Heng YU

539, Summerlea St, Pittsburgh, PA 15232

(+1) 412-954-7803   hengyu@andrew.cmu.edu   https://heng14.github.io

EDUCATION

Robotics Institute, School of Computer Science, Carnegie Mellon University *Aug.2021–Aug.2023*

- MS in Robotics,   Major GPA: 4.24/4.0
- Thesis: Towards Real-time Controllable Neural Face Avatars

School of Information Science and Technology, Tsinghua University *Aug.2014 – Jul.2018*

- BE in Automation Department,   Major GPA: 3.8/4.0, class ranking: 1/24

School of Economics and Management, Tsinghua University *Aug.2015 – Jul.2018*

- BA in Economics (second major),   Major GPA: 3.7/4.0

RESEARCH EXPERIENCES

Computational Behavior Lab, Robotics Institute, Carnegie Mellon University *Nov.2021 – **present***

Research Assistant,   Advisor: Prof. Laszlo Jeni

- Focus: neural implicit representations for 3D scenes and controllable neural rendering for avatar animation
- Proposed a fully automatic controllable neural representation for face self-portraits and the paper was accepted by FG 2023.
- Proposed the Dynamic Light Field Network method that can handle non-rigid deformations and outperform state-of-the-art methods in terms of visual fidelity and compute complexity. The paper has been accepted by CVPR 2023.
- Proposed the controllable Gaussian Splatting method that enables real-time dynamic scene manipulation without the prerequisite of pre-computing control signals. The paper has been submitted to CVPR 2024.

Martinos Center for Biomedical Imaging, Harvard-MIT *Feb.2020 – Feb.2023*

Research Assistant,   Advisor: Prof. Berkin Bilgic, Prof. Kawin Setsompop

- Focus: fast robust scan-specific MRI reconstruction
- Proposed eRAKI method which achieved more than 10-fold improvement in training and reconstruction speed than state-of-the-art scan-specific methods, while retaining high-quality reconstruction at high accelerations. The abstract has been published by ISMRM 2021 as an oral presentation.
- Devised a parallel network with attention to enhancing zero-shot self-supervised learning for faster acceleration, accepted as Power Pitch by ISMRM 2023.

Li Lab, Department of Radiation Oncology, Stanford University *Nov.2018 – Jan.2020*

Research Assistant,   Advisor: Prof. Ruijiang Li

- Focus: clinical-level AI system for diagnosis and treatment evaluation of rectal cancer
- Implemented a novel convolutional neural network structure, S-Net, to predict the survival risk of gastric cancer patients and the paper has been published by Annals of Surgery.
- Implemented a deep learning model to predict lymph node metastases at 12 locations in gastric cancer patients and the paper has been published by British Journal of Surgery.
- Implemented a novel multi-task 3D network to predict the nCRT response and improved the accuracy from 76.0% to 85.9%. It was the first deep learning method using two-stage 3D MRI images and the paper has been published by Nature Communications.

KLab, Robotics Institute, Carnegie Mellon University *Jul.2017 – Sep.2017*

Summer Intern,   Advisor: Prof. Kris Kitani

- Focus: real-time robust pedestrian detection for body-worn smartphones
- Studied pedestrian detection algorithms on mobile phones and proposed a novel network, which improved pedestrian detection accuracy from 50.9% to 74.3% with 17 fps on mobile devices. The paper has been published by WACV 2018.
- Completed the mobile app for pedestrian detection which could run on iPhone with detection results and audio speech using CoreML. This could be used to help blind people navigate along with Prof. Kris Kitani's platform NavCog.

Intelligent Vision Group, Department of Automation, Tsinghua University *Sep.2016 – Feb.2018*

Research Assistant,   Advisor: Prof. Jie Zhou, Prof. Jianjiang Feng

- Focus: medical image segmentation and substance detection in the left atrial appendage
- Proposed an approach using optical flow and clustering methods that detected substances in the left atrial appendage by spatiotemporal motion analysis. The paper has been published by MICCAI workshop 2017 as an oral presentation.
- Proposed a precise and non-invasive modeling method of left atrial appendage neck based on the segmentation result of the maximal volume phase from CT data and performed tests in 67 occlusion surgeries with a success rate of 97.01%. The paper has been published by MICCAI workshop 2017.

RESEARCH INTEREST

- 3D Vision and its application in the real world
- AI for Healthcare
- generalizable machine learning and optimization

WORK EXPERIENCES

Fujitsu Research of America, Inc., Sunnyvale   *May.2022 – Aug.2022*

Research Intern,   Collaborator: Dr. Koichiro Niinuma

- Research on controllable neural radiance fields for face avatars
- Developed the anatomically correct neural avatar system and the patent is pending.

Sangfor Technologies Inc., Shenzhen   *May.2021 – Aug.2021*

Machine Learning Engineer,   Collaborator: Dr. Cheng Chi

- Work on evading web application firewalls with reinforcement learning
- Improved PPO algorithm using action mask technique and applied it to generate adversarial payloads to bypass the firewall.
- Found 11 bypass modes and more than 1000 bypass payload samples, which greatly helped improve the robustness of the company firewall product.

Tsingh Technology Co., Ltd, Beijing   *Jul.2018 – Apr 2021*

Co-founder and Machine Learning Engineer,   Collaborator: Dr. Baohua Chen, Dr. Lei Deng

- Work on AI algorithms for smart logistics
- Developed an automated warehousing system and deployed it to more than ten factories and reduced labor costs by more than $1 million per year.
- Developed the first fully automatic boarding bridge system in China.

Nebula Link Technology, Beijing   *Feb.2018 – Jun 2018*

Research Intern,   Collaborator: Dr. Yizhi Wang, Dr. Mengkai Shi

- Work on vehicle detection and traffic parameter calculation.
- Presented a deep learning model for real-time speed and distance estimation from a fixed monocular camera, enhancing vehicle detection, published by CICTP 2019.

SELECTED PUBLICATIONS AND MANUSCRIPTS   († REFERS TO CO-FIRST AUTHOR)

- **H. Yu**, J. Julin, Z. Milacski, K. Niinuma, L. Jeni. *CoGS: Controllable Gaussian Splatting.* submitted to **CVPR** 2024
- **H. Yu**, J. Julin, Z. Milacski, K. Niinuma, L. Jeni. *DyLiN: Making Light Field Networks Dynamic.* **CVPR** 2023
- **H. Yu**, Z. Milacski, L. Jeni. *Unsupervised Style-based Explicit 3D Face Reconstruction from Single Image.* **CVPR** workshop 2023
- **H. Yu**, Y. Arefeen, B. Bilgic. *SubZero: Subspace Zero-Shot MRI Reconstruction.* **ISMRM** 2023 **Power Pitch**
- **H. Yu**, K. Niinuma, L. Jeni. *CoNFies: Controllable Neural Face Avatars.* **FG** 2023 **Best Paper Candidate**
- W. Song, **H. Yu**, J. Wu. *Non-pooling Network for medical image segmentation.* **MICAD** 2022 **Best Paper Award**
- **H. Yu**, D. Fan, W. Song. *GPU-Net: Lightweight U-Net with more diverse features.* **MIUA** 2022
- Y. Arefeen, O. Beker, J. Cho, **H. Yu**, E. Adalsteinsson, B. Bilgic. *Scan-specific artifact reduction in k-space (SPARK) neural networks synergize with physics-based reconstruction to accelerate MRI.* **Magnetic Resonance in Medicine**, 2022
- **H. Yu**, Z. Dong, Y. Arefeen, C. Liao, K. Setsompop, B. Bilgic. *eRAKI: Fast Robust Artificial neural networks for K-space Interpolation (RAKI) with Coil Combination and Joint Reconstruction.* **ISMRM** 2021 **Oral**

- C. Jin[†], **H. Yu**[†], J. Ke[†], P. Ding[†], Y. Yi, X. Jiang, X. Duan, J. Tang, D. Chang, X. Wu, F. Gao, R. Li. *Predicting Treatment Response from Longitudinal Images using Multi-task Deep Learning*. **Nature Communications**, 2021
- **H. Yu**, X. Feng, Z. Wang, H. Sun. *MixModule: Mixed CNN Kernel Module for Medical Image Segmentation*. **ISBI** 2020
- Y. Jiang[†], C. Jin[†], **H. Yu**[†], J. Wu[†], C. Chen, Q. Yuan, W. Huang, Y. Hu, Y. Xu, Z. Zhou, G. Fisher Jr, G. Li, R. Li. *Development and Validation of a Deep Learning CT Signature to Predict Survival and Chemotherapy Benefit in Gastric Cancer: A Multicenter, Retrospective Study*. **Annals of Surgery**, 2020
- C. Jin[†], Y. Jiang[†], **H. Yu**[†], W. Wang, B. Li, C. Chen, Q. Yuan, Y. Hu, Y. Xu, Z. Zhou, G. Li, R. Li. *Deep Learning Analysis of the Primary Tumour and the Prediction of Lymph Node Metastases in Gastric Cancer*. **British Journal of Surgery**, 2020
- **H. Yu**, E. Ohn-Bar, D. Yoo, K. Kitani. *SmartPartNet: Part-Informed Person Detection for Body-Worn Smartphones*. **WACV** 2018
- C. Jin, J. Feng, L. Wang, **H. Yu**, J. Liu, J. Lu, J. Zhou. *Left atrial appendage segmentation using fully convolutional neural networks and modified three-dimensional conditional random fields*. **IEEE Journal of Biomedical and Health Informatics,** 2018
- C. Jin, **H. Yu**, J. Feng, L. Wang, J. Lu, J. Zhou. *Detection of Substances in the Left Atrial Appendage by Spatiotemporal Motion Analysis Based on 4D-CT*. **MICCAI** workshop 2017 **Oral**
- C. Jin, **H. Yu**, J. Feng, L. Wang, J. Lu, J. Zhou. *Left Atrial Appendage Neck Modeling for Closure Surgery*. **MICCAI** workshop 2017

US PATENTS

Heng Yu, Koichiro Niinuma, Laszlo A Jeni. Anatomically Correct Neural Avatars. (pending)

Heng Yu, Joel Julin, Zoltan A Milacski, Koichiro Niinuma, Laszlo A Jeni. Anatomically Correct Neural Avatars. (pending)

SERVICE

Reviewer: CVPR, ECCV, NeurIPS, MICCAI, ISBI, Computer Graphics Forum, ISMRM

AWARDS

Gold Medal at the 8th China International College Students' 'Internet+' Innovation and Entrepreneurship Competition   2022

Honorable Mention in Mathematical Contest in Modeling   2017

Academic Scholarship in Automation Department, Tsinghua University   2016, 2017 (30/150)

National Encouragement Scholarship   2015, 2016, 2017 (5/150)

The "HAGE" Scholarship in Automation Department, Tsinghua University   2015, 2016, 2017

Social Service Scholarship in Automation Department, Tsinghua University   2015 (8/150)

Outstanding Volunteers Award in Tsinghua University   2014

Tsinghua talented student program   2014 (1/13,000)

First Prize in Chinese Chemistry Olympiad (Provincial Competition Area)   2013

Second Prize in Chinese Mathematics Olympiad (Provincial Competition Area)   2012, 2013

Second Prize in Chinese Biology Olympiad (Provincial Competition Area)   2013

SKILLS

Programming Languages: Python, Matlab, C/C++, and basic familiarity with R.

Operating System: Linux (Ubuntu, Fedora, CentOS), MacOS, Windows.

Frameworks and Tools: PyTorch Tensorflow, Keras, MXNet.

RELEVANT COURSEWORK

Signals and System Analysis (98/100), Process Control (98/100), Fundamentals of Engineering Graphics (98/100), C++ Programming Language (93/100), Complex Analysis (97/100), Data Structures (94/100), Interdisciplinary Research and Practice (95/100), Probability and Statistics (94/100), Computer Networks and Applications (93/100), Machine Learning* (A+/A+), Computer Vision* (A+/A+), Learning for 3D Vision* (A+/A+), Kinematics, Dynamics and Control* (A+/A+), Visual Learning and Recognition* (A+/A+), Math Fundamentals for Robotics* (A/A).

*indicates graduate courses