

# Abdelrahman Ahmad Saeed | Computer Vision Engineer

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Mobile: (+20)1552676775

Email: eng.abdelrahman.ahmad@gmail.com

Linkedin: <https://www.linkedin.com/in/abdelrahman-sdc/>

Github: <https://github.com/Abdelrahman350>

Kaggle: <https://www.kaggle.com/abdelrahman351>

Military Service Status: Completed

## Education

- **MSc:** Doing Master degree in **Flight Mechanics and Control** in **Aerospace Engineering** – Cairo University (2019 – present).
- **GPA:** 3.5
- **BSc** from Faculty of Engineering - Cairo University- Aerospace Engineering.
- **Graduation project** Multivariate optimization of rocket engines using particle swarm optimization algorithms (Distinct).
- **Relevant courses:** Probability and statistics and neural networks.

## Master Thesis

- Sensor Fusion-Based Multi-Object Tracking, where Bayesian statistics is used in sensory data fusion and AI-based models are used to process and filter information from various sensors like radar, lidar and camera.

## Experiences

- Computer Vision Researcher in Cyshield (January 2024 – present).
- Computer Vision Researcher in the American University in Cairo (AUC) (June 2023 – present).
- Computer Vision Researcher in AvidBeam (January 2022 – December 2023).
- Computer Vision Researcher intern in AvidBeam (October 2021 – January 2022).
- Artificial Intelligence 9-month professional training by ITI (2021).
- Contributed to the book "Machine Learning: A Probabilistic Perspective".

## Projects

### COMPUTER VISION

Pedestrian Intention Estimation using Spatio-Temporal Modelling (AUC).

- In this project, a transformer-based model was developed from scratch that utilizes spatio-temporal models to use RGB videos, optical flow and time-series data to predict the intention of a pedestrian.
- A state-of-the-art performance was achieved, and a journal paper was written to release those results (To be accepted).

Scene text recognition (AvidBeam).

- In this project, a transformer-based model was developed from scratch and an open-source checkpoint was used to get a high accurate weights to predict 95 classes of charecters include capital and small English alphabets and numbers.
- This model was converted to ONNX, then optimized on CPU using OpenVino, and optimized on GPU using Nvidia TensorRT.
- A full C++ TensorRT inference pipeline was developed from scratch.
- This model was deployed using Nvidia DeepStream (C++).

Faces pose estimation and landmark detection (AvidBeam).

- In this project, a model was developed from scratch and trained to learn the 3D Morphable Models (3DMM) and 3D facial geometry, including 3D alignment and face orientation.
- This model was converted to ONNX, then optimized on CPU using OpenVino, and optimized on GPU using Nvidia TensorRT.

Face attributes prediction and age estimation (AvidBeam).

- In this project, a model was developed from scratch and trained to predict some attributes from faces' images and accurate age estimation based on SOTA condor loss function.
- This model was converted to ONNX, then optimized on CPU using OpenVino, and optimized on GPU using Nvidia TensorRT.

Single Shot Multi-box detector for autonomous driving (ITI – Affectiva).

- In this project, SSD was trained using MobileNetV2 as backbone and focal loss for object detection on pascal VOC dataset.

DSTL imagery satellite competition on Kaggle using Unet (master's course).

- In this project satellite images with 20 channels were given and it was required to classify and segment every object from 10 classes present in those images.
- The proposed solution is to train multiple Unet models to get masked images for each class.
- Jaccard index and Dice score were used for evaluation.

YOLO implementation from scratch (TensorFlow).

- In this project a function was developed to filter low probability bounding boxes.
- Non-max suppression to eliminate overlapping boxes using intersection over union metric.

Implementing Unet from scratch (TensorFlow).

- The implementation of Unet included implementing encoder, decoder and skip connections using model subclassing in TensorFlow.

## Technical Skills

### COMPUTER VISION

- Convolution networks, depth-wise separable convolution, and vision transformers.
- Image preprocessing, classification, object detection and segmentation.
- Statistical shape modeling (3D face morphable models).

- Generative adversarial networks, and autoencoders.
- Saliency maps, and grad-cams.
- **Courses and self-learning:** Advanced Computer Vision with TensorFlow, coursera (1 Month)

## DEEP LEARNING

- Regularization techniques (L1 & L2 – dropout – early stop).
- Countering vanishing and exploding gradients techniques (batch normalization – gradient clipping).
- Optimization algorithms (SGD – momentum based SGD – adaptive learning rate SGD).
- Distillation.
- One-shot learning and zero-shot learning.

## FRAMEWORKS

- Development frameworks (PyTorch – TorchVision – TensorFlow).
- GPU deployment frameworks (TensorRT – DeepStream – Gstream).
- CPU deployment framework (OpenVino).

## MLOPS

- Docker (create custom images).
- VSCode development containers.
- Hydra framework for configuring deep learning files.
- LMDB and HDF5 databases for deep learning datasets.

## languages

- English: very good (written and spoken).