IR. Bangyu Lan

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RESEARCH INTERESTS

Intelligent Robotics, Raw Signal Processing and Interpretation, Computer Vision, Sequencial Model, Multimodal Machine Learning, Generative Models, Cognitive Science.

EDUCATION

UNIVERSITY OF TWENTE   Enschede, Netherlands
Master of Electrical Engineering (Robotics and Mechatronic track)   Sept. 2022 to May 2024
Modelling and Simulation, Dynamics and Kinematics, Systems Engineering, Control System, Tele-presence Robotics.
- **GPA:** 8/10
- **Thesis:** *Deep learning-based interpretation and analysis of ultrasound raw data.* (supervised by Dr. Niu Kenan)

ROCHESTER INSTITUTE OF TECHNOLOGY   Rochester, U.S.A.
Ph.D. of Computing and Information Sciences   Sept. 2021 to June 2022
Computer Vision and Image Processing, Machine Learning, Deep Learning on Multi-Modality (Audio and Video).
- **Ph.D. student (dropped)**, supervised by Dr. Yu Kong (M.S.U) and Dr. Matthew Wright (R.I.T.)
- **Research Potential Assessment Report:** *Spontaneous Facial Motion Controllable Talking Face Generation.* (Passed in the first year)

HARBIN INSTITUTE OF TECHNOLOGY, WEIHAI   Shandong, China
Bachelor of Electronic Information Engineering   Sept. 2016 to June 2020
Calculus, Analog and Digital Electronic Technology, Signals and Systems, DSP, FPGA, Satellite Positioning, etc.
- **GPA**: 89.85/100
- **Rank of Major courses**: 12/116
- **Thesis:** *Class check-in system based on collective face recognition.* (Outstanding Undergraduate Thesis)

ARTICLE RECORD

- *Deciphering Muscular Dynamics: A Dual-Attention Framework for Predicting Muscle Contraction from Activation Patterns.* **First author**. Under review at IEEE J-BHI.
- *SIRC-UNet: Improving Bone Tracking Precision of A-mode Ultrasound Signals by Decoding Hierarchical Resolution Features.* **First author**. IEEE Sensor Journal.
- *A Method to Track 3D Knee Kinematics by Multi-Channel 3D-Tracked A-Mode Ultrasound.* **Third author.** MDPI Sensors
- *Anatomical Region Recognition and Real-time Bone Tracking Methods by Dynamically Decoding A-Mode Ultrasound Signals.* **First author**. BioRob 2024.
- *Deep Learning based acoustic measurement approach for robotic applications on orthopedics.* **First author**. ICRA 2024.

PROFESSIONAL ACTIVITIES

Reviewers for the following Conferences:
- ICRA 2024, ICCV 2022, CVPR 2022, AAAI 2022, ACM MM 2022.

Teaching Assistant for the following courses:
- 201200168, Segmentation and Visualisation, Spring 2024
- CSCI-631, Foundations of Computer Vision, Spring 2022 **(in Rochester Institute of Technology)**

PROJECT HIGHLIGHTS

Improve Bone Tracking Precision of A-mode Ultrasound Signals   Enschede, Netherlands
Researcher, *Supervised by* Dr. Niu Kenan   20 hours/week, 30 weeks, 2023
Key Words: *A-mode ultrasound, dynamic bone tracking, deep learning, peak detection, SIRC-UNet*
- Develop a more advanced SIRC-UNet to detect the bone reflection peaks from the raw ultrasound signals.
- Propose the Sampling-based Proposal mechanism and a complete framework for peak detection using two UNet.
- The results prove that it can recognize and detect ultrasound bone peaks in the local lower extremity segment.

Generate Realistic Deepfake Videos Only Based Audio   Rochester, U.S.A.
Researcher, Supervised by <u>Dr. Yu Kong(MSU)</u> and <u>Dr. Matthew Wright (RIT)</u>   40 hours/week, 60 weeks, 2022
Key Words: Multimodal Generation, Attributes Disentanglement, VAE, Modulated Convoluted Generator
- Propose multiple attributes disentanglement methods to extract visual features from audio.
- Incorporate probabilistic sampling strategy to traditional audio-visual mappings process to bring diversity.
- Propose the first method to generate spontaneous facial motion in Deepfake, surpass previous SOTAs.

Class Check-in System Based on Face Recognition   Shandong, China
Engineer, Facial Recognition algorithm, Image Super-resolution, Network Finetune   30 hours/week, 20 weeks, 2020
- Program the class check-in system and recognize the attending students by only one picture in low resolution.
- Reengineer at least 20 algorithms and open sources to establish a sign-in system that can overcome problems in reality.
- Won the first prize in *2019 'Goertek's Cup'* and the second prize in *2019 'Principal's Cup'* Competitions.

Research on the Best Solution for Optimal Power Allocation Based on Reinforcement Learning   Shandong, China
Assistant Researcher, Reinforcement Learning, Tensorflow   40 hours/week, 4 weeks, 2018
- Try to find the best solution for optimal power allocation and tried neutral network methods.
- Researched and applied the reinforcement learning such as DQN, DDPG, policy gradient, etc. in the project to resolve problems such as discrete data and continuous data, randomness in the operation, etc.

Research of Cognitive Learning on High School Students' Learning Proficiency   Shandong, China
Director, Metacognition, Cognitive Psychology   15 hours/week, 20 weeks, 2017
- Took charge of the whole process of the designing and team management in the cognitive learning method design.
- Applied and integrated theories of cognitive psychology and learning method to create Cognitive Learning Method.
- Find connections between cognitive psychology and machine learning (the representations and generalization).

INTERNSHIP

Radboud University Medical Center (Radboud UMC)   Nijmegen, Netherlands
Assistant Researcher, Total Knee Replacement Arthroplasty, peak detection, CasAtt-UNet   40 hours/week, 14 weeks, 2023
- Build a Deep Learning based acoustic measurement approach for robotic applications on orthopedics.
- Generate exact bone locations (depth) from the motion tracking system based on the optical markers.
- Develop CasAtt-UNet to have high accuracy for peak detection compared to the traditional methods.

Guangdong Sanweijia Information Technology Co., Ltd.   Guangdong, China
Algorithm Intern, pix2pixHD, pix2pix, GAN   40 hours/week, 4 weeks, 2020
- Build a coloring system based on pix2pixHD model to solve problems in coloring the ceramic tile with black profile.
- Adopt other methods to optimize the coloring algorithm and achieve different results, including jump connections in the Generator Network, loss function modification, adopting the Single-color-encode-RGB instead of traditional way.

China DN Information Security Co., Ltd.   Guandong, China
Internet Security Intern Engineer: Python, Chatterbot, MongoDB   40 hours/week, 4 weeks, 2017
- Designed the testing platform Athena 0.1.1 that could: generate training data, chatbot training, inference, and testing.
- Applied python chatterbot api to encapsulate interface and provide mutual test to verify and calculate accuracy.
- Composed a software manual for users in the company.

ACHIEVEMENT

HIT Outstanding graduate   Shandong, China
Officially rewarded by Committee of Harbin Institute of Technology   June 2020

H prize in MCM/ICM   Shandong, China
Matlab, Expert System, Neural Network, Multiple Linear Programming, GIS, Investment Finance Model   Feb. 2018

Scholarships   Shandong, China
1st (two times), 2nd (one times), 3rd (three times) Level People's Scholarship   Sept. 2016 to June 2020

SKILLS

Language:	Chinese (native language), English (proficiency: TOFEL 104, GRE 330), Dutch (A1)
Programming:	Python, Matlab, C++, C, Latex
Frameworks:	Pytorch, TensorFlow,
Hobbies:	Swimming, Tennis, Table Tennis, Cooking, Guitar (beginner)