


## ADVANCED MECHANICAL ENGINEERING GROUP

### Contact details

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Acronym	IMAV_Group
Logo	
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### Areas of expertise

**Mechanical applied in robotics**, 290301 (Robotics and Mechatronics), in the framework of the research group is studying modelling and the simulation kinematics, dynamic and the accuracy of mechanical structures of robots with applicability for industrial production.

**Mechanical vibration and acoustic**, 290501 (Mechanical Engineering) on the activity of production with pollutant sound and vibration, with direct action human to the operator. Applications: 1). Action of mechanical vibrations on the human organism, 291504 (Biomechanics) or 291599 (biomedical engineering what are not to be found above); 2). Noise pollution in urban agglomerations, with the development the basics sound absorber of new materials, 291499 (elements of engineering materials which are not to be found classified above).

**Mechanical Engineering, Biomechanics, Biomedical Engineering what are not to be found above, Elements of Engineering Materials which are not to be found classified above.**

### Team and key skills

**Prof. Dr. Eng. Mariana Arghir**, group coordinator, Competence Domains: Material Systems Dynamics, Mechanical Vibrations, Measurements and control devices for sounds and vibrations, Publications: 254 scientific articles, 19 educational books, 14 projects (8 as director of project), 1 international (director of project), 14 manuals, 21 projected devices, 3 Patents for inventions, 5 Proposals for inventions in the process of validation.

**Prof. Dr. Eng. Iuliu Negrean**, Areas of competence: Mechanical Components applied in robotics, mechanical advanced, system reliability, publications: 109 scientific works, 15 books, 16 projects.

### Infrastructure

- Equipment for research in advanced mechanical and in robotics: Deck tenso-metrics SPIDER 8; PMS Pimento; Vibrotest 60 - Module 1; Vibrotest 60 - Module P95, Module 5, Module 7; Vibrotest 60 - Module 2.1; Oscilloscope HM 1508; Procurement Cards Tip DSA 4451 + NI 6602; Industrial Robot with 5 axes, FANUC ; Mobil Robot PATROL BOT; - Additional equipment; ibrotest 60 - Module 2, Module 3, Module 6; Additional equipment LMS Pimento; Equipment experimental statics Model: EX – 300; Complex Rotational System Model: EX 185; EX 176; Apparatus for the friction study Model: SAN 126; SAN 126 W;

- The research equipment on action by vibration on the human body and noise pollution: Sound Meter Integrator NL-32; Card in real-time analysis of Sound meter NX 22J; Card Analysis FFT tip NX 22FT; Card with universal filters for sound meter NX 21VA; Apparatus for determining human vibration IHVM 100; the card analysis 1/1 and 1/3 for NL 32; Kit adaptor HVM 100 with accessories; Seat-Pad Tri-axial accelerometer; Vibrations Analyzer multichannel + annexes; Vibrations Analyzer with calibrator; Comprehensive Set of production of any vibration unite and tri-directional's; Modules vibration analyzer sounds SVAN .

- Specialized software: Matlab + Toolbox + Bio + Classroom;

- Management software for sound meter NL 32; SoundPlan.

## Development strategy

The strategy group in future trends, consists in the development of the schools for doctorate and masterate in Mechanical Engineering, through the creation of specialists from masterands and PhD students who made.

## Representative projects

**ECOT - "Modern concepts in accordance to the European regulations specific on transport of surface noise ecology"** (2006 - 2008), Project Director: Prof. Dr. Ing. Mariana Arghir, UTCN Coordinator, Value: 1.500.000 lei (RON). Project has studied noise pollution in urban agglomerations of Cluj, Bihor County. They have drawn up maps of the noise area. With the results has been published the researcher book: *Ecology in the surface transport of urban agglomerations*, Main author: Prof. Dr. Ing. Mariana ARGHIR, 419 pag., EDP, ISBN 978-973-30-2093-6, 2008. Page web: <http://www.ecot.utcluj.ro>

**SICOMSUV - "Computerized system for the monitoring of pollution by sounds and vibrations, abbreviation"** (2006 - 2008), Project Director: Prof. Dr. Ing. Mariana Arghir, UTCN Coordinator, Value: 1.500.000 lei (RON). Noise pollution commanders of Cluj, Bihor and Braşov have led to a system for the monitoring of the surface traffic in urban agglomerations. With the results has been published the researcher book: *Pollution monitoring of the surface traffic*, Main author: Prof. Dr. Ing. Mariana ARGHIR, 650 pag., EDP, ISBN 978-973-30-2314-2, 2008. Page web: <http://www.sicomsuv.utcluj.ro>

**ADEL - "Virtual and experimental non-linear analysis and control of optimal mechanical many-body systems with rubber, with application in the construction of machines and robotics"** (2006-2008), Technical University of Brasov – coordinator, with thematic area in robotics for autonomous systems advanced. Responsible for the project: Prof. Dr. Ing. Iuliu Negrean

**VIBROM - "Development of a computerized system for the evaluation of occupational noise nuisance type mechanical vibration and impact on human operator in the workplace, abbreviation"**, Responsible for the project: Prof. Dr. Ing. Mariana Arghir, IPA Cluj coordinator, value: 2.200.000 lei (RON), period: 2008-2011.

The Destination project was to define the mechanical models of human body under the vibration action, in order to protect the nuisances vibration from the workplace. Will ask my results with a view to awareness of the effects of vibration and the adaptation Romanian legislation to European legislation in this field.

## Significant results

### Scientific Papers:

1. Mariana ARGHIR, Mariana RUS, Sorin Constantin MACOVESCU, Hand Vibrations of the Human Operator in the Working Space, 82<sup>nd</sup> Annual Meeting GAMM 2011, April 18-21, 2011, Short Presentation: 20.04.2011, 13.30, Proceedings of International Conference, Book of abstracts, pag. 96, ISBN 978-3-85125-145-6, Graz, Austria, published in *Proceedings ISI 2011 PAMM*, DOI: 10.1002/pamm.201110031, pag. 79-80, Proc. Appl. Math. Mech. 11, Vol. 11, Issue I, Dec 2011, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim;
2. Simona Camelia ŞARAMET, Mariana ARGHIR, Vibration by shocks of the human body in the working space, 82<sup>nd</sup> Annual Meeting GAMM 2011, April 18-21, 2011, Short Presentation: 20.04.2011, 13.50, Proceedings of International Conference, Book of abstracts, Pag. 97, ISBN 978-3-85125-145-6, Graz, Austria, published in *Proceedings ISI 2011 PAMM*, DOI: 10.1002/pamm.201110052, pag. 121-122, Proc. Appl. Math. Mech. 11, Vol. 11, Issue I, Dec 2011, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim
3. Simona Gabriela JURCO, Mariana ARGHIR, Vibration Action on the Human Body into a Tramway in Traveling, 82<sup>nd</sup> Annual Meeting GAMM 2011, April 18-21, 2011, Short Presentation: 20.04.2011, 14.10, Proceedings of International Conference, Book of abstracts, pag. 97, ISBN 978-3-85125-145-6, Graz, Austria, published in *Proceedings ISI 2011 PAMM*, DOI: 10.1002/pamm.201110038, pag. 93-94, Proc. Appl. Math. Mech. 11, Vol. 11, Issue I, Dec 2011, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim
4. Simona RODEAN, Mariana ARGHIR, Claudiu Paul RODEAN, Cristian George RODEAN, Responses Study of the Seated Human Body Exposed to Vertical Vibration in Various Automotive Postures, 82<sup>nd</sup> Annual Meeting GAMM 2011, April 18-21, 2011, Short Presentation: 20.04.2011, 14.30, Proceedings of International Conference, Book of abstracts, pag. 98, ISBN 978-3-85125-145-6, Graz, Austria, published in *Proceedings ISI 2011 PAMM*, DOI: 10.1002/pamm.201110048, pag. 113-114, Proc. Appl. Math. Mech. 11, Vol. 11, Issue I, Dec 2011, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim
5. Aurora Felicia POP, Aurica TRUŢA, Mariana ARGHIR, Monica BĂLCĂU, The Linear Mechanical Model for Hand-Arm System, 82<sup>nd</sup> Annual Meeting GAMM 2011, April 18-21, 2011, Short Presentation: 20.04.2011, 14.50, Proceedings of International Conference, Book of abstracts, pag. 98, ISBN 978-3-85125-145-6, Graz, Austria, published in *Proceedings ISI 2011 PAMM*, DOI: 10.1002/pamm.201110045, pag. 107-108, Proc. Appl. Math. Mech. 11, Vol. 11, Issue I, Dec 2011, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim
6. Aurica TRUŢA, Aurora Felicia POP, Mariana ARGHIR, Monica BĂLCĂU, Development of a biomechanical model to study the horizontal vibration transmitted from shoulder to head, 82<sup>nd</sup> Annual Meeting GAMM 2011, April 18-21, 2011, Short Presentation: 20.04.2011, 15.10, Proceedings of International Conference, Book of abstracts, pg. 99, ISBN 978-3-85125-145-6, Graz, Austria, published in *Proceedings ISI 2011 PAMM*, DOI: 10.1002/pamm.201110056, pag. 120-130, Proc. Appl. Math. Mech. 11, Vol. 11, Issue I, Dec 2011, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim
7. Călin LUMEI, Mariana ARGHIR, Massimo GARAI, Determination of Effect Flow Resistivity for Sound

Absorbing Material, The 3th International Conference ADVANCED ENGINEERING IN MECHANICAL SYSTEMS – ADEMS'11, September 21-23, 2011, Cluj-Napoca, published in ACTA TECHNICA NAPOCENSIS, Series: Applied Mathematics and Mechanics, Vol. 54, Issue PSD, pag. 19-24, ISSN 1221-5872, Ed. UTPRES, Cluj-Napoca

8. Simona URS (JURCO), Mariana ARGHIR, Vibration Action on the Human Body Into a Tramway in Travelling, The 3th International Conference ADVANCED ENGINEERING IN MECHANICAL SYSTEMS – ADEMS'11, September 21-23, 2011, Cluj-Napoca, published in ACTA TECHNICA NAPOCENSIS, Series: Applied Mathematics and Mechanics, Vol. 54, Issue PSD, pag. 55-60, ISSN 1221-5872, Ed. UTPRES, Cluj-Napoca, 2011
9. Mariana ARGHIR, Mariana RUS, Sorin Constantin MACOVESCU, Vibrations Action of the Trilling Machine MA 750 on the Human Operator Hand, 83<sup>rd</sup> Annual Meeting GAMM 2012, March 26-30, 2012, Short Presentation: 28.04.2012, 16.00, Section 2: Biomechanics, Proceedings of International Conference, Book of abstracts, pag. 74, Darmstadt, Germania;
10. Anamaria GLIGOR, Alina-Sabina TEPEȘ-BOBESCU, Mariana ARGHIR, Vibrating Portable Machine-Tools Acting on Human Operator, Hand, 83<sup>rd</sup> Annual Meeting GAMM 2012, March 26-30, 2012, Short Presentation: 28.04.2012, 16.40, Section 2: Biomechanics, Proceedings of International Conference, Book of abstracts, pag. 75, Darmstadt, Germania;
11. Alina-Sabina TEPEȘ-BOBESCU, Florin TEPEȘ-BOBESCU, Anamaria GLIGOR, Mariana ARGHIR, The Study of Psychoacoustic Effects of Noise Emitted by the Machine Tools Structure, 83<sup>rd</sup> Annual Meeting GAMM 2012, March 26-30, 2012, Short Presentation: 28.04.2012, 10.00, Section 2: Biomechanics, Proceedings of International Conference, Book of abstracts, pag. 76, Darmstadt, Germania;
12. Alin-Cosmin TOT, Călin LUMEI, Mariana ARGHIR, Studies on Material Properties Used for Noise Barriers, 83<sup>rd</sup> Annual Meeting GAMM 2012, March 26-30, 2012, Short Presentation: 28.04.2012, 14.50, Section 12: Wave Propagation, Proceedings of International Conference, Book of abstracts, pag. 267, Darmstadt, Germania;
13. Călin LUMEI, Alin-Cosmin TOT, Mariana ARGHIR, Acoustical Performance of Concreted Wood Fiber Materials, 83<sup>rd</sup> Annual Meeting GAMM 2012, March 26-30, 2012, Short Presentation: 28.04.2012, 15.30, Section 12: Wave Propagation, Proceedings of International Conference, Book of abstracts, pag. 268, Darmstadt, Germania;
14. Mariana ARGHIR, Mariana RUS, Sorin Constantin MACOVESCU, Dan Borza, Optical Method Used for the Mechanical Vibrations Action on the Human Working Hand, 2012 IEEE International Conference on Automation, Quality and Testing, Robotics, AQTR 2012, Theta 18<sup>th</sup> edition, May 24-27 2012, Cluj-Napoca, Romania, published in IEEE Catalog Number: CFP12AQ-T-CDR, S1E180, ISBN: 978-1-4673-0703-1/12/31.00\$ © 2012 IEEE.

#### Patents for inventions

1. Invention Patent: Anti-friction bearing of particulate materials sintered  
Authors: Arghir George, Domșa Șerban, Abrudan Ioan, Arghir Mariana, 1989.
2. Invention Patent: Plant for the determination of the longitudinal elasticity modulus of materials  
Author: Arghir Mariana  
Patent no. 117046 B, Bucuresti, 2001.
1. Invention Patent: Composition for dressings and orthopaedic lightweight and porous corsets  
Authors: Arghir Mariana, Ungur Patricia, Ungur Petru, Mihăilă Ștefan, Lezeu Ioan  
Brevet nr. 1023364: RO 125006 B1

#### Diplomas: Prof. Dr. Ing. Mariana ARGHIR

- Excellent diploma and gold medal, PROINVENT 2009, Cluj Napoca ;
- Diploma and medal the silver Pro invent, European exhibition of creativity and Inovation, May, 2011
- Diploma and gold medal, INVENTORS, Iasi, June, 2011.

#### Official Titles: Prof. Dr. Ing. Iuliu NEGREAN

- Correspondent Member of Academy of Technical Sciences, from 06.07.2012

#### Distinctions: Prof. Dr. Ing. Mariana ARGHIR

- Distinction of her merits, AGIR, 2010;
- TOP 100 Educators - 2011, International Biographical Centre, Cambridge.

#### The offer addressed to the economic environment

Research & development in core areas	Group of research in advanced mechanical engineering has been made up of teachers and researchers with experience in mechanical engineering, with specializations: Mechanical applied in robotics, Mechanical vibration, Noise pollution, Techniques of calculation, Technologies of measurement, Deployment of technologies and directions of research.
Research & development in applied fields	Search group can să work closely in research/development process-orientated in the fields, such as: <ul style="list-style-type: none"> <li>• Making "noise maps",</li> <li>• Assessments by vibrations,</li> <li>• Environmentally design and construction of specialized robots.</li> </ul>

Consulting	Search group has the ability to advise in the directions of research: <ul style="list-style-type: none"> <li>- Modelling mechanical systems and optimize vibrant;</li> <li>- Mechanical applied in robotics;</li> <li>- Noise pollution.</li> </ul>
Applied engineering services	There is the possibility of carrying out the services of engineering applied, in: <ul style="list-style-type: none"> <li>- Experimental analysis of mechanical vibrations;</li> <li>- Analysis of the experimental noise .</li> </ul>
Training	Search group provides for the possibility of carrying out training in directions: <ul style="list-style-type: none"> <li>- Mechanical Components applied in robotics.</li> <li>- The Order robots;</li> <li>- Measurements of sound and vibration;</li> <li>- Analysis measurements and interpretation;</li> <li>- Drawing up " maps of the noise";</li> <li>- Law suitable for mechanical engineering for the sounds and vibrations.</li> </ul>

There are a few pictures as a result of the research activity of the group IMAV\_Group.



**Fig. 1.** Use Vibro-meter



**Fig. 2.** Vibro-meter and the uni-directional accelerometer



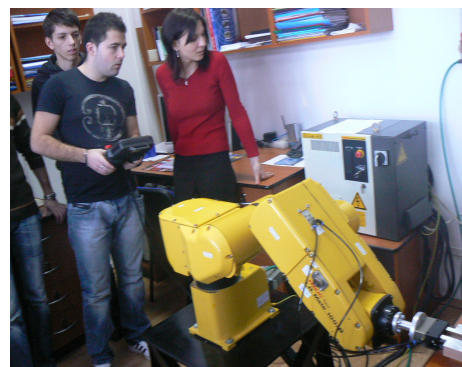
**Fig. 3.** Vibration measurements on the operator head



**Fig. 4.** Triaxial Accelerometer attached to the forearm human operator



**Fig. 5.** Experimental determinations in the noise level



**Fig. 6.** Recording and viewing robot motion