

## Research Interests

Deep Learning • Computer Vision

## Education

**Ph.D. | Engineering Science (ENSC)**

Simon Fraser University | 2021 - Present

**Ph.D. Taken Courses**

ENSC 813 - Deep Learning Systems

ENSC 801 - Linear System Theory

ENSC 802 - Stochastic Systems

ENSC 808 - Information Theory

ENSC 424 - Multimedia Communications

ENSC 895 - Digital Image Processing

**M.Sc. | Electrical Engineering**

University of Tehran | 2017 - 2020

Thesis: Control of Computer Mouse

Using Hand Gesture Recognition

**B.Sc. | Electrical Engineering (Control)**

Amirkabir University of Technology

(Tehran Polytechnic) | 2012 - 2017

Thesis: Driver's Consciousness Level Analysis

Using EEG Signals

**Online Courses on Coursera**

Neural Networks and Deep Learning (Certificate)

Improving Deep Neural Networks (Certificate)

Structuring Machine Learning Projects (Certificate)

Convolutional Neural Networks (Certificate)

Convolutional Neural Networks in TensorFlow

Introduction to TensorFlow

Sequence Models

Machine Learning

## Skills

**Programming Languages**

Proficient: Python

(PyTorch • TensorFlow • OpenCV)

Advanced Beginner: MATLAB • C/C++

**Languages**

English: Academic IELTS (2021): 7.5/9

(Listening: 8.5, Reading: 8, Writing: 6.5, Speaking: 7)

Persian (Farsi): Native Speaker

## Teaching Experience

Teaching Assistant at Simon Fraser University:

**ENSC405W Capstone A**

**ENSC204 Graphical Communication**

Teaching Assistant at Neuromatch Academy:

**Computational Neuroscience** (Certificate)

**Deep Learning** (Certificate)

Head Teaching Assistant at University of Tehran:

**Neural Networks and Deep Learning**

Designing Projects, Managing TA Sessions

**Electronic 1**

**Electronic 3**

## Publication

**Base Layer Efficiency in Scalable Human-Machine Coding**

Yalda Foroutan, Alon Harell, Anderson de Andrade, Ivan V. Bajić

Submitted in ICIP 2023

The base layer used for machines is more compressible than the content required for human viewing. In state-of-the-art scalable human-machine image codec, the base layer for obj. detection and instance seg. is improved by 20-40% in BD-Rate.

**Rate-Distortion Theory in Coding for Machines and its Applications**

Alon Harell, Yalda Foroutan, Nilesh Ahuja, Parual Datt, Bhavya Kanzariya,

Srinivasa Somayaulu, Omesh Ticko, Anderson de Andrade, Ivan V. Bajić

Submitted in TPAMI 2023

In collaborative intelligence, an AI-based sub-model is run on the edge device while the remaining model runs on the cloud. We compare rate-distortion performance of multiple choices for either the cut point (where the model is split) or the distillation point (where the loss function is calculated).

**VVC+M: Plug and Play Scalable Image Coding for Humans and Machines**

Alon Harell, Yalda Foroutan, Ivan V. Bajić

Accepted by ICME 2023

Using the efficient base layer to improve human viewing is challenging. A preview image is generated from the base layer using a synthesis model. The difference between the input and the preview images is then compressed using VVC.

**Conditional and Residual Methods in Scalable Coding for Humans and Machines**

Anderson de Andrade, Alon Harell, Yalda Foroutan, Ivan V. Bajić

Accepted by ICME 2023

**Control of Computer Pointer Using Hand Gesture Recognition in Motion Pictures** [arXiv]

Yalda Foroutan, Ahmad Kalhor, Saeid Mohammadi Nejati, Samad Sheikhaei

A dataset of 6720 images for hand gestures is collected. Deep models are utilized to develop a hand gesture detection system for controlling the computer mouse.

## Research Experience

**Research Assistant at Simon Fraser University** | Feb 2022 - Apr 2023

SFU Multimedia Laboratory, Ivan V. Bajić

I worked on scalable image codecs for both humans and machines and focused on enhancing the efficiency of base and enhancement layers. I gained advanced proficiency in PyTorch and made significant contributions to four research papers.

**Research Assistant at University of Tehran** | 2018 - 2020

Advanced Circuits for Data Communication Laboratory

## Selected Projects

**Project of ENSC 813 - Deep Learning**

Finding the Minimum Bitrates for a Computer Vision Task (Python)

**Project of ENSC 424 - Multimedia Communication**

Evaluating the Efficiency and Limitations of CANF-VC, the State-of-the-Art Learnable Video Compression (Python)

**Seminar of ENSC 808 - Information Theory**

Presentation and Proving Equations of Information Bottleneck Paper

**Project of ENSC 895 - Digital Image Processing**

Breast Cancer Segmentation (MATLAB)

**Other Python Projects**

Design of a CNN Classifier for Fashion MNIST Dataset

Implementation of RNN for Stock Market Prediction

Text Generation Based on Shakespeare's Book with RNN Networks

DCGAN, WGAN, ACGAN Implementations