

Satvik Venkatesh

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Position: PhD student at University of Plymouth, UK (3rd year)

[Google Scholar page](#)

Education

- **University of Plymouth (UK), Doctor of Philosophy** (Oct 2019 – Present)
Expected graduation in Sept 2022.
Thesis: Deep Learning for Audio Segmentation and Intelligent Remixing.
- **University of Plymouth (UK), Master of Research** (Sept 2017 – July 2019)
Thesis: Investigation into Stand-alone Brain-computer Interfaces for Musical Applications. [\[DOI\]](#)
- **SASTRA University (India), Bachelor of Engineering** (July 2013 – June 2017)
Specialization: Information and Communication Technology.
CGPA: 7.34/10
- **Other Courses**
Deep Learning Specialization by deeplearning.ai on Coursera. Certificate earned in March 2020.

Experience

- **Research Intern, Mitsubishi Electric Research Labs (US)** (Jan 2022 – June 2022)

Developing new models and optimization methods for anomalous sound detection, which identifies whether a machine is damaged by analysing the sound produced by it.

Current progress:
 - Created a novel disentangled multi-task learning method for improved domain generalisation. At the [DCASE 2022 challenge task 2](#), we ranked 5th amongst 33 teams from industry and academia. We had two systems in top 10 amongst 85 submissions.
 - In the [tech. report](#), we improved the baseline by 20.4%. Paper to be submitted to the DCASE workshop 2022.
Skills: Semi-supervised learning, Domain adaptation/generalisation, Unsupervised learning, PyTorch, and Slurm.
- **Associate Lecturer, University of Plymouth** (Sept 2021 – Jan 2022)

Leading the module titled Programming, Interfaces, and Interaction for the BSc (Hons) programme on Computing, Audio and Music Technology.

Key contents of Module: C++, Object-oriented programming, Agile development, Threading, Microcontroller boards, UI and UX design, MIDI, and JUCE.
- **Audio Segmentation** (Sept 2019 – Sept 2022)

Ongoing PhD project funded by EPSRC to investigate music-speech detection and intelligent remixing of radio broadcast.

Current progress:

- Developed state-of-the-art algorithm for music-speech detection. Relative improvement of 56.55% and 1.15% for music and speech F-measures respectively on the MIR eXchange competition dataset 2018. Research published in [IEEE ICASSP 2021](#).
- Developed a novel algorithm called You Only Hear Once (YOHO) for audio segmentation and sound event detection that generalizes better and faster than the state-of-the-art Convolutional Recurrent Neural Network. Research published in [Applied Sciences](#) journal.
- Developed an approach to use word embeddings to represent semantic descriptors. Using this technique, the machine learning model can generate EQ settings for semantic descriptors that it has not seen before. Pre-print on [ArXiv](#).

Skills: Python, Tensorflow, Keras, Convolutional and Recurrent Neural Networks, End-to-end Deep Learning, and Audio Signal Processing.

- **Retention Project** (Dec 2020 – Feb 2021)

Been appointed by the Associate Dean for Education and Student Experience at the University of Plymouth. Worked as Data analyst to investigate the reasons for dropouts in students and develop tactics to mitigate this trend.

Skills: Python, Statistics, and Data Visualisation.

- **Brain-computer Interface** (April 2018 - Feb 2019)

Worked as research engineer to develop neurotechnology for a musician suffering from severe motor disabilities. Project funded by VOLVO cars and GREY.

Key outcomes of the project:

- Optimised signal processing and detection of brain signals (Relative improvement of 36.56% in communication rate)
- Developed a stand-alone and portable brain-computer interface that can be used for musical composition and performance at home. Research published in [Assistive Technology](#) journal.

Skills: C++, JUCE, MATLAB, statistical signal processing, FIR/IIR/zero-phase filtering, OpenGL, and Biomedical engineering.

- **Biocomputing for Music** (Jan 2017 – Present)

The biological substrate *Physarum polycephalum* is harnessed for musical creativity.

Project was started during undergraduate degree and is on-going ever since.

Have held multiple research assistant appointments within this project, funded by SWCTN and internal University grants.

Skills: C, Arduino, Electronic Circuits, Raspberry Pi, and Machine Learning.

Awards and Achievements

- Ranked 5th amongst 33 teams at the DCASE challenge task 2.
- Studentship awarded by EPSRC for PhD at University of Plymouth (Sept 2019 – Sept 2022).
- Tuition fee-waiver for Master of Research degree (Sept 2017 – April 2019).

List of Publications and Talks

Journal Papers

- Venkatesh, S., Moffat, D., & Miranda, E. R. (2022). You Only Hear Once: A YOLO-like Algorithm for Audio Segmentation and Sound Event Detection. *Applied Sciences*, 12(7). [DOI]
- Venkatesh, S., Moffat, D., & Miranda, E. R. (2022). Word Embeddings for Automatic Equalization in Audio Mixing. *arXiv preprint arXiv:2202.08898*.
- Venkatesh, S., Miranda, E. R., & Braund, E. (2022). SSVEP-based Brain-computer Interface for Music using a Low-density EEG System. *Assistive Technology*. (accepted, in press)
- Venkatesh, S., Moffat, D., & Miranda, E. R. (2021). Investigating the Effects of Training Set Synthesis for Audio Segmentation of Radio Broadcast. *Electronics*, 10(7). [DOI]
- Braund, E., Venkatesh, S., & Miranda, E. R. (2019). PhyBox: A Programmable Interface for Physarum polycephalum-based Memristors. *International Journal of Unconventional Computing*, 14, 217–233. [DOI]
- Miranda, E. R., Braund, E., & Venkatesh, S. (2018). Composing with Biomemristors: Is Biocomputing the New Technology of Computer Music? *Computer Music Journal*, 42, 28–46. [DOI]

Conference Proceedings

- Venkatesh, S., Moffat, D., Kirke, A., Shakeri, G., Brewster, S., Fachner, J., . . . Miranda, E. R. (2021). Artificially Synthesising Data for Audio Classification and Segmentation to Improve Speech and Music Detection in Radio Broadcast. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 636–640). [PDF]
- Venkatesh, S., Braund, E., & Miranda, E. R. (2020). Composing Popular Music with Physarum Polycephalum-based Memristors. *International Conference on New Interfaces for Musical Expression (NIME)* (pp. 514–530). The Royal Birmingham Conservatoire. [PDF]
- Venkatesh, S., Braund, E., & Miranda, E. R. (2020). Designing Brain-computer Interfaces for Sonic Expression. *International Conference on New Interfaces for Musical Expression (NIME)* (pp. 525–530). The Royal Birmingham Conservatoire. [PDF]
- Venkatesh, S., Moffat, D., & Miranda, E. R. (2019). Radiome: Artificially Intelligent Radio for People with Dementia. *Digital Music Research Network One-day Workshop: DMRN+14*. [PDF]

Book Chapters

- Miranda, E. R., Braund, E., & Venkatesh, S. (2021). On Growing Computers from Living Biological Cells. In E. R. Miranda (Ed.), *Handbook of Artificial Intelligence for Music: Foundations, Advanced Approaches, and Developments for Creativity* (pp. 933-961). Springer International Publishing. [DOI]
- Venkatesh, S., Braund, E., & Miranda, E. R. (2019). A Nonlinear Approach to Generate Creative Data using Physarum polycephalum-based Memristors. In A. Adamatzky (Ed.), *Slime Mould in Arts and Architecture*. River Publishers. [PDF]

Talks and Research Seminars

- BCIs for severely motor-impaired musicians (April 2022). Keynote speaker at the BCI & Neurotechnology Spring School, g.tec, Vienna. (5309 attendees from 107 countries)

Deep Learning for Audio Segmentation and Intelligent Remixing (March 2022). Guest Lecture for MSc Computer Science, Topics in Applied Artificial Intelligence, University of Plymouth, UK.

RadioMe: Real-time Radio Content Analysis and Remixing. (July 2021). *Webinar*. Audio Engineering Society (AES), UK Section.

Music and Artificial Intelligence. (Dec 2020). *Chidaakaasham: International Webinar on Music and Dance*. Aatmalaya Academy and Trikalaa Gurukulam, India.

Audio Segmentation and Remixing using Deep Learning. (May 2020). *Research Seminar*. Interdisciplinary Centre for Computer Music Research (ICCMR), University of Plymouth.

Robust Portable Brain- Computer Music Interface for Real-World Applications. (Feb 2019). *Research Seminar*. Interdisciplinary Centre for Computer Music Research (ICCMR).

Brain-computer Music Interface Systems by using JUCE. (Nov 2018). *Audio Developer Conference*. ROLI, London, UK.

Other Roles and Contributions

- Reviewer for Sound and Music Computing (SMC) Conference 2021.
- Conference committee of BFE/RMA Research Students' Conference 2022
- Contributed to the [Wave-U-net](#) GitHub repository. Re-implemented the network architecture in TensorFlow 2/Keras.

Skills

- Programming: C, C++, C#, Java, JavaScript, PHP, HTML, SQL, and GLSL.
- Machine Learning: TensorFlow, PyTorch, Deep Learning, Sequence Models, Multi-label Models, and Transfer Learning.
- Signal Processing: IIR and FIR filters, zero-phase filtering, Z-transforms, Fourier transforms, Mel spectrograms, MFCC, and canonical correlation analysis.
- Biomedical Engineering: EEG, brain-computer interface, evoked potentials, and event-related potentials.
- Personal: Highly motivated, work independently and with a team, and problem-solving abilities.

Extra-curricular Achievements

- Conducted workshops for lesser privileged children in music and soft skills at NGOs in India such as Aatmalaya Academy and Agastya Foundation.
- Multi-instrumentalist and composer with knowledge of Indian and Western genres. [Link](#) to compositions.
- Won many trophies in national cultural festivals for high school and University in India.
- Website designer and content manager for the ICCMR lab (University of Plymouth) and Aatmalaya Academy.
- FIDE rated (International) chess player (Rating: 1700)
- University's student ambassador to support many departments during recruitment and other on-campus events