MITHUNJHA ANANDAKUMAR

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PERSONAL STATEMENT

Highly motivated individual with great enthusiasm for developing AI methods to improve healthcare and medical knowledge by new discoveries. Looking for a challenging role in a reputable organization to utilize my skills for the growth of the organization as well as to enhance my knowledge about new technologies and concepts.

EDUCATION

BSc. Engineering (Hons) in Biomedical Engineering *Jan 2018 - June 2022*
Department of Electronic and Telecommunication Engineering
University of Moratuwa, Sri Lanka.
CGPA : **3.98/4.2**
Notable modules: *Bio signal processing, Medical image processing, Biotechnology, Advances in Machine vision, Data Structures & algorithms, Fundamentals of computer organization & design, Applied statistic, and Neural networks & fuzzy logic*

GCE Advanced Level *Aug 2016*
Hindu Ladies College, Colombo, Sri Lanka.
2A's & B in physical science stream with Z-score of 1.9393

PUBLICATIONS

Preprints

- J. Pradeepkumar*, **M. Anandakumar***, V. Kugathasan*, A. Seeber and D. N. Wadduwage. (2021) "Physics Augmented U-Net : A High Frequency Aware Generative Prior for Microscopy", bioRxiv. [Paper]
- J. Pradeepkumar*, **M. Anandakumar***, V. Kugathasan, D. Suntharalingham, S. L. Kappel, A. C. De Silva and C. U. S. Edussooriya. (2022) "Towards Interpretable Sleep Stage Classification Using Cross-Modal Transformers.", arXiv. *Submitted in IEEE Journal of Biomedical and Health Informatics*, Under Review. [Paper]

Peer Reviewed Conference Papers

- J. pradeepkumar, **M. Anandakumar**, V. Kugathasan, T. D. Lalitharatne, A. C. De Silva and S. L. Kappel (2021) "Decoding of Hand Gestures from Electrocorticography with LSTM Based Deep Neural Network", *In Proceedings of International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC).* [Paper]
- M. Afham*, U. Haputhanthri*, J. pradeepkumar*, **M. Anandakumar**, A. De Silva and C. U. S. Edussooriya (2021) "Toward Accurate Cross-Domain In-Bed Human Pose Estimation", In IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (pp. 2664-2668). [Paper]

* denotes joint lead authors.

INTERESTS

Machine learning	Deep learning	Machine vision
Medical image processing	Bio signal processing	

TECHNICAL STRENGTHS

Programming	Python, MATLAB, Verilog
Software tools	Altium, Multisim, Quartus, Solidworks, LaTeX, GitHub
Libraries	Tensorflow, Keras, NumPy, Pytorch, ITK/VTK, OpenCV, Scikit-Learn

EXPERIENCE

Division of Science, Harvard University *July 2022 - present*
Post Baccalaureate Fellow

The Center for Advanced Imaging, Harvard University *Sept 2021 - July 2022*
Remote Undergraduate Researcher

Zone 24x7 (Pvt) Ltd, Sri Lanka *Oct 2020 - Mar 2021*
Trainee Associate Research Engineer

- Theoretical research on the effects of physical and mental exercises on the state of mind.
- Development of signal processing algorithms for stress detection and breathing rate derivation from ECG and PPG signals.

Centre for Biomedical Innovation, University of Moratuwa. *July 2019*
Research Intern

PROJECTS

Protein Structure Generation
Research project with So Lab, Harvard University (on-going)
Aim of the project is to generate protein structures using generative models.
Advisor : Dr. Sergey Ovchinnikov (So Lab, Harvard University)

Robot Pathologist
Research project with Wadduwage Lab, Harvard University (on-going)
Aim of the project is to develop a deep learning based algorithm to aid visualization of whole slide image by assisting the pathologist on which regions require high resolution scanning and which does not. Ultimate goal of the project is to reduce the cost of scanning by restricting the number of high resolution scans to few regions, thus no redundancy in data stored.
Advisor : Dr. Dushan N. Wadduwage (Wadduwage Lab, Harvard University)

Deep Learning Based Image Reconstruction for DEEP-TFM
Research project with Harvard-MIT collaboration (on-going)
Aim of the project is to develop a deep learning based image reconstruction approach for DEEP-TFM (De-scattering with excitation patterning temporal focusing microscopy) images, when the forward model of the system is not known during network training.
Advisor : Dr. Dushan N. Wadduwage (Wadduwage Lab, Harvard University)

Multi-Modal Sleep Monitoring System
Final year thesis project
Aim of the project is to develop automatic sleep stage classification algorithm mainly using ear EEG

and EOG signals, and to develop a comfortable signal acquisition system for sleep study.
Advisors : Dr. Anjula C. De Silva (University of Moratuwa), Dr. Chamira U. S. Edussooriya (University of Moratuwa), and Dr. Simon L. Kappel (Aarhus University, Denmark)

Decoding of Hand Gestures from Electrocorticography with LSTM Based Deep Neural Network
A self-initiative project
Aim of the project is to decode hand gestures using Electrocorticography (ECoG) signals with deep neural network.
Advisors : Dr. Thilina D. Lalitharatne (Imperial College London, UK), Dr. Simon L. Kappel (Aarhus University, Denmark) and Dr. Anjula C. De Silva (University of Moratuwa).
**Paper accepted for oral presentation at EMBC 2021.*

Privacy-Preserving In-Bed Human Pose Estimation
Aim of the project is to adapt state-of-the-art domain adaptation methods for in-bed human poses estimation under heavy occlusion and different illumination conditions.
Advisors : Dr. Chamira U. S. Edussooriya.
**Paper accepted for oral presentation at ICASSP 2022.*

Real time blood potassium level monitor for dialysis patients
A self-initiative project
Aim of the project is to design a non-invasive and real time blood potassium level monitoring device using Electrocardiogram (ECG) signals.

Selected Course Projects
- Implementing a custom multi-core processor on FPGA for matrix multiplication
- Designing a fingertip pulse sensor
- Designing a heart beat amplifier
- Implementing an end-to-end IoT platform for calorie tracking

HONORS AND AWARDS

Dean's List for 7 semesters.
Second Runners up at Video and Image Processing Cup (2021) at IEEE ICIP conference
IEEE SMC Winners at BR41N.IO Hackathon (2020) at IEEE SMC conference.
Second Runners-up of Data Storm v2.0 (2021) Sri Lanka's premier advanced analytics competition.
Champions of Brainstorm (2019), Sri Lanka's premier biomedical engineering design competition.
Champions of Mora ventures 5.0 (2019), organized by University of Moratuwa.
Champions of SLIoT hackathon (2019), Sri Lanka's premier IoT design competition
Runners-up of HackX Start-up competition (2019) organized by University of Kelaniya.
Runners-up of IEEE innovation nation (2019) organized by IEEE Sri lankan section.

LICENSES & CERTIFICATIONS

Machine Learning* by Stanford University
AI for Medicine*, a 3-course specialization by deeplearning.ai
Tensorflow in practice*, a 4-course specialization by deeplearning.ai
Neural Networks and Deep Learning* by deeplearning.ai
Introduction to genomics technologies* by Johns Hopkins University
*on Coursera

EXTRA-CURRICULAR ACTIVITIES

IEEE Engineering in Medicine and Biology Student Chapter at University of Moratuwa
Council Member 2021/22
Editor 2020/21
Education director 2019/2020

- Received the Most Outstanding EMB Student Branch Chapter Regional Award for the term 2019/20 and received the IEEE Darrel Chong Award (Silver Category) for Brainstorm 2019.

VOLUNTEERING AND PROFESSIONAL SERVICES

Invited Reviewer

- ECCV 2022

Kavigai foundation

- Participated in a community service project, on renovating classrooms of a school in Karainagar, Jaffna.
- Participated in a project called Chanakya, to help Ordinary level students of Vivekanada College and Ratmalana Hindu College to achieve better scores in Mathematics and Science by conducting workshops.

REFERENCES

Dr. Chamira U. S. Edussooriya
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