

# Ravi Tej Akella

☎ (+1) 765-772-0086 | ✉ ravitej@cmu.edu | 🏠 akella17.github.io/ | 📷 Akella17 | 🌐 akella17

## Research Interests

Machine Learning, Computer Vision, Reinforcement Learning and Robotics

## Education

### CARNEGIE MELLON UNIVERSITY

MASTER OF SCIENCE IN ROBOTICS (MSR)

Aug 2021 - Present

### INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

BACHELOR OF TECHNOLOGY IN ELECTRONICS & COMMUNICATION ENGINEERING

MINOR SPECIALIZATION IN COMPUTER SCIENCE & ENGINEERING

Jul 2014 - May 2018

## Publication

### DEEP BAYESIAN QUADRATURE POLICY OPTIMIZATION [PAPER]

AAAI 2021

AUTHORS: **AKELLA RAVI TEJ**, KAMYAR AZIZZADENESHELI, MOHAMMAD GHAVAMZADEH, ANIMA ANANDKUMAR, YISONG YUE

- Proposes a low-variance policy gradient estimator that uses Bayesian quadrature to analytically solve the policy gradient integral.
- Relative to Monte-Carlo estimation, our method offers more accurate policy gradient estimates and their estimation uncertainty.
- Accepted to the **35th Conference on Artificial Intelligence (AAAI)** 2021, **Deep RL & Real-World RL Workshops (NeurIPS)**, 2020.

### REINFORCED MULTI-TASK APPROACH FOR MULTI-HOP QUESTION GENERATION [LONG PAPER]

COLING 2020

AUTHORS: D. GUPTA, H. CHAUHAN, **AKELLA RAVI TEJ**, ASIF EKBAL, PUSHPAK BHATTACHARYYA

- Proposes a novel reward formulation to REINFORCE targeted question generation with multi-hop reasoning over several documents.
- Accepted to **The 28th International Conference on Computational Linguistics (COLING)**, 2020.

### ENHANCING PERCEPTUAL LOSS WITH ADVERSARIAL FEATURE MATCHING [ORAL PRESENTATION]

IJCNN 2020

AUTHORS: **AKELLA RAVI TEJ**, S. HALDER, A. SHANDILYA, VINOD PANKAJAKSHAN

- Proposes a novel training framework that unifies adversarial and perceptual objectives for high-fidelity photorealistic image generation.
- Leverages additional discriminator supervision to (i) filter the artifacts introduced by perceptual loss and (ii) stabilize adversarial training.
- Presented at **IEEE International Joint Conference on Neural Networks (IJCNN)**, 2020.

### RANDOMIZED KERNEL-BASED SECRET IMAGE SHARING (SIS) SCHEME [POSTER]

WIFS 2018

AUTHORS: **AKELLA RAVI TEJ**, R. TEJA, VINOD PANKAJAKSHAN

- Introduces an SIS scheme that offers (i) perfect threshold secrecy, (ii) optimal share size, and (iii) complete decentralization.
- Presented at **IEEE International Workshop on Information Forensics and Security (WIFS)**, 2018.

## Research Experience

### TENSORLAB CALIFORNIA INSTITUTE OF TECHNOLOGY (CALTECH)

Research Internship

SUPERVISORS: **PROF. ANIMA ANANDKUMAR**, CALTECH, **DR. MOHAMMAD GHAVAMZADEH**, GOOGLE RESEARCH

Oct 2018-Dec 2020

- Worked on policy gradient algorithms (reinforcement learning), with a focus on their theory, sample efficiency and safety.
- Primary contributor to “Deep Bayesian Quadrature Policy Optimization”, a joint project between Caltech and Google Research.

### AI-NLP-ML LAB INDIAN INSTITUTE OF TECHNOLOGY (IIT) PATNA

Research Assistant

SUPERVISOR: **PROF. PUSHPAK BHATTACHARYYA**, PROFESSOR & DIRECTOR, IIT PATNA

Jan 2019-Jan 2020

- Worked on multimodal tensor fusion (under review) and multi-hop question generation (Accepted to COLING 2020).
- Developed a block-superdiagonal fusion strategy to directly control intra-modality and inter-modality dynamics of tensor fusion.

### SIGNAL PROCESSING LAB INDIAN INSTITUTE OF TECHNOLOGY (IIT) ROORKEE

Research Assistant

SUPERVISOR: **PROF. VINOD PANKAJAKSHAN**, ASSISTANT PROFESSOR, IIT ROORKEE

Jan 2018-Jan 2019

- Worked at the intersection of image forensics and machine learning (Presented at IEEE-IJCNN 2020 and IEEE-WIFS 2018).

### AUTOMATIC GENERATION OF DESIGN-VERIFICATION TESTBENCH

Internship

TEXAS INSTRUMENTS, BANGALORE

May 2017-Jul 2017

- Built the testbench generation pipeline for auto-testing circuit designs, vastly improving the productivity of Verification Engineers.
- Organization-wide Deployment: Currently used by all the verification teams at *Texas Instruments*.

## Academic Services

### MACHINE LEARNING AND THE PHYSICAL SCIENCES (ML4PS 2019)

Subreviewer

WORKSHOP AT THE 33RD CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS (NEURIPS)

### AAAI CONFERENCE ON ARTIFICIAL INTELLIGENCE (AAAI-20)

Subreviewer

## Projects

### OPEN SOURCE

#### OPEN3D (2700+ stars, 669+ forks, 60+ contributors) [CODE]

- Open source 3D data processing library that is part of the non-profit **Open Source Vision Foundation (OSVF)**.
- Contributed to the TriangleMesh graph module: (i) C++ API, (ii) Python wrapper.

#### DISENTANGLED LEARNING WITH $\beta$ -VARIATIONAL AUTO-ENCODERS (Burgess et al., 2018) [CODE]

- Implementation of " $\beta$ -Variational Autoencoders" (Burgess et al. 2018) using TensorFlow.
- Balances the trade-off between learning disentangled representations and reconstruction fidelity using a  $\beta$ -VAE on *dsprites* dataset.

#### HANDWRITING SYNTHESIS (Graves et al., 2013) [CODE]

- Implementation of "Generating Sequences With Recurrent Neural Networks" (Graves 2013) using TensorFlow.
- Generated realistic cursive handwriting with long-range structure using a Mixture Density Network (GMM parameterized by LSTMs).

#### LANGUAGE IDENTIFICATION (Mathur et al., 2017) [CODE]

- Designed a character-level LSTM model for language identification, emulating *Stanford Language Identification Engine (SLIDE)*.

### SELECTED COURSE PROJECTS

#### FACE RECOGNITION WITH ONE-SHOT LEARNING (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 (Gatys et al., 2015)

- Generated artwork of high perceptual quality by blending low-level features and high-level features of two images.

## Honors & Awards

- 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 (1123/126,000) of the country in **IIT-JEE Advance 2014**.
- Secured 99.99%tile in **IIT-JEE Mains 2014**, given by 1.5 million students.

## Technical Skills

**Languages** Python, C, C++, Java, Shell, MATLAB and Simulink

**Technologies** TensorFlow, PyTorch, Keras, Git, Linux

## References

### PROF. KAMYAR AZIZZADENESHELI

ASSISTANT PROFESSOR  
PURDUE UNIVERSITY  
[kamyar@purdue.edu](mailto:kamyar@purdue.edu)

### DR. MOHAMMAD GHAVAMZADEH

SENIOR STAFF RESEARCH SCIENTIST  
GOOGLE RESEARCH  
[ghavamza@google.com](mailto:ghavamza@google.com)

### PROF. ANIMA ANANDKUMAR

PROFESSOR, CALTECH  
DIRECTOR OF ML RESEARCH, NVIDIA  
[anima@caltech.edu](mailto:anima@caltech.edu)

### PROF. YISONG YUE

PROFESSOR  
CALTECH  
[yyue@caltech.edu](mailto:yyue@caltech.edu)

### PROF. VINOD PANKAJAKSHAN

ASSISTANT PROFESSOR  
IIT ROORKEE  
[vinod.pankajakshan@ece.iitr.ac.in](mailto:vinod.pankajakshan@ece.iitr.ac.in)