Sr. Medical Imaging Engineer

Baichuan Jiang

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PhD in Computer Science with over 6 years' experience in robotic/medical imaging systems.

- Expertise in medical image analysis with deep learning frameworks
- Hands-on experiences for implementing real-time interventional robotics system
- First/Co-first authored 5 peer-reviewed journal articles (2 pending), 9 conference proceedings; co-authored 18 publications.

EDUCATION

PhD in Computer Science – Johns Hopkins University, Baltimore MD 2018/06 – 2024/08
Dissertation: Automation methods for interventional and diagnostic wearable ultrasound
Advisor: Dr. Emad M. Boctor GPA: 3.88/4.0

MSE in Robotics – Johns Hopkins University, Baltimore MD 2016/09 – 2018/06
Track: Medical robotics and Computer Integrated Surgical System GPA: 3.86/4.0

BE in Mechanical Engineering – Tianjin University, Tianjin, China 2012/09 – 2016/06
GPA: 3.72/4.0 (11th/152) First Class Bomesc Scholarship (2014)
Fund recipient for Thesis Abroad program at BWH, Harvard Medical School. (2015)

TECHNICAL SKILLS

Confident: Python, MATLAB, C/C++, ROS, Git, CAD modeling, PyTorch, TensorFlow, Linux
Having experience: CMake, C#, 3D Slicer SDK, VTK, ITK, R, SQL, Arduino, Ruby, Video editing

RESEARCH EXPERIENCE - HIGHLIGHTS

Wearable Ultrasound-based Lumbar Puncture Needle Guidance, JHU 2021/06 – 2024/08

- Created software-based and UR3 robot-based simulation/validation framework for a new wearable mechatronic ultrasound device prototyping. [4]
- Established image processing framework for lumbar puncture guidance with the above wearable ultrasound scanner prototype, including bone surface segmentation, angle-based reconstruction, and dynamic imaging/tracking of the needle. [2]
- Conducted whole pig & cadaver experiment and user study for system evaluation. [3]

Automatic Fetal Monitoring with Ultrasound/Photoacoustic Imaging, JHU 2019/09 – 2023/09

- Developed deep reinforcement learning algorithm to extract fetal standard plane images from volumetric ultrasound data for fetal growth restriction (FGR) monitoring. [6]
- Developed deep learning-based approach to identify fetal brain landmarks and enabled automatic monitoring of brain hypoxia using *in vivo* piglet photoacoustic data. [1]

CoSTAR in Surgery: Collaborative da Vinci Robot Interface, JHU 2017/01 – 2017/08

- Incorporated the collaborative robotic user interface CoSTAR into the da Vinci Research Kit (dVRK) to allow intuitive execution of semi-autonomous suturing. [7]

Optical-EM sensor fusion for MRI-guided needle navigation, BWH, Harvard 2015/11 – 2016/05

- Designed Kalman filter-based algorithm to fuse optical-EM sensor data to achieve real-time needle deflection compensation with a needle bending model. [8]

WORK EXPERIENCE

Engineering Intern, (part-time) Clear Guide Medical Inc. 2021/06 – 2021/12

- Integrated the FDA-approved CGM needle tracking tool into the complete AR-guidance system for ultrasound-guided lumbar puncture and achieve <3mm navigation accuracy. [3]

AI-Based Medical Image Analysis Intern, Philips 2019/06 – 2019/08 & 2020/06 – 2020/08

- Developed vessel segmentation method for peripheral vascular disease ultrasound exams with spatial and temporal gating mechanisms. [5]
- Developed fast image mask annotation tools that enables labeling 5000+ image in an hour.

SELECTED PUBLICATIONS – [Google Scholar Profile]

[1] **Jiang** et al. Automatic Photoacoustic Monitoring of Perinatal Brain Hypoxia with Superior Sagittal Sinus Detection. Journal of Biomedical Optics, 2024 (pending review)

[2] **Jiang** et al. AutoInFOCUS: Automatic Insonification Optimization with Controlled Ultrasound. IEEE Transaction on Medical Imaging, 2024 (pending review)

[3] **Jiang** et al. Wearable Mechatronic Ultrasound-Integrated AR Navigation System for Lumbar Puncture Guidance. IEEE Transaction on Medical Robotics and Bionics, 2023 [Link]

[4] Xu & **Jiang** et al. AutoInFocus, a new paradigm for ultrasound-guided spine intervention: a multi-platform validation study. IJCARS journal, 2022 [Link]

[5] **Jiang** et al. Automatic ultrasound vessel segmentation with deep spatiotemporal context learning. MICCAI – ASMUS 2021 [Link]

[6] **Jiang** et al. Standard plane extraction from 3D ultrasound with 6-DOF deep reinforcement learning agent – IEEE IUS 2020 [Link]

[7] **Jiang** et al. CoSTAR in Surgery: A Cross-platform User Interface for Surgical Robot Task Specification. IEEE IROS 2017 – Shared Platforms Workshop [Link]

[8] **Jiang** et al. Kalman filter based data fusion for needle deflection estimation using optical-EM sensor. MICCAI 2016 [Link]

AWARDS AND RECOGNITIONS

Johns Hopkins ACCM Research Day 1st Place Award	Dec. 2023
MICCAI 2022 – ASMUS Workshop Best Demo Award	Sep. 2022
IPCAI 2022 – Intuitive Surgical Bench-to-Bedside Award: Runner-up	Jun. 2022
MICCAI 2021 – ASMUS Workshop NVidia Special Award	Sep. 2021