

ASHUTOSH SINGH

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Phone: +18575882464, Availability: April 2024 - Onwards

SUMMARY:

I am an Engineer and Data Scientist with expertise in Signal Processing, Machine Learning, and Robotics. Through interdisciplinary collaborations, I apply these skills to extract meaningful patterns from complex spatio-temporal data. My current focus involves developing AI models to enhance healthcare insights by developing machine learning models for detecting patterns in biosignals. With experience in teaching graduate-level courses, I enjoy engaging in educating the next generation. My multidimensional skill set positions me to contribute significantly to the intersection of AI and healthcare, ensuring alignment with the latest advancements in both domains.

EDUCATION:

College of Engineering Northeastern University (Boston, MA)

May 2021 – Present

Ph.D. Computer Engineering

CGPA: **3.7/4.0**

Focus: Machine Learning and Signal Processing **Advisor:** Deniz Erdogmus

COURSES: Real Analysis, Advanced Control Engineering, Big Data Sparsity and Control.

College of Engineering Northeastern University (Boston, MA)

Sept. 2019 – May 2021

Master of Science in Electrical and Computer Engineering

CGPA: **3.87/4.0**

Concentration: Machine Learning, Computer Vision and Algorithms

COURSES: Machine Learning, Algorithms and Data Structures, Robot Sensing and Navigation, Legged Robotics, Artificial Intelligence, IOT, Advanced Machine Learning.

Manipal Institute of Technology (Karnataka, India)

Sept. 2015 – May 2019

Bachelor of Technology, MAJOR: Mechatronics Engineering; MINOR: Robotics

CGPA: **8.13/10**

COURSES: Stochastic Processes and Reliability, Robot Dynamics and Control, Robot Path Planning, Artificial Intelligence, Machine Learning, Machine Vision, Data Structures and Algorithms.

PUBLICATIONS:

- Learning semilinear neural operators: A unified recursive framework for prediction and data assimilation.
Ashutosh Singh, Ricardo Augusto Borsoi, Tales Imbiriba, Deniz Erdogmus
ICLR 2024 (Accepted)
- Predicting Imminent Aggressive Behaviors in Psychiatric Inpatient Youth with Autism Using Wearable Biosensing and Machine Learning.
Tales Imbiriba, Ahmet Demirkaya, Ashutosh Singh, Deniz Erdogmus, Mathew Goodwin
JAMA-2023
- Exploring variation in the brain basis of emotional experience
Christiana Westlin, Ashutosh Singh*, Deniz Erdogmus, Georgios Stratis, Lisa Feldman Barrett*
Nature Scientific Report (Under Review)
- Inv-Senet: Invariant Self Expression Network for Clustering Under Biased Data
Ashutosh Singh, Ashish Singh*, Aria Masoomi, Tales Imbiriba, Erik Learned-Miller, Deniz Erdoğan*
ICASSP-2023
- Post traumatic seizure classification with missing data using multimodal machine learning on dmri, eeg, and fmri
Md Navid Akbar, Sebastian F Ruf, Ashutosh Singh, Razieh Faghihpirayesh, Rachael Garner, Alexis Bennett, Celina Alba, Tales Imbiriba, Marianna La Rocca, Deniz Erdogmus, Dominique Duncan
CMIG (Under Review)
- SPARCLink: an interactive tool to visualize the impact of the SPARC program
Sanjay Soundarajan, Sachira Kuruppu, Ashutosh Singh, Jongchan Kim, Monalisa Achalla
F1000Research-2022
- Variation is the norm: Brain state dynamics evoked by emotional video clips
Ashutosh Singh, Christiana Westlin*, Hedwig Eisenbarth, Elizabeth A Reynolds Losin, Jessica R Andrews-Hanna, Tor D Wager, Ajay B Satpute, Lisa Feldman Barrett, Dana H Brooks, Deniz Erdogmus*
EMBC-2021

TECHNICAL SKILLS:

LANGUAGES: Python, C++, MATLAB.

TOOLS: ROS, Gazebo, MoveIt, Pytorch, OpenCV, Tensorflow, Tableau, MySQL, Gephi, GCP, Carla, AirSim.

OPERATING SYSTEMS: Linux, Windows.

RESEARCH INTEREST:

Dynamic System Modeling, Continual Learning, Invariance Modeling, Domain Adaptation, Pattern Recognition

INDUSTRIAL EXPERIENCE:

SUMMER INTERN:

June 2020 – August 2020

Research and Advanced Engineering, **Ford Motor Company (Greenfield Labs)**

- **Multi Agent Path Planning Algorithm Design and Integration (Python and Carla simulator)**
 - Designed *routing algorithm for connected vehicles*.
 - Designed and Implemented *optimal search based multi agent path planning algorithm*.
 - Performed code profiling and documentation.
 - Performed a *comparative study* of the designed algorithm with the state of the art algorithms.
 - Designed metric and test scenarios for algorithm performance evaluation in Carla.
 - Created Carla interface for the simulation of the algorithm.
 - Competed in an **intern hackathon** and bagged the **Most Popular Award** for our idea.

ACADEMIC EXPERIENCE:

GRADUATE RESEARCH ASSISTANT:

Cognitive Systems Lab, Northeastern University

August 2020 – Present

- **Autism aggression prediction**
 - Domain invariant feature modeling in physiological sensor data. Particularly worked with BVP, EDA and IMU data.
 - Multi-modal fusion of different modalities for classification.
 - Point process based modeling of the aggression behavior.
- **Discovery of brain basis of emotion**
 - Unsupervised modeling of the fMRI data to discover emotion specific variations and biomarkers.
 - Discovery of the latent feature subspaces/manifolds relating to different sources of variation.
 - Mentoring psychology students in modeling of the physio-psychological data.
- **Weather modeling and forecasting**
 - Infinite dimensional partial differential equation modeling for weather forecast.
 - Hyperspectral data fusion.
 - Uncertainty based data assimilation.

Course Development Assistant (IMPEL), Northeastern University

Nov.2020 – May 2021

- **Developing Integrative Manufacturing and Production Engineering Curricula That Leverage Data Science (IMPEL)**
 - Assisting IMPEL team in designing, developing, and deployment of sustainable online course and curriculum for Sensor Analytics that bridge the data science skills gap of the current production engineering workforce.
 - Developing comprehensive, interactive, and rigorous modules for topics associated with the analysis of sensor data like sensor fusion, time series analysis, clustering, regression, dimensionality reduction, and signal processing, etc.
 - Developing multi-media content with industrial application demonstration through code walkthroughs based on sensor data, aimed at providing comprehensive practical experience for the learners.

Robotics and Intelligent Vehicles Research (RIVeR) Lab, Northeastern University

Sept.2019 – December 2019

- **Humanoid Robot (Valkyrie) and Human Support Robot (ROS, Gazebo, Docker)**
 - Simulated and tested nonlinear control dynamics(IHMC) for humanoid robots (Valkyrie). Tested various walking gaits.
 - Used poseNet to analyze human walking gait. Walking motion detection and classification.
 - Generated Point Cloud Library using pico-zense sensor for the purpose of Robot Navigation.
 - Implemented GMapping and RRT exploration packages for HSR(Human Service Robot) navigation and movelt for manipulation tasks.

TEACHING EXPERIENCE:

- Teaching Assistant for DS5500 Capstone: Application in Data Science Spring 2023
- Teaching Assistant for DS5110 Introduction to Data Management Fall 2022
- Teaching Assistant for DS5220 Supervised Machine Learning Spring 2022
- Course assistant and Grader for EECE 5644 Machine Learning\Pattern Recognition for fall 2020

EXTRA-CURRICULAR ACHIEVEMENT:

- SPARCLink - Runner up in the SPARC codeathon 2021.
- Bagged Most popular award for the idea presented during the company wide intern hackathon.
- Reviewer for ICASSP 23, ICASSP 24, MLSP 23