Yilin Liu

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EDUCATION

Pennsylvania State University (PSU), State College, PA, USA Sep 2018 - 2023(expected)
Ph.D. student, School of EECS,
Computer Science Engineering department

University of Science and Technology of China (USTC), Hefei, China Sep 2014 - Jul 2018
B.E., School of the Gifted Young,
Electronic Information Science & Technology department

RESEARCH INTERESTS

- Cyber Physical Systems, IoT and human behavioral sensing
- Machine Learning and Deep Learning applications
- Mobile and Wearable Computing
- Wireless Networking
- Automated Speech Recognition

PUBLICATIONS

- Leveraging the Properties of mmWave Signals for 3D Finger Motion Tracking for Interactive IoT Applications
  Yilin Liu, Shijia Zhang, Mahanth Gowda, Srihari Nelakuditi
  ACM SIGMETRICS 2023
- I Spy You: Eavesdropping Continuous Speech on Smartphones via Motion Sensors
  Shijia Zhang, **Yilin Liu**, Mahanth Gowda
  ACM IMWUT/UbiComp, 2023
- One Ring to Rule Them All: An Open Source Smartring Platform for Finger Motion Analytics and Healthcare Applications
  Hao Zhou*, Taiting Lu*, **Yilin Liu**, Shijia Zhang, Runze Liu, Mahanth Gowda
  IoTDI 2023
- A Practical System for 3D Hand Pose Tracking using EMG Wearables with Applications to Prosthetics and User Interfaces
  Yilin Liu, Shijia Zhang, Mahanth Gowda
  IEEE Internet of Things Journal (IoTj)
- Learning on the Rings: Self-Supervised 3D Finger Motion Tracking using Wearable Sensors
  Hao Zhou*, Taiting Lu*, **Yilin Liu**, Shijia Zhang, Mahanth Gowda
  ACM IMWUT/UbiComp, 2022
- Let's Grab a Drink: Teacher-Student Learning for Fluid Intake Monitoring using Smart Earphones.
  Shijia Zhang, **Yilin Liu**, Mahanth Gowda
  IoTDI 2022
- When Video meets Inertial Sensors: Zero-shot Domain Adaptation for Finger Motion Analytics with Inertial Sensors.**(Best Paper Award)**
  Yilin Liu, Shijia Zhang, Mahanth Gowda
  IoTDI 2021
- NeuroPose: 3D Hand Pose Tracking using EMG Wearables.
  Yilin Liu, Shijia Zhang, Mahanth Gowda
  WWW 2021

- Finger Gesture Tracking for Interactive Applications: A Pilot Study with Sign Languages.
  Yilin Liu, Fengyang Jiang, Mahanth Gowda
  ACM IMWUT/UbiComp 2020

- Application Informed Motion Signal Processing for Finger Motion Tracking using Wearable Sensors.
  Yilin Liu, Fengyang Jiang, Mahanth Gowda
  IEEE ICASSP 2020

Intern Experience

NEC Laboratories America, Inc. , Princeton, NJ — May 2022 - Aug 2022
Real-time human body tracking and physiology monitoring with mmWave radar

Stanford University, CA — Sep 2017 - Jan 2018
NLP and Artificial intelligence

University of Virginia, VA — Jul 2017 - Dec 2018
Generalized Cascading Bandit

Research Experience

Ichnos: Real-time human body tracking and physiology monitoring — May 2022 - Aug 2022
Advisor: Ram Sheshadri, NEC Laboratories America, Inc.

- Designed a system aiming at tracking user's location, orientation and breathing rate using spatially distributed MIMO mmWave radar system
- Enabled Robustness, Penetrability and Accuracy in both physiology monitor and localization using dense aggregated point cloud

3D Finger Motion Tracking using Properties of mmWave Signals — May 2021 - Dec 2021
Advisor: Mahanth Gowda, Department of Computer Science and Engineering, Pennsylvania State University

- Proposed a system called mm4Arm which shows the feasibility of sensing forearm vibrations for 3D finger motion tracking using mmWave signals
- Anatomical constraints of finger motions were fused with ML advances in achieving reliable accuracy with low training overhead. The inference is done with low processing and energy overhead on smartphones.

Zero-shot domain adaptation for finger motion analytics from public videos — Apr 2020 - Jan 2021
Advisor: Mahanth Gowda, Department of Computer Science and Engineering, Pennsylvania State University

- Designed a system called ZeroNet, that extracts training data from publicly available videos of annotated finger gestures, and apply appropriate data augmentation techniques to increase the robustness and generalizability of ML models in user study
- With zero training overhead, ZeroNet is able to show high recognition accuracy on finger gestures indicating promise

3D hand pose tracking using EMG wearables — Apr 2019 - Mar 2020
Advisor: Mahanth Gowda, Department of Computer Science and Engineering, Pennsylvania State University

- Proposed a system called NeuroPose that shows the feasibility of 3D finger motion tracking using a platform of wearable ElectroMyoGraphy (EMG) sensors
- Utilized machine learning architectures on Recurrent Neural Networks (RNN), Encoder-Decoder Networks, and ResNets to extract 3D finger motion from noisy EMG data
- A transfer learning algorithm is leveraged to adapt a pretrained model onto a new user with minimal training overhead.

Human finger motion tracking using wearable sensors — Sep 2018 - Mar 2019

Advisor: Mahanth Gowda, Department of Computer Science and Engineering, Pennsylvania State University

- Implemented a system that shows the feasibility of fine grained finger gesture tracking using low intrusive wearable sensor platform
- Conducted extensive evaluation on users, showing high accuracy for applying our system to recognize 200 most frequently used ASL finger gestures over different sentences
- Utilized a probabilistic framework incorporating the noisy and under-constrained motion sensor data, as well as the contextual information between ASL words to decode the most likely sentences

AWARDS

- Best paper award of ACM/IEEE Conference on Internet of Things Design and Implementation. (***IoTDI***) 2021
- Student grants of the ACM Web Conference.(***TheWebConf***) 2021

TEACHING EXPERIENCE

- CMPEN 462: Wireless Communication Systems (Teaching Assistant), Penn State — Spring 2022
- CMPEN 362: Communication Networks (Teaching Assistant), Penn State — Spring 2021
- CMPSC101: Intro Python Programming (Teaching Assistant), Penn State — Spring 2020
- CMPEN 362: Communication Networks (Teaching Assistant), Penn State — Fall 2019
- CMPEN 270: Digital Design: Theory and Practice (Teaching Assistant), Penn State — Spring 2019

SKILLS

Programming Languages: Python, Matlab, C/C++, Java, SQL

Deep learning: Tensorflow, Pytorch

Hardware: Arduino, Raspberry Pi

Others: Linux, OpenCV, Origin, LaTeX, Microsoft Office