

Denizhan Kara

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EDUCATION

University of Illinois at Urbana-Champaign

Champaign, IL

Masters in Computer Science; GPA: 4.00

2019 – 2021

Koç University

Istanbul, Turkey

Bachelor of Science in Electrical and Electronics Engineering; GPA: 3.25

2012 – 2017

Koç University

Istanbul, Turkey

Bachelor of Science in Physics (Double Major); GPA: 3.25

2014 – 2017

RESEARCH EXPERIENCE

Resiliency and Security in Vehicular (V2X) Networks

2020 – Present

Graduate Researcher - Systems Security Research Group at UIUC (SyNeRCyS@Illinois)

- Developed a novel misbehavior detection framework against adversarial attacks in vehicular networks.
- The framework is a local misbehavior detection solution embedded into each vehicle, which combines temporal data anomalies and a vehicular trust mechanism with a novel ML architecture.
- Developed various V2X network models for experimentation in an open-source simulation environment (VEINS).
- Working on ML-based adversarial mechanisms for the evaluation of V2X network vulnerabilities.

Stealthy Attacks on UAV Swarms and Defenses

2020 – Present

Graduate Researcher - Systems Security Research Group at UIUC (SyNeRCyS@Illinois)

- Working on the implementation of stealthy sensor-spoofing attacks to compromise UAV security systems.
- Design ML-based adversarial attack mechanisms that additively change sensor values to bypass the existing control mechanisms (EKF) and drift & crash the UAV without alarms.
- Attacks are implemented on virtual UAVs with the Gazebo simulator. Implementations are tested on real hardware, a programmable UAV that runs Linux and the PX4 autopilot to demonstrate attacks on UAV systems.
- Worked on developing multiple UAV missions suitable for training ML models generating adversarial attacks.

WORK EXPERIENCE

Machine Learning Engineer

2020 – Present

Prometeia

- Implemented an AI-based propensity scoring framework utilizing customer transaction histories as a time series, allowing the prediction of customer interests towards products in a bank.
- Implemented Deep Credit Risk Default Model with novel features from the customer transactional data, improved the recall by 25%.
- Implemented the image augmentation pipeline and an ML-based segmentation model for the Automatic Car Damage Estimation system for Allianz Insurance, improved the F1-score by 8%.

Software Design Engineer

2017 – 2020

Turkish Aerospace - Autopilot Systems Division

- Developed and maintained signal processing libraries for autopilot control system software. Implemented custom filter blocks that reduced signal processing delay by up to 20% and suppressed various noise modes.
- Led the interpretation of electromagnetic & vibrational noise components within sensor data for the autopilot system and developed signal filtering solutions compliant with control algorithms.
- Implemented an in-house data processing tool that allowed faster analysis of test data by other engineers.
- Developed the Sensor Emulator Framework, allowing the autopilot department to perform realistic SIL simulations.

PUBLICATIONS

- **Kara, Denizhan**, Kyo Hyun Kim, Sabin Mohan, Monowar Hasan, Takayuki Shimizu, and Hongsheng Lu. "OVERTON: A Misbehavior Detection and Trust Framework for Vehicular (V2X) Networks." *31st USENIX Security Symposium (USENIX Security 22)*. (Under review)
- **Kara, Denizhan**, Bugra Akyuz, and Secil Arslan. "TRANSPROP: AI-based Propensity Scoring Framework Utilizing Transactional Data Stream." *Proceedings of the AAAI Conference on Artificial Intelligence*. 2022 (Under review)

ACHIEVEMENTS

- **TUBITAK National Scholarship Programme for M.S studies**, Granted for placing among top 50 students nationwide in TUBITAK (NSF of Turkey) Weighted ALES (National GRE) and GPA Score List.
- **TUBITAK National Undergraduate Scholarship Program For Natural Sciences**, Granted for academic success on Double Major studies in the field of physics.
- **Koç University Vehbi Koç High Honors Award**, Selected among Vehbi Koç Scholars for outstanding academic performance and SPA over 3.50.
- **Turkish Prime Ministry Special Success Scholarship**, Granted for ranking among the top-100 students in the National University Entrance Exam among 2 million students.
- **Koç University Full-Merit Scholarship**, Granted for ranking among the top-100 students in the National University Entrance Exam among 2 million students.

TECHNICAL SKILLS

Languages: Python, C++, MATLAB, Java, SQL, R

Technologies: AWS, PyTorch, Tensorflow, Simulink, Spark, Storm, Kubernetes, ROS, JIRA , GIT