

## Max Zhaoshuo Li

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## RESEARCH INTERESTS

My research focuses on vision navigation, 3D reconstruction and surgical robotics. I have strong interests in computer vision, graphics, deep learning, augmented/virtual reality and robotics.

## SKILLS

Image processing, neural rendering, registration and calibration, Python, C++, PyTorch, Blender

## EDUCATION

**Johns Hopkins University** 2018 - 2023 (expected)  
Ph.D. Computer Science  
Advised by Prof. Mathias Unberath, Prof. Russell H. Taylor

**University of British Columbia** 2013 - 2018  
B.S. Robotics Engineering  
Advised by Prof. Septimiu E. Salcudean

## SELECTED WORK

### Neuralangelo: High-Fidelity Neural Surface Reconstruction

Zhaoshuo Li, Thomas Müller, Alex Evans, Russell H Taylor, Mathias Unberath, Ming-Yu Liu, Chen-Hsuan Lin  
*Arxiv*, 2023

### TAToo: Vision-based Joint Tracking of Anatomy and Tool for Skull-base Surgery

Zhaoshuo Li, Hongchao Shu, Ruixing Liang, Anna Goodridge, Manish Sahu, Francis X Creighton, Russell H Taylor, Mathias Unberath  
*Arxiv*, 2023

### Temporally Consistent Online Depth Estimation in Dynamic Scenes

Zhaoshuo Li, Wei Ye, Dilin Wang, Francis X Creighton, Russell H Taylor, Ganesh Venkatesh, Mathias Unberath  
*WACV*, 2023

### Revisiting stereo depth estimation from a sequence-to-sequence perspective with transformers

Zhaoshuo Li, Xingtong Liu, Nathan Drenkow, Andy Ding, Francis X Creighton, Russell H Taylor, Mathias Unberath  
*ICCV*, 2021 (Oral)

### Anatomical Mesh-Based Virtual Fixtures for Surgical Robots

Zhaoshuo Li, Alex Gordon, Thomas Looi, James Drake, Christopher Forrest, Russell H Taylor  
*IROS*, 2020

## WORK EXPERIENCE

<b>Nvidia Research</b> , Internship.	Summer 2022
<b>Reality Labs, Meta Inc.</b> , Internship.	Summer 2021
<b>Intuitive Inc.</b> , Internship.	Summer 2019

## PUBLICATIONS/PREPRINTS

### *Vision navigation and 3D Reconstruction*

#### **Rethinking Causality-driven Robot Tool Segmentation with Temporal Constraints**

Hao Ding, Jie Ying Wu, **Zhaoshuo Li**, Mathias Unberath

*Arxiv*, 2022

#### **Context-Enhanced Stereo Transformer**

Weiye Guo, **Zhaoshuo Li**, Yongkui Yang, Zheng Wang, Russell H Taylor, Mathias Unberath, Alan Yuille, Yingwei Li

*ECCV*, 2022

#### **SAGE: SLAM with Appearance and Geometry Prior for Endoscopy**

Xingtong Liu, **Zhaoshuo Li**, Masaru Ishii, Gregory D Hager, Russell H Taylor, Mathias Unberath

*ICRA*, 2022

#### **E-DSSR: Efficient Dynamic Surgical Scene Reconstruction with Transformer-based Stereoscopic Depth Perception**

Yonghao Long\*, **Zhaoshuo Li\***, Chi Hang Yee, Chi Fai Ng, Russell H Taylor, Mathias Unberath, Qi Dou

*MICCAI*, 2021

#### **On the Sins of Image Synthesis Loss for Self-supervised Depth Estimation**

**Zhaoshuo Li**, Nathan Drenkow, Hao Ding, Andy S. Ding, Alexander Lu, Francis X Creighton, Russell H Taylor, Mathias Unberath

*Technical Report*, 2021

### *Surgical Robotics*

#### **Twin-S: A Digital Twin for Skull-base Surgery**

Hongchao Shu\*, Ruixing Liang\*, **Zhaoshuo Li\***, Anna Goodridge, Xiangyu Zhang, Hao Ding, Nimesh Nagururu, Manish Sahu, Francis X Creighton, Russell H Taylor, Adnan Munawar, Mathias Unberath

*Arxiv*, 2022

#### **Virtual reality for synergistic surgical training and data generation**

Adnan Munawar, **Zhaoshuo Li**, Punit Kunjam, Nimesh Nagururu, Andy S. Ding, Peter Kazanzides, Thomas Looi, Francis X Creighton, Russell H Taylor, Mathias Unberath

*AE-CAI*, 2021 ([Best paper award](#))

#### **Evaluation of Hybrid Control and Palpation Assistance for Situational Awareness in Telemanipulated Task Execution**

Rashid Yasin, Preetham Chalasani, Nicolas Zevallos, Mahya Shahbazi, **Zhaoshuo Li**, Anton Deguet, Peter Kazanzides, Howie Choset, Russell H Taylor, Nabil Simaan

*TMRB*, 2020

#### **A Robotic 3D Perception System for Operating Room Environment Awareness**

**Zhaoshuo Li**, Amirreza Shaban, Jean-Gabriel Simard, Dinesh Rabindran, Simon DiMaio, Omid Mohareri

*IPCAI*, 2020

### **Hybrid Robot-assisted Frameworks for Endomicroscopy Scanning in Retinal Surgeries**

**Zhaoshuo Li**, Mahya Shahbazi, Niravkumar Patel, Eimear O' Sullivan, Haojie Zhang, Khushi Vyas, Preetham Chalasani, Anton Deguet, Peter L Gehlbach, Iulian Iordachita, Guang-Zhong Yang, Russell H Taylor

*TMRB*, 2020

### **A Novel Semi-Autonomous Control Framework for Retina Confocal Endomicroscopy Scanning**

**Zhaoshuo Li**, Mahya Shahbazi, Niravkumar Patel, Eimear O'Sullivan, Haojie Zhang, Khushi Vyas, Preetham Chalasani, Peter L Gehlbach, Iulian Iordachita, Guang-Zhong Yang, Russell H Taylor

*IROS*, 2019

### **Free head movement eye gaze contingent ultrasound interfaces for the da vinci surgical system**

**Zhaoshuo Li**, Irene Tong, Leo Metcalf, Craig Hennessey, Septimiu E Salcudean

*ICRA*, 2018

### **Eye Gaze Contingent Ultrasound Interfaces for the da Vinci Surgical System**

**Zhaoshuo Li**, Irene Tong, Septimiu E Salcudean

*IROS*, 2017

## *Clinical Analysis*

### **Statistical Shape Model of the Temporal Bone Using Segmentation Propagation**

Andy S Ding, Alexander Lu, **Zhaoshuo Li**, Deepa Galaiya, Masaru Ishii, Jeffrey H Siewerdsen, Russell H Taylor, Francis X Creighton

*Otology & Neurotology*, 2022

### **Automated Extraction of Anatomical Measurements From Temporal Bone CT Imaging**

Andy S Ding, Alexander Lu, **Zhaoshuo Li**, Deepa Galaiya, Masaru Ishii, Jeffrey H Siewerdsen, Russell H Taylor, Francis X Creighton

*Otolaryngology–Head and Neck Surgery*, 2022

### **Automated registration-based temporal bone computed tomography segmentation for applications in neurotologic surgery**

Andy S Ding, Alexander Lu, **Zhaoshuo Li**, Deepa Galaiya, Jeffrey H Siewerdsen, Russell H Taylor, Francis X Creighton

*Otolaryngology–Head and Neck Surgery*, 2021

### **An Interpretable Approach to Automated Severity Scoring in Pelvic Trauma**

Anna Zapaishchykova, David Dreizin, **Zhaoshuo Li**, Jie Ying Wu, Shahrooz Faghieh Roohi, Mathias Unberath

*MICCAI*, 2021

### **Volumetric Accuracy Analysis of Virtual Safety Barriers for Cooperative-Control Robotic Mastoidectomy**

Andy S Ding, Sarah Capostagno, Christopher R Razavi, **Zhaoshuo Li**, Russell H Taylor, John P Carey, Francis X Creighton

*Otology & Neurotology*, 2021