Alexandros Lioulemes, Ph.D.

CONTACT INFORMATION

Ph.D. in Computer Engineering
(Lead PI) Senior Robotics-and-Vision Engineer
320 Nevada Street
Newton, MA

alioulemes@wpi.edu
LinkedIn
Google Scholar
Youtube channel

EDUCATION

Harvard Medical School, Boston, MA

Research Scientist at Motion Analysis Lab *2020 - Present*
Human motion analysis during robot-assisted exercises

- Advisor: Paolo Bonato Associate Professor

University of Texas at Arlington, Arlington, TX

Ph.D. at Heracleia Laboratory *2013 - 2017*
Intelligent Multimodal Upper-limb Robotic Rehabilitation System

- Supervisor: Fillia Makedon, Jenkins Garrett Distinguished Professor

The Institute of Informatics and Telecommunications (IIT)
Athens, Greece *Summer 2014*

Research Fellow at Roboskel robotics laboratory

- Advisor: Vangelis Karkaletis, Research Director at IIT at NCSR Demokritos

University of Ioannina, Epirus, Greece

M.Sc. in Robotic Vision and Epipolar Geometry *2011 - 2013*

- Thesis Topic: *Image-based Robot visual homing/navigation*
- Advisor: Christophoros Nikou, Associate Professor

B.Sc. in Image Processing and Object tracking *2007 - 2011*

- Thesis Topic: *Real-time object tracking using a mobile robot*
- Advisor: Christophoros Nikou, Assistant Professor

WORKING EXPERIENCE

Adjunct Teaching Professor *2022 - Present*
Worcester Polytechnic Institute (WPI)
Graduate Studies Online
Developing graduate-level courses with emphasis on laboratories that master students' programming skills.

Senior Robotics-&-Computer Vision Engineer *2018 - Present*
Barrett Medical, LLC
Leading the development of an AI-powered-medical product for the needs of the rehabilitation gyms and smart homes of the future.
320 Nevada Street, MA 02460 USA

Advanced Robotics Engineer *2017 - Present*
Barrett Technology, LLC
Developing advanced haptics and computational methods to deliver safe-physical human-robot interaction for industrial applications.
73 Chapel Street, MA 02456 USA

Scientific Reviewer *2019 - Present*

The National Institutes of Health - NIH
Reviewer for Small Business Grants related to Musculoskeletal, Oral, Skin, Rheumatology, Orthopedic, Rehab.
Bethesda, Maryland 20892

Robotics Software Engineer *Summer Internship 2016*

Barrett Technology, Inc
Robotics Software Engineer for the Proficio Medical Robotic Device (Therapy you can feel)
Barrett Technology, 73 Chapel Street Newton, MA 02458 USA

Research Interests

My research interests lie primarily in the area of:

- Haptic Virtual Fixtures for robot-assisted manipulation applied in robotic rehabilitation applications.
- Computer Vision and Pattern Recognition for safe human-robot interaction applications.
- Artificial Intelligence and perception using advanced machine-and-deep learning algorithms.

Teaching Experience

Adjunct Teaching Professor *Fall 2022 to Present*

Worcester Polytechnic Institute (WPI), Department of Robotics Engineering
Foundations of Robotics + ROS (RBE 500)
Computer Vision with Standard and Modern Techniques + OpenCV (RBE 549)

Grant awards and development Experience

1. **Principal Investigator** - R44EB027525-03: "PostureCheck: A vision-based compensatory-posture-detection tool to enhance performance of the BURT upper-extremity stroke-therapy device", Small Business Innovation Research (SBIR) Phase-II, 2023.
2. **Senior Computer Vision Engineer** - R43HD105546 : "Enabling the Manipulation of Real Objects During Robot-Assisted Stroke Rehabilitation", Small Business Innovation Research (SBIR) Phase-I, 2022.
3. **Senior Robotics Engineer** - R45EC023476-02: "Integrating SmartAssist in BURT upper-extremity stroke-therapy device", Small Business Innovation Research (SBIR) Phase-II, 2023.
4. **Senior Robotics Engineer** - 90BISA0028: "Adaptive Robotic Assistance to Maximize Patient Engagement with BURT", National Institute on Disability, Independent Living, and Rehabilitation Research, SBIR Phase-I, 2019.
5. **Principal Investigator** - 1R43EB027525-01: "PostureCheck: A vision-based compensatory-posture- detection tool to enhance performance of the BURT upper-extremity stroke-therapy device", Small Business Innovation Research (SBIR) Phase-I, 2018.
6. **Advanced Robotics Engineer** - 2R44HD080278-02: "Bimanual Robotic Rehabilitation System with Variable Interaction Modes", Small Business Innovation Research (SBIR) Phase-II, 2016.

7. **Graduate Research Assistant** - 1337866: "MRI Collaborative Proposal Development of iRehab, an Intelligent Closed-Loop Instrument for Adaptive Rehabilitation", National Science Foundation, National Science Foundation, 2013.

Research Experience

Graduate Research Assistant *2014 - 2016*
Heracleia Human-Centered Computing Laboratory
University of Texas at Arlington, Department of Computer Science & Engineering
Supervisors: Fillia Makedon, Ph.D.

Research Fellow *2013 - 2015*
Robotic Vision
National Center of Scientific Reseach "DEMOKRITOS", Greece
Roboskel Laboratory
Supervisors: Vangelis Karkaletsis, Ph.D. and Stasinos Konstantopoulos, Ph.D.

Research Experiences for Undergraduates (REU) *2010 - 2013*
Mobile and flying robots
University of Ioannina, Department of Computer Science and Engineering, Greece
Robotic Laboratory
Supervisors: Konstantinos Blekas, Ph.D. and Christophoros Nikou, Ph.D.

Patents

1. William T. Townsend, **Alexandros Lioulemes**, Claude F. Valle, Craig G. McDonald, "System and method for performing computer-based, robot-assisted therapy", (Dec. 2023).

Journal Publications

1. **Alexandros Lioulemes**, Michail Theofanidis, Konstantinos Tsiakas, Maher Abujelala, Chris Collander, Bill Townsend, Fillia Makedon, "Magni-Dynamics: A Vision-based Human Upper-Limb kinematic and dynamic analysis for Rehabilitation and Vocational Applications", International Journal of Biomedical and Biological Engineering Vol:4, No:4, 2017.

Paper Publications

1. Christopher Collander, Joseph Tompkins, **Alexandros Lioulemes**, Michail Theofanidis, Ali Sharifara, Fillia Makedon, "An Interactive Robot-based Vocational Assessment Game using Lego Assembly", Accepted Paper in International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Rhodes Island Greece, June 2017.

2. Michail Theofanidis, Saif Iftekar Sayed, **Alexandros Lioulemes**, Fillia Makedon, "VARM: Using Virtual Reality to Program Robotic Manipulators", Accepted Paper in International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Rhodes Island Greece, June 2017.

3. Konstantinos Tsiakas, Maher Abujelala, **Alexandros Lioulemes**, Fillia Makedon, "An Intelligent Interactive Learning and Adaptation Framework for Robot-Based Vocational Training", IEEE Symposium Series in Computational Intelligence (SSCI), IEEE, December 2016.

4. **Alexandros Lioulemes**, Michail Theofanidis, Fillia Makedon, "Quantitative Analysis of the Human Upper-Limb Kinematic Model for Robot-based Rehabilitation Applications", 12th Conference on Automation Science and Engineering (CASE), IEEE, August 2016.

5. Benjamin Chebaa, **Alexandros Lioulemes**, Maher Abujelala, Dylan Ebert, Eric Becker, Fillia Makedon, "Multimodal Analysis of Serious Game for Cognitive and Physiological Assessment", The 1st Workshop on Human Behaviour Monitoring, Interpretation and Understanding (NOTION), International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2016.

6. **Alexandros Lioulemes**, Michalis Papakostas, Shawn N. Gieser, Theodora Toutountzi, Maher Abujelala, Sanika Gupta, Christopher Collander, Christopher D. McMurrough, Fillia Makedon, "A Survey of Sensing Modalities for Human Activity, Behavior, and Physiological Monitoring", International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2016.

7. Michail Theofanidis, **Alexandros Lioulemes**, Fillia Makedon, "A Motion and Force Analysis System for Human Upper-limb Exercises", International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2016.

8. Srujana Gattupalli, **Alexandros Lioulemes**, Shawn N. Gieser, Paul Sassaman, Vasilis Athitsos, Fillia Makedon, "MAGNI: A Real-time Robot-assisted Game-based Tele-Rehabilitation System", International Conference on Human-Computer Interaction, (HCII), Toronto, August 2016.

9. **Alexandros Lioulemes**, Paul Sassaman, Shawn N. Gieser, Vangelis Karkaletsis, Fillia Makedon, Vangelis Metsis, "Self-Managed Patient-Game Interaction Using the Barrett WAM Arm for Motion Analysis", International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2015.

10. **Alexandros Lioulemes**, Nikos Sarafianos, Theodoros Giannakopoulos, Vangelis Karkaletsis, "A Two-Step Identification Method for Human-Robot Interaction in Assistive Environments" The 5th Workshop on Robotics in Assistive Environments, International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2015.

11. Scott Phan, **Alexandros Lioulemes**, Cyril Lutterodt, Fillia Makedon, Vangelis Metsis. "Guided Physical Therapy Through the Use of the Barrett WAM Robotic Arm.", IEEE International Symposium on Haptic Audio-Visual Environments and Games, (HAVE) , Dallas TX, October 2014.

12. Alexandros Papangelis, Georgios Galatas, Konstantinos Tsiakas, **Alexandros Lioulemes**, Dimitrios Zikos, Fillia Makedon, "Dialogue System for Ensuring Safe Rehabilitation." International Conference on Human-Computer Interaction, (HCII), Crete Greece, (6) 2014: 349-358.

13. **Alexandros Lioulemes**, Georgios Galatas, Vangelis Metsis, Gian luca Mariottini, Fillia Makedon, "Safety Challenges in using AR.Drone to collaborate with humans in indoor environments." The 4th Workshop on Robotics in Assistive Environments, International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Rhodes Island Greece, May 2014.

Poster Papers

1. Maher Abujelala, **Alexandros Lioulemes**, Paul Sassaman, Fillia Makedon, "Robot-aided Rehabilitation using Force Analysis", International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2015.

2. Christopher D. McMurrough, **Alexandros Lioulemes**, Scott Phan, Fillia Makedon, "3D Mapping of Visual Attention for Smart Rehabiliation", International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Corfu Island Greece, July 2015.

3. **Alexandros Lioulemes**, Scott Phan, Christopher D. McMurrough, Fillia Makedon, "Robotic-based Vocational Assessment", IEEE International Conference on Technologies for Practical Robot Applications, (TePRA) , Boston MA, May 2015.

Doctoral Consortiums

1. **Alexandros Lioulemes**, "Adaptive User and Haptic Interfaces for Smart Assessment and Training", ACM Conference on Intelligent User Interfaces, (IUI), Sonoma CA, March 2016 .

2. **Alexandros Lioulemes**, "Robot-assisted Rehabilitation for Smart Assessment and Training", IEEE International Conference on Healthcare Informatics, (ICHI), Dallas TX, October 2015.

3. **Alexandros Lioulemes**, "Using Haptic and Vision sensing for Human-Robot Interaction.", IEEE International Symposium on Haptic Audio-Visual Environments and Games, (HAVE) , Dallas TX, October 2014.

4. **Alexandros Lioulemes**, "Safe Human-Robot Interaction Methods", International Conference on PErvasive Technologies Related to Assistive Environments, (PETRA), Rhodes Greece, June 2014.

Research Projects

1. Franziska Kirstein, Giorgos Kalpaktsoglou, Nikolaos Sarafianos, **Alexandros Lioulemes**, "RoboCoffee: Robot serves coffee.", National Center of Scientific Research - Demokritos, International Research-Centered Summer School in Cognitive Systems and Interactive Robotics, Data and Content Analysis, Athens Greece, July 2014.

2. Konstantinos Tsiakas, **Alexandros Lioulemes**, Athanasia Sapountzi, "Multisensor robot perception.", National Center of Scientific Research - Demokritos, International Research-Centered Summer School in Cognitive Systems and Interactive Robotics, Data and Content Analysis, Athens Greece, July 2013.

Awards

Funding Awards

- NIH award for the PostureCheck grant - Phase-II — September 2021
- NIH award for the PostureCheck grant - Phase-I — September 2018

Educational Awards

- Honored talk with the Congressman of Massachusetts Jake Auchincloss during his visit at Barrett Medical to announce an NIH grant — July 2022
- Best Student Paper Award - ACM PETRA — July 2017
- Best Paper Presentation Award - WASET ICRR — April 2017
- Doctoral Consortium Award, (IUI) conference "NSF" — March 2016
- Doctoral Consortium Award, (ICHI) conference "NSF" — October 2015
- PETRA Conference 2015, Dallas - Athens "NCSR Demokritos" — July 2015
- PETRA Conference 2014, Athens - Rhodes, "NSF" — May 2014
- Doctoral Consortium Award, (HAVE) conference "NSF" — October 2014
- STEM Tuition Fellowship — Fall 2013
- Honored talk - Undergraduate student with the highest GPA — December 2011

Training Research Certifications

1. Online Pedagogy workshop - Worcester Polytechnic Institute (WPI)
2. Cognitive Systems and Interactive Robotics - National Center for Scientific
3. Project Management Professional (PMP) Certification Training Course - Edureka
4. Biomedical Research Investigators and Key Personnel - CITI Program
5. Human Subjects Protection Training (HSP)
6. Responsible Conduct in Research (RCR)

Technical Skills

Programming Languages
- C/C++, Python, MATLAB and C#

Robotic systems
- ROS/ROS 2: Robot Operating System
- Robotics Toolbox by Peter Corke develoeop in MATLAB
- Webots: Robot simulator by Cyberbotics
- OPENRAVE: Open Robotics Automation Virtual Environment

Web tools
- HTML, CSS, JavaScript, PHP, JSP, iWeb

Integrated development environment
- Unity3D, Eclipse, NetBeans, Visual Studio .NET

Markup
- LaTeX, TeX

Operating Systems
- Linux, Mac OS X, Windows

Academic References

Paolo Bonato Ph.D.
Associate Professor in the Department of Physical Medicine and Rehabilitation
Director of the Motion Analysis Laboratory E-mail: pbonato@partners.org
Harvard Medical School, Boston MA

William Townsend Ph.D.
President & CEO of Barrett Technology Phone: 617-252-9000
Director of Barrett Medical E-mail: wt@barrett.com
Massachusetts Institute of Technology, Cambridge MA

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University of Texas at Arlington

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