

Research experience and interests

Biomedical engineer (Ph.D.) with specialization in biomechanics, robotic applications, integration of collaborative robots (cobots) in industrial environments and human motion analysis. My main scientific interest is the mathematical modeling of the human body as a complex robotic system and the application of techniques and algorithms for the analysis of performance and the control of robotic systems through motion. This includes prosthetic limbs, exoskeletons and collaborative robots. In the past I have participated in research projects in the US, France and Greece.

- Excellent knowledge of the mathematical background of robotics (differential geometry)
- Analysis of kinematics and kinetics of multi-joint systems
- Excellent communication skills
- Excellent knowledge of motion capture and analysis technologies
- Staff training
- Participation in international interdisciplinary teams (USA, France, Greece)
- Knowledge of computer intelligence and computer vision
- Ability to analyze complex data
- Ability to solve problems and find creative solutions
- Excellent ability to acquire knowledge

Education

Department of Medical Engineering, College of Engineering, University of South Florida, Tampa, FL, USA

Graduation: 2018

Degree: Doctor of Philosophy in Biomedical Engineering

Summary: The PhD thesis entitled: "Human Body Motions Optimization for Able-Bodied Individuals & Prosthesis Users During Activities of Daily Living Using a Personalized Robot-Human Model" was funded by the U.S. department of defense and aimed to create a robotic model that personalizes the upper human body when it has lost some degrees of freedom (amputation). Its purpose was to guide the selection of the artificial limb so as to maximize the rehabilitation of the individual. The model that was created had many redundant degrees of freedom (23 in total for both arms) and the control algorithm relied on motion capture recordings to generate biomimetic motion. Creativity and complex mathematics and tools were required for the final result, as the human body is extremely complex.

College of Engineering, University of South Florida, Tampa, FL, USA

Graduation: 2015

Degree: Master of Science in Biomedical Engineering

Summary: During the master's degree course, I took advanced courses in engineering and biomedical engineering, as well as courses in scientific writing and technical information communication.

Department of Medical Instrument Technology (Department of Biomedical Engineering)

TEI of Athens (University of West Attica), Egaleo, Greece

Graduation: 2009

Degree: Medical Instrument Technology

A basic course of study with emphasis on the applications of engineering in the field of medicine and biomedical sciences.

Experience

Associated Lecturer

March 2024-September 2024

Department of Biomedical Engineering, School of Technological Applications, University of West Attica, Egaleo, Greece

Courses:

- Biomechanics
- Control Systems
- Biomedical micro- and nano- electromechanical systems

Postdoctoral Engineer in Biomechanics

March 2022-September 2023

Laboratory of Biomechanics, School of Physical Education and Sports Science, Democritus University of Thrace, Komotini, Greece

- Responsible for troubleshooting electromechanical equipment
- Responsible for proper recording and analysis of human movement/performance
- Responsible for staff training
- Development of prototype code for data analysis
- Writing of technical texts and reports

Research Engineer

January 2019-January 2021

Centre for Robotics, MINES ParisTech, PSL Université Paris, Paris, France

Participation in two "Horizon Europe 2020" research projects

- Collaborate (<https://collaborate-project.eu/>)
 - Integration of cobots in a production line
 - Human motion detection for handling cobots
 - Ergonomic analysis of the impact of human-cobot collaboration
- Mingei (<https://www.mingei-project.eu/>)
 - Motion capture for the preservation of European traditional arts

Research Assistant

August 2013 - December 2018

Center for Assistive, Rehabilitation, and Robotics Technologies, Department of Mechanical Engineering, University of South Florida, Tampa, FL, USA

- Responsible for the motion capture equipment
- Data curation and analysis
- Training of junior team members
- Writing scientific publications and technical reports

Teaching Assistant

August 2013 - December 2018

College Engineering, University of South Florida, Tampa, FL, USA

- Courses:
 - Robotic Systems
 - Instrumentation
 - Thermodynamics
 - Programming
 - Numerical Methods
 - Bioastronautics

Skills

Languages: Greek (native), English (bilingual), French (beginner)

- Motion analysis (biomechanics)
- Robotics
- Kinematics/kinetics
- Statistics
- Computational Intelligence
- Biomedical Engineering
- Mechanical Engineering
- Electronic circuits
- Signal processing
- Study design

Software packages

- Matlab
- C/C++
- Python
- OpenSim
- OpenPose
- MediaPipe
- AnyBody
- Windows/Linux/macOS
- FEA (Ansys, Matlab, etc.)
- CAD (AutoCAD)
- SPSS/SAS
- Mathematica
- C#
- Vicon Nexus
- MotionBuilder
- Bodybuilder
- Vizual3D
- Latex

Journal Publications

Arnautoglou, D. G., Dedemadis, D., Kyriakou, A. A., Katsimentes, S., Grekidis, A., Menychtas, D., Nikolaos Aggelousis, Georgios Ch. Sirakoulis & Kyriacou, G. A. (2024). Acceleration-Based Low-Cost CW Radar System for Real-Time Elderly Fall Detection. *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology*.

Gkrekidis, A., Giarmatzis, G., Menychtas, D., Karakasis, E., Gourgoulis, V., Michalopoulou, M., Smilios, I., et al. (2023). Clinical Validation of Estimated Muscle Activations during Phases of Elderly Gait. *Biomechanics*, 3(4), 552–560. Retrieved from <https://www.mdpi.com/2673-7078/3/4/44>

Apostolidis, K., Kokkotis, C., Karakasis, E., Karampina, E., Moustakidis, S., Menychtas, D., Giarmatzis, G., et al. (2023). Innovative Visualization Approach for Biomechanical Time Series in Stroke Diagnosis Using Explainable Machine Learning Methods: A Proof-of-Concept Study. *Information*, 14(10), 559. Retrieved from <https://www.mdpi.com/2078-2489/14/10/559>

Menychtas, D., Petrou, N., Kansizoglou, I., Giannakou, E., Grekidis, A., Gasteratos, A., Gourgoulis, V., Douda, E., Smilios, I., Michalopoulou, M., Sirakoulis, G. Ch., & Aggelousis, N. (2023). Gait analysis comparison between manual marking, 2D pose estimation algorithms, and 3D marker-based system. *Frontiers in Rehabilitation Sciences*, 4(September), 1–14. <https://doi.org/10.3389/fresc.2023.1238134>

U. Trivedi, D. Menychtas, R. Alqasemi, and R. Dubey, "Biomimetic Approaches for Human Arm Motion Generation: Literature Review and Future Directions," *Sensors*, vol. 23, no. 8, p. 3912, Apr. 2023, doi: 10.3390/s23083912.

B. E. Olivas-Padilla, S. Manitsaris, D. Menychtas, and A. Glushkova "Stochastic-Biomechanic Modeling and Recognition of Human Movement Primitives, in Industry, Using Wearables ", *Sensors* 2021, no. 7: 2497. <https://doi.org/10.3390/s21072497>

Menychtas D., Glushkova A., Manitsaris S., Analyzing the kinematic and kinetic contributions of the human upper body's joints for ergonomics assessment, *J. Ambient Intell Human Comput* (2020). <https://doi.org/10.1007/s12652-020-01926-y>

Conferences

D. Menychtas et al., "Towards a Modular Lower Body Robotic Model Using the Product of Exponentials," in *2023 18th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA)*, IEEE, Sep. 2023, pp. 1–3. doi: 10.1109/CNNA60945.2023.10652692.

D. Menychtas, S. Pavlidou, E. Abrasi, E. Douda, M. Michalopoulou, and N. Aggelousis, "Effects of Exercise on the Center of Mass of Elderly People with a High Risk of Falling," *2023 18th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA)*, pp. 4–6, 2023, doi: 10.1109/CNNA60945.2023.10652632.

Z. Tsakiris, L. Tsochatzidis, I. Pratikakis, D. Menychtas, and N. Aggelousis, "Action recognition via graph convolutional networks for the assisted living of the elderly," *2023 18th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA)*, no. 1, pp. 1–4, 2023, doi: 10.1109/CNNA60945.2023.10652618.

D. Arnaoutoglou et al., "Toward Real Time Processing of Radar Signals Detecting Elderly People Fall," in *2023 18th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA)*, IEEE, Sep. 2023, pp. 1–3. doi: 10.1109/CNNA60945.2023.10652639.

A. Kanavaki et al., "Older Adults' Views on the use of In-Home Ambient Sensors and Assistive Robotic Agents in Greece. Data from the ASPiDA Project," in *2023 18th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA)*, IEEE, Sep. 2023, pp. 1–4. doi: 10.1109/CNNA60945.2023.10652669.

Oikonomou, K. M., Kansizoglou, I., Manaveli, P., Grekidis, A., Menychtas, D., Aggelousis, N., Sirakoulis, G. Ch., & Gasteratos, A. (2022). Joint-Aware Action Recognition for Ambient Assisted Living. *2022 IEEE International Conference on Imaging Systems and Techniques (IST)*, 1–6. <https://doi.org/10.1109/IST55454.2022.9827760>

B. E. Olivas-Padilla, D. Menychtas, A. Glushkova and S. Manitsaris, "Hidden Markov Modelling And Recognition Of Euler-Based Motion Patterns For Automatically Detecting Risks Factors From The European Assembly Worksheet", *2020 IEEE International Conference on Image Processing (ICIP)*, Abu Dhabi, United Arab Emirates, 2020, pp. 3259-3263, doi: 10.1109/ICIP40778.2020.9190756.

<p>Menychtas D., Glushkova A., Manitsaris S., “Extracting the Inertia Properties of the Human Upper Body Using Computer Vision”, <i>Extracting the Inertia Properties of the Human Upper Body Using Computer Vision. Computer Vision Systems. ICVS 2019. Lecture Notes in Computer Science, vol 11754. Springer, November 2019</i></p>
<p>Menychtas D., Carey S., Alqasemi R., Dubey R., “Upper Limb Motion Simulation Algorithm for Prosthesis Prescription and Training” <i>International Conference on Intelligent Robots and Systems (IROS) 2019, Macau, China, November 2019</i></p>
<p>Olivas B., Glushkova A., Menychtas D., Manitsaris S., “Designing a web-based automatic ergonomic assessment using motion data”, <i>Proceedings of the 12th ACM International Conference on Pervasive Technologies Related to Assistive Environments (Petra 2019), Rhodes, Greece, June 2019</i></p>
<p>N. Pernalet, A. Raheja, M. Segura, D. Menychtas, T. Wiecek, and S. Carey, “Eye-Hand Coordination Assessment Metrics Using a Multi-Platform Haptic System with Eye-Tracking and Motion Capture Feedback,” in <i>2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), IEEE, Jul. 2018, pp. 2150–2153. doi: 10.1109/EMBC.2018.8512720.</i></p>
<p>Menychtas D., Carey S., Dubey R., “Comparing the Task Joint Motion Between Able-Bodied and Transradial Prosthesis Users During Activities of Daily Living” <i>International Society for Prosthetics and Orthotics (ISPO) 16th World Congress, Cape Town, South Africa, May 2017 2 of 3</i></p>
<p>Menychtas D., Carey S., Dubey R., Lura D., “A Robotic Human Body Model with Joint Limits for Simulation of Upper Limb Prosthesis Users.” <i>International Conference on Intelligent Robots and Systems (IROS) 2016, Daejeon, Korea, October 2016.</i></p>
<p>Menychtas D., Sullins T., Rigsby B., Carey S., Reed K. “Assessing the Role of Preknowledge in Force Compensation During a Tracking Task.” <i>EMBC ’16, Orlando, FL, U.S.A., August 2016.</i></p>
<p>Menychtas D., Carey S., Dubey R. “Limiting the Available Workspace of a Robot-Human Simulation Model to Increase Accuracy” <i>BMES Annual Meeting 2015. Tampa, FL, U.S.A, October 2015.</i></p>
<p>Menychtas D., Lura D., Carey S., Dubey R., “Robotic Based Human Body Model for Improvement of Upper Extremity Prostheses”. <i>BMES Annual Meeting 2014, San Antonio, TX U.S.A 22-25 October 2014</i></p>
<p>Menychtas D., Carey S., Phillips S., Dubey R., “Quantifying Compensatory Motion of Amputees for Improved Prosthetic Prescription and Training.” <i>AAOP 41st Annual meeting & scientific symposium 2013. New Orleans, LA U.S.A February 2015.</i></p>
<p>M. Kallergi, M. Botsivali, N. Politis, D. Menychtas, A. Georgakopoulos, and S. Chatziioannou, “A pilot study of the prognostic significance of metabolic tumor size measurements in PET/CT imaging of lymphomas,” in <i>Progress in Biomedical Optics and Imaging - Proceedings of SPIE, B. Gimi and R. C. Molthen, Eds., Mar. 2015, p. 941710. doi: 10.1117/12.2081877.</i></p>
<p>Kallergi M., Menychtas D., Georgakopoulos A., Pianou N., Metaxas M., & Chatziioannou, S., “Can technical characteristics predict clinical performance in PET/CT imaging? A correlation study for thyroid cancer diagnosis.” In <i>SPIE Medical Imaging (pp. 86730P-86730P). International Society for Optics and Photonics. March 2013</i></p>