Shivi Gupta

☎ (+91) 9654689691 • ✉ shivigup@iitk.ac.in • shivigup.github.io
shivigup • shivigup

Profile Summary & Research Interests

I am a senior undergraduate interested in Applied Machine Learning, Computational Physics and Signal Processing. Through research and industrial projects, I have experience in diverse fields such as Computer Vision, Edge Computing, Image & Audio Signal Processing and Control Systems.

Education

Indian Institute of Technology, Kanpur, India **August 2018 – Present**
Double Major BT-BS student - 9.2/10.0
Electrical Engineering with double major in Physics
Minor degree in English Literature

Technical Skills

Languages: C/C++, Python, MATLAB, JavaScript
Software & Tools: TensorFlow, PyTorch, Keras, NumPy/SciPy, scikit-learn, Pandas, Librosa, jsPsych, PsyToolkit, Git, HTML/CSS, Wolfram Mathematica, MATLAB

Research Experience

Research Intern | Inter University Accelerator Center, Delhi **December 2021 – Present**
Computational Analysis of Tandem Accelerator Parameters for Stable Pulsed Beam Operation
Supervisor: Dr. Bhuban Sahu, Research Scientist, IUAC
- Processed data collected over a few months of operation to find beam parameters with high correlations
- Created a deep learning model for the control of the the beam phase
- Presently working on optimizing the model and deploying it for practical use

Sunspots Prediction Using Machine Learning Methods **August 2021 – Present**
Undergraduate Project
Supervisor: Prof. Mahendra K Verma, Department of Physics, IIT Kanpur
- Analysed the trends and seasonality of the SILSO sunspots dataset and created prediction models
- Presently trying for better accuracy and preparing a draft for journal publication

Presentation Slides

Research Intern | Adobe Research India **May 2021 – August 2021**
Designing User Profiles using Edge Computing
Supervisors: Atanu Sinha, Sunav Choudhary, Adobe Research Labs
- Worked in a team on the domain of Edge Computing to bring user profiles from Cloud to Edge
- Incorporated user behaviours to infer preferences across various services to create user representations
- Employed Sequence Modelling, Deep Learning and Multitask Learning techniques
- Various evaluations around compression and updatability were undertaken

Emotion-Color Association in Biologically Inspired DNNs **August 2020 – January 2021**
Undergraduate Project
Supervisor: Prof. K S Venkatesh, Department of Electrical Engineering, IIT Kanpur
- Designed a psychophysical experiment to collect data for choosing colors for a given image
- Showed inherent correlations between images and colors learned by pre-trained image classification neural networks

Accepted in the Cognitive Science Society 2021 Conference as a poster presentation
Abstract in CogSci 2021 | ArXiv preprint | Code

Research Intern | SURGE, IIT Kanpur **June 2020 – September 2020**

Simulating and Studying Photonic Crystals using the FDTD Method
Supervisor: Dr. Shilpi Gupta, Department of Electrical Engineering, IIT Kanpur
- Studied the finite difference time domain method, used in Ansys Lumerical to simulate optical devices.
- Simulated devices such as photonic crystals, waveguides and grating couplers.
- Studied transmission and reflection for different variations of the devices

Report | Video Presentation | Presentation Slides

Projects

Spectrogram Analysis of the Doppler Effect **August 2021 – November 2021**

Course Project in PHY315: Modern Physics Laboratory
Supervisor: Dr. Anjan Kumar Gupta, Department of Physics, IIT Kanpur
- Recorded oscillatory sound profiles for different cases of source and observer movement
- Analysed the spectrograms to find the speed of oscillations, frequency variations and speed of sound

Report | Code

Audio Tagging and Sound Event Detection **August 2021 – November 2021**

Course Project in EE603: Machine Learning for Signal Processing
Supervisor: Prof. Vipul Arora, Department of Electrical Engineering, IIT Kanpur
- Created Machine Learning models to identify presence of music, speech or neither in noisy audio files
- Further estimated their onset and offset times using signal processing concepts

Report | Code

Analysing Brain and CNN Perceptions of Images and Colors **May 2021 – July 2021**

Project mentored under Brain and Cognitive Science Society, IIT Kanpur
- Mentored a group of 7 students to study image encodings of convolutional neural networks
- Studied a Computer Vision based Python toolbox, DNNBrain and extended it to color inputs
- Designed classifier models to classify colors into hue-based bins

Report

Relevant Courses

Computer Science & Mathematics: Fundamentals of Computing, Data Structures and Algorithms, High Performance Computing and Machine Learning (ongoing), Linear Algebra, ODE & PDE, Probability and Statistics

Signal Processing: Signals, Systems & Networks, Control Systems Analysis, Principles of Communication, Machine Learning for Signal Processing

Physics: Quantum Physics, Numerical Methods in Physics, Computational Physics, Classical Mechanics, Modern Physics laboratory, Experimental Physics laboratory (ongoing)

Leadership and Activities

Career Development Mentor **August 2021 – Present**

Academics and Career Council, IIT Kanpur

Manager, English Literary Events **June 2019 – October 2019**

Antaragni 2019, IIT Kanpur

Head, Unmukt **June 2019 – May 2020**

Community Welfare Cell, IIT Kanpur

Secretary, English Literary Society **June 2019 – June 2020**

IIT Kanpur