

# MERT ALBABA

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## EDUCATION

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### **Bilkent University**

*September 2019 - June 2021*

M.S. in Mechanical Engineering

Ranked 5th among 100000 graduate students in National Graduate Examination in Turkey

Academic Excellence Scholar

Overall CGPA: 3.68/4.00

### **Bilkent University**

*September 2015 - June 2019*

B.S. in Electrical & Electronics Engineering

Academic Excellence Scholar, given to 100 most successful students among 2.5 million participants

Research Excellence Award

Ranked 20th among 2 million students in National University Examination

Overall GPA: 3.14/4.00

## RESEARCH EXPERIENCE

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### **Systems Laboratory, Bilkent University**

March 2017 - Present

*Research Assistant*

- Under the supervision of Prof. Yildiray Yildiz, doing research on reinforcement learning and game theory.
- Modeling human behaviors through the combination of game-theoretical approaches and deep reinforcement learning methods.
- Developing human-like autonomous driving policies with the utilization of stochastic reinforcement learning methods.

### **Sedat Ozer's Laboratory, Bilkent University**

January 2020 - December 2020

*Research Assistant*

- Under the supervision of Prof. Sedat Ozer, researched object detection systems.
- Proposed a novel object detection approach, which combines single-stage and double-stage detectors.
- Achieved state of the art performance in object detection in MS-COCO dataset.

### **Cicek Laboratory, Bilkent University**

June 2018 - August 2019

*Undergraduate Research Assistant*

- Under the supervision of Prof. Oznur Tastan and Ercument Cicek, doing research on deep learning and bioinformatics.
- With deep learning methods, discovering drug-target relationships and reusability of drugs for other diseases.
- Finding synergistic cancer-preventing drug pairs through deep learning methods.

## JOURNAL ARTICLES

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Berat Mert Albaba and Yildiray Yildiz, "Driver Modeling through Deep Reinforcement Learning and Behavioral Game Theory," in IEEE Transactions on Control Systems Technology, 2021.

Berat Mert Albaba and Yildiray Yildiz, "Modeling Cyber-Physical Human Systems via an Interplay Between Reinforcement Learning and Game Theory," in Annual Reviews in Control, 2019.

## CONFERENCE PROCEEDINGS

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Berat Mert Albaba, Negin Musavi, and Yildiray Yildiz, "A 3D Modeling Framework for the Application of Unmanned Aircraft Systems Integration," IEEE Conference on Control Technology and Applications (CCTA), 2021.

Berat Mert Albaba and Sedat Ozer, "SyNet: An Ensemble Network for Object Detection in UAV Images," in 25th International Conference on Pattern Recognition (ICPR), 2020.

Mert Albaba, Yildiray Yildiz, Nan Li, Ilya Kolmanovsky, and Anouck Girard, "Stochastic driver modeling and validation with traffic data," in American Control Conference (ACC), 2019.

## PREPRINTS

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Berat Mert Albaba, "Predicting Human Behavior using Static and Dynamic Models," MSc Thesis, 2021.

Berat Mert Albaba and Yildiray Yildiz, "GP-k: Learning Model for the Time-Extended Human-Human Interactions," 2021.

Berat Mert Albaba, Negin Musavi, and Yildiray Yildiz, "A 3D Game Theoretical Framework for the Evaluation of Unmanned Aircraft Systems Airspace Integration Concepts," 2021.

## WORK EXPERIENCE

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### **ATLAS Unmanned Systems**

August 2018 - August 2019

*Research Intern*

*Turkey*

- By combining SLAM and deep learning methods, developed a program that converts image series taken by a UAV into a orthographic map
- Implemented the developed program on Nvidia Jetson TX2.

### **ASELSAN**

July 2018 - September 2018

*Engineering Intern*

*Turkey*

- Utilized deep learning for image processing applications in avionics.
- Tested the avionics systems used in the plane developed by TAI, by following MIL-STD.
- Wrote the codes of the software test software being used in ASELSAN.

### **Turkish Aerospace Industries (TAI)**

May 2017 - September 2017

*Electrical and Computer Engineering Intern*

*Turkey*

- Developed an autopilot system for planes by utilizing deep learning methods (DQN).
- Coded drivers of the plane developed by TAI and integrated them with RTOS (Real Time OS).
- Designed a communication interface for sensors of the plane developed by TAI with FPGA.

## PROJECTS

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### **Composing Music with Recurrent Generative Adversarial Neural Networks**

- I have developed a program to compose original music pieces with several instruments such as piano, violin, and saxophone.
- To develop this, a generative adversarial neural network, whose discriminator and generator parts are recurrent neural networks (RNN-GAN), was used.
- Developed program can also produce music according to the selected emotional theme, and the instruments that appear in the generated music can also be selected by the user.

### **Image Detection and Restyling with Generative Adversarial Neural Networks**

- By using deep learning, developed a program that restyles the given image of the user according to the style of a painter selected (Van Gogh's, Monet's, etc.).
- For the restyling process, a deep convolutional generative adversarial network (DC-GAN) is used.
- Additionally developed a program that predicts the painter of the given painting by using convolutional neural networks (CNN).

### **Cryptocurrency Stock Price Prediction with RNN**

- I have developed a program that could predict the future stock prices of selected cryptocurrencies.
- For prediction, I have trained a deep recurrent neural network with past values of cryptocurrencies obtained from coinmarketcap.com.
- The accuracy of the program is approximately 85% for the test data and 83% for the training data.

### **Chess Player Developed with Reinforcement Learning**

- I have developed a chess-playing program using reinforcement learning which learned to play chess with trial and error.
- As a deep reinforcement learning method, deep recurrent Q-Learning (DRQN) was used.

## **HONORS & AWARDS**

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### **Ranked 5th in the National Graduate Education Entrance Exam (ALES)**

- Ranked 5th in National Graduate Education Entrance Exam (ALES) among university students in Turkey (99+ percentile).

### **Research Excellence Award**

- Received Research Excellence Award at Bilkent University for my undergraduate research activities that lead publications.

### **Ranked 10th in the National University Entrance Exam (LYS)**

- Ranked 10th in National University Entrance Exam (LYS) among 2 million students in Turkey (99+ percentile).

### **Asian Science Camp**

- Chosen as one of the eight representatives of Turkey among 6 million students for Asian Science Camp. The best students in Asia are selected for this camp every year, and Nobel Laureates give lessons about different topics such as genetics, topology, or quantum physics.

### **Koc University "You in Future" Program**

- Chosen as one of the most successful students among 100.000 students in Turkey to participate in the "You in Future" program organized by Koc University in which leadership and innovation lessons are given from professionals in Turkey.

### **Math & Mind Games Championship**

- Ranked 1st in the Math & Mind Games Championship, which is organized by MATDER (Mathematical Association of Turkey) and TOBB Economics and Technology University, among 3 million students in Turkey.

### **Ranked 1st in the National High School Entrance Exam (SBS)**

- Ranked 1st in the National High School Entrance Exam (SBS) among 1.5 million students in Turkey (99+ percentile).

## PROGRAMMING SKILLS

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<b>Python</b>	Advanced (6-years experience)	<b>Java</b>	Advanced (5-years experience)
<b>C++</b>	Advanced (8-years experience)	<b>C</b>	Advanced (9-years experience)
<b>R</b>	Intermediate (4-years experience)	<b>MATLAB</b>	Advanced (5-years experience)
<b>Tensorflow</b>	Advanced (5-years experience)	<b>Keras</b>	Advanced (5-years experience)
<b>PyTorch</b>	Advanced (3-years experience)	<b>Theano</b>	Intermediate (1-years experience)

## LANGUAGES

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<b>English</b>	Full Working Proficiency, C2
<b>Turkish</b>	Native, C2
<b>German</b>	Full Working Proficiency, C1
<b>Russian</b>	Intermediate, B1
<b>Spanish</b>	Pre-Intermediate, A2

## PROFESSIONAL ACTIVITIES

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### Reviewer

- IEEE Transactions on Automatic Control
- IEEE Control Systems Letters
- Elsevier Simulation Modelling Practice and Theory Journal
- IEEE International Intelligent Transportation Systems Conference
- IEEE Conference on Decision and Control (CDC)
- IEEE American Control Conference (ACC)

## VOLUNTEERING AND ORGANIZATIONS

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### WWF - World Wide Fund for Nature 2014 - Present

- As a member of WWF, I am trying to protect nature and raise awareness of people about nature. For this purpose, I have attended several conferences and informed high school students about protecting nature.

### IEEE Bilkent 2015 - Present

- In this organization, I am a member of the robotics society and computer society. In this position, I have developed my robotics skill and created several robots. In addition, I gave lectures about Python, Robotics, and Machine Learning.

### LOSEV - Foundation for Children with Leukemia 2016 - Present

- Since 2016, I am a member of LOSEV, which aims to help children with leukemia. In LOSEV, I visit children with leukemia to give them moral support. Moreover, I try to inform people about leukemia.