

# Curriculum Vitae

**Yu Tsao (曹昱)**

**Research Fellow (Professor)/ Deputy Director**

**Bio-Acoustic Signal Processing (Bio-ASP) Lab:** <http://bio-asplab.citi.sinica.edu.tw/>

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Google Scholar: <https://scholar.google.com/citations?hl=zh-TW&user=ZO5e5I4AAAAJ>

Google Scholar Citation: 11453 (H-index: 50) until 2024/10/12

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## RESEARCH INTERESTS

- Speech Enhancement and Voice Conversion
- Assistive Oral Communication Technologies
- Biomedical Acoustic Signal Processing
- Deep Learning Algorithm Development

## EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY, Atlanta, Georgia

*Ph.D. in Electrical and Computer Engineering*

Aug. 2003-Dec. 2008

• Research Topic: Robust Speech Recognition, under advisor: Dr. Chin-Hui Lee

• Leadership Activities: President, Taiwanese Student Association (TSA): represented the school; assisted students and visiting scholars from Taiwan.

NATIONAL TAIWAN UNIVERSITY, Taipei, Taiwan

*Master of Science in Electrical Engineering*

Sept. 1999-June 2001

*Bachelor of Science in Electrical Engineering*

Sept. 1995-June 1999

• Graduate Research Topic: Rapid Speaker Adaptation, under advisor Dr. Lin-Shan Lee

• Leadership Activities: Chairman, Public Relations Department of the Student Association: organized events to cultivate strong relationships among members.

## PROFESSIONAL EXPERIENCE

RESEARCH CENTER FOR INFORMATION TECHNOLOGY INNOVATION, ACADEMIA SINICA,  
Taipei, Taiwan

*Researcher Fellow (Professor)/Deputy Director*

2020/08–Present

*Associate Researcher Fellow (Associate Professor)*

2016/05–2020/08

*Assistant Researcher Fellow (Assistant Professor)*

2011/11–2016/04

- Research and develop speech signal processing algorithms.
- Develop devices of assistive oral communication technology.
- Derive acoustic signal processing for biomedical applications.
- Derive novel machine-learning algorithms for acoustic signal processing.

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, Kyoto, Japan

*Expert Researcher*

April 2009-Sept. 2011

- Developed research to handle non-native accent issues for automatic speech recognition applications.
- Developed digital signal processing-based solutions to improve the performance of speech recognizers under real-world adverse conditions.
- Contributed to developing VoiceTra multilingual speech-to-speech translation application on iPhone.
- Carried out projects of field tests and dissemination of spoken dialog interface technologies.

## HONORS

- **Outstanding Research Award, NSTC, Taiwan (2023)**
- **Cough Diagnostic Algorithm for Tuberculosis DREAM Challenge-SubChallenge 2 First Place (2023)**
- **Clarity Machine Learning Challenges for Hearing Aids Challenge Gold Prize (2022)**
- **IEEE Signal Processing Society (SPS) Young Author Best Paper Award (corresponding author) (2021)**
- Outstanding Elite Award, Chung Hwa Rotary Educational Foundation 2019-2020 (2019–present)
- Distinguished Lecture Award, APSIPA (2018)
- Best Student Paper Award, ISCSLP 2018 (2018)

## PROFESSIONAL ACTIVITIES

### **Invited Talks**

- Keynote Speech, IEEE ICTS 2021, Title: Deep-learning-based Speech Enhancement with Its Application to Assistive Oral Communications Devices (2021/10).
- Invited Lecture APSIPA Japan Chapter, Title: Deep-learning-based Speech Enhancement with Its Application to Assistive Oral Communications Devices (2021/03).
- Keynote Speech in M3Oriental Workshop, ACM Multimedia Asia, Title: Utilizing Deep Learning for Speech Enhancement in Assistive Oral Communication Technologies, (12/2023).
- CTSoc Technical Talk, Title: Wearable Devices and Machine Learning Algorithms for Augmented Oral Communication Assistance, (2023/11).

### **Challenge Organizer**

- Voice Detection Challenge in IEEE Big Data 2018. The challenge has attracted the participation of **109 teams from 27 different countries**.
- VoiceMOS Challenge, a special session in Interspeech 2022.
- The VoiceMOS Challenge 2023: Zero-shot Subjective Speech Quality Prediction for Multiple Domains, a special session in ASRU 2023.

### **International Services**

- Chair, Speech, Language, and Audio (SLA) Technical Committee, APSIPA (2020-2022)
- Distinguished Lecturer, APSIPA (2019-2021)
- Member, IEEE Speech and Language Processing Technical Committee Members (2021-present)

### **Editorship**

- Associate Editor, IEEE Signal Processing Letters (2020-present)
- Associate Editor, IEEE/ACM Transactions on Audio, Speech, and Language Processing (2019-present)
- Associate Editor, APSIPA Transactions on Signal and Information Processing (2022- present)
- Guest Editor of the journal Biomedical Signal Processing and Control (Title: Advances in biomedical signal processing for communication disorders)
- Guest Editor of the Themed Series of APSIPA Transactions on Signal and Information Processing (Title: Advanced Acoustic, Sound and Audio Processing Techniques and Their Applications)

### **Conference Chairs**

- Tutorial Chair, IEEE GEM 2024, Italy (2023/06)
- General Chair, IEEE ASRU 2023, Taiwan (2023/12)
- General Chair, ROCLING 2017, Taiwan (2017/11)
- Sponsor Chair, TAAI 2017, Taiwan (2017/11)
- Program Chair, ROCLING 2016, Taiwan (2016/10)
- Organizer, SWS 2015, IIS, Academia Sinica, Taiwan (2015/03)

## REPRESENTATIVE RESEARCH WORKS

Prof. Yu Tsao's research primarily focuses on “**Neural Speech Enhancement and Assessment for Assistive Oral Communication Technologies**”, which can be further divided into three parts: (1) **Neural Speech Enhancement and Voice Conversion**; (2) **Neural Speech Assessment**; (3) **Assistive Oral Communication Technologies**.

### (1) Neural Speech Enhancement and Voice Conversion (in total more than 5600 citations)

#### Selected Publications:

- Paper#1: Speech Enhancement Based on Deep Denoising Autoencoder, in *Proc. Interspeech 2013*, **Google Citation: 1086**.
- Paper#2: End-to-End Waveform Utterance Enhancement for Direct Evaluation Metrics Optimization by Fully Convolutional Neural Networks, *IEEE/ACM Transactions on Audio, Speech and Language Processing*, vol. 26(9), pp. 1570-1584, April 2018. **(2021 IEEE Signal Processing Society (SPS) Young Author Best Paper Award)**. **Google Citation: 336**.
- Paper#3: MetricGAN: Generative Adversarial Networks based Black-box Metric Scores Optimization for Speech Enhancement, in *Proc. ICML 2019*, **Long Oral Presentation with Travel Grant**. **Google Citation: 348**.
- Paper#4: Audio-Visual Speech Enhancement Using Multimodal Deep Convolutional Neural Networks, *IEEE Transactions on Emerging Topics in Computational Intelligence*, vol. 2(2), pp. 117-128, April. 2018. **Google Citation: 280**.
- Paper#5: Raw waveform-based Speech Enhancement by Fully Convolutional Networks, in *Proc. APSIPA 2017*, **Google Citation: 267**.
- Paper#6: SNR-Aware Convolutional Neural Network Modeling for Speech Enhancement, in *Proc. Interspeech 2016*, **Google Citation: 214**.
- Paper#7: Complex spectrogram enhancement by convolutional neural network with multi-metrics learning, in *Proc. MLSP 2017*, **Google Citation: 200**.
- Paper#8: MetricGAN+: An Improved Version of MetricGAN for Speech Enhancement, in *Proc. Interspeech 2021*, **Google Citation: 218**.
- Paper#9: Conditional Diffusion Probabilistic Model for Speech Enhancement, in *Proc. ICASSP 2022*, **Google Citation: 150**.
- Paper#10: Learning with Learned Loss Function: Speech Enhancement with Quality-Net to Improve Perceptual Evaluation of Speech Quality, *IEEE Signal Processing Letters*, vol. 27, pp. 26-30. Nov. 2019, **Google Citation: 94**.
- Paper#11: Ensemble Modeling of Denoising Autoencoder for Speech Spectrum Restoration, in *Proc. Interspeech 2014*, **Google Citation: 77**.
- Paper#12: Improving Perceptual Quality by Phone-Fortified Perceptual Loss using Wasserstein Distance for Speech Enhancement, in *Proc. Interspeech 2020*, **Google Citation: 71**.
- Paper#13: WaveCRN: An Efficient Convolutional Recurrent Neural Network for End-to-end Speech Enhancement, *IEEE Signal Processing Letters*, vol. 27, pp. 2149-2153, Nov. 2020, **Google Citation: 71**.
- Paper#14: Experimental Study on Extreme Learning Machine Applications for Speech Enhancement, *IEEE Access*, vol. 5, pp. 25542-25554, Oct. 2017, **Google Citation: 59**.
- Paper#15: Noise Adaptive Speech Enhancement using Domain Adversarial Training, in *Proc. Interspeech 2019*, **Google Citation: 59**.
- Paper#16: Generalized Maximum A Posteriori Spectral Amplitude Estimation for Speech Enhancement, *Speech Communication*, vol. 76, pp. 112-126, Feb. 2016, **Google Citation: 54**.
- Paper#17: Speech enhancement using segmental nonnegative matrix factorization, in *Proc. ICASSP 2014*, **Google Citation: 54**.
- Paper#18: Multichannel Speech Enhancement by Raw Waveform-Mapping Using Fully Convolutional Networks, *IEEE/ACM Transactions on Audio, Speech and Language Processing*, vol. 28, pp. 1888-1900, Feb. 2020, **Google Citation: 54**.
- Paper#19: An Investigation of Spectral Restoration Algorithms for Deep Neural Networks Based Noise Robust Speech Recognition, in *Proc. Interspeech 2013*, **Google Citation: 50**.

## (2) Neural Speech Assessment (in total more than 1000 citations)

### Selected Publications:

- Paper#1: ASVspoof 2019: A Large-scale Public Database of Synthesized, Converted and Replayed Speech, *Computer Speech and Language*, vol. 64, 101114, Nov. 2020, **Google Citation: 338**.
- Paper#2: MOSNet: Deep Learning based Objective Assessment for Voice Conversion, in *Proc. Interspeech 2019*, **Google Citation: 266**.
- Paper#3: Quality-Net: An End-to-End Non-intrusive Speech Quality Assessment Model based on BLSTM, in *Proc. Interspeech 2018*, **Google Citation: 176**.
- Paper#4: The VoiceMOS Challenge 2022, in *Proc. Interspeech 2022*, **Google Citation: 92**.
- Paper#5: Deep Learning-based Non-Intrusive Multi-Objective Speech Assessment Model with Cross-Domain Features, *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 31, pp. 54-70., Sept. 2022, **Google Citation: 63**.
- Paper#6: STOI-Net: A Deep Learning based Non-intrusive Speech Intelligibility Assessment Model, in *Proc. APSIPA 2020*, **Google Citation: 37**.
- Paper#7: MBI-Net: A Non-Intrusive Multi-Branched Speech Intelligibility Prediction Model for Hearing Aids, in *Proc. Interspeech 2022*, **Google Citation: 18**.
- Paper#8: InQSS: A Speech Intelligibility and Quality Assessment Model using a Multi-task Learning Network, in *Proc. Interspeech 2022*, **Google Citation: 14**.
- Paper#9: Toward Automating Oral Presentation Scoring during Principal Certification Program using Audio-Video Low-level Behavior Profiles, *IEEE Transactions on Affective Computing*, vol. 10(4), pp. 552-567, Dec. 2019, **Google Citation: 11**.
- Paper#10: HASA-NET: A Non-Intrusive Hearing-Aid Speech Assessment Network, in *Proc. ASRU 2021*, **Google Citation: 10**.
- Paper#11: SVSNet: An End-to-end Speaker Voice Similarity Assessment Model, *IEEE Signal Processing Letters*, 29, pp. 767-771, Feb. 2022, **Google Citation: 6**.

## (3) Assistive Oral Communication Technologies (in total more than 840 citations)

### Selected Publications:

- Paper#1: Detection of Pathological Voice Using Cepstrum Vectors: A Deep Learning Approach, *Journal of Voice*, vol 33(5), pp. 634-641, Sept. 2019. **Google Citation: 242**.
- Paper#2: A Deep Denoising Autoencoder Approach to Improving the Intelligibility of Vocoder Speech in Cochlear Implant Simulation, *IEEE Transactions on Biomedical Engineering*, vol. 64(7), pp. 1568-1578, July, 2017. **Google Citation: 124**.
- Paper#3: Deep learning-based Noise Reduction Approach to Improve Speech Intelligibility for Cochlear Implant Recipients, *Ear and Hearing*, vol. 4, pp. 795-809, July 2018, **Google Citation: 90**.
- Paper#4: A Smartphone-Based Multi-Functional Hearing Assistive System to Facilitate Speech Recognition in the Classroom, *IEEE Access*, vol. 5, pp. 10339-10351, June 2017, **Google Citation: 56**.
- Paper#5: Joint Dictionary Learning-based Non-Negative Matrix Factorization for Voice Conversion to Improve Speech Intelligibility After Oral Surgery, *IEEE Transactions on Biomedical Engineering*, vol. 64 (11), pp. 2584-2594, Nov. 2017, **Google Citation: 53**.
- Paper#6: A Mobile Phone-Based Approach for Hearing Screening of School-Age Children: Cross-Sectional Validation Study, *JMIR mHealth and uHealth*, vol. 7(4), e12033, April 2019, **Google Citation: 35**.
- Paper#7: Generative Adversarial Networks for Unpaired Voice Transformation on Impaired Speech, in *Proc. Interspeech 2018*, **Google Citation: 33**.
- Paper#8: Enhancing Intelligibility of Dysarthric Speech Using Gated Convolutional-based Voice Conversion System, in *Proc. Interspeech 2020*, **Google Citation: 24**.
- Paper#9: Demographic and Symptomatic Features of Voice Disorders and Their Potential Application in Classification Using Machine Learning Algorithms, *Folia Phoniatrica et Logopaedica*, vol. 70 (3-4), 174-182, **Google Citation: 21**.
- Paper#10: A Smartphone-Based Remote Microphone Hearing Assistive System Using Wireless Technologies, *IEEE Systems Journal* vol. 12(1), pp. 20-29, Oct. 2015, **Google Citation: 20**.
- Paper#11: Improving the Intelligibility of Speech for Simulated Electric and Acoustic Stimulation Using

Fully Convolutional Neural Networks, *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 29, pp. 184-195, Dec. 2020. **Google Citation: 18.**

- Paper#12: Combining Acoustic Signals and Medical Records to Improve Pathological Voice Classification, *APSIPA Transactions on Signal and Information Processing*, vol. 8, e14, June 2019. **Google Citation: 18.**
- Paper#13: A Study of Joint Effect on Denoising Techniques and Visual Cues to Improve Speech Intelligibility in Cochlear Implant Simulation, *IEEE Transactions on Cognitive and Developmental*, vol. 13(4), pp. 984-994, Dec. 2021. **Google Citation: 13.**
- Paper#14: Ensemble and Multimodal Learning for Pathological Voice Classification, *IEEE Sensors Journal (Letters)*, vol. 5 (7), June 2021, **Google Citation: 8.**
- Paper#15: Mandarin Electrolaryngeal Speech Voice Conversion with Sequence-to-Sequence Modeling, in *Proc. ASRU 2021*, **Google Citation: 7.**
- Paper#16: Continuous Speech for Improved Learning Pathological Voice Disorders, *IEEE Open Journal of Engineering in Medicine and Biology*, vol. 3, pp. 25-33, Feb. 2022, **Google Citation: 7.**
- Paper#17: Detection of Glottic Neoplasm Based on Voice Signals Using Deep Neural Networks, *IEEE Sensors Journal (Letters)*, vol. 6, Feb. 2022, **Google Citation: 4.**
- Paper#18: ElectroNet - A Deep Learning Based Sound Coding Strategy for Cochlear Implants, to appear in *IEEE Transactions on Cognitive and Developmental Systems*. **Google Citation: 1.**