Milad Mirjalili

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RESEARCH INTERESTS

- Machine Vision (Motion Analysis, Object Recognition, Action recognition, Augmented Reality)
- Machine Learning (Supervised Learning, Unsupervised Learning, Reinforcement Learning)
- Deep Learning (Convolutional Neural Networks, Generative AI, Generative Adversarial Networks)
- Image Processing
- Video Processing
- Signal Processing

EDUCATION

- **M.Sc. in Electrical Engineering**　　　　　　　　　　　　　　　　　　　　　　2018 - 2021
  - Department of Electrical Engineering, **KNT University of Technology**
  - GPA: 17.21/20 (**3.77/4**)

- **B.Sc. in Electrical Engineering**　　　　　　　　　　　　　　　　　　　　　　2012 - 2017
  - Department of Electrical Engineering, **University of Shiraz**
  - GPA: 15.27/20 (**3.06/4**)

RESEARCH EXPERIENCE

- **Developing a variable-size adaptive block matching motion estimation algorithm**
  - Using Python, I Created a method for block matching motion estimation (ME), with a focus on variable-size blocks. First, I designed a fast and efficient way to automatically generate blocks with different shapes and sizes according to the identified location and direction of movement. Next, by utilizing adaptive search tools, (e.g. the search window size selection, global motion compensation, changing reference frame), I attempted to decrease the computation load while maintaining the quality of ME.
  - More details on my weblog.
  - Supervisor: Dr. Amir Mousavinia (moosavie@kntu.ac.ir)

- **Implementing RGB to gray scale converter and Gaussian blur filter using VHDL**
  - I implemented RGB to grayscale converter and Gaussian blur using VHDL. First, I calculated a weighted sum of image pixels to create a grayscale image. Second, I designed the filter by implementing the process of convolution by shifting a Gaussian kernel on an image.
  - More details on my weblog.
  - Supervisor: Dr.Hossein Hosseini-Nejad (hosseini_nezhad@kntu.ac.ir)

- **Designing digital to analog converter (DAC) and Analog to digital converter (ADC) using Cadence**
  - Using Cadence in two different projects, I implemented 10-bit current steering DAC and 5-bit Flash ADC in CMOS, 0.18μm technology. I selected the width and length of transistors based on the required design criteria, such as spurious-free dynamic range (SFDR).
  - More details on my weblog.
  - Supervisor: Dr.Hossein Shamsi (shamsi@eetd.kntu.ac.ir)

- **Designing and creating a portable solar battery charger using AVR**
  - Using AVR, I designed and created a portable battery charger containing three solar cells arranged in parallel. I used the LM2576 regulator to bring the panels' voltage and current to the desired level. I also used ATMEGA8 to display current and voltages on an LCD.
  - More details on my weblog.
  - Supervisor: Dr. Mehdi Miri (miri@shirazu.ac.ir)

- **Designing and creating a signal jammer**
  - In this project, I aimed to create a circuit to block undesired signals. The selected range of frequency was between 80 to 110 MHz. I used BC337 transistor to amplify the signal and a variable inductor and capacitor to adjust frequency.
  - More details on my weblog.
  - Supervisor: Dr. Mehdi Miri (miri@shirazu.ac.ir)

- **Simulating the performance of a PIN diode using Silvaco**
  - I aimed to simulate the function of a PIN diode at different voltage and doped levels using Silvaco. I analyzed the effect of different variations in doping and voltages in the operation of this device by inspecting various plots, such as hole concentration and electric field.
  - More details on my weblog.
  - Supervisor: Dr. Mehdi Miri (miri@shirazu.ac.ir)

OTHER PROJECTS

- **Implementing bitcoin mining**
  - Using Python, I performed calculations for creating a block header and guessing a random number to make the result lower than the target value.
  - More details: [1](1), [2](2)

- **Software for Optical Character Recognition (OCR)**
  - I implemented a commercial program to extract text information from catalogs. I used OpenCV to extract regions of interest and preprocess images. For example, I used a series of morphological transformations, such as the opening to detect horizontal and vertical lines. Finally, I used tesseract for OCR.
  - More details on my weblog.

- **Software for managing patients' medical insurance information**
  - Using Python, I developed a commercial software for registering patients' info. The user interface was built using the PYQT5 library, and the data storing and reporting were done using the sqlite3 module and Pandas library
  - More details on my weblog.

- **Software for extracting speaking parts from a movie based on the subtitle file**
  - I developed a commercial software for extracting talking parts from a movie based on subtitle timing and generating new subtitle files for that new video. Various encoding settings can be modified, such as using HEVC or AVC.
  - More details on my weblog.

PUBLICATIONS

1. "Efficient Block Matching Motion Estimation Using Variable-Size Blocks and Predictive Tools" (Submitted)
   Mirjalili M, Mousavinia A

2. "Deep Learning-Based Approach for Optimal Block Size Determination in Block Matching Motion Estimation" (In Preparation)
   Mirjalili M, Mousavinia A

PRESENTATIONS

1. Adaptive Block Matching Motion Estimation
   Mirjalili M
   Presentation video,
   Presentation slides
   Recognized the best seminar in 5th Student Seminar on Electrical and Computer Engineering Innovation 2020

2. In this video, I discuss the fundamentals of bitcoin mining.

3. In my YouTube channels, I tried to show different practical usage of computer vision in real life, such as colorizing black and white images, object detection using haar features, and creating a virtual pen using OpenCV.

INTERNSHIPS

- **Intern** at **Khane Sakhtafzar**, **Shiraz, Iran**   2016
  I learned to read computer circuits schematics, how they're operating, and testing different electrical components. Additionally, I got familiar with the safety protocols during working in an industrial environment.

COMPUTER SKILLS

- **Programming**: Python, MATLAB, C, VHDL, Java
- **Libraries**: OpenCV, Pandas, TensorFlow, scikit-learn, NumPy, Matplotlib, Seaborn, SciPy

LANGUAGE

- **English**: TOEFL iBT score: 100 (Reading: 28 Listening: 27 Speaking: 21 Writing: 24)
- **Persian**: Native.

CERTIFICATIONS

- **Advanced Computer Vision with TensorFlow (2022)**, Coursera
- **Convolutional Neural Networks (2022)**, Coursera
- **Neural Networks and Deep Learning (2022)**, Coursera

REFERENCES

- Master's Thesis Supervisor | Dr. Amir Mousavinia moosavie@kntu.ac.ir; +98 -21-84062228
- Bachelor's Thesis Supervisor | Dr. Mehdi Miri miri@shirazu.ac.ir; +98 -71-36133190

- Course Project Supervisor | Dr. Hamid Abrishami Moghaddam moghaddam@kntu.ac.ir; +98 -21-84062229