SOUMYADIP KAR

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EDUCATION

Year	Degree/Exam	Department/Specialization	Institute/Board	Grades
2025	M.Tech.	Vision and Intelligent Systems (E & ECE)	IIT Kharagpur	8.96 / 10
2023	B.Tech.	Electronics & Communication Engg.	JGEC, Jalpaiguri	9.17 / 10
2019	Class XII	PCM	WBCHSE	94 %
2017	Class X	All Subjects	WBBSE	93.14 %

PROJECTS

Decomposition of a Markovian Dynamical System into Boolean Networks [Jul'24 - Present]
(M.Tech Thesis Project under Prof. Ritwik Kumar Layek, Dept of E&ECE, IIT Kharagpur)
- Developing an algorithm to construct **Boolean Networks** from given,**Transition Probability Matrix**, an important inverse problem in network inference and my goal is to achieve this using minimal representation.
- Formulated this as an optimization problem with max-entropy regularization and dimensionality reduction.
- Applied Newton's method with Conjugate Gradient (CG) to efficiently represent($\approx 95\%$) with minimal BNs.

Real-Time Wake Word Detection System Using Arduino & TensorFlow Lite [Aug'24 - Sep'24]
(Course Project -Embedded Machine Learning under Prof. Ayantika Chatterjee, ATDC, IIT Kharagpur)
- Developed a real-time voice-controlled wake word detection system with 87% accuracy.
- Integrated ML models for audio processing on microcontrollers, optimized for low-power IoT devices.

EdgeYOLO: Real-Time Object Detection on Edge Devices [Aug'24 - Sep'24]
(Course Project -Embedded Machine Learning under Prof. Ayantika Chatterjee, ATDC, IIT Kharagpur)
- Designed a object detection model for edge devices using YOLO framework on the MS COCO2017 dataset.
- Optimized model speed with a low-complexity, anchor-free object detection system for embedded applications.

EffiCompress: High-Efficiency JPEG Compression Pipeline [Oct'23 - Nov'23]
(Course Project -Image & Video Processing Lab under Prof. Prabir Kumar Biswas, E&ECE, IIT Kharagpur)
- Designed the entire JPEG compression pipeline using DCT, Zig-Zag, RLE, and Huffman Encoding.
- Achieved 68% compression rate as compared to the state-of-the-art, with only 0.13% loss in accuracy.
- Optimized blockwise processing for high-quality, efficient data compression.

SKILLS

Programming: C, Embedded C, C++, Assembly Language, RTOS.
Communication Protocols: UART, SPI, I2C, CAN, RS232.
Microcontrollers / Tools: ARM7, 8051, Arduino UNO, STM32, FreeRTOS, RISC-V, Proteus 8.
Libraries/frameworks: TensorFlow Lite, C++ STL, OpenCV, Numpy, Pandas, Keras.

CERTIFICATIONS

RISC-V Processor - RV32I Base ISA | Udemy [Sep'24]
- This course covers the RISC-V RV32I processor and 32-bit integer instructions.[Certificate]

Embedded Systems Bare-Metal Programming Ground Up^{TM} (STM32) | Udemy [Jul'24]
- The course covers firmware development on the STM32F411RE (Cortex-M4) [Certificate]

Introduction to the Internet of Things and Embedded Systems | Coursera [Aug'20]
- This course gave a detailed overview of the IoT & Embedded devices using C [Certificate]

COURSEWORK INFORMATION

- Image & Video Processing
- Deep Learning
- Pattern Recognition & ML
- Embedded Systems Design
- Computer Vision
- Statistics for ML
- Operating System Design
- Embedded ML
- Multimedia Systems

POSITION OF RESPONSIBILITY

Teaching Assistant (TA) — IIT Kharagpur
- Worked as TA for Image and Video Processing Laboratory (EC 69211) for the Autumn semester 2024-25.
- Currently working as TA for Basic Electronics Laboratory (EC 29201) for the Spring session 2024-25.