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EDUCATION

Johns Hopkins University Aug'19 - present
M.S. Biomedical Engineering GPA – 3.92
Birla Institute of Technology and Sciences (BITS Pilani), Goa Aug'12 – Jul'17
M.Sc. Biological Sciences and B.E. (Hons) Electronics and Instrumentation (Dual Degree) CGPA – 7.6

WORK EXPERIENCE

Center for Imaging Science (CIS) – JHU Aug'19 - present

Brainlight/Mouselight Project:
- Classification of neurons in a mouse brain by morphology using the data from Mouselight project at Janelia.
- Worked on classification and visualization tools in Brainlit (link) – a public python tool for data handling and visualization of large volumetric datasets.

Deformity prediction using volumetric measurements of the Brain:
- Comparative study of various machine learning classification methods on volumetric measures of the brain (BIOCARD dataset) to predict presence of deformity.

Huntington's Disease project:
- Quality check for MRI scans of human brain.

Intel Technologies (CSI Team), Bangalore – Systems Engineer (Research) Aug'17 –May'19

Brain Computer Interface (BCI):
- Conceptualized, designed, and implemented various applications of BCI based on EEG signal processing and Machine Learning
- Developed intensity control features for games using EEG based concentration level detection
- Developed use-case driven dynamic selection algorithm for efficient utilization of EEG electrodes
- Patent on using EEG signals to build anti-cheat gaming device is under Intel committee review

Accelerated BCI Library:
- Designed a software development library to accelerate BCI algorithms on Intel core platforms
- Implemented (in C++) end to end ML algorithms (SVM, LDA) with automated parameter selection using K-Fold cross validation
- Validated; benchmarked library which got incorporated in Intel open source ML library (Intel DAAL)

Multimodal Sensing:
- Implemented multimodal sensing (ECG, eye tracking, facial recognition, EEG, and audio) algorithms for gaming applications
- Incorporated ECG and heart rate variability sensing in gaming applications using webcam as a contact-less PPG sensor from Philips
- Integrated emotion recognition using multimodal sensing which was demoed in CES 2019 in an Intel gaming system

AI based virtual Game Coach:
- Involved in formulation, design, and modelling of a Deep Learning based AI game coach for PUBG
- The model involved using telemetry data of players to roll out tips & suggestions using sequence classification model with LSTM
- Patent on using sequence to classification on player telemetry data to give real time suggestions has been filed

Intel Technologies (CSI Team), Bangalore – Research Intern Jan'17 – Jun'17

Brain Computer Interface:
- Implemented emotion detection, mental commands using Wavelet transform, SVM and Quadratic discriminant algorithms.
- Implemented ML based pattern recognition & neural networks to correct the head position of VR gamers to avoid VR sickness.
- The above EEG signal-based applications were submitted in Software Professionals Conference at Intel.

Intel Labs (Bio Signals and Systems Lab), Bangalore – Research Intern Jul'16 – Dec'16

Wearable Cuff-Less Blood Pressure Patch:
- Reduced device sampling rate by 10X using ECG/PPG signal processing, Linear and Polynomial Regression and curve fitting
- The final product incorporated the lower sampling-rate based implementation to reduce device heating
- Patent filed under US patent applications for the algorithm to reduce power consumption of the BP patch

PATENTS

Optical Heart Rate Sensor with reduce power – published, US patent applications (US 2018/0303353 A1) Nov'16
- A method for power reduction of optical heart rate sensor in a wearable Cuff-less Blood Pressure patch by polynomial regression of subsampled PPG and ECG synchronized LED excitation.

Novel Telemetry data-based approach to AI based virtual game coach – patent filed May'19
- Using sequence to classification based deep learning model to classify telemetry data sequences to respective suggestions.

PAPERS

Brainlit: Automated data handling, processing, visualization and classification software for brain images May' 20
• Poster presentation in ASEE conference and won 3rd place.

Adaptive Power and Performance optimizations of Brain Control Interface (using EEG signals) for real time applications Aug'18
• Paper submitted at Grace Hoppers Conference, Bangalore, Intel White Paper

Unique Blink Detection Algorithm using raw EEG-signals May'17
• Paper accepted at Intel's Software Professionals Conference, Intel White Paper.

Unique solution for head position correction to avoid VR sickness in VR gamers. Apr'17
• Vacuum based Galvanic Vestibular Stimulation (GVS) electrode latching system using closed loop control and accurate GVS pulse generation using IMU data and Machine learning algorithms for differentiated Virtual Reality experience, Intel White Paper.

RELEVANT PROJECTS

Vagus Nerve stimulator for clinically induced asystole Apr' 20
• MATLAB based simulation to stimulate VNS neurons following Frank Rattay and Hodgkin Huxley model

Comparative study on performance of Structured SPORF on real EEG Data for grasp detection Aug'19
• Pull Request to public SPORF repository as a part of Neuro Data Design course.

Using EEG data to decode listener response/attention to audio stimuli in complex environments Aug'19
• Mimicked an existing paper and built deep learning models to improve upon it as part of Machine Learning course.

Method Apparatus for an Anti-Cheat gaming system with secured biometric authentication. Jul'18
• A method to use EEG signals to derive the cognitive state of the gamer coupled with physiological data from eye tracking and mouse/keyboard clicks to classify actions to determine if the gamer is cheating or not.

TECHNICAL PROFICIENCY

Relevant Courses

JHU: - Neuro Data Design; Deep Learning; Machine Learning for Signal Processing; Neural Implants and Interfaces; Probabilistic Models of Visual Cortex
Undergrad: - Application of Computers and Statistics in Biology; Object Oriented Programming; Medical Instrumentation; Microprocessors and Interfacing; Satellite communication.

Technical Skills

Machine Learning, Deep Learning, Signal Processing, Data Structures and Algorithms, Software development, Design Patterns

Programming Skills

Python, MATLAB, C++, C#, Java, C

Biology Lab Skills

Microbiology lab techniques; PCR; SDS-PAGE; Cell culture techniques; Blotting; IHC; ELISA; Protein docking and alignment software

POSITION OF RESPONSIBILITY

Leading development for sensing and AI projects in CSI team at Intel Technologies Apr '18 – May'19
• Lead developer for sensing and AI in gaming systems being developed by CSI team at Intel.
• Single headedly implemented accelerated BCI library, lead developer for BCI project.
Events Coordinator for Department of Creative Works, BITS Goa Aug '14 – Aug '15
• Organized various events in the college festivals and headed the department.
Girls Tennis Team Leader, BITS Goa Aug'12 – Aug'13
• Led the girl's team in college sports festival.

ACHIEVEMENTS

• Tenth standard school topper and stood second in Pune city with 97.4% in ICSE.
• Developed a small remote-controlled plane in Aerodynamics workshop and demoed it in Tech fest.
• A state level tennis player (girls under 12) and won Girls Tennis tournament in BITS Goa Sports festival
• Trained Kathak dancer and cleared four exams with distinction