

Agam Tomar

<https://agamtomar.github.io/>

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EDUCATION

- **University of California Los Angeles** Los Angeles, CA
Doctor of Philosophy in Structural and Earthquake Engineering; GPA: 3.71 Sept 2016 – Sept 2020
 - **Thesis:** Modeling Seismic Risk and Resilience of Water Distribution Systems, Co-Chair: Prof. Henry Burton, Co-Chair: Prof. Ali Mosleh
- **University of California Los Angeles** Los Angeles, CA
Master of Science in Electrical and Computer Engineering; GPA: 3.90 Jan 2019 – March 2020
- **Indian Institute of Technology (BHU), Varanasi** Varanasi, India
Master of Technology in Structural Engineering; GPA: 3.36 (8.39/10.0) July 2015 – May 2016
 - **Thesis:** Analysis and Physical Parameter Identification of Structural Systems, Advisor: Prof. S. Mandal, Co-Advisor: Prof. Subir Das
- **Indian Institute of Technology (BHU), Varanasi** Varanasi, India
Bachelor of Technology in Civil Engineering; GPA: 3.36 (8.39/10.0) July 2011 – May 2015

TECHNICAL SKILLS

- **Specialization:** Big Data Analytics, Deep Learning, Computer Vision, Bayesian Inference
- **Programming & Data Analysis:** Python, BASH
- **Machine Learning Library:** TensorFlow, PyTorch, Scikit-Learn, OpenCV, SimPy, Pandas
- **DevOps:** AWS Stack Deployment, Docker, Kubernetes, Airflow, Spark, Hive, Git

WORK EXPERIENCE

- **Johnson & Johnson - Robotics and Digital Solutions (RAD)** Redwood City, CA
R&D LDP Ph.D. Engineer, Manager: Peter Ondi, Technical Mentor: Dr. Steven Yampolsky Nov 2020 - Present
 - **Monarch (Bronchoscopy) Data Analytics:** Supporting Research and Development (R&D) in J&J Medical Devices sector by analyzing medical device's data and generating quantified metrics for our customers.
 - * Collaborating with other RAD teams to identify action plan for improving navigation
 - * Developed PySpark notebooks and Docker containers for calculating temporal breakdown (labeled segments of time) of a Bronchoscopy procedure's key milestones from raw telemetry data
 - * Acquired a fundamental understanding of the Monarch Platform along with the data generation, processing and storage pipelines (Extract Transform Load (ETL) Orchestration Pipeline)
- **Genentech** South San Francisco, CA
Roche Advanced Analytics Network Intern, Mentor: Dr. Jennifer Tom, Dr. Joseph Paulson June 2019 - Sept 2019
 - **Deep Learning Model for COPD Prognosis using Lung CT scans:** Developed a prognostic Deep-Learner for Chronic Obstructive Pulmonary Disease (COPD) endpoint from High-Resolution Computed Tomography (HRCT) scans of COPD patients collected in an internal study (TESRA) conducted by Roche. The model performed with an accuracy of 95% in classifying emphysema (COPD endpoint) progression in two years from baseline. Also, worked on creating saliency maps to visualize the working of the deep learning model. **PPT**

LICENSES & CERTIFICATIONS

- **Coursera:** AI for Medical prognosis, AI for Medical Diagnosis, AI for Medical Treatment, Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization, Structuring Machine Learning projects, Convolutional Neural Networks, AWS Fundamentals: Going Cloud-Native
- **IEEE:** Member of the IEEE Computational Intelligence Society
- **MICCAI:** Member of the Medical Image Computing and Computer Assisted Intervention Society
- **ASCE:** Member of the American Society of Civil Engineers

SELECTED PROJECTS

- **Machine Learning and Data Analysis Projects:**

- **Classification of Motor Imagery Tasks:** Compared the performance of Deep Neural Networks, LSTM Networks and Variational Auto-Encoders in classification of motor imagery using PyTorch **paper**
- **Restaurant Classification and Yelp Rating System:** Performed restaurant classification based on cuisines using Latent Dirichlet Allocation (LDA) on Yelp comments textual data and used probabilistic programming framework (Pyro) to perform first-order query evaluations **paper**
- **Social Network Analysis:** Used Exponential random graph models (ERGM) to model Bruce Kapferer's clothing factory data set at two-time intervals and derived supporting conclusions for changing patterns of alliance among workers. **paper**
- **Big Data Analysis:** Modeled future tweet activity from previous tweet activity data for a hashtag using classification models (SVM, NN, Random Forest) achieving 80% accuracy **paper**

- **Signal Processing Projects:**

- **Image Inpainting via ADMM:** Implemented image inpainting via a convex optimization algorithm, Alternating Direction Method of Multipliers (ADMM) and compared its performance for three image denoising methods: Total Variation (TV), Block Matching and 3D Filtering (BM3D) and Recursive Gaussian Filter (RF) **paper**
- **Decoding Neural Activity:** Investigated Kalman Filter (KF) for conversion of the neural signals into prosthetic control signals and compared its performance with previous decoding algorithms (Wiener Filter) **paper**

RESEARCH EXPERIENCE

- **University of California Los Angeles** Los Angeles, CA
Graduate Research Assistant, The B. John Garrick Institute for the Risk Sciences *Sept 2016 - Sept 2020*
 - Developed a discrete event simulation model to hindcast post-earthquake functional loss and restoration of water distribution systems including performance measures based on hydraulic analysis
 - Captured uncertainties in the seismic hazard, vulnerability and impact of water distribution systems by developing a stochastic event-based framework along with dispersion dis-aggregation by sources of uncertainty
 - Developed a computationally efficient framework for selecting a subset of damage maps, corresponding ground motion maps, and associated occurrence rates for a probabilistic distributed infrastructure system risk assessment using active learning
 - Developed a framework to capture relevant uncertainties in the outcomes of the discrete event simulation model and dynamically reduce them using data collected in real-time
- **Indian Institute of Technology (BHU), Varanasi** Varanasi, India
Graduate Research Assistant, Advised by Prof. S. Mandal *Aug 2015 - May 2016*
 - **Structural Parameter Identification:** Developed a weighted local iteration procedure involving the Kalman filter for dynamical system parameter identification in MATLAB.
 - **Efficient Solution Technique for NVIE:** Explored a series expansion method (Homotopy Perturbation Method) for solving Nonlinear Volterra Integral Equations (NVIE) arising from structural dynamical systems. Enhanced computational efficiency and convergence of results by applying weights from Gregory Quadrature and performing Fast Fourier Transform (FFT) in MATLAB.
- **Indian Institute of Technology Gandhinagar** Gandhinagar, India
Summer Research Assistant, Advised by Prof. Gaurav Srivastava *Summer 2014*
 - **Efficient Solution of Equations arising from Structural Dynamical Systems:** Assessed computational efficiency of Homotopy Analysis Method (HAM) and its special case Homotopy Perturbation Method (HPM) for the solution of nonlinear partial differential equations arising from single degree of freedom (SDOF) system.

TEACHING EXPERIENCE

- **Teaching Assistant** Department of Civil & Environmental Engineering, UCLA
Structural Reliability, Instructor: Prof. Henry Burton *Jan 2020 - March 2020, Jan 2019 - March 2019*
 - **Duties:** Discussion Section Lectures, Office Hours, Grading
- **Teaching Assistant** Department of Civil Engineering, IIT(BHU) Varanasi
Structural Analysis, Instructor: Prof. S. Mandal *July 2015 - Dec 2015*
 - **Duties:** Office Hours, Grading

POSITION OF RESPONSIBILITY

- **Vice President** Student Organization, UCLA
Graduate Indian Student Association Sept 2016 - August 2020
- **Signatory** Student Organization, UCLA
Graduate Indian Student Association Sept 2016 - August 2020
- **Student Leader Council Representative** Student Chapter, UCLA
Earthquake Engineering Research Institute Sept 2017 - Aug 2018
- **Treasurer** Student Chapter, UCLA
Earthquake Engineering Research Institute Sept 2017 - Aug 2018
- **Training and Placement Representative** Department of Civil Engineering, IIT(BHU) Varanasi
Training and Placement Cell July 2014 - May 2016

JOURNAL PUBLICATIONS

- J5 Tomar A.**, Burton, H. V. (2021) "Active learning framework for risk assessment of distributed infrastructure systems", *Computer-Aided Civil and Infrastructure Engineering* **Paper**
- J4 Tomar A.**, Burton, H. V. (2020) "Risk-Based Assessment of the Post-Earthquake Functional Disruption and Restoration of a Water Distribution System", *International Journal of Disaster Risk Reduction*, 102002 **Paper**
- J3 Tomar A.**, Burton, H. V., Mosleh A. (2020) "Dynamic Updating of Post-Earthquake Damage and Functional Restoration Forecasts of Water Distribution Systems using Bayesian Inferencing", *Earthquake Spectra* (Under Review)
- J2 Tomar A.**, Burton, H. V., Mosleh A., Lee, J. Y. (2020) "Hindcasting the Functional Loss and Restoration of the Napa Water System Following the 2014 Earthquake Using Discrete-Event Simulation", *ASCE Journal of Infrastructure Systems* 26(4), 04020035 **Paper**
- J1 Masoomi H.**, Burton, H. V., **Tomar A.**, Mosleh A. (2019) "Simulation-Based Assessment of Post-Earthquake Functionality of Buildings with Disruptions to Cross-Dependent Utility Networks", *ASCE Journal of Structural Engineering* 146(5), 04020070 **Paper**

PEER-REVIEWED CONFERENCE PUBLICATIONS

- C1 Lee, J. Y., Tomar A.**, and Burton, H. V. "A Framework for Water Distribution System Exposed to Seismic Events and Evolving Conditions." 11th *U.S. National Conference on Earthquake Engineering*, Los Angeles, California, June 25-29, 2018 **Paper**

ORAL PRESENTATIONS

- O5** "Dynamic Updating of Post-Earthquake Damage and Functional Restoration Forecasts of Water Distribution Systems using Bayesian Methods", *International Conference on Sustainable Infrastructure*, Los Angeles, CA (2019)
- O4** "Seismic Risk and Resilience Modeling of Water Distribution Systems", 4th *Annual Le Val Lund Student Symposium on Lifeline Infrastructure and Community Resilience*, Los Angeles, CA (2018)
- O3** "A Discrete Event Simulation Model of Post-Earthquake Restoration Of Water Distribution Systems", *ASCE Structures Congress*, Fort Worth, Texas (2018)
- O2** "Modeling the Effect of Utility Disruption in Post-Earthquake Housing Recovery Simulations", 11th *National Conference on Earthquake Engineering*, Los Angeles, CA (2018)
- O1** "A Discrete Event Simulation Model of Post-Earthquake Restoration of Water Distribution Systems: Validation and Case Study using data from 2014 South Napa Earthquake ", *ASCE World Environmental and Water Resources Congress*, Minneapolis, MN (2018)