar, UC Davis, Davis, CA
2020/05 – 2020/07 Postdoctoral scholar, UKY, Lexington, KY
2019/09 – 2020/04 Research engineer, Bioptics Technology LLC, Lexington, KY
2012/08 – 2019/07 Research assistant, UKY, Lexington, KY

RESEARCH INTERESTS

Tomographic image reconstruction, Diffuse speckle contrast imaging, Diffuse correlation spectroscopy/ tomography, Interferometric diffuse wave spectroscopy, Near infrared spectroscopy
Brain imaging, Wound tissue imaging, Muscle hemodynamics

SKILLS & TOOLS

Data Acquisition LabView; Microcontroller
Programming MATLAB, Python, C/C++, Java
Optics Biomedical Diffuse Optics; Hardware: Fiber optics, Lens, CCD, sCMOS, Laser, APD, etc.
Clinical Study Clinical protocol design, Human subject experiments, Signal processing, Statistics, IRB protocol management
Electronics Circuit design (analog/ digital/ medical electronics); Schematic capture, PCB layout (Altium Designer); Circuit bring-up & rework (multimeter, oscilloscope, function generator, etc.)
Mechanical SolidWorks

RESEARCH WORK

- 2014 – 2019 **Wound Imaging:** noncontact imaging of 3D blood flow distribution in and around wound tissue; for early treatment validation and wound healing evaluations of burn wounds and chronic wounds.
Technique: noncontact Diffuse Speckle Contrast Imaging; non-contact Diffuse Correlation Tomography
My contribution: Diffuse speckle contrast imaging system development (instrumentation, Labview control); Imaging system validation in tissue-simulating phantoms and healthy subjects; Clinical trial initiation, protocol design; Data collection and analysis/ image reconstruction.
- 2018 – 2020 **Simultaneous extraction of tissue property and blood flow from diffuse speckle contrast imaging:** simultaneous extraction of absorption coefficient and blood flow index from data collected using the noncontact Diffuse Speckle Contrast Imaging system.
My contribution: Conceptualize the new algorithm, computational simulation, instrumentation improvement, phantom test: protocol design, data collection (labView), data analysis (MATLAB).
- 2016 – 2019 **Mastectomy Skin Flap Imaging:** noncontact imaging of 3D blood flow distribution in and around mastectomy skin flap right after mastectomy; for prediction of flap necrosis and early intervention.
Technique: noncontact Diffuse Speckle Contrast Imaging; non-contact Diffuse Correlation Tomography
My contribution: Imaging system development and validation (same as for **Wound Imaging** studies); Clinical protocol design; Data collection and analysis; Measurement outcome interpretation.
- 2015 – 2018 **Exercising Muscle Hemodynamics Monitoring:** Evaluating interventional effects of vitamin D supplements on muscle oxidative metabolisms in elder population; noninvasive optical measurements of tissue hemodynamics in exercising muscles.
Technique: near infrared spectroscopy; diffuse correlation spectroscopy.
My contribution: Clinical protocol design, validation & optimization; Instrumentation improvement (external trigger, multi-devices synchronization); instrument maintenance; Data collection and processing.

PEER-REVIEWED JOURNAL PUBLICATIONS

1. **M. Zhao**, C. Huang, G. Yu, “Simultaneous extraction of tissue property and blood flow from diffuse speckle contrast imaging”, In preparation.
2. **M. Zhao**, S. Mazdeyasna, C. Huang, N. Agochukwu, A. Bonaroti, L. Wong, G. Yu, “Noncontact speckle contrast

diffuse correlation tomography of blood flow distributions in burn wounds: a preliminary study”, *Military Medicine*, 2019 DOI:10.1093/milmed/usz233

3. D. T. Thomas; D. Schnell; M. Redzic; **M. Zhao***; H. Abraha; D. Jones; H. Brim; G. Yu. “Vitamin D repletion and aerobic training improves local in vivo measures of muscle lipid and oxygen consumption in aged, human subjects”, *Nutrients*, 11(4), 930 (2019). (*I am leading the optical protocols)
4. S. Mazdeyasna, C. Huang, **M. Zhao**, N. B. Agochukwu, A. A. Bahrani, L. Wong, G. Yu, “Noncontact speckle contrast diffuse correlation tomography of blood flow distributions in tissues with arbitrary geometries”, *Journal of Biomedical Optics*, 23(9), 096005 (2018)
5. C. Huang, D. Irwin, **M. Zhao**, Y. Shang, N. B. Agochukwu, L. Wong, G. Yu, “Noncontact 3-dimensional speckle contrast diffuse correlation tomography of tissue blood flow distribution”, *IEEE Transactions on Medical Imaging*, 36(10), 2017
6. N. B. Agochukwu, C. Huang, **M. Zhao**, A. Bahrani, L. Wong, G. Yu, “A novel noncontact diffuse correlation spectroscopy for assessing blood flow in mastectomy skin flaps: a prospective study in patients undergoing prosthesis-based reconstruction”, *Plastic and Reconstructive Surgery*, 140(1), 2017.
7. B. Henry*, **M. Zhao***, Y. Shang, T. Uhl, D. T. Thomas, E. S. Xenos, S. P. Saha, G. Yu, “Hybrid diffuse optical techniques for continuous hemodynamic measurement in gastrocnemius during plantar flexion exercise”, *Journal of Biomedical Optics*, 20(12), 125006 (2015). (*Contributed equally.)

INTERNATIONAL CONFERENCE PROCEEDINGS

1. S. Mazdeyasna, A. Bonaroti, C. Huang, **M. Zhao**, M. Mohtasebi, X. Liu, L. Wong, G. Yu, “Noninvasive 3D Optical Imaging of Blood Flow Distributions in Mastectomy Skin Flaps”, *BMES Annual Scientific Meeting*, Philadelphia, PA, 2019
2. **M. Zhao**, D. Jones, D. T. Thomas, G. Yu, “Monitoring of Muscle Hemodynamics during Exercise Using Hybrid Near-infrared Spectroscopy and Diffuse Correlation Spectroscopy in Older Adults”, *BMES Annual Scientific Meeting*, Atlanta, GA, 2018
3. S. Mazdeyasna, C. Huang, **M. Zhao**, N. Agochukwu, A. Bahrani, L. Wong, G. Yu, “Intraoperative 3D imaging of blood flow distributions in mastectomy skin flaps using noncontact speckle contrast diffuse correlation tomography”, *BMES Annual Scientific Meeting*, Atlanta, GA, 2018
4. L. Wong, **M. Zhao**, C. Huang, N. Agochukwu, S. Mazdeyasna, A. Bahrani, L. Chen, J. Radabaugh, R. Aouad, G. Yu, “Perioperative Optical Assessment of Blood Flow Variations in Soft Tissues: Implications for Assessment & Management of Battlefield Injuries”, *Military Health System Research Symposium*, Kissimmee, FL, (2018)
5. **M. Zhao**, C. Huang, D. Irwin, S. Mazdeyasna, A. Bahrani, N. Agochukwu, L. Wong, G. Yu, “EMCCD-based Speckle Contrast Diffuse Correlation Tomography of Tissue Blood Flow Distribution”. *OSA Biophotonics Congress: Biomedical Optics*, Hollywood, FL, 2018. Oral Presentation
6. **M. Zhao**, C. Huang, L. Chen, J. Radabaugh, R. Aouad, N. Agochukwu, L. Wong, G. Yu, “Intraoperative Assessment of Blood Flow Variations in Tissue Flaps Using Noncontact Diffuse Correlation Spectroscopy”. *OSA Biophotonics Congress: Biomedical Optics*, Hollywood, FL, 2018. Oral Presentation
7. **M. Zhao**, C. Huang, S. Mazdeyasna, E. A. Jawdeh, H. Bada, G. Yu, “A Novel Fiberless Diffuse Speckle Contrast Flowmeter for Tissue Blood Flow Measurement”. *OSA Biophotonics Congress: Biomedical Optics*, Hollywood, FL, 2018. Oral Presentation
8. N. Agochukwu, C. Huang, S. Mazdeyasna, **M. Zhao**, G. Yu, L. Wong. “3D Imaging of Tissue Blood Flow in Mastectomy Skin Flaps”. *American Society of Plastic Surgeons 2017 Annual Meeting*. Oral Presentation.
9. S. Mazdeyasna, C. Huang, N. McGregor, **M. Zhao**, A. Bahrani, G. Yu, “A photometric stereo technique to acquire tissue surface geometry for 3D imaging of blood flow distributions in mastectomy skin flaps”, *BMES Annual Scientific Meeting*, Phoenix, AZ, 2017
10. S. Mazdeyasna, C. Huang, M. Seong, J. Morgan, **M. Zhao**, A. Bahrani, J. Kim, J. Hastings, G. Yu, “A novel low-cost compact diffuse speckle contrast flowmeter for contact blood flow measurement”, *BMES Annual Scientific Meeting*, Phoenix, AZ, 2017 (oral presentation).
11. **M. Zhao**, C. Huang, D. Irwin, S. Mazdeyasna, N. Agochukwu, L. Wong, G. Yu, “Noncontact 3-dimensional speckle contrast diffuse correlation tomography of tissue blood flow distribution”, *BMES Annual Scientific Meeting*, Phoenix, AZ, 2017 (oral presentation)
12. **M. Zhao**, C. Huang, N. Agochukwu, A. Bahrani, S. Mazdeyasna, L. Wong, G. Yu, Noncontact diffuse correlation spectroscopy assessment of tissue blood flow for the prediction of mastectomy skin flap necrosis”, *BMES Annual Scientific Meeting*, Phoenix, AZ, 2017
13. N. B. Agochukwu, C. Huang, **M. Zhao**, G. Yu, L. Wong, “A novel noncontact optical method for assessing blood

flow in mastectomy skin flaps: A prospective study in patients undergoing prosthetic based reconstruction”. Annual Meeting of the Southeastern Society of Plastic Surgeons, Orlando FL, (2016) (oral presentation)

14. **M. Zhao**, Y. Shang, B. Henry, T. L. Uhl, G. Yu, “Tissue metabolic rate of oxygen consumption in calf muscle measured by arterial and venous occlusion protocols”, OSA Biomedical Optics, Miami, FL, 2014

AWARDS & HONORS

<i>2017-2018</i>	Secretary of UKY Biomedical Engineering Society
<i>2017 fall</i>	Max Steckler Fellowship
<i>2012 – 2019</i>	Research Assistant Scholarship, UKY
<i>2011/12</i>	1st Prize of Robot Contest, TJU
<i>2011/10</i>	1st Prize of 5th National Competition of MEMS Application, China
<i>2010/11</i>	Best Technical Prize of Robot Contest, TJU