Alper Alioğlu (Sajjad Baghaee)

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Senior IoT Engineer

IoT Architecture and Design | Embedded Systems Development | Communication protocols (MQTT, LoRaWAN, Wi-Fi, Bluetooth, TCP/UDP) | Network Simulation | Smart City Technology Integration | Machine Learning | C/C++ | Python

Innovative and result-oriented Senior IoT Engineer and Researcher with over 14 years of experience specializing in telecommunications, and advanced IoT applications. Demonstrated success in leading cutting-edge research and development projects. Proven expertise in IoT, LoRa/LoRaWAN technology, and machine learning. Holds a Ph.D. in Electrical and Electronics Engineering, focusing on telecommunications, highlighting a robust academic background. Expertise spans across leading innovative R&D projects, managing substantial telecommunications initiatives, and developing smart energy management systems. Actively contributes as a reviewer for IEEE journals and conferences, ensuring the rigorous evaluation and dissemination of research in the academic community.

WORK EXPERIENCE

Middle East Technical University - *Ankara, Turkey*   09/2023 - PRESENT
Lecturer, PhD (Postdoctoral Research Program)
Exploring cutting-edge research in LoRa/LoRaWAN technology and the Age of Information.
- Designing an application layer protocol for LoRa/LoRaWAN technology to enable age-aware communication capabilities.
- Conducting comprehensive feasibility studies for integrating LoRa/LoRaWAN technology into diverse IoT ecosystems.

SUIT - *Ankara, Turkey*   01/2023 - PRESENT
Senior Researcher (Part Time)
Deploying IoT and machine learning methodologies to engineer energy-efficient control algorithms for the 'Learning Smart Air Conditioner,' enhancing building sustainability for Sustainable Urbanization Through Innovative Technologies Platform.
- Leading the implementation of an IoT system for smart rooms, ensuring seamless integration of advanced environment monitoring devices for comprehensive data collection, while leveraging MQTT protocol for streamlined communication.
- Tracking the solar panel energy generation and room energy consumption.
- Engineering occupancy measurement techniques for real-time room usage monitoring.
- Employing machine learning for adaptive HVAC systems, optimizing energy efficiency and user comfort.

FRESHDATA Technologies - *Ankara, Turkey*   05/2023 - PRESENT
Senior IoT Consultant (Contract)
Developing an Age-Sensitive IoT Fault Indicator Device for the Electricity Distribution Sector
- Designing an IoT fault indicator wireless node.
- Developing and deploying an Age-Sensitive communication solution with a 20% decrease in interruptions and a 15% reduction in network load.

JeoIT Ltd. Şti - *Ankara, Turkey*   09/2018 - PRESENT
Senior Internet of Things (IoT) Engineer
IoT Engineer with expertise in designing, developing, and optimizing end-to-end IoT solutions.
- Crafting comprehensive IoT architectures that consider hardware, software, connectivity, and data management for efficient solutions.
- Leading IoT device and system designing, including coding, firmware development, and hardware integration.
- Implementing various communication protocols (e.g., MQTT, LoRa, cellular) for IoT devices.
- Designing LoRa-based IoT nodes for environmental monitoring, leading to a 30% increase in methane gas production in a landfill project.

Teknolojik Sistemler San. Ve Tic. Ltd. Şti - *Ankara, Turkey*   05/2017 - 09/2018
Machine Learning and Artificial Intelligence Engineer
Development of Building Smart Energy Management System (BSEMS) for Residential and Commercial Buildings.
- Utilized Q-learning for HVAC optimization in a Smart Energy Management System, enhancing energy efficiency in buildings under Project No. 1150648: "Development of Building Smart Energy Management System (BSEMS) for Residential and Commercial Buildings" funded by the Scientific and Technological Research Council of Turkey (TUBITAK), 2016-2018.

METU Research Group on Communication Networks - *Ankara, Turkey*   09/2010 - 05/2017
Senior Researcher
Contributed as a researcher in TUBITAK projects focused on energy-efficient IoT and wireless network optimization.
- Publishing over 15 papers on machine learning and IoT in leading journals and conferences.
- Contributed as a researcher in TUBITAK projects focused on optimizing energy-harvesting communications and wireless network efficiency.

Parto Afshan Aria Co. - *Urmia*   04/2008 - 06/2010
Project Manager
- Managing installations of OTN Centers, switch centers, rural GSM systems, and power supplies to enhance telecommunications infrastructure.

EDUCATION

Middle East Technical University (METU) - *Ankara, Turkey*   07/2023
Ph.D. in Electrical and Electronics Engineering
- Major: Telecommunication
- Minor: Biomedical
- Dissertation: Age of Information Based Flow Control in Communication Networks

Middle East Technical University (METU) - *Ankara, Turkey*   06/2012
M.Sc. in Electrical and Electronics Engineering
- Telecommunication
- Dissertation: Identification and Localization on a Wireless Magnetic Sensor Network

Azad University Urmia Branch (IAURMIA) – *Urmia*   10/2005
B.Sc. in Electrical Engineering/Telecommunications
- Telecommunication
- Dissertation: Design and Simulink a Circularly Polarized Microstrip Antenna for 2.45 GHz

FUNDING AND BURSARIES

- Graduate Research Assistantship, (funded by Huawei)   01/2019 - 12/2020
  Project: Age Optimization in Smart City Applications and on the Internet
- Graduate Research Assistantship, (funded by TUBITAK)   04/2013 - 09/2018

Projects

- "IoT-Enabled Smart Facility Management with Real-Time Environmental Monitoring", Senior IoT Engineer at JeoIT.
- "LoRa-Based IoT Environmental Monitoring System for Increased Methane Gas Production in Landfill", Senior IoT Engineer at JeoIT.
- "IoT-Enhanced Load Cell System for Recycling Efficiency and Unused Iron Plate Tracking in Manufacturing", Senior IoT Engineer at JeoIT.
- "AoI in Future Networks", Funded by Huawei. Research Assistantship (RA) at METU
- "Sampling and Scheduling for Optimal Age of Information", Funded by TUBITAK. Research Assistantship (RA) at METU.
- "Development of Building Smart Energy Management System for Residential and Commercial Buildings", Funded by TUBITAK. Machine Learning Engineer at TEKNOS.
- "E-crops: Energy harvesting Communication networks: Optimization and demonstration", Funded by TUBITAK. Research Assistantship (RA) at METU.
- "Principles and Experimental Implementation toward Energy-Efficient Design of Wireless Networks", Funded by TUBITAK. Research Assistantship (RA) at METU.
- "Managing installations of OTN Centers, switch centers, rural GSM systems, and power supplies to enhance telecommunications infrastructure". Project manager at Parto Afshan Aria Co.

AWARDS AND HONORS

IEEE Student Travel Grants - *IEEE BlackSeaCom, Batumi, Georgia*   06/2018
- Recognized for contributions to communications research, fostering academic growth at a prestigious IEEE event.

METU-EEE Publication Award - *Middle East Technical University*   06/2018
- Award highlights excellence in academic publishing.

PROFESSIONAL COMPUTER SKILLS

- **Engineering Software Proficiency:** Advanced skills in MATLAB and Arduino IDE for system modeling and embedded programming in IoT.
- **Development Environment Expertise:** Proficient in Visual Studio Code, PyCharm, and CodeLite, enhancing software development workflows.
- **Data Science and Analysis Tools:** Expert in utilizing NumPy, SciKit-Learn, Matplotlib, Pandas, and Jupyter notebook for comprehensive data analysis, machine learning modeling, and interactive visualization in IoT projects.
- **Operating Systems Knowledge:** Well-versed in both Windows and Linux, enabling versatile IoT development and testing environments.
- **Programming Language Mastery:** Demonstrated expertise in Python and C++ for developing sophisticated, scalable IoT applications.
- **Network Simulation Competence:** Experienced in ns-3 and Mininet-WiFi for in-depth network protocol simulation and IoT connectivity testing.

VOLUNTEER EXPERIENCE (Technical Reviews)

- IEEE/ACM Transactions on Networking
- IEEE Transactions on Wireless Communications
- IEEE Transactions on Industrial Electronics
- IEEE International Symposium on Information Theory (IEEE ISIT 2017)
- IEEE International Conference on Communications (IEEE ICC 2017)
- IEEE International Conference on Computer Communications (IEEE INFOCOM 2018, 2019)
- IEEE Wireless Communications and Networking Conference (IEEE WCNC 2018)

PROFESSIONAL MEMBERSHIPS

- Member of IEEE (membership number: 90708427)
- Member of METU Communication Networks Research Group

LANGUAGE COMPETENCIES

- English   • Persian   • Turkish   • Azeri

PUBLICATIONS

- **PATENT:**
  1. **Sajjad Baghaee**, Baran Tan Bacinoglu, Mahdi Shakiba-herfe, Elif Uysal, "İLETİM HIZININ AYARLANMASI İÇİN YAŞA DUYARLI İLERİ HATA DÜZELTME TEMELLİ BİR YÖNTEM", (application number: 2024/001618).

- **BOOK CHAPTER:**
  1. E. Uysal, O. Kaya, **S. Baghaee**, H. B. Beytur, "Age of Information in Practice", to appear as a chapter in "Age of Information", Cambridge University Press, 2023.

- **DISSERTATION:**
  1. **S. Baghaee**, "Age of information based flow control in communication networks," Ph.D. - Doctoral Program, Middle East Technical University, 2023.
  2. **S. Baghaee**, "Identification and localization on a wireless magnetic sensor network," M.S. - Master of Science, Middle East Technical University, 2012.

- **JOURNALS AND CONFERENCES:**
  1. **S. Baghaee** and E. Uysal, " A3L-FEC-FSFB: Age-Aware Application Layer Forward Error Correction with Fixed Sampling Rate and Fixed Block-length," 2024, 32th Signal Processing and Communications Applications Conference (SIU), Mersin, Turkey, 2024, (Accepted).
  2. E. Uysal, O. Kaya, **S. Baghaee**, H. B. Beytur, "Age of Information in Practice", to appear as a chapter in "Age of Information", Cambridge University Press, 2023.
  3. M Mitev, M Shakiba-Herfeh, A Chorti, M Reed, **S Baghaee**, "A physical layer, zero-round-trip-time, multifactor authentication protocol," IEEE Access, vol. 10, pp. 74 555–74 571, 2022.
  4. U. Guloglu, **S. Baghaee** and E. Uysal, " Evaluation of Age Control Protocol (ACP) and ACP+ on ESP32," ISWCS'21 - 17th International Symposium on Wireless Communication Systems, Berlin, Germany, 2021.
  5. H. B. Beytur, **S. Baghaee** and E. Uysal, "Towards AoI-aware Smart IoT Systems," 2020 International Conference on Computing, Networking and Communications (ICNC), Big Island, HI, USA, 2020, pp.
  6. **Sajjad Baghaee**, Hasan Burhan Beytur, Elif Uysal, "Towards AoI-aware Smart IoT Systems", IEEE INFOCOM 2019-IEEE Conference on Computer Communications, Paris, France, 29 April - 2 May 2019, (Poster Presentation).
  7. H. B. Beytur, **S. Baghaee** and E. Uysal, "Measuring Age of Information on Real-Life Connections," 2019 27th Signal Processing and Communications Applications Conference (SIU), Sivas, Turkey, 2019, pp.
  8. S. Chamanian, **S. Baghaee**, H. Uluşan, Ö. Zorlu, E. Uysal-Biyikoglu and H. Külah, "Implementation of Energy-Neutral Operation on Vibration Energy Harvesting WSN," in IEEE Sensors Journal, vol. 19, no. 8, pp. 3092-3099, 15 April15, 2019.
  9. **S. Baghaee**, Ilkay Ulusoy, "User Comfort and Energy Efficiency in HVAC Systems by Q-learning", IEEE SIU 2018, 26th Signal Processing and Communications Applications Conference, Izmir, Turkey, 2-5 May 2018.

10. Canberk Sonmez, **Sajjad Baghaee**, Abdussamed Ergisi, Elif Uysal-Biyikoglu, "Age-of-Information in Practice: Status Age Measured over TCP/IP Connections through WiFi, Ethernet and LTE", IEEE BlackSeaCom, Batumi, Georgia, 4-7 June 2018.

11. **S. Baghaee**, S. Chamanian, H. Uluşan, Ö. Zorlu, "WirelessEnergySim: A Discrete Event Simulator for an Energy-Neutral Operation of IoT Nodes ", IEEE BlackSeaCom,, Batumi, Georgia, 4-7 June 2018.

12. Egemen Sert, Canberk Sönmez, **Sajjad Baghaee**, Elif Uysal-Biyikoglu, " Optimizing Age of Information on Real-Life TCP/IP Connections through Reinforcement Learning", IEEE SIU 2018, 26th Signal Processing and Communications Applications Conference, Izmir, Turkey, 2-5 May 2018.

13. S. Chamanian, H Uluşan, Ö Zorlu, **S. Baghaee**, E Uysal-Biyikoglu, H Külah, "Wearable battery-less wireless sensor network with electromagnetic energy harvesting system" Sens. Actuators A: Phys., 249 October 2016.

14. **S. Baghaee,** S.Z. Gürbüz, E. Uysal-Bıyıkoğlu, "Implementation of an Enhanced Target Localization and Identification Algorithm on a Magnetic WSN," IEICE Trans. on Communications, June 2015.

15. Chamanian, S.; **Baghaee, S**.; Ulusan, H.; Zorlu, Ö.; Külah, H.; Uysal-Biyikoglu, E. Powering-up Wireless Sensor Nodes Utilizing Rechargeable Batteries and an Electromagnetic Vibration Energy Harvesting System. Energies 2014, 7, 6323-6339.

16. **S. Baghaee,** H. Ulusan, S. Chamanian, O. Zorlu, H. Kulah and E. Uysal-Biyikoglu, "Towards a Vibration Energy Harvesting WSN Demonstration Testbed", IEEE TIWDC 2013 "Green ICT", The 24th Tyrrhenian International Workshop on Digital Communications, Genoa, Italy, September 2013.