Aveen Hussein

aveen.hussein@niuitmo.ru |Vyazemskiy Lane, 5-7 | Saint Petersburg, 197022| 7 (985) 794-9129| github.com/aveen007

EDUCATION

ITMO University Saint Petersburg, Russia
Candidate for a Master's in System and Applied Software Engineering June 2026 (expected)

- **Thesis Topic:** Gamification of Urban Planning for Traffic Simulation and Prediction with Professor Ivan Perl.
- **Relevant Coursework:** Multi-level organization of software, System Software, DevOps, Architecture of high-load applications.

Higher Institute of Applied Sciences and Technology Damascus, Syria
B.Eng. in Software Engineering and Intelligent Systems *October 2019 – June 2023*

- **Relevant Coursework:** Machine Learning, Natural Language Processing, Computer Vision, Computer graphics.

ACADEMIC EXPERIENCE

Institute of Laser Technology (ILT ITMO) Saint Petersburg, Russia
Computer Vision Engineer (Internship) *Oct. 2024 – Jan. 2025*

- Instance segmentation using Yolov8 training.
- Stable diffusion for synthetic image generation to use for dataset augmentation.

Graduate Research Assistant Jan. 2025 – Present

Developed and integrated a monitoring and control system for automation of production processes using the example of laser welding, the system consisted of:

- Instance segmentation using Yolov8 on a custom data set to automatize identifying weld defects.
- Using optical character recognition (OCR) and OpenCV edge detection algorithms to collect data from weld images.

COSM Lab Saint Petersburg, Russia
Graduate Research Assistant Sept. 2024 – Present

- Developing a large-scale online city-building simulator.

SELECTED PROJECTS

Intelligent Weld Inspection: Machine Learning-Driven Defect Detection for Automated Laser Welding Quality Control *Oct-2024, present*

- Developed an automated weld defect detection system using **YOLOv8 instance segmentation**, achieving **97.5% accuracy** in defect classification and geometric measurements.
- Addressed data scarcity by fine-tuning **Stable Diffusion models** to generate **4,537 synthetic weld images**, improving model generalization for rare defects. Published findings in:
  - *Augmentation of Laser Welding Dataset through a Combination of Evolutionary Optimization and Deep Learning*. GECCO 2025.
- Designed a **computer vision pipeline** for weld geometry analysis, extracting key measurements (width, depth, misalignment) with **sub-millimeter precision**.
- Published full pipeline research in:
  - *Intelligent Weld Inspection: Machine Learning-Driven Defect Detection for Automated Laser Welding Quality Control*. FLAMMN 2025 (accepted).

Self-driving car in a simulated environment using deep-reinforcement learning *March 2022,Sept 2023*

- Led multidisciplinary research and coordinated the work with 6 supervisors from diverse backgrounds in Computer Vision, Graphics, AI, and Systems Engineering.
- Achieved a 94% evaluation rating for the project, which was recognized as the top graphics initiative within the institution for a bachelor's thesis.
- Designed and developed a custom physics system by simulating 6 forces that affect the car. Simulated the car with 202 Lidar sensors and 2 Cameras using Unity's ML-Agents.
- Implemented a dynamic traffic system using a way-point algorithm and a pool system and applied it to add up to 30 cars and 30 passengers.
- Compared algorithms DQN and DDQN for car control and proposed a reward function and tested it with success in achieving 30 km/h average car speed after training using DQN.
- Implemented a first-ever integration of cutting-edge computer-vision algorithms CLR-NET and YOLO-v8 into unity to allow for lane and object detection.
- Integrated Open-CV library into unity by creating a custom side channel to connect the training and the simulation.
- Designed and implemented user interfaces to easily track the lane detection and object detection process in real time.

SKILLS

Programming Languages. C#, C++, C, Assembly, Python, Java, JavaScript, PHP
Technologies. PyTorch, Docker, Unity, Unreal Engine, Pandas, Dask, Statsmodels, scikit-learn, Flask
Languages. Arabic (Native), English (C2), Russian (B2), French (B1)