Huseyin Ugur Yildiz, Ph.D.

Senior Operations Research Scientist | Network Optimization | MILP & Routing

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Summary

Associate professor of electrical and electronics engineering with a Ph.D. specializing in operations research and network optimization for wireless and underwater sensor networks. Over 10 years of research experience in developing optimization-based models for routing, resource allocation, reliability, and energy efficiency, with 20+ journal publications (14 IEEE) and extensive service as editor, reviewer, and TPC member. Strong teaching background in probability, signals and systems, and communication networks, with demonstrated leadership in curriculum development and accreditation.

Professional Experience

TED University Ankara, Turkey
Associate Professor of Electrical and Electronics Engineering 03/2021 – Present
Chair of the Electrical and Electronics Engineering Department 07/2021 – 07/2024
Assistant Professor of Electrical and Electronics Engineering 09/2016 – 03/2021

- Conducted research on network flow–based optimization to enhance wireless sensor network performance; authored 20+ peer-reviewed publications, including 14 articles in IEEE journals.
- Led academic operations for 100+ students and 12 faculty members; oversaw accreditation and curriculum, established a new teaching laboratory, launched an M.Sc. program, and founded the IEEE Student Branch.
- Taught undergraduate and graduate courses in communications, signal processing, and probability using active learning methodologies; mentored 40+ senior design teams and supervised 7 graduate theses.

Turkish Aerospace Ankara, Turkey
Avionics Design Engineer, Unmanned Aerial Vehicles 12/2015 – 08/2016

- Involved in development and integration of network architectures for the ANKA UAV program; built and configured UAV network infrastructure and designed high-availability Cisco systems ensuring 24/7 readiness.

Turk Telekom Ankara, Turkey
Senior Network Engineer, Deep Packet Inspection 12/2010 – 11/2015

- Contributed to design and operation of the Safer Internet Service, a nationwide content-filtering platform serving 5M+ users; managed 100+ Cisco/Procera DPI systems, ensuring 99.9% uptime and regulatory compliance.

Education

TOBB University of Economics and Technology (ETU) Ankara, Turkey
Ph.D., Electrical and Electronics Engineering 01/2014 – 04/2016
Dissertation Title: Transmission power control for link–level handshaking in wireless sensor networks
Doctoral Advisor: Prof. Bulent Tavli

TOBB University of Economics and Technology Ankara, Turkey
M.Sc., Electrical and Electronics Engineering 09/2011 – 09/2013
Thesis Title: Commun./comput. trade-offs in WSNs: Comparing network-level and node-level strategies
Advisor: Prof. Bulent Tavli, *Co-Advisor:* Prof. Kemal Bicakci

Bilkent University Ankara, Turkey
B.Sc., Electrical and Electronics Engineering 08/2005 – 08/2009

Technical Skills

- **Optimization & Operations Research:** Linear Programming (LP), Mixed-Integer Programming (MIP), Multi-Objective Optimization, Network Flow Programming, Constraint Programming, Metaheuristics; GAMS, Gurobi, CPLEX, XPRESS, PuLP, Pyomo.

- **Machine Learning & Reinforcement Learning:** Supervised and Unsupervised Learning, Regression and Classification Models, Decision Trees, Neural Networks, Markov Decision Processes (MDPs), Q-Learning, Proximal Policy Optimization (PPO), Deep Reinforcement Learning.
- **Programming & Scientific Computing:** Python (NumPy, Pandas, Scikit-Learn, Matplotlib), MATLAB/Octave, Simulink, LaTeX.
- **Development Tools:** PyCharm, Jupyter Notebook, VS Code, Spyder, Cursor.

Certificates

- **Machine Learning Specialization**, DeepLearning.AI – Coursera, 2025 (Credential)
- **Deep Learning Specialization**, DeepLearning.AI – Coursera, 2025 (Credential)
- **Reinforcement Learning Specialization**, University of Alberta – Coursera, 2025 (Credential)

Soft Skills

Leadership, Team Management, Communication & Collaboration, Problem-Solving, Decision-Making, Mentoring, Teaching, Adaptability, Time Management

Honors & Awards

[A2] **Elevation to the IEEE Senior Member grade,** an honor recognizing significant contributions to the profession (achieved by less than 10% of IEEE members), 2021.

[A1] **The best paper award (3rd place),** "*Utilization of multi-sink architectures for lifetime maximization in underwater sensor networks,*" 2nd IEEE Middle East & North Africa Communications Conference (MENACOMM'19), Manama, Bahrain, 2019.

Research Areas

Wireless Ad Hoc and Sensor Networks, Underwater Acoustic Sensor Networks, Internet of Things, Drone Networks, Smart Grids, Operations Research, Metaheuristics, Neural Networks, Reinforcement Learning.

Publications

(1) Journal Articles:

[J24] Tantur Karagul, C., Akgun, M. B., **Yildiz, H. U.**, & Tavli, B. (2025). Mitigating energy cost of connection reliability in UWSNs through non-uniform k-connectivity. *IEEE Internet of Things Journal, 12* (22), 47817–47826.

[J23] Asci, M., Akusta Dagdeviren, Z., Akram, V. K., **Yildiz, H. U.**, Dagdeviren, O., & Tavli, B. (2025). Enhancing drone network resilience: Investigating strategies for k-connectivity restoration. *Computer Standards & Interfaces, 92*, 103941.

[J22] Gultekin, B., Nurcan-Atceken, D., Altin-Kayhan, A., **Yildiz, H. U.**, & Tavli, B. (2023). Exploring the tradeoff between energy dissipation, delay, and the number of backbones for broadcasting in wireless sensor networks through goal programming. *Ad Hoc Networks, 149*, 103223.

[J21] **Yildiz, H. U.** (2023). Joint effects of void region size and sink architecture on underwater WSNs lifetime. *IEEE Sensors Journal, 23*(10), 11046-11056.

[J20] Cobanlar, M., **Yildiz, H. U.**, Akram, V. K., Dagdeviren, O., & Tavli, B. (2022). On the tradeoff between network lifetime and k-connectivity-based reliability in UWSNs. *IEEE Internet of Things Journal, 9*(23), 24444-24452.

[J19] Carsancakli, M. F., Al Imran, M. A., **Yildiz, H. U.**, Kara, A., & Tavli, B. (2022). Reliability of linear WSNs: A complementary overview and analysis of impact of cascaded failures on network lifetime. *Ad Hoc Networks, 131*, 102839.

[J18] Tekin, N., **Yildiz, H. U.**, & Gungor, V. C. (2021). Node-level error control strategies for prolonging the lifetime of wireless sensor networks. *IEEE Sensors Journal, 21*(13), 15386-15397.

[J17] **Yildiz, H. U.**, Kurt, S., & Tavli, B. (2019). Comparative analysis of transmission power level and packet size optimization strategies for WSNs. *IEEE Systems Journal, 13*(3), 2264-2274.

[J16] **Yildiz, H. U.** (2019). Maximization of underwater sensor networks lifetime via fountain codes. *IEEE Transactions on Industrial Informatics, 15*(8), 4602-4613.

[J15] Akbas, A., **Yildiz, H. U.**, Ozbayoglu, A. M., & Tavli, B. (2019). Neural network–based instant parameter prediction for wireless sensor network optimization models. *Wireless Networks, 25*(6), 3405–3418.

[J14] Erdem, H. E., **Yildiz, H. U.**, & Gungor, V. C. (2019). On the lifetime of compressive sensing based energy harvesting in underwater sensor networks. *IEEE Sensors Journal, 19*(12), 4680-4687.

[J13] Sayit, M., Cetinkaya, C., **Yildiz, H. U.**, & Tavli, B. (2019). DASH–QoS: A scalable network layer service differentiation architecture for DASH over SDN. *Computer Networks, 154*, 12-25.

[J12] **Yildiz, H. U.** (2019). Investigation of maximum lifetime and minimum delay trade-off in underwater sensor networks. *International Journal of Communication Systems, 32*(7), e3924.

[J11] **Yildiz, H. U.**, Gungor, V. C., & Tavli, B. (2019). Packet size optimization for lifetime maximization in underwater acoustic sensor networks. *IEEE Transactions on Industrial Informatics, 15*(2), 719-729.

[J10] **Yildiz, H. U.** (2018). The impact of transmission power levels set size on lifetime of wireless sensor networks in smart grids. *Turkish Journal of Electrical Engineering & Computer Sciences, 26*(6), 3057-3071.

[J9] Yigit, M., **Yildiz, H. U.**, Kurt, S., Tavli, B., & Gungor, V. C. (2018). A survey on packet size optimization for terrestrial, underwater, underground, and body area sensor networks. *International Journal of Communication Systems, 31*(11), e3572.

[J8] **Yildiz, H. U.**, Ciftler, B. S., Tavli, B., Bicakci, K., & Incebacak D. (2018). The impact of incomplete secure connectivity on the lifetime of wireless sensor networks. *IEEE Systems Journal, 12*(1), 1042-1046.

[J7] **Yildiz, H. U.**, Tavli, B., Kahjogh, B., & Dogdu, E. (2017). The impact of incapacitation of multiple critical sensor nodes on wireless sensor network lifetime. *IEEE Wireless Communications Letters, 6*(3), 306-309.

[J6] Kurt, S., **Yildiz, H. U.**, Yigit, M., Tavli, B., & Gungor, V. C. (2017). Packet size optimization in wireless sensor networks for smart grid applications. *IEEE Transactions on Industrial Electronics, 64*(3), 2392-2401.

[J5] Akbas, A., **Yildiz, H. U.**, Tavli, B., & Uludag, S. (2016). Joint optimization of transmission power level and packet size for WSN lifetime maximization. *IEEE Sensors Journal, (16)*12, 5084-5094.

[J4] **Yildiz, H. U.**, Bicakci, K., Tavli, B., Gultekin, H., & Incebacak, D. (2016). Maximizing wireless sensor network lifetime by communication/computation energy optimization of non-repudiation security service: Node level versus network level strategies. *Ad Hoc Networks, 37*(2), 301-323.

[J3] **Yildiz, H. U.**, Tavli, B., & Yanikomeroglu, H. (2016). Transmission power control for link–level handshaking in wireless sensor networks. *IEEE Sensors Journal, 16*(2), 561-576.

[J2] **Yildiz, H. U.**, Temiz, M., & Tavli, B. (2015). Impact of limiting hop count on the lifetime of wireless sensor networks. *IEEE Communications Letters, 19*(4), 569-572.

[J1] Batmaz, A. U., **Yildiz, H. U.**, & Tavli, B. (2014). Role of unidirectionality and reverse path length on wireless sensor network lifetime. *IEEE Sensors Journal, 14*(11), 3971-3982.

(2) Editorial:

[E1] Haytaoglu, E., Arslan, S. S., Dagdeviren, O., **Yildiz, H. U.**, & Ozturk, Y. (2025). Editorial brief for special issue: Mass connectivity and/or communication paradigms for the Internet of Things. *Internet of Things, 32*, 101625.

(3) Conference Proceedings:

[C13] Tantur Karagul, C., Akgun, M. B., **Yildiz, H. U.**, & Tavli, B. (2025, November). Non-uniform k-connectivity for energy-efficient and reliable underwater wireless sensor networks. In *2025 33rd Telecommunication Forum (TELFOR)* (pp. 1-4). IEEE.

[C12] Un, B., **Yildiz, H. U.**, & Tavli, B. (2021, May). Impact of critical node failures on lifetime of UWSNs with incomplete secure connectivity. In *2021 IEEE International Black Sea Conference on Communications and Networking (BlackSeaCom)* (pp. 1-6). IEEE.

[C11] Ozmen, A., **Yildiz, H. U.**, & Tavli, B. (2020, November). Impact of minimizing the eavesdropping risks on lifetime of underwater acoustic sensor networks. In *2020 28th Telecommunication Forum (TELFOR)* (pp. 1-4). IEEE.

[C10] **Yildiz, H. U.** (2019, November). Utilization of multi-sink architectures for lifetime maximization in underwater sensor networks. In *2019 2nd IEEE Middle East and North Africa Communications Conference (MENACOMM)* (pp. 1-5). IEEE.

[C9] **Yildiz, H. U.** (2019, October). Prolonging the lifetime of underwater sensor networks under sinkhole attacks. In *The 14th ACM International Conference on Underwater Networks & Systems (WUWNet)* (pp. 1-5). ACM.

[C8] **Yildiz, H. U.**, Gungor, V. C., & Tavli, B. (2018, June). A hybrid energy harvesting framework for energy efficiency in wireless sensor networks based smart grid applications. In *2018 17th Annual Mediterranean Ad Hoc Networking Workshop (Med-Hoc-Net)* (pp. 1-6). IEEE.

[C7] Dagdeviren, O., Akram, V. K., Tavli, B., **Yildiz, H. U.**, & Atilgan, C. (2016, October). Distributed detection of critical nodes in wireless sensor networks using connected dominating set. In *2016 IEEE SENSORS* (pp. 1-3). IEEE.

[C6] Tantur, C., **Yildiz, H. U.**, Kurt, S., & Tavli, B. (2016, October). Optimal transmission power level sets for lifetime maximization in wireless sensor networks. In *2016 IEEE SENSORS* (pp. 1-3). IEEE.

[C5] **Yildiz, H. U.**, & Tavli, B. (2015, December). Prolonging wireless sensor network lifetime by optimal utilization of compressive sensing. In *2015 IEEE Globecom Workshops (GC Wkshps) on Networking and Collaboration Issues for the Internet of Everything (ONIoE)* (pp. 1-6). IEEE.

[C4] **Yildiz, H. U.**, & Tavli, B. (2014, December). The impact of random power assignment in handshaking on wireless sensor network lifetime. In *2014 IEEE Globecom Workshops (GC Wkshps) on Management of Emerging Networks and Services (MENS)* (pp. 201-206). IEEE.

[C3] **Yildiz, H. U.**, Kurt, S., & Tavli, B. (2014, October). The impact of near-ground path loss modeling on wireless sensor network lifetime. In *2014 IEEE Military Communications Conference (MILCOM)* (pp. 1114-1119). IEEE.

[C2] Akbas, A., **Yildiz, H. U.**, & Tavli, B. (2014, May). Data packet length optimization for wireless sensor network lifetime maximization. In *2014 10th International Conference on Communications (COMM)* (pp. 1-6). IEEE.

[C1] **Yildiz, H. U.**, Bicakci, K., & Tavli, B. (2014, January). Communication/computation trade-offs in wireless sensor networks: Comparing network-level and node-level strategies. In *2014 IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet)* (pp. 49-51). IEEE.

(4) Conference Proceedings (in Turkish):

[CT5] **Yildiz, H. U.** (2019, April). Improvement of underwater acoustic sensor network performance with fountain codes. In *2019 27th Signal Processing and Communications Applications Conference (SIU)* (pp. 1-4). IEEE.

[CT4] **Yildiz, H. U.** (2018, November). Minimum delay and maximum lifetime trade-off in underwater sensor networks. In *2018 National Conference on Electrical, Electronics and Biomedical Engineering (ELECO)* (pp. 80-83). EMO.

[CT3] Karakurt, Y., **Yildiz, H. U.**, & Tavli, B. (2018, May). The impact of mitigation of eavesdropping on wireless sensor network lifetime. In *2018 26th Signal Processing and Communications Applications Conference (SIU)* (pp. 1-4). IEEE.

[CT2] **Yildiz, H. U.** (2018, May). The impact of data fragmentation on network lifetime in underwater acoustic sensor networks. In *2018 26th Signal Processing and Communications Applications Conference (SIU)* (pp. 1-4). IEEE.

[CT1] **Yildiz, H. U.**, Tavli, B., & Kahjogh, B. O. (2017, May). Assessment of wireless sensor network lifetime reduction due to elimination of critical node sets. In *2017 25th Signal Processing and Communications Applications Conference (SIU)* (pp. 1-4). IEEE.

Citations

• Total Google Scholar Citations > 1K, • **h-index:** 15

Professional Activities and Service

(1) Technical Program Committee Member:

• IEEE International Conference on Communications (ICC 2018–2022),
• IEEE Wireless Communications and Networking Conference (WCNC 2019, WCNC 2021–2025),
• International Balkan Conference on Communications and Networking (BalkanCom 2023–2025),
• Int. Conf. on Innovation and Intelligence for Information, Computation, and Technology (3ICT'19, 3ICT'20),
• Int. Conference on Network and Service Management (CNSM 2020, CNSM 2021),
• 2nd IEEE Middle East and North Africa Communications Conference (MENACOMM'19),
• International Conference on Underwater Networks & Systems (WUWNet 2019–2025),
• 2018 IEEE 87th Vehicular Technology Conference (VTC2018-Spring),
• 2018 IEEE INFOCOM'18 Workshop on Wirel. Commun. and Netw. in Extreme Environ.,
• IEEE SENSORS 2017.

(2) Reviewer:

• Ad Hoc Networks, • Computer Networks, • IEEE Access, • IEEE Communication Letters, • IEEE Communications Surveys and Tutorials, • IEEE International Conference on Communications, • IEEE Int. Conf. on Wireless and Mobile Computing, Networking and Commun. (WiMob 2016), • IEEE International Symposium on Personal, Indoor, and Mobile Radio Commun. (PIMRC 2017), • IEEE Internet of Things Journal, • IEEE Sensors Journal, • IEEE Systems Journal, • IEEE Wireless Communications and Networking Conference (WCNC 2018-2024), • IEEE Transactions on Cybernetics, • IEEE Transactions on Industrial Electronics, • IEEE Transactions on Industrial Informatics, • IEEE Transactions on Mobile Computing, • IEEE Wireless Communications Letters,

(3) Session Chair:

• "PHY-II: Physical Layer Communications-II" – 2021 IEEE BlackSeaCom,
• "Underwater Networking" – 2019 14th Int. Conf. on Underwater Networks & Systems (WUWNet'19),
• "Communication Networks II" – 2018 26th Signal Proc. and Commun. Appl. Conference (SIU),
• "Sensor Network, Method & Evaluation" – IEEE SENSORS 2016,
• "Management of Emerging Networks" – 2014 IEEE GLOBECOM Workshop on Management of Emerging Netw..

Courses Taught

(1) TED University:

• EE 205 – Software Tools for Electrical Engineering (Fall'16),
• EE 304 – Probability and Random Variables (Spring'17 – Present),
• EE 311 – Signals and Systems (Fall'16 – Present),
• EE 312 – Communication Systems I (Spring'17, Spring'18),
• EE 413 – Communication Systems II (Fall'16 – Present),
• EE 462 – Power System Analysis (Spring'17).
• EE 512 – Optimization for Communication Networks (Spring'26).

Seminars and Invited Talks

Yildiz, H. U. (2019, October 24). *Prolonging the lifetime of underwater sensor networks under sinkhole attacks* [Invited talk]. Georgia Institute of Technology, Atlanta, GA, United States. Hosted by I. F. Akyildiz.

Yildiz, H. U. (2019, April 25). *Maximization of underwater sensor networks lifetime via fountain codes* [Conference presentation]. Next Generation Communication Techniques and Applications (Special Session), 27th Signal Processing and Communications Applications Conference (SIU), Sivas, Turkey.

Yildiz, H. U. (2019, February 19). *Maximization of underwater sensor networks lifetime via fountain codes* [Invited talk]. ASELSAN Information and Communication Technologies Workshop, Ankara, Turkey.

Yildiz, H. U. (2016, November 14). *Optimal transmission power level sets for lifetime maximization in wireless sensor networks* [Invited talk]. ASELSAN Information and Communication Technologies Workshop, Ankara, Turkey.

Yildiz, H. U. (2014, December 3). *The impact of random power assignment in handshaking on wireless sensor network lifetime* [Invited talk]. The University of Texas at Dallas, Dallas, TX, United States. Hosted by M. Torlak.

Yildiz, H. U. (2014, February 11). *Transmission power control for link-level handshaking in wireless sensor networks* [Invited talk]. University of Rochester, Rochester, NY, United States. Hosted by W. Heinzelman.

Yildiz, H. U. (2014, February 7). *Transmission power control for link-level handshaking in wireless sensor networks* [Invited talk]. University at Buffalo, Buffalo, NY, United States. Hosted by T. Melodia.

Yildiz, H. U. (2014, February 5). *A seminar on wireless sensor networks, network optimization, and mathematical programming* [Invited seminar]. Carleton University, Ottawa, ON, Canada. Hosted by H. Yanikomeroglu.

Yildiz, H. U. (2014, January 23). *Transmission power control for link-level handshaking in wireless sensor networks* [Invited talk]. University of Southern California, Los Angeles, CA, United States. Hosted by B. Krishnamachari.

Yildiz, H. U. (2014, January 22). *Transmission power control for link-level handshaking in wireless sensor networks* [Invited talk]. University of California, Irvine, CA, United States. Hosted by E. Ayanoglu.

Theses Supervised

[TH7] Tantur Karagul, C. (2025). *Network lifetime optimization in underwater wireless sensor networks with variable k-connectivity* (Doctoral dissertation). TOBB University of Economics and Technology, Ankara, Turkey.

[TH6] Cobanlar, M. (2022). *Analysis of the trade-off between network lifetime and k-connectivity in wireless sensor networks* (Doctoral dissertation). TOBB University of Economics and Technology, Ankara, Turkey.

[TH5] Un, B. E. (2021). *Design of a novel optimization framework for analyzing the impact of critical nodes on the network lifetime of underwater acoustic sensor networks using private key cryptography* (Master's thesis). TOBB University of Economics and Technology, Ankara, Turkey.

[TH4] Aydin, C. (2021). *Network lifetime maximization in underwater wireless sensor networks based on the number of depleted nodes* (Master's thesis). TOBB University of Economics and Technology, Ankara, Turkey.

[TH3] Ozmen, A. (2021). *Modeling the trade-off between eavesdropping and network lifetime using a mixed-integer programming approach in underwater acoustic sensor networks* (Master's thesis). TOBB University of Economics and Technology, Ankara, Turkey.

[TH2] Karakurt, Y. (2018). *Eavesdropping potential in wireless sensor networks and modeling and analysis of network lifetime recovery* (Master's thesis). TOBB University of Economics and Technology, Ankara, Turkey.

[TH1] Tantur, C. (2017). *Optimal transmission power level sets for lifetime maximization in wireless sensor networks* (Master's thesis). TOBB University of Economics and Technology, Ankara, Turkey.

Languages

• **English:** Business and academic proficiency. • **Turkish:** Native.

Professional Memberships

• IEEE Senior Member (2021–Cont.), IEEE Commun. Society (2015–2018), IEEE Oceanic Society (2021).