Subhajit Chaudhury

CONTACT INFORMATION

Website: subhajitchaudhury.github.io **Email:** subhajit.utokyo@gmail.com
LinkedIn: www.linkedin.com/in/subhajit-chaudhury-24955455 **Phone:** +81-7021837790
Nationality: Indian **Date of birth:** 14th November, 1989
Address: Suwa 1-20-21, n' Casa Futako, Room 201, Kanagawa, Kawasaki, Takatsu, Japan 213-0004

EDUCATION

The University of Tokyo, Japan Apr 2018 - Mar 2021
Ph.D. (While working at IBM Research), Graduate School of Information Science and Technology
Thesis: *Understanding Generalization in Neural Networks for Robustness against Adversarial Vulnerabilities*
Advisor: Prof. Toshihiko Yamasaki

Indian Institute of Technology (IIT), Bombay, India Jul 2012 - Aug 2014
M.Tech, Department of Electrical Engineering
GPA: **9.81 out of 10**
Thesis: *Efficient Deformable 3D Graphics Rendering for real-time Haptics Applications*
Advisor: Prof. Subhasis Chaudhuri

Jadavpur University, India Jul 2008 - Jun 2012
B.E.(Hons.) Department of Electrical Engineering
GPA: **8.90 out of 10** (**Rank: 3rd/125**)
Topic: *Vision-based Indoor Structure Discovery for Locomotion in Autonomous Robots*

WORK EXPERIENCE

Research Scientist, IBM Research, Tokyo Apr 2017- present
I am a research scientist at IBM Research Tokyo with **expertise** in **computer vision, reinforcement learning** and **machine learning** in general. Currently, I am **leading a strategic project** within IBM Research for **neuro-symbolic reasoning** on **natural language agents** using **logical neural networks**, which is a proprietary IBM Research tool for neuro-symbolic AI. In the past, I have successfully served as a **lead researcher** for numerous projects related to **computer vision** and **reinforcement learning**.

- **Team leader for Logical Optimal Actions in Text-based Domains:** Jan 2020 - present
  I currently lead a team of researchers on the topic of **neuro-symbolic reinforcement learning (RL)** which is a **strategic project for IBM Research's AI goals**. I am responsible for **deciding the goals** of the project, **assigning tasks** to other members and **communicating research progress** to higher management. In this theme, I led the research sub-project on learning from fewer data in natural language agents which was published at a top AI conference and showcased as a **milestone achievement for IBM Research AI Pillar**.
- **AI-based Event Detection in Table Tennis Games used by Japanese National Team for Olympics Preparation:** Oct 2018 - Dec 2019
  I led the research and development of an AI-based system that can **automatically detect events in Table Tennis videos**. This technology was used by **Japan Institute of Sports Sciences (JISS)** for preparing the national team for the Olympics. This work has caused **widespread media coverage**, was published in a top-peer reviewed **international conference** in media processing, and has been called "**Latest technology that will bring medals to Japan**".
- **Reinforcement Learning from Videos:** Apr 2017 - Dec 2018
  As a research scientist, I have contributed to various research projects in the confluence of reinforcement learning and computer vision, such as **learning from demonstrations, imitation learning, multi-modal learning** etc. I have published papers in competitive **top AI venues** which contributed to both **business goals** and **external eminence of IBM Research**.

Researcher, NEC Central Research Labs, Japan Oct 2014 - Mar 2017
Topic: Deep learning-based infrastructure surveillance using computer vision methods. Delivered a vision-based crack detection system used that was deployed in real-life applications.

- **Deep learning for image-based crack detection** : Oct 2015 - Mar 2017
  Lead researcher for the development of an AI-based system for crack detection from road videos. This technology showed **real-time performance** and **state-of-the-art localization accuracy**. This research was covered by **Japanese media** for crack detection on **airport runways**.

- **Spatial-temporal motion analysis for invisible crack detection:** Jan 2015 - Sept 2016
  Developed a **crack detection algorithm** that identifies internal cracks by finding discontinues in dense 2D motion fields using energy minimization on a **Conditional Random Fields** (CRF). Improved F1 score by 0.22 compared to state-of-the-art image-based methods.

Academic Awards and Achievements

- Received **Ph.D. Travel Grant** for **AAAI 2020 Doctoral Consortium**.
- Won **Research Encouragement award** for paper "Towards Adversarial Robustness of Learning in the Frequency Domain" at Pattern Recognition and Media Understanding (**PRMU 2021**) conference in Japan.
- **Best student paper, honorable mention** (out of 321 papers) at **MIRU 2019**, a top domestic Computer Vision conference in Japan.
- **Best Paper Award** (1st in 126 accepted papers) and **Best Presentation Award** at Symposium on Sensing via Image Information (SSII), 2019.
- Secured All India Rank **33 out of 110,125** students in Electrical Engineering, GATE-2012.
- Secured rank **86/80,000** in West Bengal Joint Entrance Examination, 2008 for Engineering.

Recognition at IBM

- Recipient of multiple **Manager's choice award** for demonstrated expertise in Artificial Intelligence on Aug 2017, Jun 2018, Sep 2018, Nov 2018, May 2019, Nov 2019.
- Recipient of three **IBM Invention Plateau awards** in recognition of invention filing and publications.
- Recipient of **IBM Design Thinking Practitioner** certification.

Media Coverage

1) Media Coverage of the Table-tennis work with the Japan Institute of Sports Sciences (JISS) (Conference paper #5):

- Nikkei Voicy: https://voicy.jp/channel/865/87438
- Hokkaido Shimbun (Newspaper)
- Nikkan Kogyo Shimbun: https://newswitch.jp/p/22822
- ZDNet: https://japan.zdnet.com/article/35155927/
- Softbank Creative - Business+IT: https://www.sbbit.jp/article/bitsp2/37830
- Yomiuri newspaper: https://www.yomiuri.co.jp/sports/etc/20210616-OYT1T50189/

2) Coverage of the crack-detection work at NEC (Conference paper #11):

- Nikkei: https://www.nikkei.com/article/DGXMZO57409840Q0A330C2LKA000/
- Official announcement by NEC: https://jpn.nec.com/press/202003/20200331_03.html

Selected Publications

Please find a list of my publications here: https://scholar.google.co.jp/citations?user=EBTpFrQAAAAJ&hl=en (Does not provide all publication). I have co-authored 1 book chapter, 4 journal articles and more than 35 conferences (and workshop) articles at various AI conferences.

Book Chapters:

1) Hiya Roy, *Subhajit Chaudhury*, Toshihiko Yamasaki, Tatsuaki Hashimoto, **Chapter 10: Enhancing Spatial Resolution of Remotely Sensed Imagery Using Deep Learning and/or Data Restoration, "Machine Learning for Planetary Science"**, 1st Edition, Elsevier Science and Technology Books (to be published)

Journals:

1) *Subhajit Chaudhury*, Hiya Roy, Sourav Mishra, Toshihiko Yamasaki, **Adversarial Training Time Attack against Discriminative and Generative Convolutional Models**, **IEEE Access**, 2021.

2) *Subhajit Chaudhury* and Toshihiko Yamasaki, **Robustness of Adaptive Neural Network Optimization under Training Noise**, **IEEE Access**, 2021.

3) Hiya Roy, *Subhajit Chaudhury*, Toshihiko Yamasaki and Tatsuaki Hashimoto, **Image inpainting using frequency domain priors**, **Journal of Electronic Imaging**, 2021.

4) Hiya Roy, *Subhajit Chaudhury*, Toshihiko Yamasaki and Tatsuaki Hashimoto, **Toward Better Planetary Surface Exploration by Mars Orbital Imagery Inpainting, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS)**, 2020.

Conferences:

1) *Subhajit Chaudhury*, Prithviraj Sen, Masaki Ono, Daiki Kimura, Michiaki Tatsubori and Asim Munawar, **Neuro-symbolic Approaches for Text-based Policy Learning**, EMNLP 2021 (accepted).

2 Daiki Kimura, Masaki Ono, *Subhajit Chaudhury*, Ryosuke Kohita, Akifumi Wachi, Don Joven Agravante, Michiaki Tatsubori, Asim Munawar and Alexander Gray, **Neuro-symbolic Reinforcement Learning with First-Order Logic**, EMNLP 2021 (accepted).

3) *Subhajit Chaudhury*, Daiki Kimura, Kartik Talamadupula, Michiaki Tatsubori, Asim Munawar, and Ryuki Tachibana, **Bootstrapped Q-learning with Context Relevant Observation Pruning to Generalize in Text-based Games**, **EMNLP** 2020.

4) *Subhajit Chaudhury* and Toshihiko Yamasaki, **Investigating Generalization in Neural Networks under Optimally Evolved Training Perturbations**, IEEE **ICASSP**, 2020.

5) Daiki Kimura, *Subhajit Chaudhury*, Minori Narita, Asim Munawar, and Ryuki Tachibana, **Adversarial Discriminative Attention for Robust Anomaly Detection**, IEEE **WACV**, 2020.

6) *Subhajit Chaudhury*, Daiki Kimura, Phongtharin Vinayavekhin, Asim Munawar, Ryuki Tachibana, Koji Ito, Yuki Inaba, Minoru Matsumoto, Shuji Kidokoro, and Hiroki Ozaki, **Unsupervised Temporal Feature Aggregation for Event Detection in Unstructured Sports Videos**, IEEE **ISM**, Dec 2019.

7) Daiki Kimura, *Subhajit Chaudhury*, Ryuki Tachibana and Sakyasingha Dasgupta, **Internal Model from Observations for Reward Shaping**, **ICML**, Adaptive and Learning Agents (ALA) 2018 and **AAAI**, Reinforcement Learning in Games, 2019.

8) Phongtharin Vinayavekhin, *Subhajit Chaudhury*, Asim Munawar, Don Joven Agravante, Giovanni De Magistris, Daiki Kimura and Ryuki Tachibana, **Focusing on What is Relevant: Time-**

Series Learning and Understanding using Attention, International Conference on Pattern Recognition (**ICPR**), 2018.

9) Tadanobu Inoue, *Subhajit Chaudhury*, Giovanni De Magistris and Sakyasingha Dasgupta, **Transfer learning from synthetic to real images using variational auto-encoders for robotic applications**, IEEE **ICIP**, 2018.

10) *Subhajit Chaudhury*, Sakyasingha Dasgupta, Asim Munawar, Md. S. Khan and Ryuki Tachibana, **Conditional generation of multi-modal data using constrained embedding space mapping**, **ICML**, Implicit Models, 2017.

11) *Subhajit Chaudhury*, Gaku Nakano, Jun Takada, Akihiko Iketani, **Spatial-temporal motion field analysis for crack detection on concrete surfaces**, IEEE **WACV** 2017.

12) *Subhajit Chaudhury*, Hiya Roy, **Can fully convolutional networks perform well for general image restoration problems?**, International Conference on Machine Vision Applications (**MVA**), 2017.

Patents

I have over 15 filed patents out of which 10 are already published. A comprehensive list of my published patents can be found here: https://patents.justia.com/inventor/subhajit-chaudhury

Technical Skills

- **Programming Languages**: *Python, C++, Java*
- **Machine learning Tools**: *Pytorch, Tensorflow, Keras, scikit-learn*
- **Tools**: *Matlab, ROS, Gazebo, OpenCV, CUDA, OpenGL*

Professional Activities

- Reviewer for ICRA2018, IROS2018, IEEE Transactions on Multimedia (TMM), 2018, IJCAI 2019, ECML-PKDD 2019, ICRA2020, CVPR 2021, IEEE Access Journal 2021.
- Program Commitee member for IJCAI 2020, AAAI 2020, KBRL workshop at IJCAI 2020.
- Invited Talk on *"Visual Imitation Learning for Autonomous Control"* at **NASA, Jet Propulsion Laboratory (JPL)**, Dec 2019.
- Multiple invited talks at **IBM Research Engage Seminar** on various topics on machine learning and artificial intelligence.

Language Skills

- English: Native level proficiency (TOEFL score :111/120, TOEIC score : 990/990)
- Japanese: Daily Conservation in Japanese (Japanese Language Proficiency Test - JLPT N4)
- Bengali: Native level proficiency (Mother Tongue)
- Hindi: Native level proficiency

Extra curricular activities

- Executive Council member of IIT Bombay Alumni Association in Tokyo from 2015.
- Passed Japanese Language Proficiency Test, N4 level. (Ability have general conversations)
- IIT Bombay swimming club member and participated in various swimming competitions.

Travel History

- USA, Japan, Thailand (2014)
- USA, Vietnam, Cambodia, Thailand, Australia, Indonesia (2017)
- USA, Italy, Switzerland (2018)
- USA (twice), Australia, Malaysia, South Korea (2019)
- USA (2020)
- Japan (I was resident in Japan since 2014 to 2021, Permanent resident since March 2021)

References

Available upon request