

Final Year Dual Degree Master  
Dept. of Electrical Engineering  
Indian Institute of Technology Kanpur

GitHub: <https://github.com/shashikg>

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KEY PROJECTS	<b>tf_deepRL: RL library for TensorFlow</b> <span style="float: right;">Mar. '20 - Ongoing</span> <i>Self-Project</i> <ul style="list-style-type: none"> <li>- Developing an RL library for python for easy building of deep RL model with TensorFlow as blackened.</li> <li>- Features implemented: Vanilla policy gradient agent, continuous visualization of reward vs. epoch curve during training, custom environment creation, gym compatible.</li> </ul>
	<b>3D Human Pose Estimation using Multi Camera</b> <span style="float: right;">Feb. '20 – Apr. '20</span> <i>Undergraduate Project – Prof K S Venkatesh, IIT Kanpur</i> <span style="float: right;">[ <a href="#">Code</a> ]</span> <ul style="list-style-type: none"> <li>- Extraction of 2D joints position using <b>Cascaded Pyramid Network</b>.</li> <li>- Estimate of 3D poses using those 2D joints position and camera parameters.</li> </ul>
	<b>Real Time Human Facial Emotion Recognition</b> <span style="float: right;">Nov. '18 – Dec' 18</span> <i>Self Project</i> <span style="float: right;">[ <a href="#">Video</a> ] [ <a href="#">Code</a> ]</span> <ul style="list-style-type: none"> <li>- Extracts human faces (using OpenCV haar-cascade/ dnn based classifier) from a camera stream and classifies them into 7 different moods i.e. Angry, Disgust, Fear, Happy, Sad, Surprise and Neutral</li> <li>- CNN classifier (with ensemble) was designed, which was trained on the <b>ICML 2013</b> dataset of Facial Expression Recognition Challenge on Kaggle to achieve an accuracy of ~<b>65.34%</b> on the private test data</li> </ul>
	<b>How Close are Artificial Neural Networks to the Brain?</b> <span style="float: right;">Sep. '18 – Nov. '18</span> <i>CS771A – Machine Learning, Prof Piyush Rai, IIT Kanpur</i> <span style="float: right;">[ <a href="#">Pres</a> ] [ <a href="#">Report</a> ]</span> <ul style="list-style-type: none"> <li>- Studied different types of <b>ANN</b> models to compare their structure and performance to realise their biological resemblance to the processing in the human brain.</li> <li>- Tried explaining how a rate-based neuron in conventional NN can be realised as spiking neuron in <b>SNN</b>.</li> <li>- Studied variational EM method as explained by (Yoshua Bengio et al., 2015) on the biological plausibility of deep learning.</li> </ul>
	<b>Cooperative Localization Using Posterior Linearization Belief Propagation</b> <span style="float: right;">Sep. '18 – Nov '18</span> <i>EE602A – Statistical Signal Processing, Prof R. M. Hegde, IIT Kanpur</i> <span style="float: right;">[ <a href="#">Code</a> ] [ <a href="#">Report</a> ]</span> <ul style="list-style-type: none"> <li>- Implementation of a research paper, which presents the <b>PLBP</b> algorithm for cooperative localization</li> <li>- Learned about and implemented <b>Statistical Linear Regression</b> using <b>unscented transform</b> on a chosen sets of <b>sigma points</b> to linearize the proposed non-linear model.</li> <li>- Implemented the <b>Belief Propagation</b> algorithm to infer the marginals for different sensor nodes.</li> </ul>
	<b>Achieving CRLB in Sensor Network Estimation</b> <span style="float: right;">Sep. '18 – Nov '18</span> <i>EE602A – Statistical Signal Processing, Prof R. M. Hegde, IIT Kanpur</i> <span style="float: right;">[ <a href="#">Code</a> ]</span> <ul style="list-style-type: none"> <li>- Implementation of a research paper, which proposes a general framework to achieve CRLB bounds</li> <li>- Successfully implemented the proposed method in <b>MATLAB</b> to produce the results</li> </ul>
	<b>SL-COM (Sign Language Communication)</b> <span style="float: right;">Mar. '17</span> <i>Robotics Club, IIT Kanpur</i> <ul style="list-style-type: none"> <li>- Patterns were generated using different <b>hand gestures</b> to produce different letters</li> <li>- Produced letters were sent to a Chat-App, where a text2speech engine was used to produce voices</li> <li>- Demonstrated the prototype in <b>Techkriti Innovation Challenge</b> and was awarded with the <b>3rd prize</b></li> </ul>
	<hr/> <b>OPEN SOURCE CONTR.</b>
	<b>jsPsychSheet</b> <span style="float: right;">[ <a href="#">GitHub</a> ]</span> <i>Self-Project</i> <ul style="list-style-type: none"> <li>- Developed a simple JavaScript library for running behavioral experiments online</li> </ul>
	<b>Open AI gym</b> <span style="float: right;">[ <a href="#">GitHub</a> ]</span> <ul style="list-style-type: none"> <li>- Some issue fixations for gym environment library</li> </ul>
RELEVANT COURSES	<b>Brain-Score</b> <span style="float: right;">[ <a href="#">GitHub</a> ]</span> <i>DiCarlo Lab, MIT, USA</i> <ul style="list-style-type: none"> <li>- Implement a new benchmark based on a visual search task</li> </ul>
	<b>PixhawkArduinoMAVLink</b> <span style="float: right;">[ <a href="#">GitHub</a> ]</span> <i>Self-Project</i> <ul style="list-style-type: none"> <li>- Developed an Open Source Arduino library to communicate between Pixhawk and Arduino</li> </ul>
	<hr/> <b>Machine Learning and Computer Vision</b> <ul style="list-style-type: none"> <li>• Introduction to Machine Learning</li> <li>• CNN for Visual Recognition (Stanford AI) [#]</li> <li>• Computer Vision: Foundations and Applications (Stanford AI) [#]</li> </ul>

- Reinforcement Learning Specialisation (Coursera – University of Alberta) [o] [c]
- Deep Learning Specialisation (Coursera – deeplearning.ai) [o] [c]

### Signal Processing

- Statistical Signal Processing
- Image Processing
- Signals, Systems and Networks
- Digital Signal Processing [o]

### Cognitive Science

- Foundation of Cognitive Science
- Psychology of Language
- Psychology of Adjustment
- Computational Cognitive Science
- Neurobiology
- Logic and Cognitive Science [o]

### Mathematics and Algorithms

- Data Structures & Algorithms
- Fundamentals of Computing [\*]
- Basic Statistics, Data Analysis & Inference [o]
- Probability and Statistics
- Linear Algebra and ODE

\* - Exceptional Performance

c - [Link](#) to online course certificates

# - Online (Audit)

o - Ongoing

<b>TECHNICAL SKILLS</b>	<b>Languages:</b>	C • Python • MATLAB	
	<b>Software and Tools:</b>	TensorFlow • Keras • OpenCV • NumPy • ROS (Robot OS) • jsPsych • PsyToolkit • Git • Arduino • HTML/CSS • Jekyll	
<b>LECTURES/ TALKS / TUTORIALS</b>	<b>[28-03-2020] to [20-04-2020]</b>	Brain and Cognitive Society workshop covering topics on Basic Machine Learning, Computational Modelling, Psychophysics, Data Analysis and Experiment Design [BCS @IITK] [Around 150+ participations]	<a href="#">[ Link ]</a>
	<b>[13-12-2019]</b>	Basic ML, Deep Learning Libraries and Google Colab [BCS @IITK]	<a href="#">[ Link ]</a>
	<b>[12-12-2019]</b>	Artificial and Biological Neural Networks [BCS @IITK]	<a href="#">[ Link ]</a>
	<b>[10-12-2019]</b>	Python, NumPy, SciPy, Matplotlib Tutorial [BCS @IITK]	<a href="#">[ Link ]</a>
	<b>[25-10-2019]</b>	Talk on Role of Brain Science in AI [BCS @IITK]	<a href="#">[ Link ]</a>
	<b>[29-05-2017]</b>	Introduction and Quick Start to ROS [Robotics Club, IITK]	<a href="#">[ Link ]</a>
<b>LEADERSHIP &amp; ACTIVITIES</b>	<b>Founder and Coordinator</b>	Brain and Cognitive Society, IIT Kanpur	Jan. '20 – Now
	<b>Student Volunteer</b>	PRAYAS, IIT Kanpur	Dec. '18 – Jan. '19
	<b>Technical Head</b>	Humanoid IITK Team, IIT Kanpur	May. '18 – Nov '18
	<b>UG Coordinator</b>	EEA, Dept. of Electrical Engineering, IIT Kanpur	Aug. '17 – Aug. '18
	<b>Secretary</b>	Robotics Club, IIT Kanpur	Apr. '17 – Mar. '18
	<b>Secretary</b>	Fine Art Club, IIT Kanpur	Apr. '17 – Mar. '18
	<b>Student Guide</b>	Counselling Service, IIT Kanpur	Aug. '17 – Jul. '18
	<b>Student Volunteer</b>	National Service Scheme, IIT Kanpur	Aug. '16 – May. '17
<b>REFERENCES</b>	<b>Prof. Gabriel Kreiman</b>	Professor, Harvard Medical School Boston, MA gabriel.kreiman@tch.harvard.edu	