

# Jaskirat Singh | Academic CV

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🌐 [ljsingh.github.io](https://ljsingh.github.io) • 📺 Jaskirat Singh

## Research Interests

Controllable Image Synthesis and Editing, Creative Content Generation, Reinforcement Learning

## Education

- **The Australian National University** **Expected**  
Sep' 21–Present  
Ph.D. in Computer Science  
Supervisors: [Prof. Liang Zheng](#) and [Prof. Stephen Gould](#)
- **The Australian National University** **GPA: 7/7**  
Jul' 19–Jul' 21  
Master of Machine Learning and Computer Vision  
🎓 Awarded University Medal for Exceptional Academic Excellence
- **Indian Institute of Technology, Delhi** **GPA: 9.3/10**  
2013–2017  
Bachelor of Technology (B.Tech), Electrical Engineering  
Specialization in Intelligent and Cognitive systems

## Publications

1. [High-Fidelity Guided Image Synthesis with Latent Diffusion Models](#)  
[Jaskirat Singh](#), [Stephen Gould](#), and [Liang Zheng](#). 2022  
CVPR 2023
2. [Paint2Pix: Interactive Painting based Progressive Image Synthesis and Editing](#)  
[Jaskirat Singh](#), [Liang Zheng](#), [Cameron Smith](#), and [Jose Echevarria](#). 2022  
ECCV 2022
3. [Intelli-Paint: Towards Developing Human-like Painting Agents](#)  
[Jaskirat Singh](#), [Cameron Smith](#), [Jose Echevarria](#), and [Liang Zheng](#). 2022  
ECCV 2022, US Research Patent
4. [Combining Semantic Guidance and Deep Reinforcement Learning For Generating Human-Level Paintings](#)  
[Jaskirat Singh](#), and [Liang Zheng](#). 2021  
CVPR 2021

## Research/Teaching Experience

- **Adobe Research** **San Jose, California**  
Jun' 21 – Dec' 21  
Research Intern: Computer Vision, Imaging & Video
- **The Australian National University** **Canberra**  
Dec' 20 – Feb' 21  
Research Scholar: Computer Vision Lab with [Prof. Liang Zheng](#)
- **The Australian National University** **Canberra**  
Jul' 20 – Nov' 20  
Teaching Assistant: Introduction to Machine Learning (COMP6670)
- **Yahoo Japan** **Tokyo**  
Oct' 17– Sept '18  
Machine Learning Research Engineer




## Honors and Achievements

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- **Awarded University Medal** for exceptional academic excellence at the Australian National University.
- **Awarded Chancellors Letter of Commendation** at the Australian National University.
- Awarded **ANU Computer Science Summer Research Grant** (\$5k).
- **Invited for delivering a tutorial** on "Applying deep reinforcement learning for computer vision research" by the **Australian Centre for Robotic Vision (ACRV)** group.
- Our project "Connected Stories of Australia" has been awarded as the **best innovative design project** by the **National Museum of Australia**.
- **Won national hackday at Yahoo Japan**, among 54 competing teams from all across Japan, for developing a real-time application for **facial attribute modification using reversible GANs**.
- Received **IIT Delhi Merit Award & Scholarship** for outstanding academic performance.
- Secured **All India Rank 128 in IIT-JEE** among 1.4 million aspirants appearing for the exam.
- Won the **Silver Medal at National FIDE Rated Chess Tournament**.

## Other Research Projects

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- **Domain-Aware Adversarial Level Selection for Multi-Scene RL**  
Supervisor: *Prof. Liang Zheng* Jul' 20–Nov' 20
  - Developed an adversarial level selection strategy for achieving **better sample complexity and episode rewards** on multi-scene environments like OpenAI ProcGen and AI2THOR based visual navigation task.
  - **Reduced the source to domain gap** by using a perpetual RL model for minimizing the KL divergence between sample distributions for the training and validation game level trajectories.
-  **Exploring Semantic and Depth Penalties for Sketch Generation**  
Research Project with *Dr. Dylan Campbell* Jul' 20–Nov' 20
  - Used model-based RL with a depth variance penalty to **enhance depth perception** in generated sketches.
  - Designed a semantic entropy reward function to discourage strokes traversing multiple object boundaries.
- **Connected Stories of Australia: Project with National Museum of Australia**  
Supervisor: *Prof. Emmaline Lear* Jul' 19–Nov' 19
  - Developed a machine learning and design thinking based solution for improving organisation of historic artifacts within NMA's database and increase the outreach of their public API.
  - The final prototype poses as an online interactive treasure hunt, with an NLP based backend for learning sparse concept associations.
-  **Finetuning CNNs using Neural Activation Data**  
Independent Study: *IIT Delhi* Jul' 16–Jun '17 & Jan' 19–May' 19
  - Demonstrated significant correlation between **representational dissimilarity matrices (RDM)** for **IT cortex activations** and higher-order CNN features.
  - Showed the importance of inter-class correlations between model features for popular CNN architectures.
  - **Improved the linear SVM accuracy** for penultimate layer features from the Squeezenet model by **9.86 %** on the Cadieu dataset using a novel RDM loss finetuning approach.
- **Face Detection and Recognition**  
Undergraduate Thesis: *IIT Delhi*  Jul' 16–May' 17

- Proposed a novel face recognition approach which uses **Spatial Transformer Networks** along with traditional Facenet pipeline in order to introduce translational and rotational invariance for input images. This resulted in an **improvement of 1.37%** in accuracy over the Facenet model.
- Came up with a unique approach to **combine 3D facial reconstruction and face recognition** in an end to end pipeline, in order to account for the variations in 3D structure and facial pose.

## Relevant Courses

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- o Advanced Topics in Machine Learning (Convex & Differentiable Optimization)      Class rank: 1
- o Statistical Machine Learning (Bayesian Neural Networks)      Class rank: 1
- o Advanced Topics in Computer Vision (Probabilistic Graphical Models)      Class rank: 1
- o Advanced Topics in Mechatronics (Computer Vision and Deep Learning)

## Technical Skills

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- o **Programming Languages and Tools:** Python, Java, C++,  $\text{\LaTeX}$
- o **Deep Learning Frameworks:** Pytorch, Tensorflow, Caffe, Caffe2
- o **Big Data:** Hadoop, Hive, SQL, Teradata
- o **Web Development:** HTML5, CSS, Javascript