



ADMISSION TO DOCTORAL STUDIES
September 2022

Session

Field of doctoral studies: Mechanical Engineering
Doctoral supervisor: Silviu BUTNARIU

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Study of 3D reconstruction methods and deformation of flexible bodies in real time*

Content / Main aspects to be considered

Flexible 3D body scanning, segmentation and modeling strategies. Analysis of deformations under the action of external and/or internal demands.

Real-time study of deformations using immersive environments.

Creating a set of parameters that can be identified and implemented in type analyses.

Recommended bibliography:

1. Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology, 2nd Edition, ISBN: 978-0-471-36089-6, July 2003, Wiley-IEEE Press
2. Butnariu S., Analysis of mechanical structures using finite element method, lecture notes, ISBN 978-606-19-0311-5 (CD), Ed. Universitatii Transilvania din Brasov, 2013
3. Butnariu, S., Mogan, Gh., Analiza cu elemente finite în ingineria mecanică.. Aplicații practice in ANSYS, Ed. Universității Transilvania, ISBN 978-606-19-0474-7 (print), 2014
4. Butnariu, S., VR technologies for scanning, 3D reconstruction and tracking-lecture notes, CD, ISBN: 978-973-131-340-5, Ed. Lux Libris, 2016
5. Innmann, M., Zollhöfer, M., Nießner, M., Theobalt, C., Stamminger, M. (2016). Volume Deform: Real-Time Volumetric Non-rigid Reconstruction. In: Leibe, B., Matas, J., Sebe, N., Welling, M. (eds) Computer Vision – ECCV 2016. ECCV 2016. Lecture Notes in Computer Science(), vol 9912. Springer, Cham. https://doi.org/10.1007/978-3-319-46484-8_22
6. U. Meier, O. López, C. Monserrat, M.C. Juan, M. Alcañiz, Real-time deformable models for surgery simulation: a survey, Computer Methods and Programs in Biomedicine, Volume 77, Issue 3, 2005, Pages 183-197, ISSN 0169-2607
7. Yaoping Wang, Cheekong Chui, Honglip Lim, Yiyu Cai & Koonhou Mak (1998) Real-Time Interactive Simulator for Percutaneous Coronary Revascularization Procedures, Computer Aided Surgery, 3:5, 211-227, DOI: 10.3109/10929089809149843
8. S. Cotin, H. Delingette and N. Ayache, "Real-time elastic deformations of soft tissues for surgery simulation," in IEEE Transactions on Visualization and Computer Graphics, vol. 5, no. 1, pp. 62-73, Jan.-March 1999, doi: 10.1109/2945.764872.

Prerequisites / Remarks:

Graduates of study programs in Automotive Engineering, Mechanical Engineering, Medical Engineering, Mechatronics, Robotics, Electrical Engineering; Programming knowledge

TOPIC 2: *Improving 3D reconstruction methods*

Content / Main aspects to be considered

Increasing the quality of information of 3D digital objects rebuilt by implementing engineering components, with applications in automotive /archaeological / cultural / medical restoration. Using the CAE technics: transforming the rebuilt 3D volumes / surfaces into virtual models that can be analyzed with dedicated software applications.

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1. Butnariu S., Analysis of mechanical structures using finite element method, lecture notes, ISBN 978-606-19-0311-5 (CD), Ed. Universitatii Transilvania din Brasov, 2013
2. Butnariu, S., Mogan, Gh., Analiza cu elemente finite în ingineria mecanică.. Aplicatii practice in ANSYS, Ed. Universităţii Transilvania, ISBN 978-606-19-0474-7 (print), 2014
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Doctoral supervisor,
field of doctoral studies,

Prof.Dr.Eng. Silviu BUTNARIU
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Prof. Dr. Eng.

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