

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

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

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

**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
- Synapses, Neurons and Brains (Coursera) [#][!]
- Computational Cognitive Science [!]
- Neuronal Dynamics (Prof Gerstner) [#][!]

**Mathematics and Algorithms**

- Data Structures & Algorithms
- Fundamental of Computing [\*]
- Probability and Statistic
- Linear Algebra and ODE

\* - Exceptional Performance

! - To Be Taken in Upcomming Semester (Jan '19)

# - 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