Rakesh Gupta

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Summary

Senior technology leader with extensive software experience. Built software products and prototypes in Robotics, AI, Machine Learning, Deep Learning, Reinforcement Learning, Spoken Dialog, and Natural Language. Comfortable leading teams, contributing individually, and working with customers, startups and partners.

Experience

SAIC USA Inc., San Jose, CA

Director of Autonomous Driving *May 2016 - present*

- Strategic role, setting US strategy, working with partners, POCs with startups, and university collaborations.
- Member of SAIC Capital VC team and investment decision committee making investments in transportation, mobility, autonomous driving, connected vehicle, human machine interaction, artificial intelligence, software, security, electrification and disruptive business models. AUM: $200 million
- Tactical role in building the US autonomous driving department from scratch to 30+. Leading projects in L4 shared mobility with Perception, Mapping & Localization, Motion Planning & Control, System Integration, Testing & Validation teams. We have been testing on public roads for past 2 years and have deployed our shuttle in a University campus.

Honda Research Institute USA, Inc., Mountain View, CA

Principal Computer Scientist *July 2007 - April 2016*

Provided leadership in Machine Learning/AI, collaborating with US Universities and Honda groups worldwide. Projects included:

Autonomous Driving: Led a eight member team for urban autonomous driving software, with focus on path planning, reactive behavior with sensor data and high resolution maps. Our car was tested extensively in closed urban environments. Project on decision making at intersections using Monte Carlo Search Trees.

Spoken Dialog: Led a five member team for free form dialog system for setting destination in a car. We developed Dynamic Probabilistic Ontology Trees, a new probabilistic model to track dialog state. Modeled belief over user goal and interaction history across multiple turns using Bayesian Network. Incorporated destination landmark evidence via a kernel density estimator. Our prototype was demonstrated via an android app and soon thereafter transferred to the product group.

Personal Mobility Vehicle: Led a team of six to design and implement autonomous path planning and assistive features in a Personal Mobility Vehicle called Monpal. We added hardware modifications and motor to a four wheeled vehicle for auto steering. Detected people and objects using depth and vision sensors. Modeled beliefs about entity locations using Dynamic Bayesian Network, incorporating evidence via particle filtering. Developed variation of SARSA Reinforcement learning to learn optimal policy for navigation and interaction.

Destination prediction: Team lead for GPS data collection and destination prediction. We used data for probabilistic route prediction using Inverse Reinforcement learning. Predicted personal travel time for electric vehicle to address range anxiety.

Hybrid fuel efficiency: Team lead for using route prediction to compute optimal battery and engine power mix for fuel efficiency. We simulated system dynamics and battery charge to yield an average of 1.2% savings without any change in user behavior.

Honda Research Institute USA, Inc., Mountain View, CA

Senior Computer Scientist

Simultaneous Localization and Mapping (SLAM): Developed a single camera algorithm incorporating feature descriptors from multiple views. Built a 3D map of the environment using Extended Kalman Filtering.

Demonstrated localization on a mobile robot in a large room with path having significant viewpoint changes. Created globally consistent 3D maps from depth fields using active unstructured light space-time stereo system. Used Iterative Closest Point for local alignment, and novel outlier rejection to create a 3D map of a room.

Natural Language Processing (NLP): Integrated knowledge from Wikipedia, Yahoo Question/Answers, Open Directory Project and OpenMind to improve topic recognition on the web. Achieved a large error reduction over state of art on Google Answers and Switchboard datasets. Extracted summaries from Twitter, Yelp, newsfeeds. Created OpenMind Indoor Common Sense project to collect text data from volunteers. Data used in-house and at Intel Research, MIT Media Lab, and Technische Universität München.

Schlumberger, Austin Product Center, Austin, TX

Senior Software Engineer

Designed and wrote software in the Graphics and Modeling group. Worked on 3D Common Modeler project for creation and visualization of geometric models for geological structures. Created models by extracting fault and horizon surfaces from field data. Triangulated these surfaces and intersected them topologically to compute volume properties. Coded volume visualization of attribute data.

Managed an offshore team of 20 developers working on software components.

Massachusetts Institute of Technology, Cambridge, MA

Research Assistant

Officer of the Deck Virtual Environment Training: Designed and implemented software for Navy project on Officer of the Deck training. Developed a C++ object oriented framework and submarine dynamics model with BBN Inc. Blackboard asynchronous architecture for communication with multiple modalities such as Speech, Head Mounted Display and Beachtron sound spatialization. Wrote lab's C software system embedded in Tcl-Tk.

Education

Venture Capital, Berkeley Executive Education, CA

Massachusetts Institute of Technology, Cambridge, MA

Ph.D., M.S., Mechanical Engineering

GPA 5.0/5.0

PhD research focused on experiments with human subjects comparing their performance in real and Multimodal Virtual Environments. Developed a real-time, interactive, dynamic simulation model incorporating visual, haptics with force feedback, and auditory modes.

Indian Institute of Technology, New Delhi, India

Bachelor of Technology, Mechanical Engineering

GPA 9.6/10.0

Selected Publications

Adam Vogel, Deepak Ramachandran, Rakesh Gupta, Antoine Raux, Improving Hybrid Vehicle Fuel Efficiency Using Inverse Reinforcement Learning, AAAI, Toronto, Canada, 2012.

Rakesh Gupta, Lev Ratinov. Text Categorization with Knowledge Transfer from Heterogeneous Data Sources, AAAI, Chicago, 2008.

Rakesh Gupta and Mykel Kochenderfer. Common Sense Data Acquisition for Indoor Mobile Robots, AAAI, San Jose, 2004.

Memberships/Scholarships/Resident Status

Member IEEE, ACM, AAAI, ACL
National Talent Scholarship, India
US Citizen