

# SHUBHAM PATERIA

@shubham.pateria@gmail.com  
dblp.org/pid/186/7303

+65-83570653, +91-9770947141  
ozpicium shubham-pateria-2091

spateria.github.io



## EXPERIENCE

### Research Scientist

#### Singapore Management University

March 2022 – Ongoing Singapore

- Co-developed a hierarchical multi-agent reinforcement learning system combining self-organizing and deep neural networks, for simulated defense research technology licensed to DSO National Laboratories.
- Co-lead of the Trustworthy Federated Ubiquitous Learning project under SMU and AI Singapore. Developed a first-of-a-kind self-organizing federated learning system that outperforms baselines by 25% in sparse data clustering and 3-4% in biomedical classification tasks.

### Co-founder

#### Maargo Technologies (discontinued startup)

October 2021 – March 2022 Singapore

- Developed mental health recommendation service for university students. I implemented the front-end and back-end for user verification, profiling, and Question-Answer dialogue handling. We did pilot tests with two Singaporean universities but decided not to continue due to insufficient traction.

### Founder-in-Residence (EFSG10)

#### Entrepreneur First

July 2021 – January 2022 Singapore

### Research Scholar

#### Nanyang Technological University (NTU)

July 2017 – August 2021 Singapore

- Conducted original research on **methods and algorithms for Hierarchical Reinforcement Learning and Planning**, with publications in high-impact venues such as IEEE TNNLS, ACM CSUR, and AAMAS.
- Developed a novel approach for simulated multi-robot hierarchical reinforcement learning for Search and Rescue applications, leading to 50-70% better task-completion performance compared to baselines. This work was funded by ST Engineering. Published in IEEE SSCI.
- Developed a novel end-to-end hierarchical reinforcement learning approach for goal-based navigation and simulated robot control, leading to 30-40% increase in goal achievement rate over baseline. Published in IEEE TNNLS and AAMAS.
- Developed a novel hierarchical planning method for goal-based navigation and simulated robot control, leading to 39-46% improvement in reward-based performance and data efficiency compared to baselines. Published in IEEE TNNLS.

## EDUCATION

### Ph.D. in Computer Science

#### Nanyang Technological University (NTU), Singapore

July 2017 – Aug 2021

### B.Tech. in Electronics & Communication Engineering

#### National Institute of Technology, Durgapur, India

July 2009 – June 2013

## SKILLS

Analysis and Problem Solving

Research Writing

LaTeX

Python

Pytorch

Tensorflow

Keras

Machine Learning

Reinforcement Learning

Deep Learning, CNN, LSTM, RNN

SQL

Data Analysis

C,C++

React

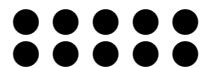
FastAPI

Django

## LANGUAGES

English

Hindi



## PATENTS

- K. K. JHA, A. K. SINGH, D. RAVI, S. PATERIA, V. P. C. SUDHEESH BABU, and M. R. MANIYAR, *Method and system for an eye sensation prediction based display enhancement*, India Patent 201741008468, 2019.
- A. K. SINGH, S. PATERIA, K. KATRA-GADDA, K. K. JHA, and V. P. C. S. BABU, *Method and system for optimizing power consumption in a display device*, India Patent 201741038214, 2019.

## EXPERIENCE

### Senior Software Engineer

#### Samsung R&D Institute India - Bangalore Pvt. Ltd.

📅 July 2016 – July 2017      📍 Bengaluru, India

- R&D Contribution: Novel methods for optimizing power consumption and visual quality of the Samsung smartphone display modules. The work led to two issued patents.

### Software Engineer

#### Samsung R&D Institute India - Bangalore Pvt. Ltd.

📅 June 2014 – June 2016      📍 Bengaluru, India

- Worked with Display technology teams in SRI-B and Samsung HQ responsible for board bring-up and device driver upgrades critical for the successful commercial launch of Samsung smartphones in the world-wide market (Galaxy S4-variants, A7, Tab4, and other mid-tier smartphone variants).
- R&D Contribution: Machine learning for power-efficient and fault-tolerant sensor management system for Smart Home IoT sensors with minimal error (average 0.24°C) in temperature prediction. Published in IEEE IACC.

### Trainee-Technology

#### Sapient Global Markets

📅 Oct Oct 2013 – Feb 2014      📍 Bengaluru, India

## OTHER PROJECTS

- **Character-level Sign Language Interpretation from Hand-gestures using Recurrent Neural Networks.** [Project Link](#)  
A Convolutional LSTM model was developed to translate sequences of character-level hand gestures into corresponding words, achieving a word prediction accuracy of 96.8%. In comparison, a character prediction CNN without hidden state recurrence achieved only 64.5% accuracy. Additionally, a Sequence-to-Sequence LSTM was created, trained on pairs of incorrectly and correctly spelled words, serving as a post-processor for the Conv LSTM's output. This further improved the test accuracy to 99.1%.
- **Aspect-based sentiment analysis using sentiment flow with local and non-local neighbor information.**  
A novel natural language sentiment prediction approach based on multi-level classification using Support Vector Machines (SVMs), achieving 83-88% sentiment classification accuracy. Published in COLING 2016.

## PUBLICATIONS

- S. Pateria, B. Subagdja, A.-H. Tan, and C. Quek, "Value-based subgoal discovery and path planning for reaching long-horizon goals," *IEEE Transactions on Neural Networks and Learning Systems*, 2023.
- K. P. Wai, M. Geng, B. Subagdja, S. Pateria, and A.-H. Tan, "Towards explaining sequences of actions in multi-agent deep reinforcement learning models," in *Proceedings of the 2023 International Conference on Autonomous Agents and Multiagent Systems*, 2023, pp. 2325–2327.
- S. Pateria, B. Subagdja, A.-H. Tan, and C. Quek, "End-to-end hierarchical reinforcement learning with integrated subgoal discovery," *IEEE Transactions on Neural Networks and Learning Systems*, vol. 33, no. 12, pp. 7778–7790, 2021.
- S. Pateria, B. Subagdja, A.-h. Tan, and C. Quek, "Hierarchical reinforcement learning: A comprehensive survey," *ACM Computing Surveys (CSUR)*, vol. 54, no. 5, pp. 1–35, 2021.
- S. Pateria, B. Subagdja, and A. H. Tan, "Hierarchical reinforcement learning with integrated discovery of salient subgoals," in *Proceedings of the 19th International Conference on Autonomous Agents and Multi-Agent Systems*, ser. AAMAS '20, Richland, SC, 2020, pp. 1963–1965.
- S. Pateria, B. Subagdja, and A.-H. Tan, "Multi-agent reinforcement learning in spatial domain tasks using inter subtask empowerment rewards," in *2019 IEEE Symposium Series on Computational Intelligence (SSCI)*, IEEE, 2019, pp. 86–93.
- S. Pateria, "Aspect based sentiment analysis using sentiment flow with local and non-local neighbor information," in *Proceedings of COLING 2016, the 26th International Conference on Computational Linguistics: Technical Papers*, 2016, pp. 2635–2646.
- P. K. Choubey, S. Pateria, A. Saxena, V. P. C. SB, K. K. Jha, and S. B. PM, "Power efficient, bandwidth optimized and fault tolerant sensor management for iot in smart home," in *2015 IEEE International Advance Computing Conference (IACC)*, IEEE, 2015, pp. 366–370.