ARNAB SINGHA

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Portfolio

PROJECTS

- **CheckMateBot:** A Vision-Guided Robotic Arm for Strategic Game Play
  ESP32, OpenCV, IoT, inverse Kinematics, Pygame, Stockfish chess engine *Ongoing, RKMVERI*
  - Working on a robotic arm that will play chess against an opponent on a physical chess board.
- **Vision-Guided Robotic Manipulation:** A Computer Vision-Integrated Robotic Arm for Real-World Object Interaction
  ESP32, OpenCV, IoT, inverse Kinematics *April 2025, RKMVERI*
  - Built a 3-DOF robotic arm that will autonomously detect objects and perform pick and place operation.
  - Used traditional computer vision methods for object detection.
  - Used trigonometry and geometry to solve the inverse kinematics of the robotic arm.
- **Object Detection using YOLO in qemu emulated Raspberry Pi with Kafka**: Object detection in a Qemu-emulated Raspberry Pi connected to a publish-subscribe system with kafka
  YOLOv11, Qemu, Kafka, Raspberry Pi, Ultralytics *May 2025, RKMVERI*
  - Emulated raspberry pi using qemu emulator and Trained YOLOv11 on a custom dataset using Ultralytics API for object detection.
  - Implemented Pub-Sub system using Kafka to send the detected image to server for further processing.
- **Chatbot: Neutron** : LLM powered chatbot
  Google Gemini, Streamlit, Langchain, ChromaDB *February 2025*
  - Used Google Gemini for response of query.
  - Implemented RAG (from pdf, text document and webpage) using Google's embedding model and ChromaDB.
- **A Comparative Study of Classification Algorithms on the EMNIST dataset:** Evaluation of ML algorithms for EMNIST dataset
  Python, Scikit-learn, Numpy, Pandas *November 2024, RKMVERI*
  - Implemented various traditional ML algorithms and a custom Two-Layer Hierarchical Softmax Model.
  - Compare the performance using metrics like Accuracy, Precision, Recall, and F1-score.

COURSEWORK

- Linear Algebra
- Probability and Stochastic Processes
- Machine Learning
- Theory of Computation
- Basic Statistics
- Computational Complexity
- Advanced Algorithm
- Blockchain, LLM, IoT
- Computer Vision
- Spectral Graphs and Algorithms
- Computational Geometry
- Deep Learning for Cyber Security
- Mining of Massive Datasets
- Computer Architecture and Organisation
- Programming in C and C++
- Programming in Java
- Data Structures and DBMS
- Computer Networks
- Artificial Intelligence and Reinforcement Learning
- Microprocessor

EDUCATION

- **Ramakrishna Mission Vivekananda Educational and Research Institute, Howrah**
  M.Sc. in Computer Science
  2024 – Present (1st year)CGPA: 7.04
- **Midnapore College (Autonomous)**
  B.Sc.(H) in Computer Science
  2021 – 2024 CGPA: 8.19
- **Midnapore Collegiate School**
  Higher Secondary
  2019 – 2021 Score: 85%

TECHNICAL SKILLS

- **Programming Languages:** C, C++, Java, JavaScript, Python, SQL
- **Frameworks:** Flask, Streamlit, OpenCv, Numpy, Pandas, Matplotlib, Pytorch, LangChain, gymnasium, sqlite, pygame
- **Tools:** Git/Github, MS Office, Oracle Database, MySql, Kafka
- **Operating System:** Windows, Linux
- **IoT and Hardware:** Microprocessor, Raspberry Pi, Arduino, ESP32, ESP8266

CERTIFICATES

- Online Certificate Course in Robotic Control Using Arduino, NIELIT Chennai
- Online Certificate Course in Python Programming, NIELIT Kolkata

ACTIVITY

- Placement Volunteer, RKMVERI, 2024-26

HOBBY

- Listening Music, Watching Movie, Listening Stories, Learning new things