# Aadi Swadipto Mondal

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## Education

**University of Wisconsin - Madison**, Wisconsin, United States — *2021 – 2023*
MS in *Computer Science* — *GPA - 0.00/4*

**Indian Institute of Technology (IIT) Kharagpur**, West Bengal, India — *2017 – 2021*
B.Tech (Hons.) in *Electronics and Electrical Communication Engineering* — *CGPA - 9.36/10*
Minor in *Computer Science and Engineering*

**Bhavan's Gangabux Kanoria Vidyamandir** — *2015 – 2017*
Class XII (Science) from *Central Board of Secondary Education (CBSE)* — *aggregate 93%*

## Publications

**Evolution of Convolution Neural Network Architectures using Genetic Algorithm** *2020*
Author: *Aadi Swadipto Mondal*
Published in *2020, IEEE Congress on Evolutionary Computation (CEC)*
*World Congress on Computational Intelligence (WCCI), 2020, Glasgow (UK)* [PDF]

**Two-Sided Fairness in Non-Personalised Recommendations** *2020*
Authors: *Aadi Swadipto Mondal, Rakesh Bal, Sayan Sinha and Gourab K Patro*
Published in *AAAI Conference on Artificial Intelligence, 2021, Student Abstract*
*Association for the Advancement of Artificial Intelligence (AAAI)* [PDF]

Two more publications under review in ACM SIGMETRICS 2022 and AAAI ICWSM 2022

## Research Experience

**Research Assistant | Analysis of DNS records** *Aug'21-Present*
*Advisor: Prof. Paul Barford*
Empirical analysis of DNS structure, behavior and performance using novel data sets and techniques. The goal of this work is to develop broad and novel perspectives on DNS that lead to improvements in the systems and protocols used to configure, manage and secure the underlying infrastructure. This work is done in collaboration with *Prof. Mark Crovella* and *Prof.Joel Sommers*

**Evolution of Deep Learning Architectures using Evolutionary Algorithms** *January'19-January'20*
*Guide: Prof. Dipankar Dasgupta*
Explored algorithms like *Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Ant Colony Optimization, etc.* and scrutinized their plausibility to design neural network architectures. The first step involved devising gene structure to represent salient features of *Convolution Neural Networks (CNNs)* with *Skip Connections*. The second step included fine-tuning genetic operators like *Crossover* and *Mutation* to apply on the devised gene structure. Coded using *python-Tensorflow* and tested on *MNIST handwritten digit data set* and *Fashion-MNIST data set*.

**Aspect Based Sentiment Analysis of App Reviews in Google Play Store** *June'20-October'20*
*Guide: Prof. Kaushal Kumar Bhagat* and *Prof. Nasser Giacaman*
Designed a *language model* based on *BERT* using *python-PyTorch* and *Transformers library* to systematically attach *sentiment labels (Positive, Negative, Neutral)* along with *seven pre-defined aspect labels (Technical Issues, Usability, Content, User Interaction, Feature Request, Learning Qualities, Advert)* to the scrapped app reviews from Google Play Store. Compared the user dispositions of apps from five different app categories (AR, VR, Educational, Educational AR, Educational VR) to analyze the effectiveness and quality of AR/VR for education in the form of android apps.

**Election Optimization in Recommendation Fairness** *June'20-September'20*
*Guide: Prof. Niloy Ganguly*
Worked on determining *fairness* in *recommender systems* using election voting methods. Used traditional recommender system algorithms like *Matrix factorization* on *SmartMedia Adressa News Dataset*. Applied the theory of electoral systems like *Single Transferable/ Non-Transferable Vote, k-Borda count, Bloc Voting etc.* to measure

fairness. Used *Point Wise Mutual Information* to extract the political bias of an article. Devised a *bias metric* to measure the *aggregate ideological bias* of a recommended set of articles. Compared user satisfaction and bias across different electoral systems.

**Intelligent Dialogue System following Intent and Emotion Flow** *January'21-March'21*

*Guide: Prof. Pawan Goyal*

Working on developing deep learning based dialogue systems based on *intent* and *emotion flow* within dialogue utterances using graphs-based representations. The nodes are used to represent intent and emotions, and the edge weights determine the probability of transitions between the intents or emotions. BERT is used for training the edge weights.

## Professional Experience

**Intern as a Software Developer** *March'21-June'21*

*Employer: Jarvis Technology and Strategy Consulting Private Limited*

Developed an android app for on-ground survey by agents, containing features like attendance management system, online form submission with location tracking, reimbursement management system. Used *Kotlin* and *Model-View-View-Model (MVVM)* architecture for app development. Network calls are made using *Retrofit* via HTTPS requests. Used *View Binding* for compile-time binding class generation of XML layouts. *Android Room Database* is used for offline storage of data.

**Intern as a Software Developer** *June'20-July'20*

*Employer: Honeywell Connected Enterprise (HCE)*

Developed visualization platforms of time-series data from *Atlassian JIRA* using *Grafana* and built custom Grafana Plugins using *ReactJS*. Stored and managed time-series data using *InfluxDB*. Got accustomed to the *Agile Methodology of Software Development*. Deployed software on *Continuous Integration Continuous Development (CICD)* pipeline using *Atlassian Bit-bucket, Octopus,* and *Open-Shift*. Learned about *Docker containers* and *Kubernetes*.

**Web Head of Inter-IIT Sports 2019 Core Committee** *March'19-December'19*

*Employer: Technology Student's Gymkhana, IIT Kharagpur*

Leaded a team of 10 students to develop a website for *operation management* of the *Inter-IIT Sports Meet 2019*. Designed front-end using *ReactJS* and back-end using *Django* with *MongoDB* as database. Also designed an android app using *Flutter* in Android Studios. The website featured registration of students and staff members, live-score of ongoing matches, automated ranking system for all IITs in different games, mess management of participants, etc.

## Selected Projects

**Analysis of COVID-19 spread in India using mobility-aware graph-based models**

*May'20-October'20*

*Guide: Prof. Animesh Mukherjee*, *Prof. Mainack Mondal*, and *Prof. Abir De*

Developed a *mobility-aware multi-agent simulation driven method* for estimation of COVID-19 spread which intrinsically takes care of factors like *mutation of virus strains, asymptomatic cases,* and *other latent conditions*. Created a human mobility simulation of 1.38 billion people in India to estimate *the amount of testing* needed under different scenarios.

**Analysis of bias in recommendations of online streaming platforms like Netflix**

*August'20-December'20*

*Guide: Prof. Animesh Mukherjee* and *Prof. Saptarshi Ghosh*

Worked on bias analysis of the movie recommendations of Netflix from different user accounts simulating several use-case scenarios using network-based representation. Analyzing irregularities before and after the pandemic.

**Analysis of bias in Buy-Box competition in Amazon** *November'20-April'21*

*Guide: Prof.Animesh Mukherjee* and *Prof. Saptarshi Ghosh*

Worked on bias analysis of the Amazon buy-box winner algorithm. Studying the possible existence of bias towards winner selection towards Amazon affiliate sellers and promotion of Amazon private products in the Amazon website. Submitted a publication regarding the same in *The 24TH ACM Conference On Computer-Supported Cooperative Work And Social Computing (CSCW 2021)*, currently under review.

## Competitions

**Ves-AI-Thon by Capgemini** *July'18*

Developed an android app in *Android Studios (JAVA)* and *Firebase* for caregivers and old-aged people. Salient features include *real-time location tracking (Google Maps API)*, *fall detector (custom model trained on MobiAct dataset)*, *emotion detector (Amazon Rekognition API)*, *intelligent chat-bot (IBM Watson)*, *smart medicine name extractor (Google Vision API)* from medicine strips. Got featured in news/media body like *India Today*, *The Hindu*, *Hindustan Times*,etc.

## Skills

- **Languages:** Python # | Java # | Javascript # | C++ $*$ | C $*$ | Matlab $+$ | HTML-CSS # | Kotlin # | LaTeX $*$ | Dart $*$
- **Frameworks:** ReactJS# | Flask # | Android Studio # | Tensorflow $*$ | Pytorch # | Bootstrap $*$ | Networkx # | Django #
- **Databases:** SQL $*$ | MongoDB # | InfluxDB # | Neo4J $*$ | Room #
- **Miscellaneous:** Firebase # | IBM Watson # | Grafana # | AWS Rekognition $*$ | Docker $+$ | Open Shift $+$ | Kubernetes $+$

$+ \rightarrow$ *beginner* $\quad * \rightarrow$ *intermediate* $\quad \# \rightarrow$ *advanced*

## Coursework Information

**Graduate Courses**

Introduction to Information Security (CS642), Mobile & Wireless Communication (CS707)

**Undergraduate Courses**

Algorithms-I+, Data Structure & Object Representations, Computational Intelligence in Cyber Security, Image Processing, Machine Learning, Machine Intelligence & Expert Systems, Cyber Physical Systems, Computer Architecture and Operating System, Computer Communication and Networking, Digital Communication+, Digital Signal Processing+, MIMO Communications, Probability and Stochastic Process, Matrix Algebra, Introduction to Internet

$+ \rightarrow$ *has lab component*

## Awards and Achievements

- Ranked second among 63 teams from the premier Indian Institutes in *Smart India Hackathon 2020*.
- Silver in overall *Inter-IIT Tech Meet 2019* and Gold in *Ashoka Tech for Change* event among all the 23 IITs.
- Gold in *HSBC AI Hackathon 2018, IIT Kharagpur* among approximately 50 teams.
- Gold in *National Service Scheme (NSS)* for overall performance throughout the freshman year.
- Ranked 2151 in *JEE Advanced 2017* (Entrance Examination for IITs), 59 in *WBJEE 2017* (Entrance Examination for State Engineering Colleges) and 849 in *Kishore Vaigyanik Protsahan Yojana (KVPY)* 2016, a national fellowship exam.