

## Asst. Prof. RAMAZAN ÜNAL

### Personal Information

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### Biography

Ph.D., Biomechanical Engineering & Robotics and Mechatronics, University of Twente, the Netherlands, 2014

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**Post-Doc.:** Vrije Universiteit Brussels, Robotics & Multi-Body Mechanics, 2014-2016.

**Research Interests:** Biomechanics, Biomechatronics, Prosthetics & Orthotics, Human-oriented Device Design, Assistive Devices, Rehabilitation Robotics, Robotic Exoskeletons, Design, Kinematics & Dynamics, Energy Efficiency, Compliant Actuators, Robotics, Mechatronics,...

**Short bio:** Dr. Ramazan Ünal is currently an assistant professor in Mechanical Engineering Department at Abdullah Gül University. He received his Ph.D. from University of Twente in January 2014 for the design and control of energy-recycling transfemoral prosthesis in Biomechanical Engineering and Robotics and Mechatronics groups. He received his M.Sc. from Sabanci University for the design optimization and control of parallel structured haptic exoskeleton for wrist rehabilitation in Human Machine Interaction Laboratory, 2008. He received his B.Sc. from Yildiz Technical University in Mechanical Engineering with major in Automotive, 2005. He worked as a post-doc researcher for design and development of actuation systems for lower limb exoskeletons in Robotics & Multi-body Mechanics group at Vrije Universiteit Brussels (2014-2016). There he was involved with one European and one national research projects, related with robotic exoskeletons.

### Education Information

Doctorate, Universiteit Twente, Engineering Technology, Biomechanical Engineering, Netherlands 2008 - 2014

Postgraduate, Sabanci University, Faculty Of Engineering And Natural Sciences, Mekatronik Mühendisliği, Turkey 2007 - 2008

Undergraduate, Yildiz Technical University, Makine Mühendisliği Fakültesi, Makine Mühendisliği Bölümü, Turkey 2001 - 2005

## Foreign Languages

Dutch, B1 Intermediate

English, C1 Advanced

## Dissertations

Doctorate, WalkMECH: Design and Control of an Energy Recycling Transfemoral Prosthesis, Universiteit Twente, Engineering Technology, Biomechanical Engineering, 2014

Postgraduate, Design Optimization and Control of a Parallel Lower-Arm Exoskeleton, Sabancı Üniversitesi, Mühendislik Ve Doğa Bilimleri Fakültesi, Mekatronik Mühendisliği, 2008

Competence In Art, Motor ve araç kontrol sistemleri, Yıldız Teknik Üniversitesi, Makina Mühendisliği Fakültesi, Makine Mühendisliği Bölümü, 2005

## Research Areas

Mechanical Engineering, Machine Theory and Dynamics, Machine Dynamics, Mechanisms, Robotics, Mechatronics, Modeling and Simulation of Dynamic Systems, Mechanical, Biomechanics, Engineering and Technology

## Academic Titles / Tasks

Assistant Professor, Abdullah Gul University, Mühendislik Fakültesi, Makine Mühendisliği, 2018 - Continues

Assistant Professor, Abdullah Gul University, Mühendislik Fakültesi, Makine Mühendisliği, 2016 - 2018

Lecturer, Abdullah Gul University, Mühendislik Fakültesi, Makine Mühendisliği, 2016 - 2016

Research Assistant, Vrije Universiteit Brussel, Engineering Faculty, Mechanical Engineering, 2014 - 2015

Research Assistant, Universiteit Twente, Engineering Technology, Biomechanical Engineering, 2008 - 2013

Research Assistant, Universiteit Twente, Electric-Electronics Mathematics Computer Science, Robotics And Mechatronics, 2008 - 2013

Research Assistant, Sabanci University, Faculty Of Engineering And Natural Sciences, Mekatronik Mühendisliği, 2007 - 2008

## Courses

Exploring Profession, Undergraduate, 2016 - 2017, 2015 - 2016

Enginnering Mechanics II: Dynamics, Undergraduate, 2016 - 2017

Engineering Drawing, Undergraduate, 2016 - 2017

Engineering Drawing & Design, Undergraduate, 2015 - 2016

Machine Theory, Undergraduate, 2016 - 2017

## Advising Theses

ÜNAL R., Design and Control of Transfemoral Prosthesis for Different Tasks, Postgraduate, F.Klijnstra(Student), 2012

ÜNAL R., Control and Modeling of Energy-Efficient Transfemoral Prosthesis, Postgraduate, B.Burkink(Student), 2012

ÜNAL R., Investigation of the optimal electro tactile feedback in trans-femoral prosthesis, Postgraduate, R.Koning(Student), 2011

ÜNAL R., Prototype Design of a Mechanically Actuated Transfemoral Prosthesis, Postgraduate, S.Behrens(Student), 2010

ÜNAL R., Design and Implementation of a Variable Stiffness Actuator, Postgraduate, L.Cicchitti(Student), 2010

## Published journal articles indexed by SCI, SSCI, and AHCI

- I. **Human-oriented approaches for assistive and rehabilitation robotics — Engineering methods, technical implementation, and treatment**  
Beckerle P., Salvietti G., ÜNAL R., Mastrogiovanni F.  
ROBOTICS AND AUTONOMOUS SYSTEMS, vol.96, pp.238-241, 2017 (SCI-Expanded)
- II. **A Human-Robot Interaction Perspective on Assistive and Rehabilitation Robotics**  
Beckerle P., Salvietti G., ÜNAL R., Prattichizzo D., Rossi S., Castellini C., Hirche S., Endo S., Ben Amor H., Ciocarlie M., et al.  
FRONTIERS IN NEUROBOTICS, vol.11, 2017 (SCI-Expanded)

## Refereed Congress / Symposium Publications in Proceedings

- I. **MATERIAL SELECTION FOR KNEE EXOSKELETON FRAME**  
Najam H., BAL B., ÜNAL R.  
The Internatinonal Conference on Materials Science, Mechanical and Automotive Engineerings and Technology, 10 - 12 April 2018
- II. **Conceptual Design of a Novel Variable Stiffness Actuator for Use in Lower Limb Exoskeletons**  
Bacek T., Unal R., Moltedo M., Junius K., Cuypers H., Vanderborght B., Lefeber D.  
14th IEEE/RAS-EMBS International Conference on Rehabilitation Robotics (ICORR), Singapore, Singapore, 11 - 14 August 2015, pp.583-588
- III. **The Control of Recycling Energy Storage Capacity for WalkMECHadapt**  
Unal R., KLIJNSTRA F., BEHRENS S. M., HEKMAN E. E. G., STRAMIGIOLI S., KOOPMAN H. F. J. M., CARLONI R.  
23rd IEEE International Symposium on Robot and Human Interactive Communication (IEEE RO-MAN), Edinburgh, Saint Helena, 25 - 29 August 2014, pp.720-725
- IV. **Modeling of WalkMECH: A fully-passive energy-efficient transfemoral prosthesis prototype**  
Unal R., KLIJNSTRA F., BURKINK B., BEHRENS S., Hekman E., STRAMIGIOLI S., Koopman H., CARLONI R.  
2013 IEEE 13th International Conference on Rehabilitation Robotics, ICORR 2013, Seattle, WA, United States Of America, 24 - 26 June 2013
- V. **Towards a Fully Passive Transfemoral Prosthesis for Normal Walking**  
Unal R., CARLONI R., BEHRENS S. M., HEKMAN E. E. G., STRAMIGIOLI S., KOOPMAN H. F. J. M.  
4th IEEE RAS and EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob) / Symposium on Surgical Robotics, Rome, Italy, 24 - 27 June 2012, pp.1949-1954
- VI. **Design of a Fully-Passive Transfemoral Prosthesis Prototype**  
BEHRENS S. M., Unal R., HEKMAN E. E. G., CARLONI R., STRAMIGIOLI S., KOOPMAN H. F. J. M.  
33rd Annual International Conference of the IEEE Engineering-in-Medicine-and-Biology-Society (EMBS), Massachusetts, United States Of America, 30 August - 03 September 2011, pp.591-594
- VII. **Conceptual Design of an Energy Efficient Transfemoral Prosthesis**  
Unal R., CARLONI R., HEKMAN E. E. G., STRAMIGIOLI S., KOOPMAN H. F. J. M.  
IEEE/RSJ International Conference on Intelligent Robots and Systems, Taipei, Taiwan, 18 - 22 October 2010, pp.343-348
- VIII. **Prototype Design and Realization of an Innovative Energy Efficient Transfemoral Prosthesis**  
Unal R., BEHRENS S. M., CARLONI R., HEKMAN E. E. G., STRAMIGIOLI S., KOOPMAN H. F. J. M.  
3rd IEEE RAS and EMBS International Conference on Biomedical Robotics and Biomechatronics, Tokyo, Japan, 26 - 29 September 2010, pp.191-196
- IX. **Biomechanical Conceptual Design of a Passive Transfemoral Prosthesis**  
Unal R., CARLONI R., HEKMAN E. E. G., STRAMIGIOLI S., KOOPMAN H. F. J. M.  
32nd Annual International Conference of the IEEE Engineering-in-Medicine-and-Biology-Society (EMBC 10), Buenos Aires, Argentina, 30 August - 04 September 2010, pp.515-518
- X. **Modeling and Design of Energy Efficient Variable Stiffness Actuators**

VISSER L. C., CARLONI R., Unal R., STRAMIGIOLI S.

IEEE International Conference on Robotics and Automation (ICRA), Alaska, United States Of America, 3 - 08 May 2010, pp.3273-3278

**XI. Optimal Dimensional Synthesis of Force Feedback Lower Arm Exoskeletons**

Unal R., Patoglu V.

2nd Biennial IEEE RAS-EMBS International Conference on Biomedical Robotics and Biomechanics (BioRob 2008), Arizona, United States Of America, 19 - 22 October 2008, pp.329-334

**XII. Multi-criteria Design Optimization of Parallel Robots**

Unal R., Kiziltas G., Patoglu V.

IEEE Conference on Robotics, Automation, and Mechatronics, Chengdu, China, 21 - 24 September 2008, pp.577-583

**XIII. Optimal dimensional synthesis of a dual purpose Haptic exoskeleton**

Unal R., Patoglu V.

6th International Conference on Haptics: Perception, Devices and Scenarios, EuroHaptics 2008, Madrid, Spain, 10 - 13 June 2008, pp.529-535

**XIV. A multi-criteria design optimization framework for haptic interfaces**

Unal R., Kiziltas G., Patoglu V.

16th Symposium on Haptics Interfaces for Virtual Environment and Teleoperator Systems, Nevada, United States Of America, 13 - 14 March 2008, pp.231-238

**XV. Rehabilitasyon Robotunun Empedans Kontrolü Göre Tasarım Optimizasyonu**

ÜNAL R., KIZILTAS G., PATOGLU V.

Otomatik Kontrol Ulusal Toplantısı, TOK 2007, İstanbul, Turkey, 5 - 07 September 2007, pp.134-139

## Supported Projects

ÜNAL R., TUBITAK Project, Oturma-Kalkma, Merdiven İnme-Cıkma, Farklı Hız, Eğitim ve Yüzeylere Uyum Sağlayabilen Enerji Dönüşümlü Transfemoral Protez Tasarımı, 2017 - Continues

ÜNAL R., Other International Funding Programs, MIRAD: an Integrated Methodology to Bring Intelligence Robotic Assistive Devices to the Users, strategic basic research project (SBO-project), 2013 - Continues

ÜNAL R., EU Framework Program Project, BIOMOT: Smart Wearable Robots with Bioinspired Sensory-Motor Skills, 2013 - 2016

ÜNAL R., Other International Funding Programs, Product Realization of WalkMECH: Innovative Transfemoral Prosthesis, 2012 - 2013

ÜNAL R., Other International Funding Programs, REFLEXLEG, 2008 - 2012

## Activities in Scientific Journals

Robotics and Autonomous Systems, Elsevier, Special Issue Editor, 2016 - Continues

## Scientific Refereeing

Journal of Advanced Robotics, SCI Journal, August 2017

IEEE Transaction on Mechatronics, SCI Journal, June 2017

IEEE Transaction on Neural Systems and Rehabilitation Engineering, SCI Journal, May 2017

Child's Nervous System, SCI Journal, May 2017

Transaction on Biomedical Engineering, SCI Journal, April 2017

IEEE Transactions on Robotics, SCI Journal, April 2016

IEEE Transactions on Neural Systems and Rehabilitation Engineering, SCI Journal, April 2016

## Metrics

Publication: 17

Citation (WoS): 98

Citation (Scopus): 167

H-Index (WoS): 7

H-Index (Scopus): 8

## Congress and Symposium Activities

IEEE International Symposium on Robot and Human Interactive Communication, RO-MAN 2014., Attendee, Edinburgh, United Kingdom, 2014

International Conference on Rehabilitation Robotics, ICORR 2013, Attendee, Washington, United States Of America, 2013

4th Dutch Biomedical Engineering Conference, BME 2013, Attendee, Amsterdam, Netherlands, 2013

IEEE RAS / EMBS International Conference on Biomedical Robotics and Biomechatronics, BioRob 2012, Attendee, Roma, Italy, 2012

IEEE Engineering in Medicine and Biology Society, EMBC 2011, Attendee, Massachusetts, United States Of America, 2011

3rd Dutch Biomedical Engineering Conference, BME 2011, Attendee, Amsterdam, Netherlands, 2011

Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBC 2010, Attendee, Buenos Aires, Argentina, 2010

Annual IEEE-EMBS Benelux Chapter, 2009, Attendee, Enschede, Netherlands, 2009

IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems, HAPTICS 2008, Attendee, Nevada, United States Of America, 2008

Otomatik Kontrol Ulusal Toplantısı, TOK 2007, Attendee, İstanbul, Turkey, 2007