

# Mohammad Taufeeque

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## EDUCATION

### Indian Institute of Technology Bombay

2018–2022

B.Tech (with Honors) in Computer Science and Engineering

Mumbai, India

– GPA - **9.28**/10.0

– Bachelor's Thesis - Fianchetto: Speed, Belief, Guile, Caution to Win at Reconnaissance Blind Chess

## PUBLICATIONS

- [1\*] **M. Taufeeque**, S. Parthasarathy, R. Ragesh, S. Shet, A. Iyer, S. Sarawagi, and S. Rajamani, “Softcompose: Handling compliance violations in advertisements with neuro-symbolic classifiers”, submitted to *The ACM Web Conference (WWW)*, 2023.
- [2] A. Gleave, **M. Taufeeque**, J. Rocamonde, E. Jenner, S. H. Wang, S. Toyer, M. Ernestus, N. Belrose, S. Emmons, and S. Russell, “Imitation: Clean imitation learning implementations”, arXiv, 2022. arXiv: 2211.11972 [cs.LG].
- [3\*] **M. Taufeeque**, N. Tongia, and S. Kalyanakrishnan, “Fianchetto: Speed, belief, guile, caution to win at reconnaissance blind chess”, submitted to *The Journal of Artificial Intelligence Research*, 2022.
- [4] G. Perrotta, R. W. Gardner, C. Lowman, **M. Taufeeque**, N. Tongia, S. Kalyanakrishnan, G. Clark, K. Wang, E. Rothberg, B. P. Garrison, P. Dasgupta, C. Canavan, and L. McCabe, “The Second NeurIPS Tournament of Reconnaissance Blind Chess”, in *Proceedings of the NeurIPS 2021 Competitions and Demonstrations Track*, ser. Proceedings of Machine Learning Research, vol. 176, 2022, pp. 53–65.
- [5] **M. Taufeeque**, S. Koita, N. Spicher, and T. M. Deserno, “Multi-camera, multi-person, and real-time fall detection using long short term memory”, in *Medical Imaging 2021: Imaging Informatics for Healthcare, Research, and Applications*, vol. 11601, SPIE, 2021, pp. 35–42.

*\*submitted*

## INDUSTRY & RESEARCH EXPERIENCE

### FAR AI - Research Engineer

Berkeley, USA

Supervisor: Dr. Adam Gleave

Aug '22-Present

- Benchmarked and improved the performance and documentation of the open-source library **imitation**
- Added new algorithmic features to algorithms like Deep RL from Human Feedback, AIRL, and GAIL
- Prepared the pre-print paper to be submitted to **The Journal of Machine Learning Research (JMLR)**

### Microsoft Research - Research Intern

Bangalore, India

Guide: Prof. Sunita Sarawagi (IIT Bombay) & Dr. Sriram Rajmani (Microsoft Research)

Dec '21-Aug '22

- Developed an online algorithm against OOD data to integrate noisy feedback rules to a trained ML text classifier
- Proposed a novel metric to measure the compliance of an algorithm to the feedback rules and the ML classifier
- Deployed the algorithm to **Microsoft's Ads** system & improved the compliance of the system by over **55%**

### Goldman Sachs - Summer Analyst

Bangalore, India

Guide: Kesavan Mukunthan

Summer 2021

- Created a webapp module to compute and display performance exposures to different factors for each stock in a portfolio of mutual funds that helps portfolio managers to analyse the drivers of performance of every fund
- Studied **finance theory** on alternative investments, portfolio risk evaluation & management using factor models

- Developed an application that **detects falls in real-time** using human pose keypoints from multiple cameras
- Detected fall events by modeling **temporal dependencies** between frame features using **LSTM Networks**
- Maintainer of the open-source project on GitHub with **128+ stars & 40+ forks**

## RESEARCH PROJECTS

### AI Agent for Reconnaissance Blind Chess

IIT Bombay

Bachelor's Thesis | Guide: Prof. Shivaram Kalyan Krishnan | Won NeurIPS competition (RBC) Aug '21-Present

- Developed an AI Agent for RBC, a variant of Chess where only a 3x3 region can be sensed before making a move
- Maintained a set of all possible board states with belief probability from a **Deep Neural Network** tuned with intuitions from tactics in RBC to select sense moves that maximizes information obtained about the state
- Won the **NeurIPS 2021** competition on RBC with **91.3%** win rate & **100 Elo pts** margin from the runner-up

### Pretrained Model for Structured Documents

IIT Bombay &amp; Adobe Research, India

Guide: Prof. Ganesh Ramakrishnan

Jan '21 - Aug '21

- Proposed a **BERT**-based architecture to model structured documents using self-supervised learning
- Incorporated document structure based **attention masking** to regularize the model and increase efficiency
- Achieved near **99%** accuracy on self-supervision tasks of masked language modeling and header alignment

### Randomized Planning Algorithms for POMDPs

IIT Bombay

Guide: Prof. Shivaram Kalyan Krishnan

Spring 2021

- Designed planning algorithms for **partially observable-MDPs** (POMDPs) by combining multiple policies
- Combined random subsets of nodes from Finite State Controllers of weak policies to obtain a strong policy
- Solver found policies with **20% higher rewards** than state of the art non-randomized planning algorithms

### SAFE App Vulnerabilities

IIT Bombay

Guide: Prof. Bhaskaran Raman

Aug '20 - Apr '21

- Found **severe vulnerabilities** in the SAFE App IITB, used by many institutions to conduct remote exams
- Reported **data-leak**, **APK signature verification** and **timing-based** vulnerabilities in the Android app
- Suggested patches and fixes to the SAFE App development team at IITB to circumvent these vulnerabilities

## SCHOLASTIC ACHIEVEMENTS

|                               |   |      |
|-------------------------------|---|------|
| Attended Google Research Week | Selected among 50 undergraduates nationwide           | 2022 |
| Best AI Agent out of 18 Bots  | RBC chess competition in NeurIPS 2021                 | 2021 |
| AP (Advanced Performer) Grade | Best performance in Machine Learning course (GNR 638) | 2020 |
| All India Rank 303            | JEE Advanced (230,000 aspirants)                      | 2018 |
| All India Rank 330            | JEE Mains (1.2 Million aspirants)                     | 2018 |
| National top 1%               | Indian National Physics Olympiad (INPhO)              | 2017 |
| National top 1%               | Indian National Chemistry Olympiad (INChO)            | 2017 |
| KVPY Science Fellowship       | Government of India                                   | 2016 |

## TECHNICAL SKILLS

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|-----------------|--|
| Programming     | C++, C, Python, Java, Bash, Racket, Prolog, MIPS, PostgreSQL                                       |
| ML Libraries    | PyTorch, Tensorflow, Transformers (by Huggingface), Keras, Scikit-learn, Pandas                    |
| Web Development | HTML5, CSS, Bootstrap, JavaScript, React, jQuery, Django, PHP, AJAX                                |
| Softwares       | Android Studio, MATLAB, Git, CMake, L <sup>A</sup> T <sub>E</sub> X, MakeFiles, RStudio, Wireshark |

## RELEVANT COURSEWORK

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|                         |   |
|-------------------------|---|
| <b>Machine Learning</b> | Foundations of Intelligent Learning Agents, Topics in Learning Algorithms, AI & ML, Formal Methods in ML, Medical Image Computing, ML in Remote Sensing II, Database & Information Systems, Data Analysis & Interpretation  |
| <b>Computer Science</b> | Data Structures and Algorithms, Operating Systems, Computer Architecture, Implementation of Programming Languages, Automata Theory, Design & Analysis of Algorithms, Discrete Structures, Computer Networks, Software Systems Lab, Design and Analysis of Algorithm, Logic for CS |
| <b>Mathematics</b>      | Numerical Analysis, Calculus, Linear Algebra, Differential Equations  |

## POSITIONS OF RESPONSIBILITY

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### Teaching Assistantships

- Intro to ML Safety (Summer 2022)
- Artificial Intelligence & Machine Learning (Autumn 2021)
- Medical Image Computing (Spring 2022)
- Calculus II (Autumn 2021)

### English Language Tutor at ELIT

Autumn 2020

- Discussed, ideated and created an English language curriculum for 50+ students registered for the program
- Held online classes to teach students topics in written English and how to structure their written piece

### Member in Developer's Community (DevCom) IIT Bombay

Jan '19 - Aug '20

- Maintained, developed & updated features of **InstiApp**, the institute app with over **10,000+** downloads
- Designed **frontend** of a timetable feature along with API endpoint to generate a universal iCalendar file

### Mentor of SoC project - Intrusion Detection System | Github: taufeeque9/IDS

Summer 2020

- Mentored a team of **9 developers** in building a real-time system that monitors network for malicious activity
- Deployed an ExtraTrees model of **99.7% accuracy** with a raw network **packet sniffer** written in Python

**SoS Mentor** - Mentored a group of 5 students exploring Artificial Intelligence through Summer of Science

## EXTRACURRICULAR ACTIVITIES

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- Built Arduino based **Remote-Controlled-Vehicle** in XLR8 conducted by Robotics Club, IITB 2018
- Taught Science & Maths to underprivileged school students under National Service Scheme (NSS) 2018
- Attended a three day **National Science Camp** organised by KVPY held at **IISc Bangalore** 2017
- Attended a two day workshop on **Ethical Hacking** conducted by E-Cell, IITB 2018