Ozgur Ege Aydogan

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Portfolio Website | LinkedIn

EDUCATION

Osaka University   Osaka, Japan
MS in Robotics Engineering | **GPA:** 3.78/4.00   Sept. 2023
- Thesis: "*3D Walking of a Bio-inspired Musculoskeletal Quadruped Robot Using Pneumatic Artificial Muscles*" (Advisors: Prof. Kensuke Harada and Prof. Koh Hosoda)

Yildiz Technical University   Istanbul, Turkey
BS in Mechatronics Engineering | **Graduated with Honors**   July 2020
- Thesis: "*Development of a 4-DOF Upper Limb Robotic Exoskeleton for Shoulder and Elbow Rehabilitation*" (Advisor: Prof. Erhan Akdogan)

RESEARCH EXPERIENCE

Osaka University, Graduate School of Medicine, Yanagisawa Lab   Osaka, Japan
Research Assistant – Advisor: Prof. Takufumi Yanagisawa   Nov. 2023 – present
- Implemented multimodal BMI control using SSVEP and P300 paradigms for robotic arm manipulation, achieving 85% classification accuracy and enabling intuitive robotic arm interactions
- Developed EEG signal processing pipelines utilizing PCA for feature extraction and SVM for classification, improving robotic arm manipulation precision for neurorehabilitation by 15%

Osaka University, Adaptive Robotics Lab (Hosoda Lab)   Osaka, Japan
Graduate Research Assistant – Advisor: Prof. Koh Hosoda   Oct. 2021 – Sept. 2023
- Enhanced a bio-inspired quadruped robot by designing leg structures, joint mechanisms, and moment arms, resulting in a 25% improvement in walking stability and an 80% increase in speed
- Developed and tested six muscle drive patterns and gait cycles to optimize walking speed by implementing feedforward control algorithms using Arduino Due
- Controlled a solenoid valve system for pneumatic artificial muscles using Arduino Dues and CAN communication, which improved muscle activation precision by 30%

Yildiz Technical University, Biomechatronics Research Lab   Istanbul, Turkey
Post-Baccalaureate Research Assistant – Advisor: Prof. Erhan Akdogan   Mar. – Sept. 2021
- Mentored a team of three undergraduates in designing and developing a 5-DOF impedance-controlled wearable upper limb exoskeleton, achieving a 99% improvement in muscle assistance
- Implemented an integrated load suspension system, reducing user load by 56% and enhancing the exoskeleton's usability and efficiency
- Developed and validated a force-based impedance control method to improve human-robot interaction, reducing user effort by 20% based on sEMG and user feedback
- Integrated low-cost wearable EMG sensors, enhancing feedback accuracy by 20% for real-time muscle activation monitoring

Undergraduate Research Assistant – Advisor: Prof. Erhan Akdogan   Sept. 2019 – July 2020
- Led the design and development of a 4-DOF upper limb exoskeletal rehabilitation robot with a team of three undergraduate students, achieving 95% accuracy in joint movement replication and consistent force application across passive, active-assistive, isotonic, and isometric exercises
- Performed kinematic and dynamic modeling using MATLAB and Simulink, achieving over 90% accuracy in simulating joint torque dynamics and actuator responses

- Designed an adjustable mechanism with a 10-inch range, making the exoskeleton adaptable for a wide range of users (4'11" to 6'7")
- Developed and integrated a low-cost EMG sensor for real-time muscle activation feedback, improving signal-to-noise ratio by 15dB to enhance rehabilitation efficiency
- Collaborated with physiotherapists to ensure the practical applicability of the robotic exoskeleton for shoulder and elbow rehabilitation

JOURNAL PUBLICATIONS

1. Dikbas, F. E. H. M., **Aydogan, O.**, Aydin, I., Cetin, D., Emin Aktan, M., & Akdogan, E. (2023). *Development of A 5-DOF Impedance-Controlled Wearable Upper Limb Exoskeletal Robot*. Journal of Mechanics in Medicine and Biology. doi:10.1142/S0219519423500574

2. Karadeniz, F., **Aydogan, O. E.**, Kazanci, E. A., & Akdogan, E. (2020). *Design of a 4-DOF grounded exoskeletal robot for shoulder and elbow rehabilitation*. Sustainable Engineering and Innovation, 2(1), 41-65, cited by 6. doi:10.37868/sei.v2i1.106

CONFERENCE PRESENTATIONS

1. **Aydogan, O. E.** (2024). *Advancing Brain-Computer Interfaces (BCI): Overcoming Challenges in Transfer Learning*. 2024 IEEE EMBS SAC Summer Camp, Sept. 25, 2024

2. Changhao D., Huixiang, Y., **Aydogan O. E.**, Ryohei, F., Yanagisawa, T. (2024). *Augmented Reality Brain-Computer Interface Using Slow Cortical Potentials for Phantom Limb Pain*. JST CREST Final Results Report International Symposium, Sept. 24, 2024

3. **Aydogan, O. E.**, Ceylan, G., Yilmaz, F., Ertekin, S. N., Tekerek, O. E. (2022). *Transfer Learning from Real to Imagined Motor Actions in ECoG Data*. Neuromatch Conference 5.0, Sept. 28, 2022

4. **Aydogan, O. E.**, Zhang, Y., Barry, B., Haram, L., Mishra, U. (2021). *Classification of motor planning into overt or imagery using an ECoG signal*. Neuromatch Conference 4.0, Dec. 2, 2021

HONORS AND AWARDS

1. **Japanese Government (Monbukagakusho: MEXT) Scholarship**, $24,700, awarded to less than 4% of applicants, Oct. '21 – Sept. '23

2. **7th Place (among 1256 projects),** TEKNOFEST Aerospace and Technology Festival 2021, Technology for Humanity Competition, Health and First Aid Category, Sept. 2021

3. **1st Prize (among 894 projects)**, TEKNOFEST Aerospace and Technology Festival 2020, Technology for Humanity Competition, Health and First Aid Category, Sept. 2020

4. **2nd Prize (among 204 projects)**, TUBITAK 2242 University Students Research Projects Competitions, Health Category, The Scientific and Technological Research Council of Turkey (TUBITAK), Sept. 2020

5. **1st Prize (among 20 projects)**, 8th University Students Research Project Competitions, Istanbul-Asian Side, Health Category, TUBITAK, Aug. 2020

6. **Full Merit Scholarship** (OSYM, 100% merit-based, top 0.1% of 2 million applicants) Aug. '15 – Nov. '17

RESEARCH GRANTS

1. **TUBITAK 2209-B Industry-Oriented Research Projects Grant**   Jan. – Dec. 2020
   Grounded Upper Limb Robotic Exoskeleton, TUBITAK BIDEB, $565 USD
2. **TEKNOFEST 2020 Technology for Humanity Competition Grant**   July – Sept. 2020
   Grounded Upper Limb Robotic Exoskeleton, Turkish Technology Team Foundation, $214 USD

TEACHING EXPERIENCE

Neuromatch Academy   Remote
Teaching Assistant, "Deep Learning" course   July 2023
- Mentored 13 students on deep learning techniques, including CNNs, LSTMs, and transformers
- Supervised two research projects utilizing LSTM models for time-series predictions, focusing on neural activity analysis and behavioral outcome modeling

WORK EXPERIENCE

Eurobotik   Kocaeli, Turkey
Automation R&D Engineer (Full–time)   Mar. – May 2021
- Enhanced the efficiency of high-speed robotic control systems by 20% by developing a foundation in robotic automation, PID control algorithms, and ROS-based implementations
- Reviewed 50+ sources on control strategies for high-speed, dynamically balanced robotic manipulators, applying insights to improve ROS-based control precision by 15%

LEADERSHIP AND MENTORSHIP

Mentor, IEEE EMBS SAC Student Mentoring Program 2024   Aug. 2024 – present
- Led the integration of capacitive sensors, EMG, and machine learning algorithms to enhance prosthetic arm adaptability, optimizing control strategies and improving human-robot interaction

Research Mentor, Biomechatronics Research Lab   Mar. 2021 – Sept. 2021
- Mentored a team of three undergraduates in developing a 5-DOF wearable robotic exoskeleton, focusing on impedance control and muscle assistance for rehabilitation

INVITED TALKS

You Wear It Well Podcast:
- [Designing Wearable Robotic Exoskeletons for Shoulder Rehabilitation](#)   Oct. 2023
- [The Future of Rehabilitation Robotics: The Role of Biomechatronics](#)   May 2021

PRESS COVERAGE

- "[Outstanding Success for Upper Limb Rehabilitation Robot](#)", Hurriyet Newspaper, Oct. 9, 2020

SKILLS

- **Programming Languages:** Python, C/C++, MATLAB
- **Embedded Systems:** Raspberry Pi, Arduino, TI microcontrollers
- **Software:** Simulink, SolidWorks, Autodesk Inventor, ROS, PyTorch, MS Visual Studio
- **Language:** Turkish (Native), English (Advanced, IELTS Academic: 7.5), Japanese (Intermediate)

PROFESSIONAL MEMBERSHIPS

- The American Society of Mechanical Engineers (ASME)   July 2023 – present
- IEEE Robotics and Automation Society (RAS)   Apr. 2023 – present
- IEEE Engineering in Medicine and Biology Society (EMBS)   Apr. 2023 – present

COMMUNITY SERVICE

- Foundation for Children with Leukemia (LOSEV)   May 2021 – present
- Turkish Foundation for Combating Soil Erosion (TEMA)   May 2021 – present

EXTRACURRICULAR ACTIVITIES

- **Member**, Osaka University Competitive Programming Club   Oct. 2022 – Aug. 2023