Bahri Batuhan Bilecen

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Education

- **Bilkent University** — Ankara, Türkiye
  Master of Science in Computer Engineering — *2022-2024*
- **Middle East Technical University (METU)** — Ankara, Türkiye
  Bachelor of Science in Electrical and Electronics Engineering — *2018-2022*

Experience

- **Graduate Researcher** — Ankara, Türkiye
  Bilkent Generative Deep Learning Lab — *September 2022 - Present*
  - Investigated generative networks (GANs, diffusion models) on image restoration and editing problems, under the supervision of Asst. Prof. Aysegul Dundar. Currently working on 3D GAN inversion for image editing and implicit neural representations.
  - Mentored undergraduate students for research work. Voluntarily reviewed manuscripts submitted to respectable conferences and journals (*IEEE TIP, ECCV*, etc.).
- **Research Engineer** — Ankara, Türkiye
  ASELSAN Research — *August 2022 - Present*
  - Experienced in both low and high-level computer vision. Focused on inverse problems in image processing (denoising, deblurring, super-resolution, inpainting), computational imaging, compressed sensing and statistical signal processing on acoustic systems, neural network optimization (pruning, knowledge distillation), efficient person re-identification and object detection, under the supervision of Dr. Alper Gungor and Dr. Mustafa Ayazoglu.
  - Took part in the national defense industry, volunteered in mobility projects, and contributed to the insider knowledge of the company. *ASELSAN Inc.* is among the top 50 defense companies as of 2024.
- **Part-Time Research Engineer** — Ankara, Türkiye
  ASELSAN Research — *November 2021 - August 2022*
  - Developed mobile device-friendly, deep learning-based super-resolution networks, under the supervision of Dr. Mustafa Ayazoglu.
  - Participated in CVPR and ECCV workshops as a senior student as an author.
- **Undergraduate Researcher** — Ankara, Türkiye
  METU Center for Image Analysis (OGAM) — *July 2021 - June 2022*
  - Conducted comparative performance analyses on frame-based and event-based optical flow algorithms, under the supervision of Prof. Aydin Alatan.
  - Performed controlled hands-on experiments on a DAVIS event camera, testing its dynamic range and latency.
- **Part-Time Computer Vision Engineer** — Ankara, Türkiye
  STM Defence — *October 2020 - April 2021*
  - Worked on real-time background subtraction and object-tracking solutions for unmanned aerial vehicles (UAVs).
  - Refactored some C++ code for real-time optimization, which is now used in the company's UAV products.
- **Engineering Intern** — Ankara, Türkiye
  STM Defence — *August 2020 - September 2020*
  - Investigated image signal processing pipelines and image dehazing methods.
  - Performed a literature search on classical image contrast enhancement algorithms and performed controlled experiments to optimize their hyper-parameters.

Projects

- **ALKAN WASP & SAKA** *March 2020 - September 2021*
  - Built custom-frame and autonomous quad-copters with ALKAN UAV Team, named Wasp and Saka, as finalists of 5th and 6th TUBITAK *(The Scientific and Technological Research Council of Türkiye)* International Unmanned Aerial Vehicle Competitions, respectively. The competition was held under TEKNOFEST.
  - Learned the basics of *ArduPilot, MAVLink, DroneKit, ROS, and Gazebo*. Led the team with software setups and prepared tutorials. Modified ArduPilot C++ source code to add our custom flight modes.

- **University Departmental Projects** *2019 - Present*
  - **Computer Architecture:** Designed a fully custom 16-bit instruction set architecture and a suitable multi-cycle CPU with *Verilog*. (**project page**)
  - **Microprocessors:** Designed a frequency-based motor controller with ARM Cortex M4. Wrote the code in *ARM Assembly*, using the Thumb 2 instruction set. (**project page**)
  - **Logic Design:** Designed a point-of-sale device using Cyclone V FPGA. Utilized *Verilog* and wrote a VGA protocol handler from scratch. (**project page**)
  - **Digital Signal Processing:** Implemented an algorithm in *MATLAB* which embeds any image into a spectrogram using short-time Fourier transforms.
  - **Advanced Signal Processing & Data Science:** Investigated SVD and applications to classical and deep priors in inverse problems in image restoration. (**doc link**)
  - **Neural Networks:** Derived the backpropagation equations for MLP and RNN, and implemented from scratch in Python. (**project page**)

Honors & Scholarships

- Given a full scholarship by Bilkent University, including the tuition fee.
- Placed on High Honor and Honor Roll of METU every semester.
- Given a merit scholarship by METU Development Foundation (2018-2022).
- Given a merit scholarship by The Ministry of National Education of Türkiye (2010-2018).

Selected Publications

- Alper Güngör, **B. Batuhan Bilecen**, Tolga Çukur. *"Bayesian Conditioned Diffusion Models for Inverse Problems"*. In submission.
- **B. Batuhan Bilecen**, **A. Berke Gökmen**, Ayşegül Dündar. *"Dual Encoder GAN Inversion for High-Fidelity 3D Head Reconstruction from Single Images"*. In submission. (**project page**)
- **B. Batuhan Bilecen**, Yiğit Yalın, Ning Yu, Ayşegül Dündar. *"Reference-Based 3D-Aware Image Editing with Triplanes"*. In submission. (**project page**)
- Ahmet Burak Yıldırım, Hamza Pehlivan, **B. Batuhan Bilecen**, Ayşegül Dündar. *"Diverse Inpainting and Editing with GAN Inversion"*, IEEE/CVF ICCV, 2023. (**project page**)
- Alperen Kalay, **B. Batuhan Bilecen**, Mustafa Ayazoğlu. *"Towards Clip-Free Quantized Super-Resolution Networks: How to Tame Representative Images"*, BMVC, 2023.
- **B. Batuhan Bilecen** and Mustafa Ayazoğlu. *"Bicubic++: Slim, Slimmer, Slimmest - Designing an Industry-Grade Super-Resolution Network"*, NTIRE Workshop @ IEEE/CVF CVPR, 2023. **(Challenge 1st place)** (**project page**)
- Mustafa Ayazoğlu and **B. Batuhan Bilecen**. *"XCAT - Lightweight Quantized Single Image Super-Resolution Using Heterogeneous Group Convolutions and Cross Concatenation"*, AIM Workshop @ ECCV, 2022.
- **B. Batuhan Bilecen**, Alparslan Fişne, Mustafa Ayazoğlu. *"Efficient Multi-Purpose Cross-Attention Based Image Alignment Block for Edge Devices"*, Embedded Vision Workshop @ IEEE/CVF CVPR, 2022.

Skills & Interests

- **Languages:** Turkish (Native), English (TOEFL iBT: 104/120).
- **Tools:** Python, C, C++, MATLAB, Bash, JavaScript, TensorFlow, Keras, PyTorch, Robot Operating System (ROS), Verilog, ARM assembly, LaTeX.
- **Related Academic Courses:** Mathematical Foundations of Data Science, Linear Algebra, Probability and Statistics, Advanced Signal Processing, Signals and Systems, Digital Signal Processing, Computer Vision, Deep Learning, Deep Generative Networks, Computer Architecture, Computer Graphics, Logic Design, Microprocessors, Operating Systems, Data Structures, Digital Electronics, C Programming.
- **Hobbies:** Avid classical guitar player, currently learning Gran Vals by Tarrega. Interested in the history of architecture and mobile photography. Enjoys reading novels.