

# Hunar Batra

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## Education

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**University of Oxford, MSc Advanced Computer Science** Class of 2022

Coursework : Computational Learning Theory, Machine Learning, Quantum Processes & Computation, Advanced Machine Learning, Artificial Intelligence, Topics in Computational Biology, Probability & Computing

**University of Delhi, B.Sc (Honours) Computer Science** Class of 2020

C.G.P.A - **8.42 / 10**, First Division Honours Degree

*Academic Achievements and Honours*

- Student of the Year, Department of Computer Science, 2020 - *for all-rounder performance*
- Rank 3, Department of Computer Science, 2020
- Achieved the Highest Grade Point in the university in Data Structures, Machine Learning, Android Programming, Software Engineering, System Programming, PHP, Computer Graphics, Microprocessor subjects

**Modern School Vasant Vihar, New Delhi** Class of 2017

Grade 12th (CBSE) - 92%; Grade 10th (CBSE) - 9.6 CGPA

## Research Publications

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- Medbot: Conversational Artificial Intelligence powered Chatbot for delivering Telehealth after COVID-19, **IEEE 5th International Conference on Communications and Electronic Systems (ICCES 2020)**; Urmil Bharti, Deepali Bajaj, **Hunar Batra** et al., **IEEE Xplore**, Scopus Indexed - **57 citations** [Paper Link [🔗](#)]
- Serverless Deployment of a Voice-Bot for Visually Impaired, **International Conference on Applied Soft Computing & Communication Networks (ACN 2020)**; Deepali Bajaj, Urmil Bharti, **Hunar Batra** et al., Book Chapter - **Springer Singapore** [Paper Link [🔗](#)]
- CoVShorts: News Summarization application based on Deep NLP transformers for SARS-CoV-2, **IEEE 9th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO 2021)**; **Hunar Batra**, Akansha Jain, Gargi Bisht et al., - IEEE - [Paper Link [🔗](#)]
- MUCE - A Multilingual Use Case Model Extractor using GPT-3; Deepali Bajaj, **Hunar Batra** et. al, **International Journal of Information Technology (IJIT 2022)**, **Springer** [Paper Link [🔗](#)]
- TiGen - Title Generator based on Deep NLP Transformer Model for Scholarly Literature; Hunar Batra, Eshika Gupta, Arupriya et. al, [To be published]
- CovFakeBot: A Machine Learning based ChatBot using Ensemble Learning Technique for Covid-19 Fake News Detection; **Hunar Batra**, Deepali Bajaj, Urmil Bharti et. al, [To be published]

## Research Experience

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**Research Lead, Oxford Rhodes AI Lab** 05/2022 – present

- Leveraging GNNs to model turbulence closures using symbolic regression in collaboration with CLiMA, CalTech, MIT and NASA

**Chatbot Development Research, University of Oxford** 02/2022 – present

- Developing a Question-Answering language model consisting of intent matching and entity recognition for the Philosophy Dept to help convey their research work over website/messenger.

**EWADA Research Intern, Oxford Human Centred AI Lab** 12/2021 – present

*University of Oxford, Department of Computer Science*

- Developing web apps using the SOLID framework enabling data autonomy and privacy preserving ML for the Ethical Web and Data Infrastructure in the Age of AI (EWADA) project under **Sir Tim Berners Lee**

**NLP Researcher, Department of Computer Science** 01/2021 – 07/2021

*University of Delhi*

- Spearheaded the development of four research projects on building an ensemble ML based WhatsApp bot to detect COVID-19 Fake News, web app for abstractive & extractive summarisation of COVID-19 News using transformer-based NLP Models (BERT, GPT-2, XLNet, BART, T5), fine-tuning GPT-2 to generate titles for Research Articles & web-based tool for extracting use case model from software case study using GPT-3.

## **Student Researcher, Department of Computer Science**

03/2020 – 06/2020

*University of Delhi & IIT Delhi*

- Developed a serverless Voice-based personal assistant web application for visually impaired students
- Single-handedly built & trained the feedback collection NLP agent, tagged entities, added contextual input-output conversational flow & embedded voice interaction using WebSpeech API Speech Recognition & Speech Synthesis interfaces

## **Student Researcher, Artificial Intelligence Research Lab**

06/2019 – 09/2019

*University of Delhi*

- Self-initiated research work under Dr. Amita Kapoor, wherein I built an Assistive System for Autonomous Vehicles for vehicles and lane detection, based on Deep Learning & Computer Vision
- Compiled Darknet, an open-source neural network & YOLOv3 with OpenCV for real-time predictions. Implemented a bash script to automate bulk testing & mean average precision calculation
- Achieved 99.07% accuracy for detecting vehicles and lanes using Histogram of Oriented Gradients (HOG) & a Linear Support Vector Machine Classifier on HSV colour space

## **Work Experience**

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### **Mobile Robotics Engineer, UVRobots**

08/2020 – 09/2021 | London, UK

- Built a React Native mobile application integrated with ROS melodic nodes, to control the sanitisation Robot Lamp's navigation & lucidly developed the front-end of the application
- Developed Flask REST API for streaming live video from Raspberry Pi using the Motion-JPG technique. Processed the video, generated depth & disparity maps using OpenCV and merged images using KNN
- Generated room laser scan visualisations using LiDAR real-time data, roboviz & PyLidar libraries

### **Co-Founder, HushTech Solutions**

06/2019 – 07/2021 | New Delhi, India

- Self-taught Conversational AI developer, developing omni-channel messenger chatbots powered by Natural Language Processing (NLP) to help businesses automate their customer interactions, marketing & lead generation
- Built intelligent full-funnel integrated messaging chatbots with data analytics abilities
- Conducted extensive research into the conversational technology market, requirements of the clients & shipped chatbots for messaging platforms and Robotic Process Automation solutions

## **Internships**

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### **Machine Learning Engineer, Omdena AI**

03/2020 – 06/2020 | Palo Alto, USA

- Selected as one of the 28 Global AI Experts to work on the AI Pandemics project in collaboration with AI for Peace
- Performed Latent Dirichlet Allocation (LDA) topic modelling over a dataset of scraped COVID-19 news articles to analyse the impact of government policies over the vulnerable population.
- Used time series analysis on OxGCRT & Mobility Datasets to find correlations between policy implementations & it's impact on number of cases & mobility. Further, implemented moving averages & vector autoregression (VAR)
- Conducted exploratory data analysis, built categorical heat maps for analysis & a modified SEIR model. Results showcased at the United Nations AI for Good Summit 2020

### **Mobile Application Development Intern, Impute Inc.**

04/2019 – 07/2019 | Tokyo, Japan

- Developed a Hybrid Voice-Assistant based on Natural Language Processing for the Fluent8 iOS Application, integrated with a corpora of daily-life topics to help users improve their conversational skills.
- Extensively trained the NLP agent & enabled contextual conversation using Dialogflow AI & Node.js client SDK
- Deployed webhooks on Cloud Function for Firebase for response retrieval. Designed the Conversational User Interface (CUI) & directed fallback user queries to external APIs to enhance the conversational experience

### **Chatbot Development Intern, Inverted Sense**

12/2018 – 04/2019 | New Delhi, India

- Built messenger chatbots for real businesses using Twilio, Chatfuel, Janis.ai. Worked on designing, building, training, testing bots & integrated interactive UI with suggestion cards
- Proposed & successfully developed an in-built shopping cart, instant order email alert & up-selling feature which led to higher lead conversions & ROAS

## Awards and Honours

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- **First Indian** to receive **The Mars Generation 24 under 24** Award - Leader & Innovator in STEAM category, 2019
- **National Finalist**, Smart India Hackathon Software Edition (out of 5,000 teams), India's largest hackathon by MHRD Govt. of India, 2019
- **Young Inventor**, Tech Will Save Us, 2019
- Developer Student Clubs Lead, Google Developers, 2020
- **Paper Presentation** at 5th International Conference on Communication and Electronic Systems, ICCES'20, IEEE
- **Paper Presentation** at 5th International Conference on Applied Soft Computing and Communication Networks, ACN'20, Springer
  
- **Paper Presentation** at 9th International Conference on Reliability, Infocom Technologies and Optimization ICRITO 2021, IEEE
- Rank 7, G-Research Algorithmic Trading Oxbridge Challenge, 2021
- **Ideation Paper Presentation** on 'Ingestible Robots' at 15th WONCA World Rural Health Conference, 2018
- **National Winner**, Summer with Google (out of 20,000 participants), 2018
- World Rank **1642**, Google CodeJam 2020
- Winner, Smart City Challenge, IIT Delhi, 2018
- Winner, National Level B-Plan Competition, MSME, Govt. of India, 2019
- Rank **15**, All India Gen-Z Leadership Olympiad, 2018
- Gold Award, Digital Champions Program, Reliance JIO, 2018

## Projects | [github.com/hunarbatra](https://github.com/hunarbatra)

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**covid19variants.org** [**React.js, HTML, CSS, Python**] - COVID-19 variants genomic surveillance open-tracker. Created data pipelines & built visualisations [[Link](#)]

**COVID-19 Tweets Fake News Detection** [**Python, NLTK, Scikit**] - WhatsApp bot to classify fake news using ensemble ML boosting approach

**CoVShorts, COVID-19 News Summarizer** [**Python, Transformers, Flask**] - GPT2, BERT, XLNet, T5, BART to perform abstractive/extractive text summarization web application

**Research Article Title Generation** [**Python, GPT**] - NLG fine-tuned GPT-2 trained over arXiv articles for title generation of research abstracts

**MUCE, Multilingual Use Case Model Extractor** [**GPT-3, Flask**] - An autoregressive transformer (GPT-3) based use case model extractor web app for software case studies

**HunAI** [**Python, GPT**] - A pre-trained response generation, DialoGPT DSTC model based Telegram Bot buddy, trained on Reddit discussions

**Real Time Voice Cloning** [**Python, Synthesizer, TensorFlow**] - Transfer Learning based voice cloning on the recorded input to generate Text-to-Speech (TTS)

**Voixt** [**JS, HTML, CSS, Chrome TTS**] - A Chrome Extension to read aloud the textual content on any browser tab, enabling TTS [[Link](#)]

**Rekognition** [**Java, XML, ML Kit**] - Native Android app for Text Recognition, Object Recognition & Facial Features Recognition

**CoRelief** [**React.js, Kendo UI, API.AI**] - Natural Language Processing based web chatbot to help fight COVID-19 related anxieties & support mental health [[Link](#)]

**UAV Delivery Drone** [**ArduPilot Copter**]

Unmanned Aerial Vehicle for delivering vaccinations and disaster relief material to remote areas. Awarded The Mars Generation 24 under 24 Award in recognition of this project

## Skills

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C++, C, Python, Javascript, Java, HTML, CSS, PHP, SQL, Application Development (Native, React Native)

*Tools & Frameworks:* Node.js, React.js, TensorFlow, PyTorch, PyTorch Geometric, Kubernetes, Flask, OpenCV, Dialogflow, git, bash, Firebase, Google Cloud Platform, ROS

## Invited Talks

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### **Protein Language Modelling to generate de novo SARS-CoV-2 mutations**

Oxbridge Women in Computer Science Conference, 2022, University of Oxford

### **Process Automation with Chatbots**

Think Outside the Valley, The DMZ (Ryerson University), World's leading accelerator for Tech Startups [Link] [↗](#)

### **Ok, Google! Let's build an Action for Google Assistant**

HackOn, A Pan-India Virtual Hackathon [Link] [↗](#)

### **Chatbot Development for Marketing**

Youngest Guest Speaker at Shri Ram College of Commerce, University of Delhi

### **The Power of Technology - Developer Student Clubs**

Google Developer Groups DevFest 2019, India's Largest Developer Conference

## Positions of Responsibility & Volunteering

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### **IT Officer, Oxford Women in Computer Science**

### **IT Officer, Oxford Women in Business**

### **University of Oxford MSc Academic Supervisory Representative**

### **Solutions Challenge Lead, Google Developer Students Club Oxford**

### **Mathematics Admission Test Marker, University of Oxford**

### **Founder & Lead – Google Developer Student Clubs**

01/2019 – 07/2020

*One of the few students selected globally by Google*

- Conducted 10+ workshops, trained 300+ students, delivered talks on Cloud, Machine Learning, Data Science, Web & Mobile Application Development.
- Facilitated Google Cloud Platform Crash Course, Explore ML & hackathons to foster a strong technical developer community. Supervised & led live projects

### **Teaching Assistant - Computer Literacy Program**

07/2019 – 03/2020

*University of Delhi*

- Served as a Teaching Assistant in Computer Literacy Program, which aims to teach women foundational basics of Computer Science in order to help them restart their career.
- Undertook weekly classes, elucidated core basics & hands-on over general-purpose industry tools

### **Mentor – Google Code-in at TensorFlow**

12/2019 – 01/2020

- Mentored students to get started with open source developments for TensorFlow.
- Developed problem statements on BERT model, beginner friendly resources, reviewed submissions, provided constructive feedback & guidance