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Muhammad Arrasy Rahman

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Employment

Postdoctoral Research Fellow — **The University of Texas at Austin** — **Nov 2022 – Now**

Learning Agents Research Group

- **Supervisor:** Prof. Peter Stone
- Researched different methods to enable generalist agents that can adapt to co-exist with other agents having unknown policies.
- Published a AAAI paper that achieves state-of-the-art generalization performance in ad hoc teamwork by generating diverse teammate policies.
- Acquired research funding from Lockheed Martin to explore policy generation methods for ad hoc teamwork.
- Helped write research proposals on ad hoc teamwork.
- Explored offline RL to design AI advisors that enhance surgeons' decisions in the organ transplant domain.
- Co-advised Ph.D. and B.Sc. student projects.
- Assisted the Ph.D. admissions process at UT Austin.

Research Intern — **Five AI** — **Apr 2021 – Jun 2021**

- Help develop a goal recognition algorithm for autonomous vehicles under partial observability based on inverse planning approaches.
- Designed experiments to evaluate different methods of controlling autonomous vehicles under occlusion.
- Assisted in writing a paper on the goal recognition algorithm, which eventually was accepted at IROS 2021.

Teaching Support Provider — **The University of Edinburgh** — **Sep 2018 – Aug 2020**

- Courses: Reinforcement Learning (2018/2019); Reinforcement Learning (2019/2020).
- Design coursework and lecture materials.
- Deliver lectures on deep reinforcement learning.
- Hold office hours to discuss course materials with M.Sc. students.
- Co-advise three M.Sc. students on their RL-related dissertation.

Data Scientist — **Gojek Indonesia** — **Oct 2017 – Mar 2018**

- Build predictive models to assign car drivers to passengers.
- Create an adaptive pricing model that can handle surges in service requests.

Associate Data Scientist — **Traveloka** — **Sep 2015 – Apr 2016**

- Built a clustering model to analyze different users of a ticketing service app.
- Designed predictive models to identify potentially churning customers.
- Create a classifier to detect crawler bots that frequently access the service website.

Teaching Support Provider — **Universitas Indonesia** — **Sep 2012 – Jan 2015**

- Courses: Linear Algebra; Probability and Statistics; Intelligent Systems; Automata theory.
- Hold office hours to discuss course materials with students.
- Hold tutorials and demonstrations related to various subject materials.
- Marked student assignments.

Education

Edinburgh, UK — **The University of Edinburgh** — **Sep 2018 – Nov 2022**

- **Ph.D. in Informatics**, May 2023
- **Supervisors**: Dr. Stefano V. Albrecht & Prof. Subramanian Ramamoorthy
- **Thesis title**: Advances in Open Ad Hoc Teamwork and Teammate Generation

- **Thesis defense committee**: Prof. Michael Rovatsos & Prof. Michael Bowling
- **Funding**: Edinburgh Enlightenment Scholarship – Teaching Track, full Ph.D. scholarship
- **Research interests**: Ad hoc teamwork, Multiagent reinforcement learning, Reinforcement learning, Graph neural networks, Autonomous vehicles, Transfer learning

Edinburgh, UK **The University of Edinburgh** **Sep 2016 – Aug 2017**

- **M.Sc. in Data Science**, Dec 2017
- **Grade**: Distinction
- **Final project supervisor**: Dr. Henry Thompson
- **Thesis title**: Implementing Repeated Updates with Prioritized Experience Replay as Deep Reinforcement Learning Algorithms
- **Funding**: Indonesia Endowment Fund for Education Scholarship, full M.Sc. scholarship
- **Highlighted courses**: Machine Learning and Pattern Recognition, Probabilistic Modelling and Reasoning, Reinforcement Learning

Depok, Indonesia **Universitas Indonesia** **Sep 2011 – Jan 2015**

- **B.Sc. in Computer Science**, Jan 2015
- **Grade**: 3.85/4.00
- **Final project supervisor**: Dr. Denny
- **Thesis title**: Weighted Ensemble Clustering Using Self-Organizing Maps
- **Funding**: Samsung Indonesia Scholarship, full B.Sc. scholarship
- **Highlighted courses**: Linear Algebra, Statistics and Probability, Machine Learning, Information Theory.

Publications

Journals

1. Arrasy Rahman, Ignacio Carlucho, Niklas Höpner, and Stefano V Albrecht. A general learning framework for open ad hoc teamwork using graph-based policy learning. *Journal of Machine Learning Research*, 24(298):1–74, 2023
2. Arrasy Rahman, Elliot Fosong, Ignacio Carlucho, and Stefano V Albrecht. Generating teammates for training robust ad hoc teamwork agents via best-response diversity. *Transactions on Machine Learning Research*, 2023
3. Ibrahim H Ahmed, Cillian Brewitt, Ignacio Carlucho, Filippos Christianos, Mhairi Dunion, Elliot Fosong, Samuel Garcin, Shangmin Guo, Arrasy Rahman, Trevor McInroe, et al. Deep reinforcement learning for multi-agent interaction. *AI Communications*, (Preprint):1–12

Conferences

1. Arrasy Rahman, Jiaxun Cui, and Peter Stone. Minimum coverage sets for training robust ad hoc teamwork agents. In *Proceedings of the 38th AAAI Conference on Artificial Intelligence (AAAI-24)*, February 2024
2. Reuth Mirsky, Ignacio Carlucho, Arrasy Rahman, Elliot Fosong, William Macke, Mohan Sridharan, Peter Stone, and Stefano V Albrecht. A survey of ad hoc teamwork research. In *European Conference on Multi-Agent Systems*, pages 275–293. Springer, 2022
3. Josiah P Hanna, Arrasy Rahman, Elliot Fosong, Francisco Eiras, Mihai Dobre, John Redford, Subramanian Ramamoorthy, and Stefano V Albrecht. Interpretable goal recognition in the presence of occluded factors for autonomous vehicles. In *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 7044–7051. IEEE, 2021
4. Muhammad A Rahman, Niklas Hopner, Filippos Christianos, and Stefano V Albrecht. Towards open ad hoc teamwork using graph-based policy learning. In *International Conference on Machine Learning*, pages 8776–8786. PMLR, 2021
5. Filippos Christianos, Georgios Papoudakis, Muhammad A Rahman, and Stefano V Albrecht. Scaling multi-agent reinforcement learning with selective parameter sharing. In *International Conference on Machine Learning*, pages 1989–1998. PMLR, 2021

Workshop Papers & Preprints

1. Elliot Fosong, Arrasy Rahman, Ignacio Carlucho, and Stefano V Albrecht. Learning complex teamwork tasks using a sub-task curriculum. *arXiv preprint arXiv:2302.04944*, 2023
2. Arrasy Rahman, Elliot Fosong, Ignacio Carlucho, and Stefano V Albrecht. Towards robust ad hoc teamwork agents by creating diverse training teammates. *arXiv preprint arXiv:2207.14138*, 2022
3. Elliot Fosong, Arrasy Rahman, Ignacio Carlucho, and Stefano V Albrecht. Few-shot teamwork. *arXiv preprint arXiv:2207.09300*, 2022
4. Ignacio Carlucho, Arrasy Rahman, William Ard, Elliot Fosong, Corina Barbalata, and Stefano V Albrecht. Cooperative marine operations via ad hoc teams. *arXiv preprint arXiv:2207.07498*, 2022
5. Arrasy Rahman, Filippos Christianos, and Stefano V Albrecht. Open ad hoc teamwork using graph-based policy learning. *arXiv preprint arXiv:2006.10412v1*, 2020
6. Georgios Papoudakis, Filippos Christianos, Arrasy Rahman, and Stefano V Albrecht. Dealing with non-stationarity in multi-agent deep reinforcement learning. *arXiv preprint arXiv:1906.04737*, 2019

Invited Talks

- **Minimum Coverage Sets for Training Robust Ad Hoc Teamwork Agents**
  Arrasy Rahman and Jiaxun Cui
  UC Berkeley Multiagent Learning Seminar (Virtual)
  Oct 2023
- **Game Theory & Its Application in AI**
  Arrasy Rahman
  Universitas Lambung Mangkurat – Public Lecture (Virtual)
  Sep 2023
- **Advances in Ad Hoc Teamwork**
  Arrasy Rahman
  Carnegie Mellon University – AI & Social Good Group Meeting (Virtual)
  Aug 2023
- **Deep Reinforcement Learning for Multi-Agent Interaction**
  Stefano Albrecht, Arrasy Rahman, Filippos Christianos, and Georgios Papoudakis
  UC Berkeley Multiagent Learning Seminar (Virtual)
  Jul 2022
- **Graph-based Machine Learning**
  Arrasy Rahman
  Universitas Indonesia – Public Lecture (Virtual)
  Oct 2020

Awards

- **ECAI 2023 Quality Champion Review Award**: Provided high-quality reviews for papers at ECAI 2023.
- **NeurIPS 2022 Top Reviewers**: Provided high-quality reviews for papers at NeurIPS 2022.
- **ICML 2022 Best Reviewers (Top 10%) Recognition**: Became one of the top 10% reviewers at ICML 2022 in terms of review quality.
- **Best Paper Runner Up at the Adaptive & Learning Agents Workshop at AAMAS 2021**: Awarded for our paper in open ad hoc teamwork.
- **Edinburgh Teaching Award**: A recognition of attainment against the UK Professional Standards Framework (UKPSF) for teaching and learning support at the University of Edinburgh.
- 4^{th} **Place in Huawei UK's 2019 Autonomous Vehicles Challenge**: Awarded to our RL-based approach to control simulated autonomous vehicles.
- **Edinburgh Enlightenment Scholarship –Teaching Track**: Full scholarship for 30 students pursuing a doctoral degree at the University of Edinburgh.
- **2017 Class Prize for Top Performance in MSc Data Science Programme**: Awarded for finishing with the highest grades among the University of Edinburgh's 2016/2017 M.Sc. Data Science student cohort.
- **Indonesia Endowment Fund for Education Scholarship**: Full scholarship for Indonesian students pursuing

M.Sc. or Ph.D. degrees from Indonesia's Ministry of Finance.
- **Samsung Indonesia Scholarship**: Full scholarship for five undergraduate students pursuing a B.Sc. in Computer Science at Universitas Indonesia.

Advised Students

- **UT Austin:** Jiaxun Cui, Caroline Wang, Zhihan Wang, Sanjit Juneja
- **The University of Edinburgh:** Tawqir Sohail, Paul Chelarescu, Niklas Höpner

Professional Activities

Seminar Organization
- **Workshop Series Organizer**, Ad Hoc Teamwork Seminar Series

Workshop Organization
- **Workshop Organizer**, Workshop in Ad Hoc Teamwork at AAAI 2024
- **Workshop Organizer**, Workshop in Ad Hoc Teamwork at IJCAI 2022

Reviewing Duties
- **Program Committee Member**, AAMAS 2024
- **Reviewer**, AAMAS Journal
- **Program Committee Member**, AAAI 2024
- **Reviewer**, ICLR 2024
- **Reviewer**, ECAI 2023
- **Reviewer**, NeurIPS 2023
- **Reviewer**, ICML 2023
- **Reviewer**, AAAI 2023
- **Reviewer**, AAMAS 2023
- **Reviewer**, NeurIPS 2022
- **Reviewer**, ICML 2022
- **Reviewer**, AAMAS 2022
- **Program Committee Member**, ALA 2022

Research Interests and Commonly Used Technologies

- **Research Interests**: Ad hoc teamwork, Zero-shot coordination, Agent modelling, (Multiagent) Deep reinforcement learning, Graph neural networks, Deep learning, Probabilistic graphical models
- **Technologies**: Pytorch, Tensorflow, Pytorch Geometric, Deep Graph Library, Python, Java