

Vikranth Reddy Dwaracherla

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I am a third year PhD student working with Prof. Benjamin Van Roy. I am mainly interested in Reinforcement Learning, Algorithms, Learning theory, Robotics and Machine Learning.

EDUCATION

- from 2016 Stanford University, PhD in **Electrical Engineering**, CGPA [4.04/4](#)
Advisor: Prof. Benjamin Van Roy
Reinforcement Learning(A+), Machine Learning(A+), Optimal control theory(A+),
Advanced Robotic Manipulation(A+), Robot Autonomy, Linear Dynamical Systems,
Statistical Learning Theory, Optimization Theory, Probabilistic Graphical Models,
NLP with deep learning, , Adaptive Signal Processing(A+)
- 2012-2016 Indian Institute of Technology Bombay, **President's Gold Metal** -2016
Advisor: Prof. Vivek Borkar
Bachelors in **EE** with honours, Minor in **CS**, CGPA [9.76/10](#)
Control Systems, Advanced Probability, Multivariate Control Systems,
Signals and Systems, Microprocessors, Speech Processing, Advanced Signal Processing,
Computer Vision, Image Processing, Digital Signal Processing, Digital Communications,
Communication Systems, Optimization, Network Theory, Ordinary Differential Equations,
Partial Differential Equations, Linear Algebra, Complex Analysis

PUBLICATIONS

- **Conference:** Sparse Regression using Compressive Sensing with Input Shaping, *Vivek S Borkar, Vikranth R Dwaracherla, Neeraja Sahashrabude*, Mathematical Theory of Networks and Systems (MTNS-2018)
- **Journal:** A Gradient Estimation Method using SPSA and Compressive Sensing, *Vivek S Borkar, Vikranth R Dwaracherla, Neeraja Sahashrabude*, Journal of Machine Learning Research (JMLR)
- **Journal:** Motion-based Object Segmentation based on Dense RGB-D Scene Flow, *Lin Shao, Parth Shah, Vikranth Dwaracherla, Jeannette Bohg*, IEEE Robotics and Automation Letters (RAL), IROS
- **Journal:** Nonlinear control for point-to-point navigation of spherical robot using position feedback, *Vikranth Dwaracherla, Shantanu Thakar, Leena Vachhani, Abhishek Gupta, Ayush Yadav*, IEEE Transactions on Mechatronics (under review)
- **Conference:** A Discrete time position feedback based steering controller for autonomous homing of a mobile robot, *Vikranth Reddy Dwaracherla, Shantanu Thakar, Arun Kumar, Leena Vachhani*, International Conference on Control and Automation (IEEE ICCA-2016)
- **Journal:** A Probabilistic Approach for Visual Homing of a Mobile Robot in the Presence of a Dynamic Obstacle, *Anupa Subnis, Arun Kumar, Vikranth Reddy Dwaracherla, Leena Vachhani*, IEEE Transactions on Industrial Electronics
- A patent filed on construction, design of spherical robot with pendulum based steering mechanism (4717/MUM/2015)

RESEARCH Projects: Independent Study

RLSVI with function approximations

Department of Electrical Engineering, Stanford

Prof. Benjamin Van Roy

Spring 2018 - (on going)

- Randomized Least Squares Value Iteration (RLSVI) offers a promising way for efficient deep exploration
- We perform function approximation in RLSVI for faster and efficient exploration. Analyzing the theoretical soundness of the algorithm using regret bounds.
- The goal is to develop fast and efficient algorithms for exploration, learning which are also theoretically sound

Learning Scene Flow

Department of Computer Science, Stanford

Prof. Jeannette Bohg

Winter 2018

- Learning rigid body motion, scene flow and segmentation using interconnected convolution neural networks from dataset created using 3D simulation environment, Blensor
- Novel scheme for resolving non-uniqueness in symmetry has been proposed

Human Robot collaboration

Prof. Oussama Khatib, Samir Menon

Department of Computer Science, Stanford

2016 - 2017

- Developed impedance and hybrid controllers which estimate human intent based on force measurements
- Multi-robot synchronous control, human biomechanical model from MRI scans of bones and muscles
- Implemented redis-based drivers for KUKA IIWA, KINOVA robots and other sensors

Human Intent Estimation

Prof. Dorsa Sadigh

Department of Electrical Engineering, Stanford

Autumn 2017

- Learning policies from human demonstrations using Inverse Reinforcement Learning to mitigate the problem of defining incorrect rewards
- Learned policies or strategies are used for collaborative task completion

MinMax DDP for Differential games

Prof. Marco Pavone

Department of Aeronautics & Astronautics, Stanford

Spring 2017

- Developed a sampling based controller similar to RRT* and used minmax Differential Dynamic Programming to obtain a closed loop policy to make the controller more robust
- Also developed a method to find controllers for pursuer-evasion problem by formulating it as SOS, sum of squares

Other Research Projects

Bachelor Thesis:

A Gradient Estimation Method using Compressive Sensing

Prof. Vivek Borkar

Department of Electrical Engineering, IIT Bombay

July 2015 - April 2016

- Proposed a computationally efficient gradient estimation method that combines Simultaneous Stochastic Perturbation and Compressive Sensing using a very small number of functional evaluations
- Extended the method for Manifold Learning and adaptive optimization
- Proposed a sparse linear regression method for estimating dependency among samples

Controllers for Autonomous Navigation of Spherical Robot

Prof. Leena Vachhani

Systems and Control Engineering, IIT Bombay

Autumn 2015

- Worked on two pendulums and yoke based spherical robot and made structural modifications to improve the functionality of the robot and efficient autonomous navigation of the Spherical Robot
- Proposed and Verified the controller in theory and experimentation. Position measurement was obtained from an uncalibrated camera, GPS module. Controller was also implemented on the Spherical robot

Visual Homing of a Mobile Robot using Panoramic images

Prof. Leena Vachhani

Systems and Control Department, IIT Bombay

Autumn 2015

- Worked on autonomous navigation of a robot which uses current panoramic image and destination panoramic image to estimate the optimal control
- Proposed a method for localizing the robot from erroneous bit pattern. Worked on theoretical bounds on maximum possible errors in the bit pattern which the robot can tolerate

Visiting Scholar at University of Southern California

Computer Vision: Segmentation and Stereo Vision

Prof. Jay Kuo

Ming Hsieh Department of Electrical Engineering, USC

Summer 2015

- Worked on segmentation and Stereo Vision algorithms using contour cues available in the image
- Proposed a fast segmentation algorithm using contour cues. Structured edge detection toolbox was used for edge detection in the images

Scholastic Achievements

- Dilip R. Limaye Academic Excellence Award, President's Gold Medal 2016 for most outstanding performance in 2016 among B.Tech and Dual Degree students.
- Viterbi-India scholar 2015, by IUSSTF, for a fully funded research internship at University of Southern California.
- Secured All India Rank 50 in IIT-JEE 2012 among more than 500,000 candidates

Technical skills

Python, C++, MATLAB, SolidWorks, AutoCAD, LabView, Eagle,

Teaching Experience

Teaching Assistant for CS 229: Machine Learning, CS223A: Introduction to Robotics, Stanford University

Conducting Office hours, setting assignments, exams and taking classes. Autumn 2017, 2018 & Winter 2018

Teaching Assistant for MA 105: Introduction to Calculus, Department of Mathematics, IIT Bombay

Conducted tutorial sessions, special classes and organized exams for 200 students. Spring 2016