Soheil Jafrifard Bidgoli

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# Education

**MS Aston University,** Computer Science, Birmingham, UK

* Dissertation: *Keyframe Localization and Instance Segmentation in Endoscopic Videos*
* Supervisor: Dr. ZhuangZhuang Dai
* Dissertation Expected Grade: Distinction (>70%)

**BS University of Science and Technology,** Electrical Engineering, Tehran, Iran

* Thesis: *Design and Implementation of an RFID-Based Smart Lock System*
* Supervisor: Dr. Davood Arab Khabouri
* Thesis Score: 18.5/20 (4.0/4.0)

Sept 2024 – Sept 2025

Sept 2018 – Sept 2023

# Research Interests

* Artificial Intelligence and Machine Learning
* Deep Learning Architectures and Representation Learning
* Computer Vision and Visual Understanding
* Investigating the theoretical foundations of deep learning architectures, with a particular interest in representation learning, attention mechanisms, and the underlying information dynamics in neural networks.
* Robotics and Intelligent Systems
* Pursuing rigorous, mathematically grounded research in machine learning, combining principles from information theory, optimization, and statistical learning to enhance interpretability and performance.
* Multimodal and Interdisciplinary AI
* Applied AI in Real-World Domains

# Research Experience

**M.Sc. Dissertation – Aston University (Ongoing)***Keyframe Localization in Endoscopic Videos*

* Conducting MSc-level research on deep learning for keyframe detection and instance segmentation in medical endoscopic video data.
* Developing and evaluating models using **PyTorch**, **Detectron2**, **OpenCV**, and datasets such as GIANA and Hyper-Kvasir.
* Targeting publication and exploring industrial application in consultation with **Endoscope-i** (pending confirmation).

**B.Sc. Capstone Project – Iran University of Science and Technology***RFID-Based Smart Lock System*

* **Researched communication protocols** and security vulnerabilities in RFID systems to inform the design of a custom smart lock architecture tailored to low-cost embedded applications.
* Designed and built the system using **AVR microcontrollers** (Atmega8, ATtiny13) and **Altium Designer**, applying hardware knowledge to prototype a fully functional locking mechanism.
* Developed real-time access control software in **C++**, implementing **RF signal demodulation**, EEPROM data handling, and **interrupt-driven authentication logic** for precise card validation.

**Publications**

**Soheil Jafarifard Bidgoli**, *Keyframe Localization and Instance Segmentation in Endoscopic Videos***. Manuscript in preparation**, targeting submission to a computer vision or medical imaging conference/journal by [e.g., September 2025].

# Technical Skills

* **Programming**: Python (PyTorch, Detectron2, OpenCV, matplotlib), Java, C++, JavaScript, HTML/CSS, Node.js, MATLAB, PISM
* **Embedded Systems**: AVR, ARM microcontrollers, Atmega8, ATtiny13
* **Tools & Platforms**: MySQL, Git, Altium Designer, Microsoft Office, Google Colab

# Teaching Experience Teaching Assistant – Iran University of Science and Technology Sep 2022 - June 2022 *Electrical Machines I & II* | Dr. Alireza Jalilian

* Assisted in preparing lecture materials, solved example problems during tutorials, and supported in-class demonstrations.
* Helped design quizzes and midterm exams and participated in grading with detailed feedback.
* Provided one-on-one support to students on complex topics like synchronous machines and transformers.

# Work Experience

**Electrical Engineer Intern – Nira Systems Company**, Tehran, Iran May 2022-Sep 2022  
*Full-time Internship*

* Assisted in circuit design, multi-layer PCB assembly, and hardware diagnostics using **Altium Designer**, oscilloscopes, and other lab tools.
* Debugged embedded firmware in **C** for **ARM-based microcontrollers**, contributing to real-time system testing and co-design of industrial sensor modules.

# Academic Projects Epitopes Classification using Machine Learning [GitHub](https://github.com/Soheil-jafari/epitope-classification)

* Designed a predictive machine learning pipeline using **Python (scikit-learn, XGBoost)**, integrating **SMOTE** for class balancing and **PCA** for dimensionality reduction to handle imbalanced biomedical data.
* Implemented end-to-end preprocessing, training, and evaluation stages, following a **research-style pipeline** emphasizing model interpretability and reproducibility.

**Transformer-Based Multivariate Time Series Forecasting** [GitHub](https://github.com/Soheil-jafari/deep-transformer-multivariate-forecasting)

* Developed a deep learning pipeline in **PyTorch** using Transformer Encoders to predict future values in multivariate sequences using attention and positional encoding.
* Implemented full sequence preprocessing, model training, and visualization for real-world forecasting scenarios.

**Image Classification with CNNs on CIFAR-10** [GitHub](https://github.com/Soheil-jafari/cifar10-cnn-classifier)

* Conducted comparative experiments on convolutional neural network (CNN) architectures using **Python with PyTorch**, exploring accuracy vs. regularization trade-offs.
* Achieved 85%+ test accuracy through hyperparameter tuning and architectural adjustments guided by **literature-informed techniques**.

**Spatiotemporal Video Segmentation Using Vision Transformers and Spectral Clustering** [GitHub](https://github.com/Soheil-jafari/video-cut-segmenter/tree/main)

* Built a research-grade unsupervised segmentation pipeline using DINO-ViT and spectral clustering to analyze visual patterns in video data.

**Vinyl Vault – E-Commerce Web Application for Vinyl Records** [GitHub](https://github.com/minankk/TEAMPROJECT_TEAM2)

* Built a vinyl record marketplace in a team of 6 using **React**, **Node.js**, **Express**, and **MySQL**, with features including product filtering, wishlist, cart, and secure checkout.
* Designed and implemented responsive UI components with **HTML**, **CSS**, and **JavaScript**, integrating frontend and backend for seamless user experience.

# Certifications

* Advanced Python Programming
* Intro to Machine Learning
* Intro to Deep Learning
* ARM STM32 Embedded Systems
* AVR Microcontrollers
* PCB Assembly

# Languages

**English**: IELTS 7.0 (Dec 2023)

**Persian**: Native

# References

* **Dr. Zhuang Zhuang Dai**  
  Lecturer in Applied AI & Robotics, School of Computer Science and Digital Technologies

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* [**Ms Abinaya Sowriraghavan**](https://research.aston.ac.uk/en/persons/abinaya-sowriraghavan)   
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