Fahimeh Azari Last update: 30 May, 2023

Contact Information

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Research Interests

Computational Engineering, Scientific Computing, Bone Mechanics, Medical Imaging, Finite Element Analysis

Education

Katholieke Universiteit Leuven (KU Leuven), Leuven, Belgium, June 2019 – Present
Ph.D. in Mechanical Engineering (Biomechanics)
Thesis: *Mechanical and structural alterations after surgical treatment of knee osteoarthritis*
Adviser: Prof. G. Harry van Lenthe

Sharif University of Technology, Tehran, Iran, Sep 2014 – Sep 2016
M.Sc. in Mechanical Engineering (Applied Design) GPA: 18.5 / 20
Thesis: *Passive Finite Element Model Combined with a Musculoskeletal Model of the Spine to Estimate in vivo Load Sharing in the L4-L5 Motion Segment*
Adviser: Prof. Navid Arjmand and Prof. Mohamad Parnianpour

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran, Sep 2010 – Sep 2014
B.Sc. in Biomedical Engineering (Biomechanics) GPA: 18.91 / 20
Thesis: *Design and Implementation of an Elastography Apparatus for Mechanical Characterization of Soft Tissues*
Adviser: Prof. Nasser Fatouraee

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran, Sep 2011 – Sep 2014
B.Sc. in Industrial Engineering, studying two majors at the same time (double degree) GPA: 17.71 / 20

Research Experience

PhD Researcher, June 2019 – Present
BioMechanics (BMe), Bone Group, **KU Leuven**, Leuven, Belgium
- Visualization and quantification of bone microstructure in knee osteoarthritis.

Research Assistant, August 2018 – June 2019
BioMechanics (BMe), Bone Group, **KU Leuven**, Leuven, Belgium
- Developing a computational study of line-to-line versus undersized cementing techniques of short-stem total hip arthroplasty with experimental verification.

Research Assistant, Sep 2016 – Sep 2017
Biomechanics Lab, **Sharif University of Technology**, Tehran, Iran
- Finite element analysis based on CT scans modeling; developing a combined passive and active musculoskeletal model study to estimate L4-L5 load sharing based.

Member of Research and Development (R&D) group, Sep 2017 – August 2018
R&D group, Dideban Tajhiz Alborz Co., Tehran, Iran

Teaching & Coaching Experience

Teaching Assistant, October 2022
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Course: Advanced Tissue Mechanics
- Tutoring Materialise software packages (mimics and 3-matic) for developing subject-specific finite element models of implanted femora to identify critical locations prone to failure under physiological loading conditions.

Teaching Assistant, November 2021
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Course: Numerical Modelling in Biomedical Engineering
- Tutoring students in developing a python tool for computed tomography-based structural rigidity analysis (CTRA) to predict and monitor fracture risk associated with metastatic bone lesions.

Teaching Assistant, October 2021, October 2022
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Course: Advanced Study Topics in Musculoskeletal Biomechanics
- Tutoring Materialise software packages (mimics & 3-matic) and ABAQUS to quantify bone tissue modulus in CT-based finite element models of the femur using three-point bending and beam theory.

Teaching Assistant, Fall 2016, Fall 2015
Department of Mechanical Engineering, **Sharif University of Technology**, Tehran, Iran
Course: Statics

Teaching Assistant, Fall 2015
Department of Mathematics, **Sharif University of Technology**, Tehran, Iran
Tutoring MATLAB software to Bachelor Students

Teaching Assistant, Spring 2016, Spring 2015
Department of Mechanical Engineering, **Sharif University of Technology**, Tehran, Iran
Course: Material Science

Supervision and Mentoring, 2022-2023
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Emma Van Riet, **MSc thesis project**: "Developing an open-source image analysis tool to assess bone microstructure in photon counting CT images"

Supervision and Mentoring, 2022-2023
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Erik Schulte, **MSc thesis project**: "Studying the performance of free subchondral screws in increasing stability in tibial plateau fractures"

Supervision and Mentoring, Summer 2022
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Karen Vanhalle, **Honor program (BSc)**: "Association between osteoarthritis severity and bone matrix changes"

Supervision and Mentoring, fall 2021
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Phachara Suklim, **Research visitor**: "Finite element modeling of tibia plateau fractures"

Supervision and Mentoring, Summer 2021
Department of Mechanical Engineering, **KU Leuven**, Leuven, Belgium
Camille Le Goff, **Semester thesis**: "developing bone remodeling algorithm to investigate the long-term mechanical performance of cemented short short-stem total hip arthroplasty"

Industrial Experience

Content Creator, March 2021-Present
Udemy, Online platform
- Developing and producing video and written content for online courses on Materialise software packages (mimics & 3-matic).

Beta Tester, June 2020
Materialise Co., Leuven, Belgium
- Testing and providing feedback on the functionality and usability of the upcoming release of the company's materials software (version 23).

Collaborated with Mathys company, 2018-2019
Mathys Co., Bettlach, Switzerland
- Assessing the feasibility and mechanical performance of a cemented short stem for the first time in patients with poor bone stock.

Publications

[1] William Colyn, **Fahimeh Azari**, Johan Bellemans, G. Harry van Lenthe, Lennart Scheys
Microstructural adaptations of the subchondral bone are related to the mechanical axis deviation in end stage varus OA knees
European Cells & Materials Journal, February 2023

[2] **Fahimeh Azari**, William Colyn, Johan Bellemans, Lennart Scheys, G. Harry van Lenthe
In the end-stage knee osteoarthritis the subchondral bone microarchitecture of the tibial plateau is correlated to that of the distal femur
27th Congress of the European Society of Biomechanics, June 2022, Porto, Portugal

[3] **Fahimeh Azari**, Amelie Sas, Karl P Kutzner, Andreas Klockow, Thierry Scheerlinck, G Harry van Lenthe
Cemented short-stem total hip arthroplasty appears promising in patients with poor bone quality
26th Congress of the European Society of Biomechanics, August 2021, Milan, Italy

[4] **Fahimeh Azari**, Amelie Sas, Karl P Kutzner, Andreas Klockow, Thierry Scheerlinck, G Harry van Lenthe
Cemented short-stem total hip arthroplasty: Characteristics of line-to-line versus undersized cementing techniques using a validated CT-based finite element analysis
Journal of Orthopaedic Research®, September 2021

[5] Chadapa Rungruangbaiyok, **Fahimeh Azari**, G Harry van Lenthe, Jos Vander Sloten, Boonsin Tangtrakulwanich, Surapong Chatpun
Finite element investigation of fracture risk under postero-anterior mobilization on a lumbar bone in elderly with and without osteoporosis
Journal of Medical and Biological Engineering, June 2021

[6] **Fahimeh Azari**, Navid Arjmand, Aboulfazl Shirazi-Adl, Shima Rahimi-Moghaddam
A combined passive and active musculoskeletal model study to estimate L4-L5 load sharing
Journal of biomechanics, March 2018

Talks and Presentations

Photon-counting CT appears promising in quantifying bone microstructure in the knee
50th Congress of the European Calcified Tissue Society, April 2023, Liverpool, United Kingdom

In the end-stage knee osteoarthritis the subchondral bone microarchitecture of the tibial plateau is correlated to that of the distal femur
27th Congress of the European Society of Biomechanics, June 2022, Porto, Portugal

Microstructural adaptations of the subchondral tibial bone are related to the mechanical axis deviation in end-stage varus osteoarthritic knees
OARSI 2022 World Congress on Osteoarthritis, April 2022, Berlin, Germany

Cemented short-stem total hip arthroplasty appears promising in patients with poor bone quality
26th Congress of the European Society of Biomechanics (remote), August 2021, Milan, Italy

The cemented optimys stem: A computational study of line-to-line and undersized stems with experimental verification
18th National Day on Biomedical Engineering, Artificial Intelligence in Medicine, November 2019, Brussels, Belgium

Honors and Awards

- **PhD research assistantship**, Mechanical Engineering, The Pennsylvania State University, 2018 (declined)
- **PhD studentship** Institute of Bioengineering in the School of Engineering, École Polytechnique Fédérale de Lausanne (EPFL), 2018 (declined)
- **Membership of** National Elites Foundation, Iran, 2010-2018
- **Fellowship of** National Elites Foundation, Iran, 2014-2018
- **Exceptional Talents Fellowship** in Biomedical Engineering Department, Amirkabir University of Technology, Iran, 2014
- **Membership of** Exceptional Talent Center, Amirkabir University of Technology, Iran, 2010-2014
- **Ranked 1st** in cum. GPA among undergraduate biomedical engineering students, Amirkabir University of Technology, 2010-2014

Technical Skills

Programming Languages:
Python, R

Operating Systems:
Linux, Windows

Analysis/Simulation Tools:
MATLAB, Neural Network in MATLAB, Identification System in MATLAB, Simulink, Business Process Modeling in Arena, ABAQUS

Applications Software:
CATIA, SolidWorks, AutoCAD, Mimics & 3-matic, Geomagic, Hypermesh, OpenSim, AnyBody

References

Available upon request