

# KAMAL SHRESTHA

Senior Applied AI Research Engineer

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## SUMMARY

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- Possess a comprehensive theoretical and practical foundation in natural language processing, machine learning and deep learning combined with hands-on experience in experimental design methodologies and applied research for business applications.
- Proficient in executing learning pipeline encompassing various stages such as data extraction, analysis, cleaning, pre-processing, modelling, training, and evaluating, and deployment primarily utilizing PyTorch, Langchain, Streamlit, Scikit-learn, Transformers and other necessary libraries to achieve optimal results.
- Demonstrate excellent teamwork, communication, and writing skills honed through multiple years of industry experience, academic qualification, research publications, poster presentations, and teaching engagements.
- **Professional Career/Research Interests:** Intersection of applied NLP, DL, and Classical ML Techniques

## WORK EXPERIENCE

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### **BOSCH Global Software Technologies(BGSW), RTC-IN**

*Senior Applied Data Scientist*

Bengaluru, India

*August 2023 – Present*

- Currently, working on a high-impact project centered on leveraging large language models (LLM) for retrieval augmented generative text to introduce interactive agents for streamlined workflows and user engagement aiming to enhance operational efficiency across business units. **Received the Bravo Award for excellent rigor and engineering skills in successful completion of first Generative AI PoC within 3 months.**
- In parallel, working with in-house data pool to create multiple training, testing and deployment fine-tuning pipelines using SOTA models for production-ready generative and classification task to drive tangible results for critical decision and optimize team efforts in diverse business units.

### **Fusemachines**

*Machine Learning and Curriculum Engineer*

Kathmandu, Nepal

*July 2020 – Dec 2021*

- Worked on **clients based (US, Germany) and in-house projects** that involved all stages of **applied ML, DL and NLP** in real world data (from collection, cleaning and EDA to model building, deployment and maintenance).
- Worked as a **lead curriculum engineer** to design, create, review and refine course materials (reading materials, presentation slides, audio transcripts, auto-graded assignments, hands-on implementations, quizzes) for Fusemachines AI Education Programs: "Foundations in AI: Computer Science for AI, Micro Degree™ in Artificial Intelligence, Machine Learning, Deep Learning, and Natural Language Processing, Strategy for implementing AI, AI for agriculture and AI in Healthcare.
- Designed and Developed fully **automated Video and Text-to-Speech(TTS) Generation System** for Fusestudio(in-house project), which focuses on creating a entire video given Google Slides presentation and audio transcript mimicking how a person presents with the same using Tacotron2, GlowTTS and MelGAN.
- Remodeled and optimized **Questions Answering and Difficulty Ranking Model** along with **Content Recommendation System** (in terms of better representations, raking, and recommendations) for quizzes, assignments, and exams using BERT, Ensemble models, Elastic Search, MongoDB, and FastAPI.

### **Q. I. Roberts Jr-Sr High School & Herald International College**

*Computer Science Instructor*

Florida, USA & Kathmandu, Nepal

*June 2021 – Dec 2021*

- Designed, planned, implemented and instructed **daily lesson plans, coding sessions and online lectures** for the course "Computer Science for AI" to high school students of US and undergraduate BSc.CSIT final year students of Nepal.
- The class was of size **60** in Nepal and **18** in the US
- Received an **overall rating of 4.65/5** from Nepal students and **4.35/5** from US students
- The course topics include Introduction to AI, Fundamentals of CS, Python Programming, Scientific Python(Numpy, Pandas and Matplotlib), Data Structure, Database Management, and Web Application Basics.

## EDUCATION

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### M. Tech. in Computer Science and Engineering

Indian Institute of Technology, Hyderabad (IITH)

CGPA: 9.06/10

**Advisor:** Dr. Maunendra Sankar Desarkar

**Area of focus:** jobs recommendation system based on heuristics and transformer approaches and hostility detection on online social media conversation threads

**Relevant Courses:** Natural Language Processing, Information Retrieval, Multilingual NLP, Deep Learning, Fundamentals of Machine Learning, Software Engineering.

*Aug 2021 – July 2023*

*Hyderabad, India*

### Micro-degree in Machine Learning and Deep Learning

Fusemachines Nepal

**Area of focus:** classical machine learning, deep learning, scientific python, pytorch

*Jan 2020, May 2020*

*Kathmandu Nepal*

### Bachelors in Computer Engineering

Kathmandu University

Percentage: 92.30%

**Relevant Courses:** Artificial Intelligence, Data Structures and Algorithms, Algorithm and Complexity, Software Engineering, Probability and Statistics, Machine Learning, Speech and Language Processing, C, C++

*Aug 2016 – Nov 2020*

*Dhulikhel, Kavre, Nepal*

## AWARDS AND ACHEIVEMENTS

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**Dr. Homi Jahangir Babha Scholarship Scheme-HJBSS. Fully Sponsored by Ministry of External Affairs, Government of India** with EdCIL and provided by the Embassy of India, Nepal to study M.Tech in Computer Engineering at IIT, Hyderabad. **1 (in CSE) of 3 selected out of 10,000+** students per year through embassy screenings and college interviews, and the scholarship is worth **12 lakhs INR (self-sponsored)**.

*2021 – 2023*

**Golden Jubilee Scholarship (GJS).** 1 of 200 out of 20,000+ recipients of the prestigious GJS awarded by Embassy of India for Nepalese students based on B.Tech academic certifications with a monthly stipend of **NPR 4,000 for 4 years**.

*2016 – 2020*

**Fuse Machines Artificial Intelligence Fellowship Program.** 1 of 15 recipients in 2,000+ applications of Micro Degree™ in Artificial Intelligence continued to Micro Degree™ in Machine Learning and Deep Learning, worth **NPR 58,000 each**[1][2]. Selections were based on knowledge in in-person exams, interviews, and coding sessions.

*2019 – 2020*

**Kathmandu University Merit-based scholarship (2x).** 1 out of 60, awarded for securing the highest SGPA in the Computer Engineering in the 2<sup>nd</sup> and 6<sup>th</sup> semesters respectively each worth of **NPR 60,000**.

*2016, 2017*

## POSITION OF RESPONSIBILITIES

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### ACM - IIT Hyderabad Student Chapter - Machine Learning Moderator

*Indian Institute of Technology Hyderabad*

*2022-2023*

*Telangana, India*

- Responsible for all in college **AI/ML/NLP** discussion groups, paper reading sessions, blogs, writing groups, implementation workshops.
- Organized session on **”Structuring Machine Learning Projects”** that aimed to provide insights and guidance for fellow students looking to excel in their ML projects for better reproducibility, collaboration and more with industry-standard tools like Poetry, Commit Hooks, Github, Tensorboard, MLFlow, Docker.

### IT MEET v8.0 Documentation Lead and Marketing Representative

*Kathmandu University*

*2020*

*Kavre, Nepal*

- **Lead of documentation team** and member of the marketing team of one of Nepal’s premier annual IT events, IT Meet v8.0 with **25 different events** and participation of more than **50 tech. companies** with internships and full-time career opportunities.

- Directed a **team of 25** through multiple documentation stages for sponsorship (proposals, cost analysis, contracts, MoU) and collaboration with **10-20** companies to successfully bring in **8** different companies with total funding of **NPR 110,000, 20%** of total funding.

### IT MEET v7.0 Photography Event Organizer 1, 2

*Kathmandu University*

2019

*Kavre, Nepal*

- Organized **all Nepal Photography Competition** (open theme), which was judged by the president of Nepal Photography Association (NPA) and the Dean of Engineering at Kathmandu University
- A collective prize pool of **NPR 25,000** was shared among the top three winners with scholarships to a photography workshop, 14\*20 inch framed winning photos, and cash prizes.

### Executive Board Member

*Kathmandu University Computer Club*

2018 –2019

*Kavre, Nepal*

- An active student-run club of the Department of Computer Science and Engineering at Kathmandu University solely responsible for the majority of extracurricular activities like LTSP (Linux Terminal Server Project) and Software Freedom Day.
- Conducted **20+** **workshops** (on varied topics) in collaboration with multiple guests from premium companies like **A Yomari Company, Fusedmachines, Deerwalk, F1Soft International, MIDAS** and more every year.

### Ambassador

*Em-Blood Android Application with Nepal Red Cross Society*

2017

*Kathmandu, Nepal*

- Supervised a **team of ten volunteers among five different teams** in spreading awareness of the need for fresh emergency blood within different blood donation centers, hospitals, universities, schools, and blood banks.
- Involved in creating awareness posters, **an indexable database (using Google Firebase)** for health professionals, and managing help desks in every hospital (**in a distributed network of hospitals**) that patients can contact in need of fresh blood/blood donors.

## RESEARCH EXPERIENCE

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### Natural Language and Information Processing Lab (NLIP)

*Academic 'C' Block, IITH*

IIT Hyderabad

*May 2022, July 2023*

- Developed personalized odd jobs recommendation engine based on heuristics and transformer-based learning approaches for a platform catering to differently able individuals with skills and training.
- Implemented SOTA models, TransferTransfo and DialogPT, to enhance the representation of in-turn conversational history, resulting in improved accuracy, diversity, and human-like responses in dialogue systems.
- Introduced a novel hierarchical neural network architecture for threaded social media posts, comments, and replies in conversations that involve a mixture of Hindi and English languages compared with SOTA models.
- Conducted multiple human evaluation benchmarks to assess the performance and effectiveness of various trained models for text generation, recommendation analysis, similarity study, hostile text assessment, and more.

## PUBLICATION

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Aditi Bagora, **Kamal Shrestha**, Kaushal Kumar Maurya, and Maunendra Sankar Desarkar. 2022. Hostility Detection in Online Hindi-English Code-Mixed Conversations. In Proceedings of 14th ACM Web Science Conference 2022 (WebSci '22). ACM, New York, NY, USA, 11 pages doi: 10.1145/3501247.3531579

**Shrestha, K.** , Poudyal, P. , Karki, J. , Ranabhat, D. (2022). A Machine Learning Approach to Identify Fake News. Center for Project Management and Information Systems (PMIS) Review, 1–13.  
<http://journal.pmis.du.ac.bd/journaldetails.php?pid=2203281648465920>

## TECHNICAL SKILLS

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<b>Programming Languages</b>	Python, C, C++, PHP, HTML, CSS, Bootstrap, SQL
<b>Libraries</b>	Langchain, Streamlit, Pytorch (Lightning), HF Transformers, Scikit-Learn, Keras, Pandas, Numpy, SciPy, Matplotlib, Flask, FastAPI, Docker, Pytest, NLTK, Jupyter, Loguru, Poetry, Commit-Hooks, Open-CV, Vector Stores
<b>Database</b>	MySQL, MongoDB, Firebase, Elasticsearch
<b>Management</b>	Git, Github, JIRA, HRM Suite, Trello, Notion, Slack
<b>Miscellaneous</b>	Linux, Bash, Arduino, Anaconda, Latex (Overleaf), MLFlow, Tensorboard, SSH, nbgrover, Wireshark, Visual Studio Code

## PROJECTS

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**Inclusivity in Job Recommendation based on heuristic and learning approaches** IIT, Hyderabad  
*M. Tech. Thesis* *May 2022 – July 2023*

- Given the structured meta-data of the users, jobs, and applications, I developed a Hybrid Recommendation System (HRS) that implements two primary approaches, a heuristics-based and transformer learning-based approach, to generate recommendations that cater to the disability, skills, location, experience preferences of the user.
- Attained an impressive F1 score of 0.9389 on the validation dataset using a novel transformer-based model and similar users analysis from algorithms evaluated by humans found that 65% of the suggested similar users were indeed identified as truly similar, thus validating the effectiveness of the approach.
- Defense Slides

**Hostility Detection in Online Hindi-English Code-Mixed Conversations** IIT, Hyderabad  
*14<sup>th</sup> ACM Web Science Conference 2022 (WebSci'22)* *June 2022*

- Proposed a **novel hierarchical neural network architecture** to identify hostile posts/comments/replies in online Hindi-English Code-Mixed conversations as a part of HASOC'2021.
- Adapted multilingual pre-trained models like **mBERT, XLMR, and MuRIL** to generate contextual representations for natural abstraction and selection of the relevant context by exploiting the hierarchy of the conversations.
- [URL], [PDF], [Presentation], [Video], [Code],

**Natural Language and Information Processing (NLIP) Lab** IIT Hyderabad, Supervised by Dr. Maunendra Sankar Desarkar *Dec, 2022 - July, 2023*

- Actively involved in the information collection, design, development, documentation, and maintenance of the NLIP Lab at IITH, which is hosted at [nlip.cse.iith.ac.in](http://nlip.cse.iith.ac.in).
- Developed valuable collaboration skills by actively participating in project work with lab mates, focusing on repository management, agile workflow, work delegations, effective team communication, minimal front-end requirements, and structuring Jekyll websites

**Zero Reference Low-Light Image Enhancement with Attention** IIT Hyderabad  
*Dr. Sumohana Channappayya, Deep learning, AI5100* *2022*

- A low-light image enhancement task using a deep learning-based Zero-Reference Deep Curve Estimation (Zero-DCE). The idea is to use carefully formulated non-reference loss functions to convert the light enhancement as an image-specific curve estimation task.
- [Code], [Project Report], [Project Presentation]

**Federated Semi-Supervised Medical Image Classification via Inter-Client Relation Matching** IIT Hyderabad  
*Dr. C. Krishna Mohan, Visual Computing, CS6450* *April, 2022*

- Remodeled and evaluated **medical image classification** with the addition of Self Attention mechanism in every convolutional block: using CBAM to obtain better classification results.
- Outperformed the official implementation given a reduced dataset (only 2%) because of computational limitations
- Ranked with the best **Top 2%(A+)** of the class on the basis of two project presentations.
- [Paper], [Official Implementation], [Modification], [Presentation 1], [Presentation 2]

**Cracking WPA2-PSK Wi-Fi Passphrase and Defenses** IIT Hyderabad  
*Dr. Bheemarjuna Reddy Tamma, Network Security, CS6903* *May, 2022*

- Focused on de-authenticating and eavesdropping on the connection between an AP and clients to capture 4-way handshake messages used to brute force the passphrase using aircrack-ng tools
- Demonstrated comprehensive knowledge of handshake protocols, wireless MITM attacks, and proficient understanding of potential defense mechanisms. defenses.
- [Project Details], [Report],

### **Creating a two-way firewall using raw sockets**

IIT Hyderabad

*Dr. Kotaro Kataoka, Network Security, CS6903*

*May, 2022*

- Designed and implemented a bidirectional firewall system using raw sockets with extended rules set adaptable for all protocol layers, detection of DDoS attacks, and unbiased performance examination and evaluation
- [Project Details], [Report],

### **Secure chat communication with Openssl and Man-in-the-middle attacks**

IIT Hyderabad

*Dr. Bheemarjuna Reddy Tamma, Network Security, CS6903*

*April, 2022*

- Implemented and demonstrated a **secure peer-to-peer chat application using openssl** along with how evil Trudy(user) can intercept the chat messages to launch various attacks(Downgrade Attack by rejecting the request for TLS Encryption and MITM attack with two TLS connections at either end and Fake Certificates)
- [Project Details], [Application], [Interceptor]

### **Network Intrusion Detection System (NIDS) using Machine Learning Techniques**

IIT Hyderabad

*Network Security, CS6903*

*March , 2022*

- A machine learning approach to detect different anomalies and **attacks like DDoS, MITM, Probing attacks, and R2L**, in network systems using classical machine learning techniques like Support Vector Machine, Decision Tree, Random Forest, Naive Bayes, K-Means, and Neural Networks with sampling techniques like SMOTE to report weighted F1 score
- [Project Details], [Dataset], [Checkpoints], [Code]

### **Fake News Detection**

Kathmandu University

*PMIS Review, Volume 1, No 1*

*June 2020*

- Focused on applying NLP sentence classification to generate contextual sentence representations passed over classical machine learning classification heads to predict whether the provided sentence is fake or not with a certain degree of confidence.
- Evaluated using lexical/syntactical/grammatical/factual features based only on raw text and semantic features based on contextual representations with attentive weights.

### **Fuse Studio, Video Automation**

Kathmandu, Nepal

*Fusemachines Nepal*

*July, 2020*

- Designed and Developed a **fully automated Video and Text-to-Speech(TTS) Generation System** for Fusestudio (an in-house project), which focuses on creating a complete lecture video with subtitles given google presentations slide and audio text transcript mimicking how a person presents in a virtual presentation.
- The best sounding Mozilla TTS models used were **Tacotron2, GlowTTS, and MelGAN** with different vocoders.
- [Slide], [Script] ,[Video]

### **A Machine Learning Approach to Identify Fake News**

Kathmandu University

*Semester Project, Dr. Prakash Poudyal*

*June, 2020*

- Focused on applying NLP sentence classification to generate contextual sentence representations passed over classical machine learning classification heads to predict whether the provided sentence is fake or not with a certain degree of confidence.
- Evaluated using **lexical/syntactical/grammatical/factual features** based only on raw text and **semantic features** based on contextual representations with attentive weights.

### **A Machine Learning Approach to Detect Click baits in Online News**

Kathmandu, Nepal

*Microdegree in Deep Learning, Fusemachines Annual Journal*

*2020*

- Characterization of the raw textual data using multiple hand-crafted attributes combined with the contextual word vector representations and modeled using RNN and LSTM with attention to the classification of click-bait headlines in online news portals.

## Self Diagnosis, Computer-Aided Diagnosis (CAD)

Semester Project, Dr. Dhiraj Shrestha

Kathmandu University

2019

- A computer-aided diagnosis approach to detect potential diseases based on symptoms.
- Users were asked a series of dynamic questions (the next question depended on the previous answer) that were converted to a feature set for making inferences.
- Baseline models were Naive Bayes, multi-layered (four) deep neural networks, and Ensemble Techniques like Gradient Boosted Tree(XG-Boost) trained in detecting Tuberculosis and Hepatitis.
- [Proposal], [Code], [Report]

## Automatic Obstacle Avoidance Four wheeler

Kathmandu University

2019

- Designed and created **an obstacle avoiding self-driving car** that uses ultrasonic sound sensors directed motor modules for detection, navigation, and avoidance using Arduino.
- [Video], [Hardwares]

## Generation of National Flags using GAN

Microdegree in Deep Learning, Fusemachines

2019

- Scrapped 600 national fags of 60 different countries to train DC-GAN using Keras API for the generation of unique national fags of our own.

## Simulation of the sorting algorithms using OpenGL

Kathmandu University

2018

- Created a simple desktop application to visualize sorting algorithms like the **Bubble sort, Insertion sort, and Merge Sort** in C++ using SDL/SFML.

## RentSpace, a rental solution

Semester project, Dr. Gajendra Sharma

Kathmandu University

2017

- An android application that acts as a mediator for customers (Customer to Customer approach) to address the need to rent, lease and sell available spaces like rooms, apartments, lands, hotels, conference halls, etc., online.
- [Proposal], [Presentation], [Report]

## COURSE WORK

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1. **B. Tech.** 2016-2020  
Machine Learning, Artificial Intelligence, Data Structures and Algorithms, Algorithm and Complexity, Software Engineering, Probability and Statistics, Linear Algebra, Computer Architecture, Operating Systems, Human-Computer Interaction, Digital Signal Processing, Compiler Design, Speech and Language Processing, C, C++
2. **M. Tech.** 2021-2023  
Fundamentals of Machine Learning, Natural Language Processing, Information Retrieval, Deep Learning, Computer Vision, Network Security, Computer Networks, Recommendation Systems, Data Structure and Algorithms.
3. **Supplementary**
  - **Stanford course CS224N:** Natural Language Processing with Deep Learning 2022
  - **Hugging Face Course** (Datasets, Dataloaders, Transformers, NLP Tasks) 2022
  - DeepMind x UCL, **Introduction to Reinforcement Learning, 2015** 2019
  - **Technical Writing One**, Google Developers 2019

## CERTIFICATION

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1. **Deep Learning Institute(DLI), NVIDIA**
  - Fundamentals of Deep Learning April 6, 2022
  - Accelerating Data Engineering Pipelines February 12, 2022
  - Fundamentals of Accelerated Data Science with RAPIDS February 5, 2022
  - Accelerated Computing with CUDA Python January 29, 2022

Accelerated Computing with CUDA C/C++	January 22, 2022
2. <b>AWS Certified Machine Learning – Specialty</b> , Amazon AWS	August 31, 2021
3. <b>Complete Google Slides Course</b> -Create Stunning Slides, Udemy	May 23, 2021
4. <b>Machine Learning from Beginner to Advance</b> , Udemy	May 27, 2021
5. <b>Python for Machine Learning with Numpy, Pandas and Matplotlib</b> , Udemy	May 27, 2021
6. <b>How to win Data Science Competition: Learn from Top Kagglers</b> , Coursera	October 1, 2020
7. <b>Effective Client Communication</b> , Fusemachines, Nepal	July 23, 2020

## PARTICIPATION

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1. Symposium on Artificial Intelligence for Sustainable Development	January 29, 2022
2. Online Research Paper Writing Training conducted by NIRC	May 17, 2020
3. 3 <sup>rd</sup> National Workshop on Machine Learning and Data Science	30 July - 3 August, 2020
4. Webinar on cyber security and cyber space organised by Oxford Stem, Code For Change	June 28-30, 2020
5. Arduino Workshop, K.U. Robotics Club	April 25-28, 2018
6. Prixa Excellence Award for Project RentSpace, Android Application	June, 2017
7. Effective Manuscript Writing, Ethics and Plagarism by ACS	22 July, 2022

## VOLUNTEERING

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1. Worked as a medical volunteer for first aid in Inter College Basketball Tournament organized by Kathmandu University Student Welfare Council	2017
2. Worked as a volunteer in all Nepal Counter Strike Competitions at IT MEET 2018, organized by Kathmandu University Computer Club	2018
3. Worked as a volunteer in Annual General Meeting of Kathmandu University Youth Red Cross Circle (KUYRCC)	2019