

Third Year Undergraduate
Dept. of Electrical Engineering
Indian Institute of Technology Kanpur

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

EDUCATION	<p>Indian Institute of Technology, Kanpur, India <i>Major in Electrical Engineering with Minor in Cognitive Science</i> GPA: 8.84/10.0 (Five Semesters)</p> <p>Munam Public School, Hazaribagh, India <i>Intermediate</i> Percentage: 91.2%</p> <p>DAV Public School, Hazaribagh, India <i>Matriculation</i> GPA: 10.0/10.0</p>	<p>Aug. '16 – Jun. '20 (Expected)</p> <p>April 2016</p> <p>April 2014</p>
PUBLICATIONS	Vishal Choudhary, Shashi Kant Gupta , Shaohui Foong, Hock Beng Lim “Distance Measurement for UAVs in Deep Hazardous Tunnels”, Demo Paper accepted at IEEE Consumer Communications & Networking Conference (2019 IEEE CCNC), Las Vegas, USA	
HONORS & ACHIEVEMENTS	<ul style="list-style-type: none">Selected for a Summer Internship at SUTD Singapore in the second year (2018)Received Academic Excellence Award twice for outstanding academic performance (awarded to top 7% of students in the institute) for the year 2016 and 2016-17Only first year student to be selected to deliver a campus level lecture (on ROS) during summer '17Won 3rd prize in Techkriti Innovation Challenge, conducted by Techkriti IIT Kanpur (2017).99.89 percentile in Joint Entrance Examination (IIT-JEE 2016) among 1.5 million students.Secured All India Rank 842 in KVPY 2015, a fellowship exam conducted by IISc Bangalore and funded by Department of Science and Technology, Govt. of India	
INTERESTS	Artificial Intelligence • Cognitive Science • Computer Vision • Machine Learning • Robotics • Signal Processing	
RESEARCH EXPERIENCE	<p>Bridging Deep Learning and Neuroscience Dec. '18 – Ongoing</p> <p><i>Self Project</i></p> <ul style="list-style-type: none">Approach 1: Deriving learning rule based on STDP found in Biological NeuronsApproach 2: Studying the weight change during backprop to derive some local learning rule <p>How Close are Artificial Neural Networks to the Brain? Sep. '18 – Nov. '18</p> <p><i>CS771A - Machine Learning, Prof Piyush Rai, IIT Kanpur</i> [Pres.] [Report]</p> <ul style="list-style-type: none">Studied different types of ANN models to compare their structure and performance to realise their biological resemblance to the processing in the brainTrained several neural network models on MNIST dataset for empirical evaluation. Achieved an accuracy of 99.60% using a CNN architecture and 99.38% using an RNN architectureTried explaining how a rate based neuron in conventional NN can be realised as spiking neuron in SNNWorked on a more biologically plausible Deep Learning model (continued as a separate project) <p>Optical Flow for Localisation of UAVs in Deep Tunnel Jun. '18 – Jul. '18</p> <p><i>Summer Internship, Dr Hock Beng Lim, Centre for Smart System, SUTD Singapore</i></p> <ul style="list-style-type: none">Worked on the Optical Flow algorithm based on SAD block matching to determine UAV position in deep tunnels i.e. GPS denied environment (coded in python, for actual prototype PX4FLOW was used)Developed a self-prediction based algorithm to correct the errors in inconsistent flow calculationPerformed various experiments to collect data samples to measure and analyse performanceWorked on implementing Extended Kalman Filter to use acceleration data to improve accuracyDemo Paper accepted at IEEE Consumer Communications & Networking Conference, Las Vegas, USA <p>Humanoid IITK Dec. '16 – Ongoing</p> <p><i>Team Member, Dean of Research and Development Project, IIT Kanpur</i></p> <p><i>Faculty Advisor (Jul. '18 Onwards) - Dr Ashish Dutta, IIT Kanpur</i> [Video]</p> <ul style="list-style-type: none">Helped the team in designing and developing the Institute's first Humanoid Robot (AUTOMI)Worked on developing the bipedal walking algorithm, designed a MATLAB simulation for the sameWorked on Object Tracking using various computer vision algorithms in OpenCV	
OTHER RELEVANT PROJECTS	<p>Role of Emotional Valence on Sense of Agency Dec. '18 – Ongoing</p> <p><i>Prof Devpriya Kumar, Center for Cognitive Science, IIT Kanpur</i></p> <ul style="list-style-type: none">Studying the influence of emotional valence of an action outcome on sense of agency	

Real Time Human Facial Emotion Recognition

Nov. '18 – Ongoing

Self Project[\[Video \]](#) [\[Code \]](#)

- 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
- CNN classifier (with ensemble) was designed, which was trained on the **ICML 2013** dataset of Facial Expression Recognition Challenge on kaggle to achieve an accuracy of **~65.34%** on the private test data

Cooperative Localization Using Posterior Linearization Belief Propagation

Sep. '18 – Nov '18

EE602A – Statistical Signal Processing, Prof R. M. Hegde, IIT Kanpur

[\[Code \]](#) [\[Report \]](#)

- Implementation of a research paper, which presents the **PLBP** algorithm for cooperative localization
- Learned about and implemented Statistical Linear Regression using **unscented transform** on a chosen sets of **sigma points** to linearise the proposed non-linear model.
- Implemented the **Belief Propagation** algorithm to infer the marginals for different sensor nodes.

Achieving CRLB in Sensor Network Estimation

Sep. '18 – Nov '18

EE602A – Statistical Signal Processing, Prof R. M. Hegde, IIT Kanpur

[\[Code \]](#)

- Implementation of a research paper, which proposes a general framework to achieve CRLB bounds
- Successfully implemented the proposed method in MATLAB to produce the results

PixhawkArduinoMAVLink

Jun. '18

Self Project[\[Code \]](#)

- Developed an Open Source Arduino library to communicate between Pixhawk and Arduino
- Used **MAVLink** messaging protocol to create the communication

SL-COM (Sign Language Communication)

Mar. '17

Robotics Club, IIT Kanpur

- Patterns were generated using different **hand gestures** to produce different letters
- Produced letters were sent to a Chat-App, where a text2speech engine produces voices for the words
- Demonstrated the prototype in **Techkriti Innovation Challenge** and was awarded the **3rd prize**

RELEVANT COURSES**Machine Learning and Computer Vision**

- Introduction to Machine Learning
- CNN for Visual Recognition (Stanford AI) [#]

- Computer Vision: Foundations and Applications (Stanford AI) [#]

Signal Processing

- Statistical Signal Processing

- Signals, Systems And Networks

Cognitive Science

- Foundation of Cognitive Science
- Psychology of Language [o]

- Computational Cognitive Science [o]
- Neuronal Dynamics (Prof Gerstner) [#][o]

Mathematics and Algorithms

- Data Structures & Algorithms
- Fundamental of Computing [*]

- Probability and Statistic
- Linear Algebra and ODE

* - Exceptional Performance

- Online (Audit)

o - Ongoing

TECHNICAL SKILLS**Languages:**

C • Python • Matlab • JavaScript

Software and

TensorFlow [Keras] • Brian (beginner) • OpenCV • NumPy • ROS (Robot OS) • Git •

Tools:

Arduino • HTML/CSS • Jekyll

LEADERSHIP & ACTIVITIES**Student Volunteer** PRAYAS, IIT Kanpur

Dec. '18 - Present

Students Project Coordinator EEA, Dept. of Electrical Engineering, IIT Kanpur

Sep. '18 - Present

Technical Head Humanoid IITK Team, IIT Kanpur

May. '18 – Nov '18

UG Coordinator EEA, Dept. of Electrical Engineering, IIT Kanpur

Aug. '17 – Aug. '18

Secretary Robotics Club, IIT Kanpur

Apr. '17 – Mar. '18

Secretary Fine Art Club, IIT Kanpur

Apr. '17 – Mar. '18

Student Guide Counselling Service, IIT Kanpur

Aug. '17 – Jul. '18

Student Volunteer NSS, IIT Kanpur

Aug. '16 – May. '17