

## Education

<b>Harvard University</b> <i>PhD in Computer Science</i>	<i>2023 - Present</i>
<b>ABV-Indian Institute of Information Technology and Management, Gwalior</b> <i>Integrated Bachelor's + Master's in Information Technology</i> Outstanding grade in bachelor's and master's thesis and in 7 courses across CS and Mathematics.	<b>GPA: 8.53/10</b> <i>2015 - 2020</i>
<b>Delhi Public School, Faridabad</b> <i>Class XII</i>	<b>Score: 92.3%</b> <i>2015</i>

## Work Experience

<b>Pre-Doctoral Researcher - Google Research</b> <i>Mentor: Prof. Milind Tambe <a href="#">↗</a>, Aparna Taneja <a href="#">↗</a></i>	Bengaluru, IN <i>June. 2021 - August 2023</i>
<ul style="list-style-type: none"><li>Helped conduct large-scale Randomized Control Trials (RCT) involving 100K+ beneficiaries to show applicability of Restless Multi-Armed Bandit (RMAB) models in Mobile Health. [AAAI 2022 <a href="#">↗</a>, IAAI 2023 <a href="#">↗</a>]</li><li>Designed a regret-minimizing double-oracle algorithm to address interval uncertainty in RMAB parameter estimation. Resultant robust policies reduce minimax regret by up to 50%. [AAAI 2023 <a href="#">↗</a>]</li><li>Developed and field-tested end-to-end differentiable RMAB algorithms. Our proposed method improved engagement metric over the current standard of care by 31%. [AAAI 2023 <a href="#">↗</a>]</li></ul>	
<b>Data Scientist - United Health Group</b> <i>Mentor: Kishore V. Ayyadevara</i>	Gurgaon, IN <i>Aug 2020 - May 2021</i>
<ul style="list-style-type: none"><li>Worked alongside Chief Medical Officer to model hospital readmission risk problem for 40M+ beneficiaries.</li><li>Used high-dimensional ICD-10 embeddings to encode patient's sequential visit history and generated explainable predictions using boosted trees for end-users providing in-patient care.</li><li>Improved real-time capabilities to map out patient's journey in wellness using the largest healthcare graph database in the world (10B+ nodes).</li></ul>	

## Thesis

<b>Master's Thesis Project</b> <i>Advisor: Prof. Joydip Dhar <a href="#">↗</a></i>	<i>July 2019 - July 2020</i>
<b>Learning to Communicate through Deep Multi-Agent Reinforcement Learning</b> <ul style="list-style-type: none"><li>Showcased and evaluated the emergence of written language system in speaker and listener agents in referential games. [AAAI 2020 <a href="#">↗</a>]</li><li>Developed an autonomously coordinated multi-agent model for watershed management and optimized it through inter-agent communication and intrinsic social-motivation rewards.</li></ul>	
<b>Bachelor's Thesis Project</b> <i>Advisors: Prof. Joydip Dhar <a href="#">↗</a>, Prof. Anupam Shukla <a href="#">↗</a></i>	<i>May 2018 - October 2018</i>
<b>Deep Reinforcement Learning for Stability and Safe Adaptation in Damaged Robots</b> <ul style="list-style-type: none"><li>Improved the locomotory performance of damaged quadrupeds and hexapods by 38% against existing baselines. [CoDS-COMAD 2020 <a href="#">↗</a>]</li><li>Proposed an LSTM based self-diagnose network and augmented observation space for damage awareness.</li></ul>	

## Accepted and Published Papers

- *Improving Health Information Access in the World's Largest Maternal Mobile Health Program via Bandit Algorithms*  
Lalan A. \*, **Verma S.** \*, Killian J., Rodriguez, P., Danassis P., Mahale A., Sudan M., Hegde A., Taneja A., Tambe M.;  
AAAI Conference on Innovative Applications of AI (**IAAI 2024**)
- *Limited Resource Allocation in a Non-Markovian World: The Case of Maternal and Child Healthcare*  
Danassis P., **Verma S.**, Killian J., Taneja A., Tambe M.;  
International Joint Conference on Artificial Intelligence (**IJCAI 2023**)
- *Restless Multi-Armed Bandits for Maternal and Child Health: Results in Decision-Focused Learning*  
**Verma S.**, Mate A., Wang K., Taneja A., Tambe M.;  
International Conference on Autonomous Agents and Multiagent Systems (**AAMAS 2023**)
- *Scalable Decision-Focused Learning in Restless Multi-Armed Bandits with Application to Maternal and Child Care* ☐  
Wang K. \*, **Verma S.** \*, Shah S., Mate A., Taneja A., Tambe M.  
AAAI Conference on Artificial Intelligence 2023 (**AAAI 2023**)
- *Robust Planning over Restless Groups: Engagement Interventions for a Large-Scale Maternal Telehealth Program* ☐  
Killian J. \*, Xu L. \*, Biswas A. \*, **Verma S.** \*, Nair V., Rodriguez, P., Johnson-Yu S., Taneja A., Tambe M.  
AAAI Conference on Artificial Intelligence 2023 (**AAAI 2023**)
- *Increasing Impact of Mobile Health Programs: SAHELI for Maternal and Child Care* ☐  
**Verma S.** \*, Singh G. \*, Mate A., Verma P., Gorantla S., Madhiwalla N., Hegde A., Thakkar D., Jain M., Tambe M., Taneja A.  
AAAI Conference on Innovative Applications of AI (**IAAI 2023**, **\*\*IAAI 'Innovative' Application Award\*\***)
- *Field Study in Deploying Restless Multi-Armed Bandits: Assisting Non-profits in Improving Maternal and Child Health* ☐  
Mate A. \*, Madaan L. \*, Taneja A., Madhiwalla N., **Verma S.**, Singh G., Hegde A., Varakantham P., Tambe M.  
AAAI Conference on Artificial Intelligence 2022 (**AAAI 2022**)
- *Towards Sample-Efficient Learners in Population based Referential Games through Action Advising* ☐  
**Verma S.**  
International Conference on Autonomous Agents and Multiagent Systems (**AAMAS 2021**)
- *Emergence of Writing Systems through Multi-Agent Cooperation (Student Abstract)* ☐  
**Verma S.**, Dhar J.  
AAAI Conference on Artificial Intelligence 2022 (**AAAI 2020**)
- *Deep Reinforcement Learning for Single-Shot Diagnosis and Adaptation in Damaged Robots* ☐  
**Verma S.**, Nair H.S., Agarwal G., Dhar J., Shukla A.  
ACM IKDD Joint Conference on Data Science and Management of Data (**CoDS-COMAD 2020**)
- *IIITM Face: A Database for Facial Attribute Detection in Constrained and Simulated Unconstrained Environments* ☐  
Arya, K., **Verma S.**, Gupta K., Agarwal S., Gupta P.  
ACM IKDD Joint Conference on Data Science and Management of Data (**CoDS-COMAD 2020**)

## Workshop Papers

- *Understanding DFL in Restless Multiarmed Bandit Problem through Large Scale Field Study* [↗](#)  
Verma S., Mate A., Wang K., Taneja A., Tambe M.; Presented at **TSRML NeurIPS 2022**
- *On the Pitfalls of Visual Learning in Referential Games* [↗](#)  
Verma S.; Presented at **LaReL NeurIPS 2022**
- *Restless Bandits in the Field: Real-World Study for Improving Maternal and Child Health Outcomes* [↗](#)  
Mate A., Madaan L., Taneja A., Madhiwalla N, **Verma S**, Singh G., Hegde A, Varakantham P., Tambe M.; Presented at **MLPH NeurIPS 2021, \*\*Best Paper award\*\***
- *Emergence of Multilingualism in Population based Referential Games* [↗](#)  
Verma S.; Presented at **LaReL ICML 2020**

## Under Review

- *Group Fairness in Predict-Then-Optimize Settings for Restless Bandits*  
Verma S., Zhao Y., Shah S., Boehmer N., Taneja A., Tambe M.; Under review at UAI 2024

## Awards, Grants & Honours

Student Travel Grant for attending Data Study Group at Alan Turing Institute, London, UK . . . . .	2024
Accepted into Harvard's Technical AI Safety Fellowship . . . . .	2024
Student Travel Grant for presenting research poster at AAAI, New York, US . . . . .	2020
Student Travel Grant for attending IEEE High Performance Computing Conference, Hyderabad, IN . . . . .	2019
Rotaract National Technical Quiz Pune, India - 1 <sup>st</sup> in India among 500+ teams . . . . .	2018
Ramanujan Mathematics Olympiad - 3 <sup>rd</sup> in State among 400+ participants . . . . .	2013
Regional Mathematics Olympiad - 22 <sup>nd</sup> in State among 2000+ participants . . . . .	2013
National Cyber Olympiad - 8 <sup>th</sup> in India among 30000+ participants . . . . .	2012
Qualified for Indian National Mathematics Olympiad thrice - Top 900/50000 in India . . . . .	2011-2013

## Academic Service & Volunteering

<b>PC Member</b>	Autonomous Agents for Social Good Workshop at AAMAS 2024
<b>Reviewer</b>	Trustworthy and Socially Responsible Machine Learning Workshop at NeurIPS 2022
<b>Volunteer</b>	Helpdesk at the International Conference on Learning Representations (ICLR) 2021
<b>Taught</b>	Lecture Series on Contributing to Open Source Software, IIITM Gwalior, India 2019
<b>Mentored</b>	Undergraduate students within the student forum at IIITM Gwalior, India 2018-2020

## Selected Open-Source Projects

- Developed and open-sourced **Jupyter-Probe** [↗](#), a library to monitor, declare, and manage resource usage on shared Jupyter environments. Published the library on PyPI software repository to be used as pip package.
- Contributor to scientific python libraries for Astronomy - **AstroPy** [↗](#), and Heliophysics - **SunPy** [↗](#). Added features [↗](#) in the Time module for astronomical calculations which is at the core of the libraries' functionality.

## Skills

<b>Languages and Tools</b>	C++, C#, Python, L <sup>A</sup> T <sub>E</sub> X, Git, Docker, Jenkins, Kubernetes
<b>Libraries and Softwares</b>	Tensorflow, PyTorch, RLib, OpenAI gym, OpenCV, MuJoCo, Unity3D