Erfan Loweimi

Contact Information

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Research Interests

✓ End-to-end Speech Processing
✓ Speech Technology for Healthcare Applications
✓ Explainable and Trustworthy AI-based Speech Technology

Academic Career

- Research Associate in EPSRC-funded MVSE Project (Nov 2022 - March 2024)
  - Speech Research Group, Machine Intelligence Laboratory, University of Cambridge
- Research Associate in EPSRC-funded SpeechWave Project (July 2018 - Jan 2023)
  - Department of Engineering, King's College London (July 2021 - Jan 2023)
  - CSTR, University of Edinburgh (July 2018 - June 2021)

Education

Ph.D., Computer Science, University of Sheffield, Sheffield, UK, 2018
- Thesis: *Robust Phase-based Speech Signal Processing; from Source-Filter Separation to Model-Based Robust ASR*
- Supervisors: Professor Jon Barker and Professor Thomas Hain

Selected Publications

Journal Papers

1. **E. Loweimi**, Z. Yue, P. Bell, S. Renals and Z. Cvetkovic, "Multi-stream Acoustic Modelling using Raw Real and Imaginary Parts of the Fourier Transform", IEEE/ACM Transactions on Audio, Speech, and Language Processing (IEEE/ACM TASLP), vol. 31, pp. 876-890, 2023.
2. Z. Yue*, **E. Loweimi***, J. Barker, H. Christensen and Z. Cvetkovic, "Acoustic Modelling from Raw Source and Filter Components for Dysarthric Speech Recognition", IEEE/ACM TASLP, vol. 30, pp. 2968-2980, 2022. (* Equal contribution).

Conference Papers

1. Z. Yue*, **E. Loweimi*** and Z. Cvetkovic, "Dysarthric Speech Recognition, Detection and Classification using Raw Phase and Magnitude Spectra", *INTERSPEECH*, 2023 (* Equal contribution).
2. Z. Yue*, **E. Loweimi***, J. Barker, H. Christensen and Z. Cvetkovic, "Dysarthric Speech Recognition from Raw Waveform with Parametric CNNs", *INTERSPEECH*, 2022 (* Equal contribution).
3. N. Shao, **E. Loweimi** and X. Li, "RCT: Random Consistency Training for Semi-supervised Sound Event Detection", *INTERSPEECH*, 2022.
4. Z. Yue*, **E. Loweimi***, and Z. Cvetkovic, "Raw Source and Filter Modelling for Dysarthric Speech Recognition", *ICASSP*, 2022 (* Equal contribution).
5. Z. Yue, **E. Loweimi**, Z. Cvetkovic, H. Christensen, and J. Barker, "Multimodal Acoustic-Articulatory Feature Fusion for Dysarthric Speech Recognition", *ICASSP*, 2022.
6. **E. Loweimi**, P. Bell, and S. Renals, "Speech Acoustic Modelling using Raw Source and Filter Components", *INTERSPEECH*, 2021.

7. S. Zhang, **E. Loweimi**, P. Bell, and S. Renals, "Stochastic Attention Head Removal: A Simple and Effective Method for Improving Transformer Based ASR Models", *INTERSPEECH*, 2021.

8. **E. Loweimi**, Z. Cvetkovic, P. Bell, and S. Renals, "Speech Acoustic Modelling from Raw Phase Spectrum", *ICASSP*, 2021.

9. S. Zhang, C-T. Do, R. Doddipatla, **E. Loweimi**, P. Bell, and S. Renals, "Train your classifier first: Cascade Neural Networks Training from Upper Layers to Lower Layers", *ICASSP*, 2021.

10. **E. Loweimi**, P. Bell, and S. Renals, "Raw Sign and Magnitude Spectra for Multi-head Acoustic Modelling", *INTERSPEECH*, 2020.

11. **E. Loweimi**, P. Bell, and S. Renals, "On the Robustness and Training Dynamics of Raw Waveform Models", *INTERSPEECH*, 2020.

12. S. Zhang, **E. Loweimi**, P. Bell, S. Renals, "When Can Self-Attention Be Replaced by Feed Forward Layers?", *SLT*, 2020.

13. J. Fainberg, O. Klejch, **E. Loweimi**, P. Bell, S. Renals, "Acoustic Model Adaptation from Raw Waveforms with SincNet", *ASRU*, 2019.

14. **E. Loweimi**, P. Bell, and S. Renals, "On Learning Interpretable CNNs with Parametric Modulated Kernel-based Filters", *INTERSPEECH*, 2019.

15. S. Zhang, **E. Loweimi**, Y. Xu, P. Bell, S. Renals "Trainable Dynamic Subsampling for End-to-End Speech Recognition", *INTERSPEECH*, 2019.

16. M.A. Jalal, **E. Loweimi**, R. Moore, and T. Hain, "Learning Temporal Clusters Using Capsule Routing for Speech Emotion Recognition", *INTERSPEECH*, 2019.

17. **E. Loweimi**, P. Bell, and S. Renals, "On the Usefulness of Statistical Normalisation of Bottleneck Features for Speech Recognition", *ICASSP*, 2019.

18. S. Zhang, **E. Loweimi**, P. Bell, S. Renals,"Windowed Attention Mechanisms for Speech Recognition", *ICASSP*, 2019.

19. **E. Loweimi**, J. Barker, and T. Hain, "On the Usefulness of the Speech Phase Spectrum for Pitch Extraction", *INTERSPEECH*, 2018.

20. **E. Loweimi**, J. Barker, and T. Hain, "Exploring the use of Group Delay for Generalised VTS based Noise Compensation", *ICASSP*, 2018.

21. **E. Loweimi**, J. Barker, and T. Hain, "Channel Compensation in the Generalised Vector Taylor Series Approach to Robust ASR", *INTERSPEECH*, 2017.

22. **E. Loweimi**, J. Barker, O. Saz Torralba, and T. Hain, "Robust Source-Filter Separation of Speech Signal in the Phase Domain", *INTERSPEECH*, 2017.

23. **E. Loweimi**, J. Barker, and T. Hain, "Statistical Normalisation of Phase-based Feature Representation for Robust Speech Recognition", *ICASSP*, 2017.

24. **E. Loweimi**, J. Barker, and T. Hain, "Use of Generalised Nonlinearity in VTS Noise Compensation for Robust Speech Recognition", *INTERSPEECH*, 2016.

25. **E. Loweimi**, J. Barker, and T. Hain, "Source-filter Separation of Speech Signal in the Phase Domain", *INTERSPEECH*, 2015.

26. **E. Loweimi**, S.M. Ahadi, and T. Drugman, "A New Phase-based Feature Representation for Robust Speech Recognition," *ICASSP*, 2013.

27. **E. Loweimi**, M. Doulaty, J. Barker, and T. Hain, "Long-term statistical Feature Extraction from Speech Signal and its Application in Emotion Recognition," Statistical Language and Speech Processing (*SLSP*), 2015.

28. **E. Loweimi**, S.M. Ahadi, T. Drugman, and S. Loveymi, "On the Importance of Pre-emphasis and Window Shape in Phase-based Speech Recognition," Lecture Notes in Computer Science, vol. 7911 LNAI, 2013.

29. **E. Loweimi**, S.M. Ahadi, and H. Sheikhzadeh, "Phase-only Speech Reconstruction Using Very Short Frames," *INTERSPEECH*, 2011.

30. **E. Loweimi** and S.M. Ahadi, "A New Group Delay-based Feature for Robust Speech Recognition," *ICME*, 2011.

31. **E. Loweimi**, S.M. Ahadi, and S. Loveymi, "On the Importance of Phase and Magnitude Spectra in Speech Enhancement," *ICEE*, 2011.

32. **E. Loweimi** and S.M. Ahadi, "Objective Evaluation of Magnitude and Phase only Spectrum-based Reconstruction of the Speech Signal," *ISCCSP*, 2010.

Awards

- Outstanding Reviewer Award, ICASSP, 2022
- Research Communicator of the Year Award, University of Sheffield, 2017
- ISCA Student Travel Grant, INTERSPEECH, 2017
- Faculty PhD Scholarship (2013-2017), Faculty of Engineering, University of Sheffield

Teaching Experience

Teaching Assistant

- Machine Learning and Adaptive Intelligence — Falls 2016–2017
- Speech Technology — Springs 2016-2017
- Speech Processing — Falls 2015–2016
- Data-driven Computing — Falls 2014–2015

Selected Oral Presentations

Tutorial Talks

- **E. Loweimi** and S. Loveymi, "Recent Advances in Interpreting and Understanding DNNs", Machine Vision & Image Processing (MVIP) Conference, 2022, Iran.
- Internal Tutorial Talks in CSTR, University of Edinburgh (2018-2021)
  - Contrastive Learning, Deep Scattering Spectrum, Transformers, Overparameterisation in DNNs (three sessions), Raw Waveform Acoustic Modelling (four sessions), Capsule Neural Networks, Information Bottleneck, Kernel methods in ASR

Research Talks

- Speech Acoustic Modelling from Raw Signal Representations
  - Edinburgh Napier University, Edinburgh, UK, 2022
- CSTR Talk, University of Edinburgh (Internal)
  - On the Robustness and Training Dynamics of Raw Waveform Models, 2021
  - Raw Sign and Magnitude Spectra for Multi-head Acoustic Modelling, 2020
  - Understanding and Interpreting DNNs for Speech Recognition, 2019
  - Speech Phase Spectrum: Love It or Leave It?, 2018
- DNN Statistical Interpretation and Normalisation for ASR
  - Qatar Computing Research Institute (QCRI), Doha, Qatar, 2019

- Channel Compensation in the Generalised VTS Approach to Robust ASR
  - UKSpeech, Cambridge, UK, 2017 INTERSPEECH, Sweden, 2017
- Source-filter Separation of Speech Signal in the Phase Domain
  - UKSpeech 2015, Norwich, UK, 2015

Other Talks

- Genie in the mike! The Science of Talking (with) Machines
  - A Pint of Science Festival, Sheffield, UK. 15, May, 2017; Teaser
- Signal Processing is Dead(?)! Long Live DNN!
  - Machine Intelligence for Natural Interfaces (MINI) workshop, Sheffield, 2016
- Deep Learning, The End of History and The Last Computer Scientist
  - A Pint of Science Festival, Sheffield, 2016
- Ethics in Data Modelling; Love it or Leave it?
  - Research Ethics and Integrity module, University of Sheffield, 2014

Roles

- Area Chair (Speech and Multimodality), EMNLP 2023
- Area Chair (Speech Recognition), INTERSPEECH 2023
- Associate Member of Speech & Language Proc. Technical Committee (SLTC), 2023
- Meta Reviewer (Speech Analysis), ICASSP 2023
- Reviewer (INTERSPEECH, ICASSP, ASRU, SLT, Speech Communication, ITASLP)
- Scientific Committee Member of ICASSP 2023 AMHAT Workshop
- Publication Chair in Spoken Language Technology Workshop (SLT) 2022
- Session Chair in Spoken Language Technology Workshop (SLT) 2022
- Session Chair (Language Disorder Detection) in ICASSP 2022
- Co-supervising one PhD student, University of Edinburgh (2018-2021)
- Primary supervisor of four MSc students, University of Edinburgh (2019-2021)
- Examiner of more than 15 MSc dissertations, University of Edinburgh (2019-2021)
- Session Chair (ASR for Noisy and Far-Field Speech) in INTERSPEECH 2019
- UKSpeech 2016 Co-organiser, Sheffield, UK, 2016

Skills

Computer: Python, PyTorch, Kaldi, Shell scripting, Linux, Docker, Latex, Office

Language: English (Fluent), Arabic (Native), Persian (Native)

Memberships

ISCA Member IEEE Member IEEE SPS Member

References

✓ Zoran Cvetkovic, Professor in Signal Processing
- King's College London, London, UK E-mail: zoran.cvetkovic@kcl.ac.uk

✓ Jon Barker, Professor in Computer Science
- University of Sheffield, Sheffield, UK E-mail: j.p.barker@sheffield.ac.uk

✓ Peter Bell, Professor in Speech Technology
- University of Edinburgh, Edinburgh, UK E-mail: peter.bell@ed.ac.uk