

# Shantanu Jaiswal

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## EDUCATION

### Nanyang Technological University (NTU Singapore)

Singapore

*Bachelor of Engineering in Computer Engineering, Specialization in Intelligent Systems*

*Aug 2014 – Jun 2018*

- **GPA:** 4.64/5.00 (Honours highest distinction)
- **Selected Courses:** CE4041 (Machine Learning, A+); CE4042 (Neural Networks, A); EE8087 (Living with Mathematics, A+); CE4034 (Information Retrieval, A+); CE1008 (Engineering Mathematics, A+); MH1812 (Discrete Mathematics, A); MH8300 (Math in Real World Applications, A); CE1007 (Data Structures, A+)

## RESEARCH INTERESTS

Scene Understanding and Reasoning; Multimodal and Embodied AI; Self-supervised Learning; Cognitive Science

## PUBLICATIONS

### Conference papers

- [1] **Shantanu Jaiswal**, Debaditya Roy, Basura Fernando, and Cheston Tan. “Learning to Reason Iteratively and Parallely for Complex Visual Scenarios”. In: *Under review at Conference on Computer Vision and Pattern Recognition (CVPR)*. 2024. [\[Paper\]](#) [State-of-art on [STAR-VideoQA](#), [CLEVRER-Humans](#), [CLEVR-Humans](#), [NLVRv1](#), [CLEVR-CoGenT](#)].
- [2] Ishaan Rawal, **Shantanu Jaiswal**, Basura Fernando, and Cheston Tan. “Revealing the Illusion of Joint Multimodal Understanding in VideoQA Models”. In: *Under review at International Conference on Learning Representations (ICLR)*. 2024. [\[Paper\]](#) [\[Short version at NeurIPS 2023 XAI in Action Workshop\]](#).
- [3] **Shantanu Jaiswal**, Basura Fernando, and Cheston Tan. “TDAM: Top-Down Attention Module for Contextually-Guided Feature Selection in CNNs”. In: *European Conference on Computer Vision (ECCV)*. 2022. [\[Paper\]](#) [\[Suppl.\]](#) [\[Code\]](#).
- [4] **Shantanu Jaiswal**, Dongkyu Choi, and Basura Fernando. “What do CNNs gain by imitating the visual development of primate infants?” In: *31st British Machine Vision Conference (BMVC)*. 2020. [\[Paper\]](#) [\[Suppl.\(zip\)\]](#) [\[Code\]](#) [\[Abstract \(Cogsci 2020\)\]](#).

### Other workshop/symposium/tiny-track papers and technical reports

- [5] Aishik Nagar, **Shantanu Jaiswal**, and Cheston Tan. “Dissecting Zero-Shot Visual Reasoning Capabilities in Vision and Language Models”. In: *Under review at International Conference on Learning Representations (ICLR) Tiny-Papers Track*. 2024. [\[Paper\]](#).
- [6] Cheston Tan\* and **Shantanu Jaiswal\*** (equal contribution). “The Path to AGI Goes through Embodiment”. In: *Proceedings of the AAAI Symposium Series. Vol. 1. No. 1*. 2023. [\[Paper\]](#).
- [7] **Shantanu Jaiswal**, Liu Yan, Dongkyu Choi, and Kenneth Kwok. “A Probabilistic-Logic based Commonsense Representation Framework for Modelling Inferences with Multiple Antecedents and Varying Likelihoods”. In: *arXiv*. 2022. [\[Tech. Report\]](#).
- [8] Annamalai Narayanan, Mahinthan Chandramohan, Rajasekar Venkatesan, Lihui Chen, Yang Liu, and **Shantanu Jaiswal**. “graph2vec: Learning Distributed Representations of Graphs”. In: *Proceedings of the 13th International Workshop on Mining and Learning with Graphs (MLG)*. 2017. [\[Paper\]](#) [\[Code\]](#).

## RESEARCH EXPERIENCE

### Senior Research Engineer I – A\*STAR Center for Frontier AI Research

Jan 2019 – Present

*Advisors: Dr. Cheston Tan and Dr. Basura Fernando; Topic: Cognitively-inspired computer vision*

*Singapore*

- Investigating design of more effective architectural components and training approaches for scene understanding and reasoning tasks by taking inspiration from relevant cognitive phenomena (related papers: [1], [3], [4]).

- Contributed to design of probing techniques and benchmarking studies for vision-language models to systematically examine their reasoning capabilities and analyze potential multimodal biases (related papers: [2], [5]).

## Undergraduate Research Assistant – NTU School of EEE

Sep 2016 – Aug 2017

*Advisor: Dr. Lihui Chen; Topic: Deep learning for graph representation learning*

*Singapore*

- Implemented deep learning approaches for graph representation learning and aspect-based sentiment analysis.
- Contributed to development of the *graph2vec* framework and evaluation of other graph learning approaches (incl. node2vec, deep graph kernels and Weisfeiler-Lehman graph kernels) on relevant benchmarks (related paper: [8]).

## SCHOLARSHIPS, AWARDS AND HONOURS

President's Research Scholar, Nanyang Technological University	2017
Ideasinc Collab4Good Seed Fund (declined), Nanyang Technopreneurship Center	2016
Most Innovative Prize, NTU Hackathon on Digital Economy and Services	2016
Ministry of Education (MOE) Tuition Grant (merit-based; international student category), Govt. of Singapore	2014
Scholarship for Higher Education (SHE-INSPIRE) for meritorious academic performance (top 1%ile; perfect score in Math and Computer Science, Indian School Certificate Board Exams), Govt. of India	2014

## INDUSTRIAL EXPERIENCE

<b>A*STAR Social and Cognitive Computing Department</b>	Aug 2018 – Dec 2022
<i>Lead Engineer in "Commonsense Knowledge" group of K-EMERGE Programmatic Grant</i>	<i>Singapore</i>
<ul style="list-style-type: none"> <li>• Developed a commonsense knowledge representation framework and hierarchical conceptual ontology (using ProbLog) to encode probabilistic facts and inferential rules (related paper/technical report: [7]).</li> <li>• Co-designed a crowd-sourcing pipeline for knowledge collection and applied the framework for rule-based semantic parsing of aerospace documents within a larger industrial machine reading and question-answering system.</li> </ul>	
<b>Government of Singapore Investment Corporation (GIC Private Ltd.)</b>	Jun 2017 – Aug 2017
<i>Graduate Internship Program – Data and Analytics</i>	<i>Singapore</i>
<ul style="list-style-type: none"> <li>• Implemented forecasting models and bias-reduction strategies for real-estate investment trust (REIT) predictions.</li> </ul>	
<b>SAP Innovation Center Network (Leonardo Machine Learning)</b>	Jan 2017 – May 2017
<i>Developer Intern – Sales and Service Ticket Intelligence</i>	<i>Singapore</i>
<ul style="list-style-type: none"> <li>• Developed model deployment and evaluation framework for clients to analyze models in real-time.</li> </ul>	

## REFERENCES

**Cheston Tan:** cheston-tan@i2r.a-star.edu.sg (*Senior Principal Scientist II, A\*STAR Center for Frontier AI Research*)  
**Basura Fernando:** fernando\_basura@cfar.a-star.edu.sg (*Principal Scientist II, A\*STAR Center for Frontier AI Research*)  
**Lihui Chen:** elhchen@ntu.edu.sg (*Associate Professor, NTU School of Electrical and Electronic Engineering*)  
**Kenneth Kwok:** kenkwok@ihpc.a-star.edu.sg (*Department Director, A\*STAR Social and Cognitive Computing*)

## SKILLS AND STANDARDIZED TESTS

**Programming languages:** Python, Java, Matlab, Prolog, C  
**Select frameworks:** PyTorch, ProbLog, TensorFlow, Scikit-learn, CoreNLP, Networkx, Pandas, Git, MTurk  
**Languages:** English (native), Hindi  
**GRE (General):** 169Q, 165V, 4.5AW

## ORGANIZATIONS AND ACTIVITIES

Reviewer for NeurIPS 2023, ICLR 2024 and CVPR 2024	-
Hall Soccer Team Member (trained towards professional soccer in 2nd university year), NTU	Aug 2015 – Dec 2017
Press and Publicity Director, NTU Astronomical Society	Aug 2015 – May 2016
Head of Media, NTU Model United Nations Organizing Committee	Aug 2014 – May 2015
High-school Computer Science Teacher, Shri Ram School Aravali	June 2014 - July 2014
Varsity Soccer (U-17 ASISC North West Regional 2011 winning team), Shri Ram School	Aug 2009 – July 2013
Volunteer Secondary School Math teacher, Mewat Rural Education Program	Jan 2013 – Nov 2013
Indian team (3 members) at Pacific Astronomy Summit, Hawaii Space Grant Consortium	Jan 2013 – July 2013
Volunteer Programming Instructor, Navjyoti Institute for Intellectual Disabilities	May 2012 – July 2012