Emre Tuygan

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EDUCATION:

SABANCI UNIVERSITY Istanbul, Turkey | Expected January 2026
B.S. in Computer Science & Engineering, Faculty of Engineering and Natural Sciences
Minor in Physics, Faculty of Engineering and Natural Sciences Expected January 2026

CGPA: 3.77/4.00; %75 Scholarship (assigned %25 extra scholarship due to success as of Fall 2024)

Research Objectives:

- Develop and analyze algorithms for solving complex computational problems, with a focus on optimization and graph theory.
- Apply algorithmic and computational approaches to solve problems emerging in natural sciences, integrating principles from computer science and mathematics.
- Leverage quantum computing for combinatorial optimization, exploring its potential in solving complex computational challenges.

Course Highlights:

- **Computer Science & Engineering:** Formal Lang&Automata Theory (CS 302); Operating Systems (CS 307); Software Engineering (CS 308); Algorithms (CS 301); Data Structures (CS 300); Database Systems (CS 306)
- **Physics:** Quantum Mechanics I (PHYS 303); Quantum Mechanics II (PHYS 304); Introduction to Data Science (CS 210)
- **Mathematics:** Number Theory (MATH 317); Linear Algebra (MATH 201); Introduction to Probability (MATH 203); Discrete Mathematics (MATH 204)

Work Experience:

Fall 2023 **Sabancı University: *Computational Approaches to Problem Solving* Learning Assistant**

- Held weekly office hours to assist students in problem solving and course related tasks.
- Supported instructors during recitations, ensuring students' engagement and understanding.

Spring 2025 **Sabancı University: *Algorithms* Learning Assistant**

- Weekly office hours to assist students in problem solving and course related tasks.
- Supported instructors during recitations, ensuring students' engagement and understanding.
- Quiz grading assistance.

Research Experience:

Fall 2024 ***AI for Quantum Computing*** (article in progress)

- Searching for an optimized algorithm to design quantum optical circuits capable of generating arbitrary quantum states, based on the concept of Path Entanglement

Spring 2024 ***AI for Quantum Computing***, Sabancı University Program for Undergraduate Research Project (PURE Project)

- Implemented the suggested algorithm in MILP using MiniZinc and GurobiPy; evaluated its performance. This work applies Tutte's Theorem to verify the FORALL-PMVC condition in graph theory within the context of path entanglement, as proposed in Moshe Vardi's article, "Solving Quantum-Inspired Perfect Matching Problems via Tutte's Theorem-Based Hybrid Boolean Constraints."

Fall 2023 ***Exploring the Skills & Scope of ChatGPT in Academic Writing Assignments*** (PURE Project)

- Evaluated the competency of GPT-3.5 to generate academic writing assignments in a social science context; collaborated with students from Computer Science and Social Sciences departments; gathered data in the form of an academic writing assignments

Selected Projects:

Fall 2023 ***Introduction to Data Science (CS210)*****:** Caffeine and Sleep Study

- Analyzed the relationship between caffeine consumption and sleep quality using Sleep Metrics from Apple Health and caffeine consumption logs from a specialized app. Cleaned and prepared the data for analysis, applied multivariable linear regression, random forest regressor, and random forest classifier for analysis.

Spring 2024 ***Software Engineering (CS308)*****:** Flight Roster Project

- Designed and implemented a full-stack Flight Roster application as part of a 10 people group. Maintained agile practices; used MongoDB and JavaScript; primarily contributed to backend development

Spring/Fall 2024 ***Website Development Projects***

- Developed QSBSU FallFest event website using Nextjs and React
- Developed Tuygan Consulting Business website using Vanilla HTML, CSS

Achievements:

- National Quantum Computing Hackathon **Finalist** (2024)
- TUBITAK High School Project Competition Math Project **İstanbul Region Invitee and Finalist** (2020)
- ManPower Entrepreneurship Special Award **Winner** (2020)
- FRC Robotics Competition Bosphorus Region **Winner** (2019)
- Kangaroo International Mathematics Competition **Outstanding Achievement Award** (2017)

Extracurricular Activities

- Google Developer Student Club **Technology Core Member** (2023/24)
- Sabancı Quantum Technologies Club **Event Organization Lead** (2024/25)

SKILLS:

- **Language:** Turkish (Native); English (Advanced)
- **Programming Languages:** Python; C; C++; MiniZinc; Qiskit; Swift; JavaScript