

TAWSIF AHMED

AI RESEARCHER

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An Artificial Intelligence researcher. I have 4 years of experience in Artificial intelligence, mainly in the field of Natural Language Processing and Computer Vision. In the past, I have developed advanced neural network architecture for prestigious academic institutions, promising startups and personal projects. Proven success in neural net architecture, datasets preparations, mathematical functions (activations, optimizer and loss) and scalability of models. A strong understanding in NLP, CV and quite recently, Quantum Computing.

PROFESSIONAL EXPERIENCE

LEAD AI RESEARCHER

HARVARD GAMI, HARVARD UNIVERSITY, Cambridge, MA

September 2022–Present (Full-time)

- Currently, developing state of the art artificial intelligence solutions to detect cancer in its early stages via medical scans.
- Combined grid search and second derivative optimizers to achieve high accuracy
- Developed two fully automated and semi-automated masking solutions, through FAIR's SAM and QuPath models to annotated the datasets
- Benchmarked models between first derivative and second derivative optimizer trained models
- Collaborating with *Dr. Anna Yaraslovsky (University of Massachusetts Lowell)* and *Dr. Victor Neel (Massachusetts General Hospital)* to deploy it for clinical trials in Massachusetts General Hospital by the fall.

SENIOR PROJECT LEAD

HARVARD GAMI, HARVARD UNIVERSITY, Cambridge, MA

November 2023-Present (Full-time)

- Promoted to become Project lead and decision maker in upcoming new projects planning and unveiling.
- Have the authority to decide what new AI solutions and methodologies & Medical application to focus our resources and talents on
- Control over undergraduate students from Harvard University, UC Berkeley, Duke and Stanford University who work in my lab and leading them to develop critical medical applications combining Artificial Intelligence to improve healthcare.
- Working with leading Clinical experts, renowned doctors, specialists in medicine and hospitals to develop our solutions.
- Fully being under the direct supervision of Harvard Medical School faculty (e.g., Professors and Doctors)

TECHNICAL CONSULTANT

CAPVISION, New York City, New York

May 2023–Present (Part-time)

- Signed with CapVision to provide feedback to their multi-million-dollar clients at 400\$ per hour rate.

LEAD AI RESEARCHER**THE PLASTIC PROJECT, Kirkland, Washington***April 2023–Present (Part-time)*

- Helped high schoolers to develop a DIY powerful image classifier using Lobe.ai
- (Reverse Engineered + re-wrote WasteNet) (UK Government's waste management DL model) to classify garbage adhering to Kirkland laws.
- Working alongside the local government for the deployment of our solutions in the community and through governmental recycling applications.
- Packaged the website in PWA.
- Currently deployed and accessible online (**BETA PHASE**)

UI/UX DESIGNER & DEVOPS**OCTOML, Seattle, Washington***October 2022-November 2022 (Contractor)*

- Provided feedback & advise to improve the platform for fast deployment by AI researchers and people with little knowledge in DevOps
- Pointed out flaws and unrequired complexities of both the UI and the DevOps portion of the platform.

BEAMLINE FOR SCHOOLS COACH**PAKISTAN ATOMIC ENERGY COMMISSION, PAKISTAN***January 2023-Present*

- Taught high school students high energy physics and Machine Learning
- Helped them to develop both idea and proposal for Beamline for Schools
- Helped the students to create a Quantum Algorithm to recognise faint sounds produced by particles while they collide and recognise particles based upon that

SOFTWARE/ALGORITHM TESTER**TARTEEL AI, San Francisco, California***August 2020-September 2020 (Part-time)*

- Tasked to test app UI and voice recognition Algorithm

VOLUNTEER LECTURER**ARTE, The Open Lab, Yale University, New Haven, Connecticut***October 2021-October 2021 (2 weeks)*

- Taught New Haven School Students Electrical Physics (performing Circuits and switch making & experiments)

RESEARCH COLLABORATION**IFJ PAN INSTITUTE OF NUCLEAR PHYSICS POLISH ACADEMY OF SCIENCES***December 2021-March 2022*

- Collaborated with Krzysztof Woźniak to create DIY Neutrino Detector for Beamline for Schools competition

EDUCATION**DHAKA CITY COLLEGE, Dhanmondi, Dhaka***September 2020 – February 2023*

High School Degree in (Literature + Pure Science + Maths + Computer Science),

Grade: A (*Taking a Gap Year*)**Key Points:**

- Studied introductory Quantum Mechanics and advanced Mathematics

- ICT aka Computer courses included courses in Circuits, programming in C++ & web development
- Selected to be club president in two different clubs i.e. Debate & English
- Active member in all the clubs most notably being English & Art
- Worked as volunteer & planner in English club's national festival

WOLFRAM SUMMER SCHOOL, Boston, Massachusetts

June 2023-July 2023 (3 weeks)

Key Points:

- Received 100% Financial Aid (3000\$) to participate in the program
- Wolfram Mathematica & Research's Owner **Stephen Wolfram** advised me to work on, "**Analysing rare words in Wikipedia**".
- Modified Stephen Wolfram's recommendation, and developed my thesis on "Analysing rare and **NER (Named Entity Recognition)** words in Wikipedia through **Large Language Models**"
- Against traditional methods, Large Language models were extremely successful
- Able to provide a proof of concept, Large Language Models has the potential to replace NER domain specific neural network models which costs from hundreds to thousands to train.
- Discovered a potential extension, where through the analysis of words on different layers of Large Language Models, and forming a complete sentence for high resource language such as English, we can understand how complicated Constructed Language are learnt by the Language models as well and thus breaking the linguistics puzzle of language development in Large Language Models and helping us in both Linguistics research and adding context and meaning and cognitive aspects in conversations between humans and AI
- Further comparing the development of a sentence in Large Language model example of flow of information in state-of-the-art Artificial Intelligence(AI) models and then comparing it against flow of information in human brain
- Proceeding paper for my project will be published in the next few weeks
- Finally, performed a small extension of my thesis by making table of inflection for exotic languages such as Latin, Greek and Hebrew via OpenAI's GPT 3.5 Turbo model

TAKE ACTION LAB, GLOBAL CITIZEN YEAR PROGRAM, Cape Town, South Africa

August 2023-December 2023 (3 months in South Africa)

- Deprecated: Due to health concerns regarding visiting South Africa

SUMMER CAMPS

TECH & JOURNALISM CAMP, THE STANFORD DAILY, STANFORD UNIVERSITY, CA

September 2021-September 2021 (3 weeks)

- Accepted as one of 10 participants
- Studied fundamental knowledge of JavaScript and web development
- Studied responsible journalism and ethics
- Received 100% Scholarship

SYNTHETIC BIOLOGY CAMP, STANFORD UNIVERSITY, CA

September 2022-October 2022 (3/4 weeks)

- Studied Genetic engineering and DNA
- Performed DNA modification and Analysis using Software
- Studied Bioinformatics Algorithms and wrote them.

SUMMER SCHOOL

COMPUTATIONAL NEUROSCIENCE SCHOOL, NEUROMATCH ACADEMY, REMOTE

July 13 2023-July 28 2023 (3 weeks)

- Received 100% Financial Aid to participate in the program
- Studied Introduction-Intermediate level Computational Neuroscience
- Developed Computational Neuroscience Project: **Finding the flow of information in brain through Functional Connectivity** (used Steinmetz dataset)
- Programmed 50% of the entire final project by myself
- Praised by TAs' for proposing exotic mathematical methods to calculate complex formulas with ease

COLLEGE CREDITS

4TH ANNUAL CONFERENCE ON DISABILITY IN HEALTHCARE AND MEDICINE, STANFORD MEDICINE, STANFORD UNIVERSITY, CA

- Received 6.00 AMA PRA Category 1 Credit(s)™ for the live activity

ACTIVISM ACTIVITIES

MENTORSHIP FOR PROJECTS ADDRESSING TO SOLVE SOCIAL INJUSTICE IN ASIA/OCENIA, PEACE FIRST, Boston, MA

May 2023-June 2023

- Received 1:1 mentorship for my project
- Selected as one of the top 10 projects from their application pool in South East Asia/Oceania
- Opportunity to meet impactful changemakers and learn the process of activism and changemaking from them.

CONFERENCE & ACTIVITIES

NATIONAL IQ TEST

December 2020-December 2020 (1 week)

- Secured 3rd position among 250 high school seniors from top schools in Bangladesh

INTERNATIONAL CONFERENCE FOR LEARNING REPRESENTATION (ICLR), Virtual

May 2021-May 2021 (1 week) – 2 times (2021 & 2022)

- Web testing, monitoring the website & looking for bugs and errors.
- Helping Authors and moderators with video infrastructure software & monitoring chat rooms for code of conduct violation
- Conducting Q&A sessions after Orals with moderators, and helping them to select important questions and forward them.
- Answering questions on technical issues in the helpdesk

INTERNATIONAL CONFERENCE FOR MACHINE LEARNING (ICML), Virtual

July 2021-July 2021 (1 week)

- Conducting 3 Orals as the youngest moderator in ICML history (high school junior)
- Web testing, monitoring the website & looking for bugs and errors.
- Helping Authors and moderators with video infrastructure software & monitoring chat rooms for code of conduct violation
- Conducting Q&A sessions after Orals with moderators, and helping them to select important questions and forward them

CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS (NEURIPS), Virtual*December 2021-December 2021 (1 week)*

- Web testing, monitoring the website & looking for bugs and errors.
- Helping Authors and moderators with video infrastructure software & monitoring chat rooms for code of conduct violation
- Conducting Q&A sessions after Orals with moderators, and helping them to select important questions and forward them.

OX-WSDC , THE OXFORD UNION, Oxford, England*April 2021-June 2021*

- Selected as one of the 10 independent teams among 100 total selected team for highly prestigious debate competition for high school students
- Competed against sixth forms like Eton College.
- Praised by the judges for gifted logical and reasoning skills.
- Received partial 80% scholarship

HARVARD SCIENCE AND RESEARCH CONFERENCE (HSRC), MA, Cambridge*October 2021-October 2021 (3 days)*

- Selected among one of the 250 participants from 1000+ applications as one of the advanced high school students
- Received the chance to learn key academic qualities from Harvard Professors
- Received 100% scholarship

INTERNATIONAL ASTRONOMY AND ASTROPHYSICS COMPETITION (IAAC), Virtual*April 2021 (1 month)*

- Received a Bronze award in the competition

FEMTECH BERKELEY 2022*April 2022-April 2022 (1 day)*

- Had the opportunity to learn scalability and best software practices from industry experts
- Developed a project using lobe.ai to detect nail styles and tell its name

HARVARD COLLEGE VISION PROGRAM, Cambridge, MA*March 2022-March 2022 (1 week)*

- One of the 30 students selected from an application pool of 1000s
- Learned Medical Leadership and activities
- Participated in Case Study
- Received 100% scholarship

HARVARD UNICEF CONFERENCE, Cambridge, MA*February 2022-February 2022 (3 days)*

- Accepted for the Conference and participated as one of the 30 few individuals
- Participated in Environment and Climate Change Project
- Accepted in both 2022 & 2023 Conferences with 100% scholarship
- In 2023, served as an Ambassador for the Conference

IMMERSIVE ESSAY COMPETITION, UK*January 2022-February 2022*

- Accepted into their program with 20% scholarship

HARVARD UNDERGRADUATE INTERNATIONAL RELATIONS SCHOLARS PROGRAM, Cambridge, MA

May 2023-June 2023 (2 months approx.)

- Accepted to Harvard's Prestigious International Relations program as a gap year student
- Considered as one of the best applicants they received in 2023 application pool
- Full scholarship was awarded

TEACHING AND MENTORSHIP/ACADEMIC ADVISOR

HARVARD GAMI, HARVARD UNIVERSITY, Massachusetts, Cambridge

(Performing this role every year)

- Performing the role of (academic advisor + mentor) for first year undergraduate students at Harvard University
- Teaching them about Artificial Intelligence & Neuroscience
- Being their academic and research advisor for entire four years of their undergraduate program for the selected students by Harvard GAMI

INTERSHIPS

DONDERS INSTITUTE FOR BRAIN, COGNITION, AND BEHAVIOUR, GENZEL LAB, Netherlands

Research Assistant Intern

August 2023 – Undefined

- Offering help in multiple Computational Neuroscience projects, mainly focusing on HexMaze Project: delta oscillations during sleep.
- Internship with the possibility to shift towards a full-time researcher position as a Computational Neuroscientist.
- Internship terms are extremely flexible. I can continue the internship as long as I want either part-time/full-time, with preferred working hours.
- Received this position first hand, even before finishing my prestigious Summer School at Neuromatch.

PROGRAMMING LANGUAGES

1. Python

- Primary programming language
- Advanced level expertise
- 4+ years of experience developing advanced software, data analysis and artificial intelligence

2. C

- Secondary programming language
- Intermediate level expertise
- 2 years of experience writing algorithms

3. Wolfram Language

- Favourite functional programming language
- Intermediate level expertise
- 10 months of experience writing algorithms, data analysis and artificial intelligence

4. Julia

- Hobbyist programming language
- Intermediate experience and can use Julia notebooks
- 1.5 years of experience performing data analysis

5. LaTeX

- 2 years of experience in LaTeX by using Texmaker

6. Scilab

- Preferred Matrix Programming Language
- Intermediate level expertise
- 11 months of experience writing algorithms and computational mathematics

Fields of Expertise:

1. Artificial Narrow Intelligence (ANI) (e.g. RHLF, CNN, NLP and vice versa) (**Advanced level**)
2. Cognitive Artificial Intelligence/Neuromorphic Artificial Intelligence (**Intermediate level**)
3. Statistical Machine Learning (**Advanced level**)
4. Computational Neuroscience (**Intermediate level**)
5. Computational Mathematics (**Intermediate level**)
6. Particle Physics (**Advanced level + mainly in Neutrino/high-energy beams/particle interaction**)
7. Synthetic Biology (**Beginner level**)
8. Quantum Computing (**Intermediate level**)
9. Quantum Artificial Intelligence (**Intermediate level**)

FRAMEWORKS

1. DEEP LEARNING FRAMEWORKS

- Tensorflow (Advanced level)
- Pytorch (Intermediate level)
- Jax (Intermediate level)
- PyBrain (Intermediate level)

2. MATHEMATICS & DATA ANALYSIS

- Numpy (Advanced level)
- Pandas (Advanced level)
- SciPy (Advanced level)
- Scikit-learn (Advanced level)
- Matplotlib (Advanced level)

3. SOFTWARE ENGINEERING/WEB-DEVELOPMENT & DATABASE

- Django (Intermediate level)
- Flask (Advanced level)

4. QUANTUM COMPUTING & QUANTUM ARTIFICIAL INTELLIGENCE

- Qiskit (Advanced level)
- PennyLane (Advanced level)
- lambeq (Advanced level)
- DisCoPy (Advanced level)

5. COMPUTATIONAL NEUROSCIENCE

- Nengo (Intermediate level)
- NetworkX (Advanced level)
- Statsmodel (Advanced level)
- Brainrender (Beginner level)
- Navis (Intermediate level)

GITHUB PROJECTS

A set of best projects are highlighted here. I request to check-out my entire GitHub account to receive a proper glimpse of the breadth and encompassing nature of the projects.

A new type of AlexNet

AlexNet is widely considered as one of the best large Neural Network models ever created. Especially in Computer Vision. Recently, researchers working for the United Kingdom Government, made a new Image Classification Model known as WasteNet.

That allows faster and better image Classification results by leveraging fine-tuning and a new method called Hybrid Tuning. Preventing destruction of information in the fine-tuning stage and getting better performance in downstream tasks that are widely different from the training dataset of the initial model.

In this project, I have recreated the original model's architecture WasteNet closely to the original in TensorFlow.

Link: <https://github.com/sleepingcat4/WasteNet>

GUI for Object Detection (YOLO v5)

A personalised GUI is long a demand in Object Detection tasks, that can run locally on a user's computer. Another demand was having Flask as backend to deploy a inference GUI to create a light-weight inference interface for Object Detection tasks.

There were solutions available yet none were complete as either all were broken Or outdated. Understanding those project's code was another challenge since they didn't have best coding style practices.

That prompted me to develop a GUI for Object Detection task while having Flask as the backend to light all the technical intricacies with outstandingly simple and well-documented code.

Link: <https://github.com/sleepingcat4/wasteclassification>

Competitive Programming

I had been well fascinated by Competitive Programming, though I am interested in Computer Science, I perceive it being a cornerstone in understanding Computer Algorithms and one of the prerequisites in becoming a good Artificial Intelligence researcher.

I started practising this year, from practising Competitive Programming Questions from Wolfram Mathematica and solving them. From 2024, I am starting to practise LeetCode.

Link: <https://github.com/sleepingcat4/Wolfram-Challenge>

Presence Monitor

Quite lately, I had been feeling bored, and I came-up with a project that allows anyone on the internet to see when I was "LAST SEEN ONLINE" on my computer.

It's done through clever, tracking system design that runs a script on my computer locally and another Flask backend website fetches metadata from a GitHub repository and tracks the last commit done by me.

It's updated every hour and 24 times a single day.

Link: <https://github.com/sleepingcat4/p-monitor>

Tracker: <https://track-ammar.onrender.com/>

GitHub Search Engine

Don't get me wrong, GitHub by default provides a very powerful search-engine. One of the best I've ever seen even more than Google search functionalities. Yet, it is plagued by complexities for the beginner.

Which is why, I streamlined it and created a new search engine for GitHub, that searches for all the usernames and repositories with the query terms an individual provides and returns the results.

Link: <https://hub-search.onrender.com/>

One-step PDF extractor

I have created a Python wrapper around Meta AI (FAIR)'s state-of-art OCR (Optical Character Recognition) Deep Learning Model: Nougat. To provide one-step PDF extraction and Latex extraction at ease.

PyPI: `pip install nougatop`

Link: <https://github.com/sleepingcat4/nougat-op>

Bash Blog

Having a personal Blog in Computer Science and specifically in Artificial Intelligence can always be valuable to illustrate an individual's experience and expertise. Now, an obvious choice nowadays will be Medium.

I personally resent it because it has the worst fonts and too much pressure on me to monetise it. Which is a complete unnecessary for me and hinders me from writing quality content.

That's why, I created a new Blog template, basing Chad Baldwin's blog template and modifying to my needs.

Link: <https://github.com/sleepingcat4/bash-blog>

Blog-site: <https://sleeping4cat.github.io/Milkshake/>

RESEARCH PROJECTS

1. **Ox-Debate:** A high-quality dataset compiled of Oxford Union's debate sessions, public events and interviews that were uploaded in their official YouTube Channel. **(SIZE: 13GB)**

Link: <https://github.com/sleepingcat4/datasets>

2. **8chan-kun:** A high-quality dataset compiled of all 8chan boards' image embeddings and raw images itself.

Embeddings: <https://www.kaggle.com/datasets/sleepingcat4/8chan-image-embeddings>

Raw Images: <https://huggingface.co/datasets/sleeping4cat/8chan>

CURRENTLY WORKING

1. Developing a startup with friends for Microsoft Imagine Cup 2024
2. Studying Bioinformatics and Chemical NLP
3. Doing an in-depth study on Reinforcement learning
4. Studying cluster computing through utilising industry standard solutions like TorchX, Microsoft Azure and Google Cloud TPUs (research access)
5. Pathological Curvature analysis for maths function in BMI (Brain-Machine Inspired Models)
6. Learning Causal inference from group-up to advanced
7. Mastering Web-development + designing

(FEATURE) WEB-DEVELOPMENT + DESIGNING

1. 3D Photo Gallery (Prague Design Quality) <https://github.com/sleeping4cat/yuxin-gallery>
2. Story Book Theme (Ukrainian Quality) <https://github.com/sleeping4cat/little-dream>
3. Moonlit Night (Immersive Europe) <https://github.com/sleeping4cat/twilight-sky>
4. Timeless Mind Creativity (French Design Quality) <https://github.com/sleeping4cat/sleepingcat>
5. Canvas Approach (Chinese Quality) <https://github.com/sleeping4cat/canvas-theme>

NOTE: Web Development projects are stored in my second account ([@sleeping4cat](#)).

LANGUAGE SKILLS

1. English (Native Speaker + First Language) + (Both speak, read + write)
2. Bengali (Native Speaker) + (Both speak, read + write)
3. Hindi (Native Speaker) + (Only speak)
4. Urdu (Native Speaker) (Only Speak)
5. German (Intermediate Speaker) (Both speak, read + write)
6. Spanish (beginner Speaker) + (Both speak, read + write)

SOFT SKILLS

- Friendly and calm attitude with strong leadership skills. And led about 30 teams in deep learning which consisted of master's and PhD students from Ivy league universities and top universities around the world.
- Expert networking and connecting skills
- Experienced in marketing and promotion. And worked as a salesman for 6 months while in middle school.

TECHNICAL WRITING EXPERIENCE

RESEARCH BLOG

LINK: <https://sleeping4cat.github.io/Milkshake/>

NOTE: In the past, I have written on Quora platform extensively unfortunately due to poor quality of platform in the recent years shifted to my own blog. I have restarted my hobby of writing from past month and I frequently write about most influential and recent research papers and Algorithms.

ETHICS & INTEGRITY

PROGRAMMING CLAUSE

I hereby declare all code and materials showcased on my resume are work completely, partially, Or fractionally owned, Or co-owned by me. I have the proper rights to distribute, modify, utilise and share the code while maintaining proper code of conduct agreements and licence clauses described by the respective owners and contributors.

Common programming etiquettes and practices such as reading documentation, notes, text-books and tutorials and utilising their respective knowledge and use them as learning resources do not make the authors of those materials entitled to any/all shoutouts, mention, or any form of promotion and credit until they have explicitly required in their copyright note to exercise it for the readers by default.

ARTIFICIAL INTELLIGENCE GENERATED CONTENT

I acknowledge Artificial Intelligence to be an important tool in the learning process and synthetic data production for mundane work. Artificial Intelligence tools of any form (text, video, audio, code) not limited but beyond if and were exercised in any of my work were properly cited.

But exemptions were made if an intelligent agent was used for nominal, mundane and repetitive tasks.

CREATIVITY AND DESIGNING

I have complete ownership of the creative ideas and thoughts, which are responsible for making my projects already that are completed/on-going and beyond. If there were other individuals and entities involved in the ideation phase, they are properly mentioned in the respective work.

In terms of designing, I took inspiration from landscapes, picturesque scenes and artistic examples and other moments, took publicly available, licenced under creative commons Or equivalent licence and permissible media and multimedia (video, textual designs, typography, fonts, canvas, scenes, photographs, creative assets, 3d models) not limited to but beyond and made use in my programming, software and artistic activities.

Proper credits are given to all artists, creative individuals and entities whose creations, assets and materials were/are used in my works. Though, in some extreme circumstances where proper credits individuals' information was not readily available it was left blank. But I completely allow the concerned entity whose work might be used in my project and not properly credited to email for allowing me to update the relevant works of mine where it may be in use.
