

# Akella Ravi Tej

B.Tech. – Electronics & Communication Engineering – Indian Institute of Technology Roorkee

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## Interests

Computer Vision, Deep Learning, Generative Modeling, Robotics and Reinforcement Learning

## Education

**Indian Institute of Technology Roorkee**

**GPA: 8.129/10**

*B.Tech in Electronics & Communication Engineering*

*Minor Specialization in Computer Science & Engineering*

2014-2018

## Exam Scores

**Graduate Record Examination**

**329/340** (Verbal: 159, Quant: 170, AWA: 4.0)

**TOEFL**

**106/120** (R: 29, L: 28, S: 22, W: 27)

## Publication

**A Randomized Kernel-Based Secret Image Sharing (SIS) Scheme**

**IEEE Workshop**

*Authors: Akella Ravi Tej, Rekula Ravi Teja, Vinod Pankajakshan*

*Jan 2017-Jul 2017*

- o Proposed a novel SIS scheme that offers perfect threshold secrecy, optimal share size, and complete decentralization.
- o Presented at IEEE International Workshop on Information Forensics and Security (WIFS), 2018.

Undergraduate Thesis Project.....

**Review: Super Resolution as a Supervised Learning Problem**

**Working on a manuscript**

*Supervisor: Prof. Vinod Pankajakshan*

*Jul 2017-May 2018*

- o Surveys recent work in the area of single image super resolution (SISR), covering advances in neural network architectures, learning algorithms, objective functions, and how they all overcome the ill-posed nature of SISR.
- o Special emphasis on perceptual loss functions for stabler training and generating more realistic-looking images.
- o Targeting the 36<sup>th</sup> International Conference on Machine Learning (ICML), 2019.

## Experience

Research Projects and Internships.....

**Bayesian Optimization with Guaranteed Monotonic Policy Improvements**

*Supervisors(remote): Prof. Anima Anandkumar, Bren Professor, CMS Caltech*

*Aug 2018-Present*

- o Attempts to combine the benefits of Bayesian approaches, such as targeted exploration and sample efficiency in gradient estimation, with the guaranteed monotonic policy improvements offered by TRPO method.
- o Extends the work in *Azizzadenesheli et al., (2018)* to continuous state-action space.
- o Uses variational inference with structured kernel interpolation for large-scale GP regression ( $10^6+$  datapoints).

**Statistical Modelling of Speech Signals**

*Supervisors: Prof. Ajit K Chaturvedi, Professor & Director, IIT Roorkee*

*Prof. R Balasubramanian, Associate Professor, IIT Roorkee*

*Jan 2018-May 2018*

- o Reviewed common feature extractors used in pre-processing raw audio signals for solving speaker recognition task.
- o Experiments were performed with stacked LSTM architecture using the Voice Conversion (VCC) 2016 dataset.
- o Compared the performance of convolutional auto-regressive networks (dilated causal convolutions with a finite receptive field) with stacked LSTM networks (theoretically infinite receptive field) for high fidelity speech synthesis and automatic speech recognition tasks.

**Underlying Cryptography behind Zero-Knowledge (ZK) Proofs**

*Supervisor(remote): Dr. R. Ramanujam, Professor, Institute of Mathematical Sciences*

*Jul 2017-Jan 2018*

- o Examined the mathematical principles behind various advanced cryptographic protocols in the zk-SNARK pipeline.

- Paper Implementations.....
- Language Identification** [↗](#) by *Mathur et al.*, (2017)[↗](#)
- Character-level LSTM model for language identification based on *Stanford Language Identification Engine*(*SLIDE*).
- Disentangled Learning with  $\beta$ -Variational Auto-Encoders** [↗](#) by *Burgess et al.*, (2018)[↗](#)
- Balanced the trade-off between learning disentangled representations and reconstruction fidelity by adjusting the hyperparameter  $\beta$  to extract disentangled factors from *dsprites* dataset[↗](#).
  - Achieved more robust disentangling at a higher reconstruction fidelity using the modified objective function that performs a controlled increase of encoding capacity.
- Handwriting Synthesis** [↗](#) by *Graves et al.*, (2013)[↗](#)
- Mixture distribution parameterized using an LSTM network (Mixture Density Network) to generate realistic cursive handwriting, demonstrating the ability of recurrent neural networks to capture long-range structure.
- Face Recognition with One-Shot Learning** by *Schroff et al.*, (2015)[↗](#)
- Used a siamese network with triplet loss function to recognize faces from a single example.
- A Neural Algorithm of Artistic Style** by *Gatys et al.*, (2015)[↗](#)
- Generated artwork of high perceptual quality by blending low-level features and high-level features of two images.
- Debiasing Word Embeddings** by *Bolukbasi et al.*, (2016)[↗](#)
- Eliminated common biases in word embeddings such as gender, age, etc., emerging from unbalanced training sets.

## Academic Achievements

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- Recipient of **Nehru Memorial Scholarship** for overall excellence in undergraduate.
- Ranked of 315/13388 teams in **Codechef SnackDown-2016**: Global Competitive Programming Tournament.
- KVPY fellowship** (SX Stream-2014) in recognition of aptitude for research.
- Ranked in top 1% students of the country in **IIT-JEE Advance 2014**.
- Secured 99.99%tile in **IIT-JEE Mains 2014**.

## Technical skills

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**Programming Languages:** Python, Java, C, C++, MATLAB and Simulink

**Frameworks:** TensorFlow, PyTorch, Keras

**Simulators:** MuJoCo Physics Engine, Box2D Physics Engine, OpenAI Gym

## Relevant courses

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Undergraduate Courses.....

**Linear Algebra:** Mathematics-I(MAN 001) and Mathematical Methods(MAN 002)

**Statistics:** Probability and Statistics(MAN 006)

**Machine Learning:** Machine Learning(CSN 106)

Online Courses.....

**Coursera:** Deep Learning Specialization by *Andrew NG*, *deeplearning.ai* [↗](#)

- Neural Networks and Deep Learning [↗](#), Improving DNNs: Hyperparameter tuning, Regularization and Optimization [↗](#), Structuring Machine Learning Projects [↗](#), Convolutional Neural Networks [↗](#), Sequence Models [↗](#)

**Coursera:** Neural Networks for Machine Learning by *Geoffrey Hinton*, *University of Toronto* [↗](#)

**Coursera:** Machine Learning by *Andrew NG*, *Stanford University* [↗](#)

**Other MOOCs:** RL course by David Silver, Deep RL Bootcamp, Deep RL(CS 294-112) by Sergey Levine, CNN for Visual Recognition(CS231n) by Andrej Karpathy, NLP with Deep Learning(CS224n) by Christopher Manning.

## Extracurricular Activities

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- Tutor at **HashLearn**: Conducted over 200 online sessions and mentored 100+ students for IIT-JEE.
- Member of **Data Science Group**, a platform that brings together the students of IIT Roorkee who are passionate in artificial intelligence, machine learning, and data science to share ideas and collaborate.
- Member of the **Institute Athletics Team** and **National Sports Organization (N.S.O)**, IIT Roorkee.