Program

© Bürkert Werke GmbH & Co. KG / Hintergrund: Fotolia (pixel)

ACTUATOR 21

International Conference and Exhibition on
New Actuator Systems and Applications

Online Conference
Germany
February 17 – 19, 2021

www.actuator.de

#actuator21

Organized by:

Society of Microelectronics, Microsystems and Precision Engineering (VDE/VDI GMM)

VDE VDI GMM

ACTUATOR 21

Welcome to the ACTUATOR 2021 Online Conference

Still existing Corona turbulences forced us to decide upon a new conference format. Nevertheless, we would like to welcome you to ACTUATOR 2021, the 17th International Conference and Exhibition on New Actuator Systems and Applications.

Having attracted about 400 participants from more than 20 countries in the years before, the ACTUATOR Conference has become the most important place to meet leading international specialists, to share their expertise and to start business cooperations in the field of new actuator technologies.

ACTUATOR has been the key forum for actuators based on smart materials and micro technologies as well as their applications in all areas of engineering for thirty years now. Over the years, a huge variety of excellent ideas and results have been reported. A lot of them have been raised from vision to mass product. Among the success stories you will find quite a number of established applications of new actuators, in particular their well-known use in fuel injection, adaptive shock absorbers, nanopositioning, precision engineering like camera lenses and other applications of miniaturized drives.

In this way, ACTUATOR has launched the realization of new product generations with outstanding compactness and high performance properties which so far have not been achieved in conventional technologies. A small wonder that based on this ignition, resulting in gaining access to new markets.

The Program Committee, the exhibitors and the organizer will be pleased to welcome you to the 17th International Conference on New Actuators and its accompanying exhibition in February 2021.

Prof. Helmut F. Schlaak
Chairman

Technical University Darmstadt
Microtechnology and Electromechanical Systems Lab

List of contents

International Program Committee 4
Organizer 5

Program Overview 7
Wednesday, February 17th, 2021 8
Thursday, February 18th, 2021 12
Friday, February 19th, 2021 18

List of Authors 24

General Information 28
ACTUATOR Office 28
ACTUATOR Project Management 28
Conference Fees 28
Payment of Conference Fees 28
Cancellation 28
Sponsors and Exhibitiors 29

The ACTUATOR 2021 International Program Committee

Schlaak, Helmut F. (Chairman) | Technische Universität Darmstadt, Germany (Conference Chair)
Amrhein, Wolfgang | Johannes Kepler University Linz, Austria
Ando, Akira | Murata Manufacturing Co. Ltd., Nagaokakyo-shi, Kyoto, Japan
Chikhaoui, Mohamed Taha | Université Grenobles-Alpes, Laboratoire TIMC – IMAG, France
Choi, Seung-Bok | Inha University, Nam-Gu, Incheon, South Korea
Claeyssen, Frank | CEDRAT Technologies S.A., Meylan, France
Goldasz, Janusz | BWI Beijing West Industries Technical Center Kraków, Poland
Henke, Markus | Technische Universität Dresden, Germany
Kanda, Takefumi | Okayama University, Japan
Karkosch, Hans-Jürgen | Contitech Vibration Control GmbH, Hannover, Germany
Keller, Roland | Dr. Fritz Faulhaber GmbH & Co. KG, Schönaich, Germany
Keplinger, Christoph | University of Colorado at Boulder, USA
Krippner, Peter | Bürkert Werke GmbH & Co. KG, Karlsruhe, Germany
Lötters, Joost | Bronkhorst High-Tech B.V., Ruurlo, Netherlands
Maas, Jürgen | Technische Universität Berlin, Germany
Manfredi, Luigi | University of Dundee, Great Britain
Marienfeld, Peter | Contitech Vibration Control GmbH, Hannover, Germany
Maroufi, Mohammad | Apple Inc., CA, USA
Monner, Hans Peter | German Aerospace Center (DLR), Braunschweig, Germany
Morishima, Keisuke | Tokyo University of Agriculture and Technology, Japan
Morita, Takeshi | Tokyo University, Japan
Müller, Bert | University of Basel, Switzerland
Müllner, Peter | Boise State University, USA
Pagounis, Emmanouel | ETO MAGNETIC GmbH, Stockach, Germany
Perret, Jérôme | Haption GmbH Technologiezentrum am Europaplatz, Aachen, Germany
Pertsch, Patrick | PI Ceramic GmbH, Lederhose, Germany
Pott, Peter | University of Stuttgart, Germany
Preumont, André | Université libre de Bruxelles, Belgium
Price, Aaron | The University of Western Ontario, Canada
Seelecke, Stefan | Universität des Saarlandes, Saarbrücken, Germany
Spomer, Waldemar | Physik Instrumente (PI) GmbH & Co. KG, Karlsruhe, Germany
Takasaki, Masaya | Saitama University, Japan
Uchino, Kenji | The Pennsylvania State University, USA
Vander Poorten, Emmanuel | Katholieke Universiteit Leuven, Heverlee, Belgium
Vergani, Giorgio | SAES Getters S.p.A., Lainate, Italy
Wallrabe, Ulrike | University of Freiburg, Department of Microsystems Engineering – IMTEK, Germany

Organizer

VDE VDI-Society Microelectronics Microsystems and
Precision Engineering (GMM)

Dr. Ronald Schnabel
Stresemannallee 15,
60596 Frankfurt/Main, Germany
Phone: +49 69-6308-227
Fax: +49 69-6308-9828
e-Mail: gmm@vde.com

During the conference:
Mobile: +49 171 4695 118

Time

Photo: www.pixabay

The given times in the program schedule are according to the German Local Time (CET)

Check at: https://www.worldtimebuddy.com/

San Francisco	New York	Europe (Berlin)	Beijing	Tokyo
04:45	07:45	13:45	20:45	21:45
06:00	09:00	15:00	21:00	22:00
07:45	10:45	16:45	21:45	22:45
08:05	11:05	17:05	00:05 (+1)	01:05 (+1)
08:15	11:15	17:15	00:15 (+1)	01:15 (+1)

Overview

Time	Plenary	Track 1	Track 2	Track 3	Track 4
Wednesday, February 17					
13:45 – 14:45		**A1:** Piezoelectric Actuators (1) p. 8	**B1:** Shape Memory Actuators (1) p. 8	**C1:** Magnetostrictive Devices p. 9	**D1:** Dielectric Elastomer Actuators p. 9
14:45 – 15:00	*Short Break*				
15:00 – 16:30	Review Talks I p. 10				
16:30 – 16:45	*Short Break*				
16:45 – 17:45		**A2:** Piezoelectric Actuators (2) p. 10	**B2:** Shape Memory Actuators (2) p. 11	**C2:** Advanced Micro-Actuators p. 11	
Thursday, February 18					
13:45 – 14:45		**A3:** Piezoelectric Actuators (3) p. 12	**B3:** Shape Memory Actuators (3) p. 12	**C3:** Actuator Control and Electronics p. 13	**D3:** ER / MR Fluids p. 13
14:45 – 15:00	*Short Break*				
15:00 – 17:00	Review Talks II p. 14				
17:00 – 17:15	*Short Break*				
17:15 – 18:15		**A4:** Piezoelectric Actuators (4) p. 15	**B4:** Shape Memory Actuators (4) / MSM p. 15	**C4:** Electromagnetic Actuators p. 16	**D4:** Aerospace p. 17
Friday, February 19					
13:45 – 14:45		**A5:** Medical Devices (1) p. 18	**B5:** Magnetic Shape Memory Actuators p. 18	**C5:** Polymer-based Actuators p. 19	**D5:** Applications p. 19
14:45- 15:00	*Short Break*				
15:00 – 16:30	Review Talks III p. 20				
16:30- 16:40	Introduction to DFG Priority Program SPP2206 'KOMMMA' p. 20				
16:40- 16:50	Closing Remarks p. 20				
16:50- 17:05	*Short Break*				
17:05- 18:05		**A6:** Medical Devices (2) / Haptic Devices p. 21	**B6:** Emerging Actuator Principles p. 21	**C6:** Special Solutions p. 22	**D6:** Special Session of the DFG Priority Program SPP2206 'KOMMMA' p. 23
18:05- 18:15					

Wednesday, February 17 13:45 - 14:45

*The given times in the program schedule are according to the **German Local Time (CET)***

Opening
Prof. Dr. Helmut F. Schlaak, Chairman
Technical University Darmstadt, Microtechnology and Electromechanical Systems Lab, DE

Track 1

A1 **Piezoelectric Actuators (1)**
Chairs: Kenji Uchino (The Pennsylvania State University, USA), Ulrike Wallrabe (Albert-Ludwigs-University Freiburg, DE)

13:45 **Piezoelectric Active Spherical Shell Reflector for Space**
Kainan Wang (Université Libre de Bruxelles, BE); David Alaluf (European Space Agency - ESA/ESTEC, NL); Thomas Godfroid, Damien Robert (Materia Nova, BE); Gonçalo Rodrigues (European Space Agency, NL); André Preumont (Université libre de Bruxelles, BE)

13:55 **Uniaxial Stress and Temperature Resilience of HPZ Piezoelectric**
Tim Comyn, Peter Cowing (Ionix Advanced Technologies, GB); Andrew Bell (University of Leeds, DE)

14:05 **High Power Synthetic Jet Actuator**
Gerald Aigouy, Etienne Betsch, Gladys Jaussaud, Frank Claeyssen (CEDRAT Technologies S.A., FR); Frederic Ternoy, Emmanuel Eglinger, Julien Dandois, Pierre More, Quentin Gallas (Onera, FR)

Track 2

B1 **Shape Memory Actuators (1)**
Chair: Emmanouel Pagounis (ETO MAGNETIC GmbH, DE)

13:45 **SMA thick wires for fast actuation**
Marco Citro, Salvatore Coco (Saes Getters, IT)

13:55 **Alternating Current Activation of SMA Wires**
Tom Gorges (Center for Mechatronics and Automation Technology - ZeMA gGmbH & University of Applied Sciences - HTW Saar, DE); Stefan Seelecke (Saarland University, Saarbrücken, DE); Paul Motzki (ZeMA gGmbH & Saarland University, DE)

14:05 **Self-locking SMA Actuator for Optical Zoom in Smartphones**
Michael Honold (University of Applied Sciences Aalen, DE); Neven Bobic, Markus Koepfer (Actuator Solutions GmbH, DE); Arif Kazi (Aalen University of Applied Sciences, DE)

14:15 **SMA actuators made from continuously rolled sheets**
Charles Castillo, Stefan Knoll (G Rau GmbH & Co. KG, DE)

14:25 **SMA Microsprings for high stroke in tight geometries**
Luca Fumagalli, Matteo Zanella (SAES Getters SpA, IT); Marco Citro (Saes Getters, IT)

14:45 - 15:00 Short Break

*The given times in the program schedule are according to the **German Local Time (CET)***

	Track 3
C1	**Magnetostrictive Devices** *Chair: Manfred Kohl (Karlsruher Institut für Technologie (KIT), DE)*
13:45	**Interfacial adhesion evaluation of magnetostrictive thin films applying electrochemical hydrogen loading technique** *S. Ono, R. Tokiwa, Yoshihito Matsumura, H. T. Uchida (Tokai University, JP)*
13:55	**Self-sensing Nanometric Magnetoelectric Actuator Based on Metglas/PZT Composites** *Yikun Yang, Haomin Wu, Bintang Yang (Shanghai Jiao Tong University, CHN)*
14:05	**Effect of in-situ substrate biases changes and ex-situ hydrogen loading on in-plane stress win Sm-Fe thin films** *Masato Kamiya, R. Tokiwa, Kengo Yamaguchi, H. T. Uchida, Yoshihito Matsumura, R. Gemma, Ryuichi Kataoka, S. Ono (Tokai University, JP)*
14:15	**Effect of hydrogen solution on the Young's modulus of Nickel** *Mutsuki Matsumoto, R. Yamane, R. Tokiwa, H. Odaka, T. Adachi, A. Kaneko, Toshikio Takimoto, A. Tonegawa, H. Tsuchiya, H. T. Uchida (Tokai University, JP)*
	Track 4
D1	**Dielectric Elastomer Actuators** *Chair: Peter P. Pott (University of Stuttgart, DE)*
13:45	**Industrializing silicone stack transducers for vehicles of the future** *Daniel Haefliger (SATECO XT AG, CH)*
13:55	**Concept and Fabrication of Silicone-based Rolled Dielectric Elastomer Actuators (RDEAs) for Soft Robots** *Julian Kunze (ZeMA gGmbH & Saarland University, DE); Johannes Prechtl, Daniel Bruch (Saarland University, DE); Sophie Nalbach (ZeMA gGmbH, DE); Paul Motzki (ZeMA gGmbH & Saarland University, DE); Stefan Seelecke, Gianluca Rizzello (Saarland University, DE)*
14:05	**Optimization of Electro-Zipping Actuators Using Dielectric Elastomers as Insulating Layer** *Michael J. Gareis, Jürgen Maas (Technical University Berlin, DE)*
14:15	**Influence of electrode design on actuation characteristics of cooperative DEAP actuators** *Rui Zhu (Hochschule Furtwangen, DE); Ulrike Wallrabe, Peter Woias, Matthias C Wapler (Albert-Ludwigs-University Freiburg, DE); Ulrich M Mescheder (Hochschule Furtwangen, DE)*
14:25	**Soft Robotic Module Actuated by Silicone-Based Rolled Dielectric Elastomer Actuators - Modeling and Simulation** *Johannes Prechtl (Saarland University, DE); Julian Kunze (Saarland University & ZeMA, DE); Stefan Seelecke, Gianluca Rizzello (Saarland University, DE)*

14:45 - 15:00 Short Break

Wednesday, February 17 15:00 - 16:30

*The given times in the program schedule are according to the **German Local Time (CET)***

Plenary

Review Talks I

Chairs: Helmut F. Schlaak (Technical University of Darmstadt, DE), Kenji Uchino (The Pennsylvania State University, USA)

15:00	**Shape Memory Alloy Actuation in Aerospace: materials, applications, demonstrations, and barriers to acceptance** *James H Mabe (The Boeing Company & Texas A&M University, USA)*
15:30	**Advances in Magnetorheological Actuators** *Janusz Gołdasz (BWI Group, Technical Center Krakow, Poland); Seung-Bok Choi (INHA University, KOR)*
16:00	**Novel MEMS actuators with advanced piezoelectric and magnetic materials** *Fabian Stoppel (Fraunhofer ISIT, DE)*

16:30 - 16:45 Short Break

Wednesday, February 17 16:45 - 17:45

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 1

A2 Piezoelectric Actuators (2)

Chair: Waldemar Spomer (Physik Instrumente (PI) GmbH & Co. KG, DE)

16:45	**Extremum seeking control of preload-controllable ultrasonic motor** *Abdullah M Mustafa, Takeshi Morita (The University of Tokyo, JP)*
16:55	**Generating Homogeneous Gas Mixtures by Using Acoustic Waves** *Sandro Krempel, Nico Seidel, Sabrina Tietze, Klaus Drese (Coburg University of Applied Sciences and Arts, DE)*
17:05	**Controller design for the Vector Control of Piezoelectric transducers** *Anis Kaci, Frédéric Giraud (University of Lille, FR); Christophe Giraud-Audine (Ensam, FR); Michel Amberg, Betty Semail (University of Lille, FR)*
17:15	**MSPA motors for rotary motions** *Jonathan Stentz, Alexandre Pagès, Adrien Guignabert, Jolan Gauthier, Aurore Loubet, Frank Claeyssen (CEDRAT Technologies S.A., FR)*

*The given times in the program schedule are according to the **German Local Time (CET)***

	Track 2
B2	**Shape Memory Actuators (2)** *Chair: Giorgio Vergani (SAES Getters S.p.A., IT)*
16:45	**Bending actuators based on SMA wires - designed for easy integration** *Moritz Hübler, Nicolà Hammann, Nils Neblung (CompActive GmbH, DE); Max Kaiser (Institut für Verbundwerkstoffe, DE)*
16:55	**Evolution of a resettable Hold-Down and Release Actuator Based on SMA Technology** *Marcelo Collado, Cayetano Rivera, Javier Inés (Arquimea Ingeniería, ES)*
17:05	**Design of complex NiTi dampers trough subtractive and additive production processes: three case studies** *Adelaide Nespoli, Enrico Bassani (Consiglio Nazionale delle Ricerche, IT); Antonio Grande, Paolo Bettini (Politecnico di Milano, IT); Elena Villa, Francesca Passaretti (Consiglio Nazionale delle Ricerche, IT)*
17:15	**Numerical and experimental analysis of the discrete workspace of a prestressed planar mechanism driven by six SMA wires** *Rym Boufayed, Xavier Balandraud, Frédéric Chapelle, Jean-François Destrebecq (Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, FR)*
17:25	**Multi-stable proportional valve: An energy efficient approach for high temperature passive magnetic shape memory applications** *Julius Happel, Emmanouel Pagounis, René Schnetzler, Jonas Heider, Markus Laufenberg (ETO MAGNETIC GmbH, DE)*
17:35	**Effects of abnormal grain growth on shape memory characteristics of Cu-Al-Mn alloys** *Benjamin Schelnberger, Robin Roj, Ralf Theiß, Peter Dültgen, Mozhgan Gholami-Kermanshahi (Forschungsgemeinschaft Werkzeuge und Werkstoffe, DE)*
	Track 3
C2	**Advanced Micro-Actuators** *Chair: Ulrike Wallrabe (Albert-Ludwigs-University Freiburg, DE)*
16:45	**Low powered Uni-directional actuator for wireless active enteroscopy** *Hamza Khan, Alfred Cuschieri (University of Dundee, GB)*
16:55	**Effect of hydrogen solution on the Young's modulus of rolled tungsten** *R. Yamane, H. T. Uchida, H. Tsuchiya, A. Kaneko, Toshikio Takimoto, T. Adachi, A. Tonegawa, R. Tokiwa (Tokai University, JP)*
17:05	**Piezoelectric Motor Operated Both in Resonance and DC Modes** *Maxim Wischnewski, Buelent Delibas, Alexej Wischnewski (Physik Instrumente (PI) & GmbH & Co KG, DE)*
17:15	**Miniaturized electric linear drive with permanent magnetic weight compensation** *Bela Schulte Westhoff, Abd Elkarim Masoud, Jürgen Maas (Technical University Berlin, DE)*
17:25	**Enhanced Low Harmonic Waveform for Low-bandwidth Inertia-drive Actuator** *Junyang Wei, Sergej Fatikow (Oldenburg University, DE)*

Thursday, February 18 13:45 - 14:45

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 1

A3	**Piezoelectric Actuators (3)** *Chairs: Hassan Hariri (Rafik Hariri University, Lebanon), Patrick Pertsch (PI Ceramic GmbH, DE)*
13:45	**Gimbal mechanism design based on piezoelectric motors** *Marcelo Collado, Cayetano Rivera, Alvaro Pascual, Javier Inés (Arquimea Ingeniería, ES)*
13:55	**Dual-source dual-frequency drive and modeling of resonance type piezoelectric motors** *Burhanettin Koc, Lennart Von Deyn, Buelent Delibas (Physik Instrumente (PI) GmbH & Co. KG, DE)*
14:05	**Ship Propulsion by Means of Acoustic Radiation** *Alexander Backer, Sandro Krempel, Frank Ritter, Sabrina Tietze, Klaus Drese (Coburg University of Applied Sciences and Arts, DE)*
14:15	**High frequency oscillation control technique for Piezoelectric Damping System** *Shunji Suzuki (Innovative Research Excellence, Honda R&D Co., Ltd., JP); Toshizumi Yamaguchi (Honda Motor Co., Ltd., JP)*
14:25	**Phase difference torque control of USM for walking assist system** *Tatsuki Sasamura, Takamitsu Kaneko, Abdullah M Mustafa, Yuichiro Orino, Satori Hachisuka, Takeshi Morita (The University of Tokyo, JP)*
14:35	**Core-shell droplet generation device using a flexural vibration by a bolt-clamped Langevin type ultrasonic transducer** *Kentaro Omori (Okayama University & Graduate School of Natural Science and Technology, JP); Nozomu Fujimoto, Takefumi Kanda, Shuichi Wakimoto, Norihisa Seno (Okayama University, JP)*

Track 2

B3	**Shape Memory Actuators (3)** *Chair: Stefan Seelecke (Saarland University, DE)*
13:45	**Development of a Bistable SMA Actuated Industrial Gripper Based on a Compliant Design** *Dominik Scholtes (Saarland University & ZeMA gGmbH, DE); Stefan Seelecke (Saarland University, Saarbrücken, DE); Paul Motzki (ZeMA gGmbH & Saarland University, DE)*
13:55	**Surface Shape Control using a Shape Memory Actuator** *Ali Berhil (University Paris-Saclay, CentraleSupélec, FR); Yves Bernard (Université Paris Sud, FR); Laurent Daniel (University Paris Saclay, CentraleSupelec, FR)*
14:05	**Development of an SMA Based End-effector Prototype for Material Handling in Manufacturing Processes** *Lukas Zimmer (ZeMA gGmbH, DE); Felix Welsch, Susanne-Marie Kirsch (Saarland University & Intelligent Material Systems Lab, DE); Gianluca Rizzello, Stefan Seelecke (Saarland University, DE); Paul Motzki (ZeMA gGmbH & Saarland University, DE)*
14:15	**Model-Based, Self-Sensing Actuator System based on antagonistic SMA Wires** *Johannes Prechtl, Stefan Seelecke (Saarland University, DE); Paul Motzki (ZeMA gGmbH & Saarland University, DE); Gianluca Rizzello (Saarland University, DE)*

14:45 - 15:00 Short Break

*The given times in the program schedule are according to the **German Local Time (CET)***

	Track 3
C3	**Actuator Control and Electronics** *Chairs: Jürgen Maas (Technical University Berlin, DE), Takeshi Morita (The University of Tokyo, JP)*
13:45	**A Compact Control Unit for a Pneumatic Soft Colonoscope** *Luigi Manfredi (University of Dundee, GB)*
13:55	**Individually Tunable Array of Micro Fresnel Mirrors** *Binal Poyyathuruthy Bruno, Robert Schütze, Ulrike Wallrabe (University of Freiburg, DE)*
14:05	**Low-scale HV Amplifier for driving thin-film DE Transducers** *Samuel Junglas, Jürgen Maas (Technical University of Berlin, DE)*
14:15	**Flatness-based Control for Dielectric Elastomer Transducers** *Abd Elkarim Masoud, Andreas Hubracht, Samuel Junglas, Jürgen Maas (Technical University Berlin, DE)*
14:25	**Training and Modelling the Non-Linear Behavior of an MR Brake by Using RNN and LSTM** *Mehmet Gorkem Karabulut, Sefa Furkan Kucukoglu, Can Dede (Izmir Institute of Technology, TR)*
	Track 4
D3	**ER/MR Fluids** *Chairs: Janusz Gołdasz (BWI Group, Technical Center Krakow, PL), Thomas Sattel (Ilmenau University of Technology, DE)*
13:45	**Design and experimental evaluation of energy-efficient MRF-coupling elements with multiple shear gaps for enhancement of torque capacity** *Christian Hegger, Jürgen Maas (Technical University of Berlin, DE)*
13:55	**Landing Efficiency of Aircraft Landing Gear System with MR Dampers** *Byung-Hyuk Kang, Seung-Bok Choi (INHA University, KOR)*
14:05	**Magnetorheological Yaw Damper with Short Response Time for Railway Vehicle Bogie** *Michal Kubík, Zbyněk Strecker, Filip Jenis (Brno University of Technology, CZE); Ondřej Macháček (Strojírna Oslavany & Brno University of Technology, CZE); Matěj Přikryl (Strojírna Oslavany, CZE); Petr Špalek (Škoda Transportation, CZE)*
14:15	**A New Configuration of MR Damper with Pole Shape Function: Design and Analysis** *Bo-Gyu Kim, Seung-Bok Choi (INHA University, KOR)*
14:25	**Impact of material properties on the dynamics of MR dampers** *Paweł Trębacz (Cracow University of Technology, PL); Janusz Gołdasz (BWI Group, Technical Center Krakow, PL); Bogdan Sapiński (AGH University of Science and Technology, PL)*
14:35	**Parallel Field Segmentation Concept in ER/MR Dampers for a simpler Control System** *Aditya Suryadi Tan, Thomas Sattel; Oliver Radler (Ilmenau University of Technology, DE)*

14:45 - 15:00 Short Break

Thursday, February 18 15:00 - 17:00

*The given times in the program schedule are according to the **German Local Time (CET)***

	Plenary
	Review Talks II *Chairs: Emmanouel Pagounis (ETO MAGNETIC GmbH, DE), Stefan Seelecke (Saarland University, Saarbrücken, DE)*
15:00	**Dielectric elastomer transducers for medical applications** *Bert Müller (University of Basel, CH)*
15:30	**Mechatronic Applications of Magnetic Shape Memory Alloys** *Sebastian Breisch, Arda Tüysüz (ABB AG Corporate Research, DE)*
16:00	**Kinesthetic and surface haptics for future intuitive HMI** *Moustapha Hafez (CEA LIST, FR)*
16:30	**High-Power Piezoelectric Characterization System (HiPoCS)** *Kenji Uchino (The Pennsylvania State University, USA)*

17:00 - 17:15 Short Break

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 1

A4	**Piezoelectric Actuators (4)** *Chair: Waldemar Spomer (Physik Instrumente (PI) GmbH & Co. KG, DE)*
17:15	**Efficient Simulation Model of a Circular Piezoelectric Actuator with TDNNS Elements in Netgen/NGSolve** *Alexander Reininger, Lukas Grasböck, Daniel Reischl (Linz Center of Mechatronics GmbH, AT); Martin Meindlhumer, Astrid Pechstein (Johannes Kepler University, AT); Thomas Lechleitner (MED-EL Elektromedizinische Geräte GmbH, AT)*
17:25	**Flat small size piezoelectric actuator operating in several modes** *Dalius Mazeika, Andrius Ceponis (Vilnius Gediminas Technical University, LTU); Piotr Vasiljev (Vytautas Magnus University, LTU); Sergejus Borodinas (Vilnius Gediminas Technical University, LTU); Regimantas Bareikis (Vytautas Magnus University, LTU); Vytautas Jūrėnas, Vytautas Ostasevicius (Kaunas University of Technology, LTU); Genadijus Kulvietis (Vilnius Gediminas Technical University, LTU)*
17:35	**Hemispherical resonators made of soft and hard piezo material for planar ultrasonic motors** *Frank Schiele, Bernd Gundelsweiler (University of Stuttgart, DE)*
17:45	**A vibro-impact approach to PILine® ultrasonic motors** *Simon Kapelke (Physik Instrumente (PI) GmbH & Co. KG, DE)*
17:55	**Optical evaluation of the large signal behaviour of piezoelectric disc actuators to increase the precision of micro diaphragm pumps** *Agnes Bußmann, Philipp Korzer, Christian Wald (Fraunhofer EMFT, DE)*
18:05	**Energy Harvesting System by Piezoelectric Power Generation using Mechanical-acoustic Coupling** *H. Tsuchiya, S. Iwamori, Hiroyuki Moriyama, H. T. Uchida, T. Adachi, M. Tsuchiya (Tokai University, JP)*

Track 2

B4	**Shape Memory Actuators (4) / MSM** *Chair: Emmanouel Pagounis (ETO MAGNETIC GmbH, DE)*
17:15	**Hybrid dynamical model for elastocaloric heating and cooling device based on Shape Memory Alloy wires** *Michele Mandolino (Saarland University, DE); Felix Welsch, Susanne-Marie Kirsch (Saarland University & Intelligent Material Systems Lab, DE); Nicolas Michaelis (Saarland University & Lab for Measurement Technology, DE); Andreas Schütze, Stefan Seelecke (Saarland University, DE); Paul Motzki (ZeMA gGmbH & Saarland University, DE); Gianluca Rizzello (Saarland University, DE)*
17:25	**Active Vibration Damping and Control using Shape Memory Alloy (SMA) Foil-Based Devices** *Kiran Jacob (Karlsruhe Institute of Technology, DE); Shuichi Miyazaki (University of Tsukuba, JP); Manfred Kohl, Vincent Sessner (Karlsruhe Institute of Technology, DE)*
17:35	**Modelling the Stress-dependent Hysteresis of Shape Memory Alloys** *Arif Kazi (Aalen University of Applied Sciences, DE); Philip Frenzel (Hochschule & Hochschule Aalen, DE); Neven Bobic (Actuator Solutions GmbH, DE)*
17:45	**Fully coupled multiphysics simulation model of magnetic shape memory actuators** *Robert Courant, Jürgen Maas (Technical University of Berlin, DE)*
17:55	**New Separation Processes for Fabrication of Magnetic Shape Memory Actuator Elements** *Andrea Böhm, Gunnar Meichsner, Joerg Schneider, Welf-Guntram Drossel (Fraunhofer Institute for Machine Tools and Forming Technology IWU, DE)*

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 3

C4	**Electromagnetic Actuators** *Chairs: Roland Keller (Dr. Fritz Faulhaber GmbH & Co. KG, DE), Wolfgang Amrhein (ACCM GmbH, AT)*
17:15	**Magnetic Levitation Positioning Stages for Molecular Cleanliness** *Rainer Gloess (Physik Instrumente (PI) GmbH & Co. KG, DE)*
17:25	**Zero Boil Off Compressor based on MICA Actuators** *Gerald Aigouy, Steven Rowe, Patrick Meneroud, Frank Claeyssen (CEDRAT Technologies S.A., FR); Nicolas Pouvesle, Bernhard Strauss (ET Energie Technologie, DE); Celen Nil, Armin Isselhorst (Ariane Group, DE); Moritz Branco, Jan Persson (Esa Estec, FR)*
17:35	**Permanent magnet linear actuator: causal and non-linear modelling** *Kévin Lauzier (Air Liquide Advanced Technologies & University of Lyon, INSA Lyon, CNRS, Ampère Laboratory, FR); Jean-Yves Gauthier (Laboratoire Ampère & INSA de Lyon, FR); Sylvie Sesmat (INSA Lyon & University of Lyon, CNRS, Ampère Laboratory, FR); Xuefang Lin-Shi (INSA Lyon, FR); Federico Bribiesca-Argomedo (INSA Lyon & University of Lyon, CNRS, Ampère Laboratory, FR); Diogo Carvalho Lopes (Air Liquide Advanced Technologies, FR)*
17:45	**Precise Position Control of Linear Motors using Stator Magnets as the Measurement Scale** *Rolf Slatter (Sensitec GmbH, DE)*
17:55	**Large stroke Rotary Voice Coil Motor for cryogenic application** *Nabil Bencheikh, Gerald Aigouy (Cedrat Technologies, FR)*

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 4

D4	**Aerospace** *Chair: Frank Claeyssen (CEDRAT Technologies S.A., FR)*
17:15	**FPSA & BSMA: Nanometric positioning actuators for ground and space applications** *François Barillot, Jocelyn Rebufa, Jonathan Stentz, Adrien Guignabert, Kevin Benoit, Gerald Aigouy, Frank Claeyssen (CEDRAT Technologies S.A., FR)*
17:25	**Magnetically actuated Fast Steering Mirrors** *Frank Claeyssen, Gerald Aigouy, Kevin Benoit, Jocelyn Rebufa, Marc Fournier (CEDRAT Technologies S.A., FR)*
17:35	**Modeling and Experiments of Additively-Manufactured Fluid Actuated Morphing Unit Structures** *Srinivas Vasista (German Aerospace Center DLR, DE); Kathrin Büchner (Otto von Guericke Universität Magdeburg, DE); Maik Titze, Johannes Riemenschneider, Hans Peter Monner (German Aerospace Center (DLR), DE); Vera Seitz (ACEO® 3D Printing with Silicones, DE)*
17:45	**Slipring rotor made by Additive Manufacturing: redesign, manufacturing and validation testing for space applications** *Lionel Kiener (CSEM, CH)*
17:55	**Measurement by vibrating reed method of Young's modules of Carbon fiber reinforced plastics** *Eiichi Miura, Keisuke Takeda, Tomomi Adachi, Hideki Kimura (Tokai University, JP); Yoshitake Nishi (Tokai University and Kanagawa Institute of Industrial Science and Technology (KISTEC), JP); Helmut Takahiro Uchida (Tokai University, JP)*

Friday, February 19 13:45 - 14:45

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 1

A5	**Medical Devices (1)** *Chairs: Bert Müller (University of Basel, CH), Peter P. Pott (University of Stuttgart, DE)*
13:45	**Concentric muscles - Miniature Pneumatic Actuation with Integrated Channel for Surgical Instruments** *Julie Legrand, Mouloud Ourak, Emmanuel Benjamin Vander Poorten (KU Leuven, BE)*
13:55	**Posture Control of Hand Using Multi-balloon Actuator** *Ken'ichi Koyanagi, Tomoaki Murabayashi, Toru Oshima (Toyama Prefectural University, JP); Kenji Kagechika (Toyama Prefectural Rehabilitation Hospital & Support Center for Children with Disabilities, JP); Takumi Tamamoto (Toyama Prefectural University, JP)*
14:05	**Robust Silicon Micropump of Chip Size 5x5x0.6 mm3 with 4 ml/min Air and 0.5 ml/min Water Flow Rate** *Henry Leistner, Martin Richter, Yuecel Congar, Daniel Anheuer, Martin Wackerle, Siegfried Röhl (Fraunhofer EMFT, DE)*
14:15	**Titanium Micro Diaphragm Pump for Implantable Medical Applications** *Claudia Patricia Durasiewicz, Agnes Bußmann, Sebastian Kibler (Fraunhofer EMFT, Fraunhofer Research Institution for Microsystems and Solid State Technologies, DE)*
14:25	**Investigation of Flexural Mechanical Amplifier for the Development of Miniaturized and Large Force Piezoelectric Actuator for Medical Implant Applications** *Hussam Kloub (Furtwangen University, DE)*
14:35	**Comparison of smart artificial muscles with different functional fibers** *Shuichi Wakimoto, Sota Kogawa, Hiroaki Matsuda, Kazuya Nagaoka, Takefumi Kanda (Okayama University, JP)*

Track 2

B5	**Magnetic Shape Memory Actuators** *Chairs: Andrea Böhm (Fraunhofer-Institut für Werkzeugmaschinen und Umformtechnik, DE), Stefan Seelecke (Saarland University, Saarbrücken, DE)*
13:45	**A Combined Magneto-Mechanical Characterization Procedure for Magnetic Shape Memory Alloys** *Fabian Ehle, Peter Neumeister, Eric Haufe, Holger Neubert (Fraunhofer IKTS, DE)*
13:55	**Experimental Investigation of an MSM controlled Reluctance Actuator** *Marco Hutter (University of Stuttgart, DE); Arif Kazi (Aalen University of Applied Sciences, DE); Bernd Gundelsweiler (University of Stuttgart, DE)*
14:05	**A valve-free, bidirectional, self-priming micropump** *Peter Müllner, Andrew Armstrong (Boise State University, USA); Brent Johnston, Aaron Smith (Shaw Mountain Technology LLC, USA)*
14:15	**Compact Damping System with Magnetic Shape Memory Alloys** *Julius Happel, René Schnetzler, Emmanouel Pagounis, Markus Laufenberg (ETO MAGNETIC GmbH, DE)*

14:45 - 15:00 Short Break

*The given times in the program schedule are according to the **German Local Time (CET)***

	Track 3
C5	**Polymer-based Actuators** *Chair: Aaron Price (Western University, CA)*
13:45	**Actuation with Magnetoactive Polymers** *Holger Böse, Thomas Gerlach, Johannes Ehrlich (Fraunhofer ISC, DE)*
13:55	**Self-Sensing Electroadhesive Polymer Gripper with Magnetically Controllable Surface Geometry** *Dirk Sindersberger, Nina Prem, Gareth Monkman (OTH Regensburg, DE); Klaus Zimmermann (Ilmenau University of Technology, DE)*
14:05	**Electromechanical characterization and laser structuring of Ni-based sputtered metallic compliant electrodes for DE applications** *Jonas Hubertus, Günter Schultes, Stefan Seelecke, Gianluca Rizzello, Sipontina Croce, Julian Neu (Saarland University, DE)*
14:15	**Modelling and characterization of a Soft Inverse Pneumatic Artificial Muscle** *Lucrezia Lorenzon, Debora Zrinscak, Martina Maselli, Matteo Cianchetti (Scuola Superiore Sant'Anna, IT)*
14:25	**Bridging the Gap between High Actuation Displacements and Rapid Response Times for Dielectric Elastomer Actuators** *Matthew Wei Ming Tan, Gurunathan Thangavel, Pooi See Lee (School of Materials Science and Engineering, Nanyang Technological University, SGP)*
	Track 4
D5	**Applications** *Chair: Thomas Sattel (Ilmenau University of Technology, DE)*
13:45	**The Influence of Boundary Condition and Collision Position on the Elastic Collision of Bar and Beam** *Hirotarou Tsuchiya, Helmut Takahiro Uchida, Ryoya Yamane, T. Narabayashi (Tokai University, JP)*
13:55	**Road Noise Reduction inside car cabin using Active Structural Acoustic Control (ASAC)** *Hassan Hariri (Rafik Hariri University, Lebanon); Luc Frechette (Univeristé de Sherbrooke, CA); Patrice Masson (Universite de Sherbrooke, CA)*
14:05	**Evaluation of low-cost inertial measurement units for application in high-volume autonomous vehicles** *Christoph Kolhoff, Markus Kemper, Manuel Olze (University of Applied Science Diepholz, DE)*
14:15	**Compact 3D-printed z-positioning unit for high-throughput microscopy** *Sophie Weiland, Max B. Schäfer, Kent W. Stewart, Peter P. Pott (University of Stuttgart, DE)*
14:25	**IRESA - Intelligent Redundant Spacecraft Actuator, Generation II** *Robin Roj (Forschungsgemeinschaft Werkzeuge und Werkstoffe, DE); Florian Schummer (Technische Universität München, DE); Ralf Theiß, Peter Dültgen (Forschungsgemeinschaft Werkzeuge und Werkstoffe, DE)*

14:45 - 15:00 Short Break

Friday, February 19 15:00 - 16:30

*The given times in the program schedule are according to the **German Local Time (CET)***

Plenary

Review Talks III
Chairs: Jürgen Maas (Technical University Berlin, DE), Emmanuel Benjamin Vander Poorten (KU Leuven, BE)

15:00	**Emerging advanced manufacturing techniques for electroactive polymer transducers** *Aaron Price (Western University, CA)*
15:30	**Energy-efficient Actuation Concepts for SMAS** *Paul Motzki (ZeMA gGmbH & Saarland University, DE)*
16:00	**Electromagnetic Actuators** *Tom Ströhla, Martin Dahlmann, Thomas Sattel (Ilmenau University of Technology, DE)*

Friday, February 19 16:30 - 16:40

*The given times in the program schedule are according to the **German Local Time (CET)***

Plenary

Introduction to DFG Priority Program SPP2206 'KOMMMA'
Chair: Manfred Kohl (Karlsruhe Institute of Technology (KIT), DE)

16:30	**Introduction to the Symposium of the DFG Priority Program SPP2206 'KOMMMA'** *Manfred Kohl (Karlsruhe Institute of Technology (KIT), DE)*

Friday, February 19 16:40 - 16:50

*The given times in the program schedule are according to the **German Local Time (CET)***

Plenary

Closing Remarks
Chair: Helmut F. Schlaak (Technical University of Darmstadt, DE)

16:50 - 17:05 Short Break

*The given times in the program schedule are according to the **German Local Time (CET)***

	Track 1
A6	**Medical Devices (2) / Haptic Devices** *Chairs: Jérôme Perret (Haption GmbH, DE), Emmanuel Benjamin Vander Poorten (KU Leuven, BE)*
17:05	**Rendering Large-Area Deformable Tissue Haptics through Robotic Encountering Technology** *Sergio Portoles-Diez, Emmanuel Benjamin Vander Poorten, Dominiek Reynaerts (KU Leuven, BE); Yasuyoshi Yokokohji (Kobe University, JP)*
17:15	**Electromagnetic tuneable haptic feedback for HMI devices** *Javier Ríos Quesada, Shinara Utegenova (Moving Magnet Technologies S.A., FR)*
17:25	**Twisted String Actuation for an active modular hand orthosis** *Pia Mühlbauer, Mario Schimbera, Kent W. Stewart, Peter P. Pott (University of Stuttgart, DE)*
17:35	**Energy Harvesting in and on the Human Body** *Ailinn Scheidl, Peter P. Pott (University of Stuttgart, DE)*
17:45	**Monolithic joints and linkages for low-cost microscopy** *Christian Tichopad, Peter P. Pott (University of Stuttgart, DE)*
	Track 2
B6	**Emerging Actuator Principles** *Chair: Joost Lötters (Bronkhorst High-Tech B.V., NL)*
17:05	**High force density actuators with inherent safety** *Wolfgang Zoels, Georg Bachmaier, Christopher McClanahan (MetisMotion GmbH, DE)*
17:15	**Fully Parametrized Electromechanical Design Method and Toolchain for an Automotive Axial-Flux Synchronous Machine** *Tim Ließke, Folke Schwinning, Thorsten A Kern (Hamburg University of Technology, DE)*
17:25	**Effects of hydrogen treatment and substrate hardness on the negative magnetostrictive thin films and their coatings** *Ren Tokiwa, Shuntaro Nakahiro, Seo Ono, Masato Kamiya, Ryota Gemma, Yoshihito Matsumura, Helmut Takahiro Uchida (Tokai University, JP)*
17:35	**Stepwise electrostatic actuator system for THz reflect arrays** *Lisa Schmitt, Philip Schmitt, Jan Barowski, Martin Hoffmann (Ruhr University Bochum, DE)*
17:45	**Twisted polymeric and CNT yarn-based actuators and energy harvesters** *Marcio Dias Lima (Lintec of America, USA)*
17:55	**Bending of molecular crystals as mechanical response on the light excitation** *Michael Pavlovich Bubnov (G. A. Razuvaev Institute of Organometallic Chemistry of RAS, RU)*

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 3

C6	**Special Solutions** *Chair: Emmanuel Benjamin Vander Poorten (KU Leuven, BE)*
17:05	**Study of Gyro Monorail Production** *Satoshi Amatani, Hirotarou Tsuchiya, A. Okuyama, Helmut Takahiro Uchida (Tokai University, JP)*
17:15	**Automatic solver selection and solution for CPU based automotive HIL simulations with small step size requirements** *Dennis Kähler, Julius Harms, Thorsten A Kern (Hamburg University of Technology, DE)*
17:25	**Effect of Actuation Signal Variation on Single Stroke Volume in Metal Micro Diaphragm Pumps** *Thomas Thalhofer, Agnes Bußmann, Claudia Patricia Durasiewicz (Fraunhofer EMFT, Fraunhofer Research Institution for Microsystems and Solid State Technologies, DE); Oliver Hayden (Technical University of Munich, DE)*
17:35	**Adaptive Beams with Integrated Thermal Actuator** *Timon Burghardt (University of Stuttgart & Institute for Engineering Design and Industrial Design, DE); Christian Kelleter, Matthias Bosch, Matthias Bachmann, Hansgeorg Binz, Lucio Blandini, Werner Sobek (University of Stuttgart, DE)*
17:45	**Polymorphism of “bending” crystals of the dicarbonyl-o-semiquinonato rhodium complex** *Vladimir Cherkasov (G. A. Razuvaev Institute of Organometallic Chemistry of RAS, RU)*

*The given times in the program schedule are according to the **German Local Time (CET)***

Track 4

D6	**Special Session of the DFG Priority Program SPP2206 'KOMMMA'** *Chair: Manfred Kohl (Karlsruhe Institute of Technology (KIT), DE)*
17:05	**A Consistent View on Cooperative Multistage Electrostatic Actuation** *Peter Conrad, Martin Hoffmann (Ruhr-University Bochum, DE)*
17:15	**Bistable Actuators Based on Shape Memory Alloy/ Polymer Composites** *Sabrina Curtis, Duygu Dengiz, Prasanth Velvaluri, Lars Bumke, Justin Jetter, Eckhard Quandt (Kiel University, DE)*
17:25	**Development of Co-Integrated Shape Memory Actuators for Silicon Micro- and Nanomechanics** *Zixiong Li, Gowtham Arivanandhan, Sanaz Rastjoo, Randy Fechner (Karlsruhe Institute of Technology (KIT), DE); Lars Bumke, Eckhard Quandt (Kiel University, DE); Manfred Kohl (Karlsruhe Institute of Technology (KIT), DE)*
17:35	**Design Concepts of Multistage Multistable Cooperative Electrostatic Actuation System with Scalable Stroke and Large Force Capability** *Hussam Kloub (Furtwangen University, DE)*
17:45	**Design and characterization of polymeric domes as biasing elements for dielectric elastomer membrane actuators** *Julian Neu, Sipontina Croce, Jonas Hubertus, Gianluca Rizzello (Saarland University, DE); Günter Schultes (HTWsaar, ZeMA gGmbH, DE); Stefan Seelecke (Saarland University, DE)*
17:55	**Modeling and simulation of compliant biasing systems for dielectric elastomer membranes based on polymeric domes** *Sipontina Croce, Julian Neu, Jonas Hubertus, Gianluca Rizzello (Saarland University, DE); Günter Schultes (HTWsaar, ZeMA gGmbH, DE); Stefan Seelecke (Saarland University, DE)*
18:05	**Simulation of Static Pull-in Instability of Hybrid Levitation Micro-actuators** *Kirill Poletkin (Karlsruhe Institute of Technology (KIT), DE)*

List of Authors

A

Adachi, T.	C1.4, C2.2, A4.6, D4.6
Aguayo, Ed	D4.4
Aigouy, Gerald	A1.3, C4.2, C4.5, D4.1, D4.2
Alaluf, David	A1.1
Amatani, S.	C6.1
Amberg, Michel	A2.3
Anheuer, Daniel	A5.3
Arivanandhan, Gowtham	D6.3
Armstrong, Andrew	B5.3

B

Bachmaier, Georg	B6.1
Bachmann, Matthias	C6.4
Backer, Alexander	A3.3
Balandraud, Xavier	B2.4
Bareikis, Regimantas	A4.2
Barillot, François	D4.1
Barowski, Jan	B6.4
Bassani, Enrico	B2.3
Bell, Andrew	A1.2
Bencheikh, Nabil	C4.5
Benoit, Kevin	D4.1, D4.2
Berhil, Ali	B3.2
Bernard, Yves	B3.2
Betsch, Etienne	A1.3
Bettini, Paolo	B2.3
Binz, Hansgeorg	C6.4
Blandini, Lucio	C6.4
Bobic, Neven	B1.3, B4.3
Böhm, Andrea	B4.5
Borodinas, Sergejus	A4.2
Bosch, Matthias	C6.4
Böse, Holger	C5.1
Boufayed, Rym	B2.4
Branco, Moritz	C4.2
Breisch, Sebastian	RT.II.2
Brekosky, Regis	D4.4
Bribiesca-Argomedo, Federico	C4.3
Brown, Ari	D4.4
Bruch, Daniel	D1.2
Bubnov, Michael	B6.6
Büchner, Kathrin	D4.3
Bumke, Lars	D6.2, D6.3
Burghardt, Timon	C6.4
Bußmann, Agnes	A4.5, A5.4, C6.3

C

Carvalho Lopes, Diogo	C4.3
Castillo, Charles	B1.4
Ceponis, Andrius	A4.2
Chang, Meng-Ping	D4.4
Chapelle, Frédéric	B2.4
Cherkasov, Vladimir	C6.5
Choi, Seung-Bok	RT.I.2, D3.2, D3.4
Cianchetti, Matteo	C5.4
Citro, Marco	B1.1, B1.5
Claeyssen, Frank	A1.3, A2.4, C4.2, D4.1, D4.2
Coco, Salvatore	B1.1
Collado, Marcelo	B2.2, A3.1
Comyn, Tim	A1.2
Congar, Yuecel	A5.3
Conrad, Peter	D6.1
Costen, Nicholas	D4.4
Courant, Robert	B4.4
Cowing, Peter	A1.2
Croce, Sipontina	C5.3, D6.5, D6.6
Curtis, Sabrina	D6.2
Cuschieri, Alfred	C2.1

D

Dahlmann, Martin	RT.III.3
Dandois, Julien	A1.3
Daniel, Laurent	B3.2
Dede, Can	C3.5
Delibas, Buelent	C2.3, A3.2,
Dengiz, Duygu	D6.2
Destrebecq, Jean-François	B2.4
Drese, Klaus	A2.2, A3.3
Drossel, Welf-Guntram	B4.5
Dültgen, Peter	B2.6, D5.5
Durasiewicz, Claudia	A5.4, C6.3

E

Eglinger, Emmanuel	A1.3
Ehle, Fabian	B5.1
Ehrlich, Johannes	C5.1

F

Fatikow, Sergej	C2.5
Fechner, Randy	D6.3
Fettig, Rainer	D4.4
Fournier, Marc	D4.2
Frechette, Luc	D5.2
Frenzel, Philip	B4.3
Fujimoto, Nozomu	A3.6
Fumagalli, Luca	B1.5

G

Gallas, Quentin	A1.3
Gareis, Michael	D1.3
Gauthier, Jean-Yves	C4.3
Gauthier, Jolan	A2.4
Gemma, R.	C1.3, B6.3
Gerlach, Thomas	C5.1
Gholami-Kermanshahi, Mozhgan	B2.6
Giraud, Frédéric	A2.3
Giraud-Audine, Christophe	A2.3
Gloess, Rainer	C4.1
Godfroid, Thomas	A1.1
Gołdasz, Janusz	RT.I.2, D3.5
Gorges, Tom	B1.2
Grande, Antonio	B2.3
Grasböck, Lukas	A4.1
Greenhouse, Matthew	D4.4
Guignabert, Adrien	A2.4, D4.1
Gundelsweiler, Bernd	A4.3, B5.2

H

Hachisuka, Satori	A3.5
Haefliger, Daniel	D1.1
Hafez, Moustapha	RT.II.3
Hammann, Nicolà	B2.1
Happel, Julius	B2.5, B5.4
Hariri, Hassan	D5.2
Harms, Julius	C6.2
Haufe, Eric	B5.1
Hayden, Oliver	C6.3
Hegger, Christian	D3.1
Heider, Jonas	B2.5
Hoffmann, Martin	B6.4, D6.1
Honold, Michael	B1.3
Hu, Gang	D4.4
Hubertus, Jonas	C5.3, D6.5, D6.6
Hübler, Moritz	B2.1
Hubracht, Andreas	C3.4
Hutter, Marco	B5.2

I

Inés, Javier	B2.2, A3.1
Isselhorst, Armin	C4.2
Iwamori, S.	A4.6

J

Jacob, Kiran	B4.2
Jaussaud, Gladys	A1.3
Jenis, Filip	D3.3
Jetter, Justin	D6.2
Johnston, Brent	B5.3
Junglas, Samuel	C3.3, C3.4
Jūrėnas, Vytautas	A4.2

K

Kaci, Anis	A2.3
Kagechika, Kenji	A5.2
Kähler, Dennis	C6.2
Kaiser, Max	B2.1
Kamiya, Masato	C1.3, B6.3
Kanda, Takefumi	A3.6, A5.6
Kaneko, A.	C1.4, C2.2
Kaneko, Takamitsu	A3.5
Kang, Byung-Hyuk	D3.2
Kapelke, Simon	A4.4
Karabulut, Mehmet Gorkem	C3.5
Kataoka, Ryuichi	C1.3
Kazi, Arif	B1.3, B4.3, B5.2
Kelleter, Christian	C6.4
Kemper, Markus	D5.3
Kern, Thorsten	B6.2, C6.2
Khan, Hamza	C2.1
Kibler, Sebastian	A5.4
Kiener, Lionel	D4.5
Kim, Bo-Gyu	D3.4
Kim, Kyowon	D4.4
Kimura, Hideki	D4.6
Kirsch, Susanne-Marie	B3.3, B4.1
Kloub, Hussam	A5.5, D6.4
Knoll, Stefan	B1.4
Koc, Burhanettin	A3.2
Koepfer, Markus	B1.3
Kogawa, Sota	A5.6
Kohl, Manfred	B4.2, DFG.1, D6.3
Kolhoff, Christoph	D5.3
Korzer, Philipp	A4.5
Kotecki, Carl	D4.4
Koyanagi, Ken'ichi	A5.2
Krempel, Sandro	A2.2, A3.3
Kubík, Michal	D3.3
Kucukoglu, Sefa Furkan	C3.5
Kulvietis, Genadijus	A4.2
Kunze, Julian	D1.2, D1.5
Kutyrev, Alexander	D4.4

L

Laufenberg, Markus	B2.5, B5.4
Lauzier, Kévin	C4.3
Lechleitner, Thomas	A4.1
Lee, Pooi See	C5.5
Legrand, Julie	A5.1
Leistner, Henry	A5.3
Li, Mary	D4.4
Li, Zixiong	D6.3
Ließke, Tim	B6.2
Lima, Marcio	B6.5
Lin-Shi, Xuefang	C4.3
Lorenzon, Lucrezia	C5.4
Loubet, Aurore	A2.4

Author index

M

Maas, Jürgen D1.3, C2.4, C3.3, C3.4, D3.1, B4.4
Mabe, James RT.I.1
Macháček, Ondřej D3.3
Mandolino, Michele B4.1
Manfredi, Luigi C3.1
Maselli, Martina C5.4
Masoud, Abd Elkarim C2.4, C3.4
Masson, Patrice D5.2
Matsuda, Hiroaki A5.6
Matsumoto, Mutsuki C1.4
Matsumura, Yoshihito C1.1, C1.3, B6.3
Mazeika, Dalius A4.2
McCandliss, Stephan D4.4
McClanahan, Christopher B6.1
Meichsner, Gunnar B4.5
Meindlhumer, Martin A4.1
Meneroud, Patrick C4.2
Mescheder, Ulrich D1.4
Michaelis, Nicolas B4.1
Miura, E. D4.6
Miyazaki, Shuichi B4.2
Monkman, Gareth C5.2
Monner, Hans Peter D4.3
More, Pierre A1.3
Morita, Takeshi A2.1, A3.5
Moriyama, Hiroyuki A4.6
Motzki, Paul B1.2, D1.2, B3.1, B3.3, B3.4, B4.1, RT.III.2
Mühlbauer, Pia A6.3
Müller, Bert RT.II.1
Müllner, Peter B5.3
Murabayashi, Tomoaki A5.2
Mustafa, Abdullah A2.1, A3.5

N

Nagaoka, Kazuya A5.6
Nakahiro, S. B6.3
Nalbach, Sophie D1.2
Narabayashi, T. D5.1
Neblung, Nils B2.1
Nespoli, Adelaide B2.3
Neu, Julian C5.3, D6.5, D6.6
Neubert, Holger B5.1
Neumeister, Peter B5.1
Nil, Celen C4.2
Nishi, Y. D4.6

O

Odaka, H. C1.4
Okuyama, A. C6.1
Olze, Manuel D5.3
Omori, Kentaro A3.6
Ono, S. C1.1, C1.3, B6.3
Orino, Yuichiro A3.5
Oshima, Toru A5.2
Ostasevicius, Vytautas A4.2
Ourak, Mouloud A5.1

P

Pagès, Alexandre A2.4
Pagounis, Emmanouel B2.5, B5.4
Pascual, Alvaro A3.1
Passaretti, Francesca B2.3
Pechstein, Astrid A4.1
Persson, Jan C4.2
Poletkin, Kirill D6.7
Portoles-Diez, Sergio A6.1
Pott, Peter D5.4, A6.3, A6.4, A6.5
Pouvesle, Nicolas C4.2
Poyyathuruthy Bruno, Binal C3.2
Prechtl, Johannes D1.2, D1.5, B3.4
Prem, Nina C5.2
Preumont, André A1.1
Price, Aaron RT.III.1
Přikryl, Matěj D3.3

Q

Quandt, Eckhard D6.2, D6.3

R

Radler, Oliver D3.6
Rastjoo, Sanaz D6.3
Rebufa, Jocelyn D4.1, D4.2
Reininger, Alexander A4.1
Reischl, Daniel A4.1
Reynaerts, Dominiek A6.1
Richter, Martin A5.3
Riemenschneider, Johannes D4.3
Ríos Quesada, Javier A6.2
Ritter, Frank A3.3
Rivera, Cayetano B2.2, A3.1
Rizzello, Gianluca D1.2, D1.5, B3.3, B3.4, C5.3, B4.1, D6.5, D6.6
Robert, Damien A1.1
Rodrigues, Gonçalo A1.1
Röhl, Siegfried A5.3
Roj, Robin B2.6, D5.5
Rowe, Steven C4.2

S

Sapiński, Bogdan	D3.5
Sasamura, Tatsuki	A3.5
Sattel, Thomas	D3.6, RT.III.3
Schäfer, Max	D5.4
Scheidl, Ailinn	A6.4
Schelnberger, Benjamin	B2.6
Schiele, Frank	A4.3
Schimbera, Mario	A6.3
Schmitt, Lisa	B6.4
Schmitt, Philip	B6.4
Schneider, Joerg	B4.5
Schnetzler, René	B2.5, B5.4
Scholtes, Dominik	B3.1
Schulte Westhoff, Bela	C2.4
Schultes, Günter	C5.3, D6.5, D6.6
Schummer, Florian	D5.5
Schütze, Andreas	B4.1
Schütze, Robert	C3.2
Schwinning, Folke	B6.2
Seelecke, Stefan	B1.2, D1.2, D1.5, B3.1, B3.3, B3.4, B4.1, C5.3, D6.5, D6.6
Seidel, Nico	A2.2
Seitz, Vera	D4.3
Semail, Betty	A2.3
Seno, Norihisa	A3.6
Sesmat, Sylvie	C4.3
Sessner, Vincent	B4.2
Sindersberger, Dirk	C5.2
Slatter, Rolf	C4.4
Smith, Aaron	B5.3
Sobek, Werner	C6.4
Špalek, Petr	D3.3
Stentz, Jonathan	A2.4, D4.1
Stewart, Kent	D5.4, A6.3
Stoppel, Fabian	RT.I.3
Strauss, Bernhard	C4.2
Strecker, Zbyněk	D3.3
Ströhla, Tom	RT.III.3
Suzuki, Shunji	A3.4

T

Takeda, K.	D4.6
Takimoto, Toshikio	C1.4, C2.2
Tamamoto, Takumi	A5.2
Tan, Aditya	D3.6
Tan, Matthew	C5.5
Ternoy, Frederic	A1.3
Thalhofer, Thomas	C6.3
Thangavel, Gurunathan	C5.5
Theiß, Ralf	B2.6, D5.5
Tichopad, Christian	A6.5
Tietze, Sabrina	A2.2, A3.3
Titze, Maik	D4.3
Tokiwa, R.	C1.1, C1.3, C1.4, C2.2, B6.3
Tonegawa, A.	C2.2, C1.4
Trębacz, Paweł	D3.5
Tsuchiya, H.	C1.4, C2.2, A4.6, D5.1, C6.1
Tsuchiya, M.	A4.6
Tüysüz, Arda	RT.II.2

U

Uchida, H.	C1.1, C1.3, C1.4, C2.2, A4.6, D4.6, D5.1, B6.3, C6.1,
Uchino, Kenji	RT.II.4
Utegenova, Shinara	A6.2

V

Vander Poorten, Emmanuel	A5.1, A6.1
Vasiljev, Piotr	A4.2
Vasista, Srinivas	D4.3
Velvaluri, Prasanth	D6.2
Villa, Elena	B2.3
Von Deyn, Lennart	A3.2

W

Wackerle, Martin	A5.3
Wakimoto, Shuichi	A3.6, A5.6
Wald, Christian	A4.5
Wallrabe, Ulrike	D1.4, C3.2
Wang, Frederick	D4.4
Wang, Kainan	A1.1
Wapler, Matthias	D1.4
Wei, Junyang	C2.5
Weiland, Sophie	D5.4
Welsch, Felix	B3.3, B4.1
Wischnewski, Alexej	C2.3
Wischnewski, Maxim	C2.3
Woias, Peter	D1.4
Wu, Haomin	C1.2

Y

Yamaguchi, Kengo	C1.3
Yamaguchi, Toshizumi	A3.4
Yamane, R.	C1.4, C2.2, D5.1
Yang, Bintang	C1.2
Yang, Yikun	C1.2
Yokokohji, Yasuyoshi	A6.1

Z

Zanella, Matteo	B1.5
Zhu, Rui	D1.4
Zimmer, Lukas	B3.3
Zimmermann, Klaus	C5.2
Zoels, Wolfgang	B6.1
Zrinscak, Debora	C5.4

General Information

ACTUATOR 2021 Office

For detailed information please contact:

VDE VDI-Society Microelectronics Microsystems and Precision Engineering (GMM)
Dr. Ronald Schnabel
Stresemannallee 15,
60596 Frankfurt am Main, Germany

Phone: +49 69-6308-227
Fax: +49 69-6308-9828
E-Mail: gmm@vde.com

During the conference:
Mobile: +49 171 4695 118

ACTUATOR Project Management

VDE-Conference Service
Stresemannallee 15
60596 Frankfurt am Main / Germany
Ms. Hatice Altintas
Phone: +49 69 63 08 477
E-Mail: hatice.altintas@vde.com

Conference Fees
(including proceedings)

Regular:	450 EURO
Authors: *	350 EURO
Students: **	100 EURO

* Only one person per paper
** A photocopy of the student card must be sent

Payment of Conference Fee

Payment for registration, including bank charges and processing fees, must be made in Euro. The conference fee has to be fully paid in advance by credit card. Your registration can only be confirmed if VDE-Conference Services has recorded receipt of your full payment.

Cancellation

In case of cancellation, provided that written notice has been given to VDE-Conference Services before January 15, 2021, the registration fee will be fully refunded less a handling fee of EURO 80.00. After January 15, 2021, no refund will be made. Proceedings will then be sent to the registrant after the conference.

Conference Information

Virtual Exhibition

The 11th International Exhibition on New Actuator Systems and Applications will present components, system approaches and applications of smart actuators and low-power electromagnetic drives based on conventional (electromagnetic) and innovative working principles (new actuators), and associated subjects. The range of topics also includes measurement techniques, control concepts and circuits, driver components and units, system integration, layout and simulation tools etc.

Within the Virtual exhibition, we will have application-oriented presentations on a product level, besides the in-depth conference programme. Exhibition conditions and more detailed information on the Exhibition Forum may be obtained from the organizer or can be downloaded from the event homepage www.actuator.de

Contact:
Ms. Hatice Altintas
hatice.altintas@vde.com

Sponsors

The VDE GMM and the members of the ACTUATOR 2021 Program Committee would like to thank all the sponsors and exhibitors for their support.

CEDRAT TECHNOLOGIES
59 Chemin du Vieux Chêne
38240 Meylan, France
+33 4 56 58 04 00
actuator@cedrat-tec.com
www.cedrat-technologies.com

Cisco Systems GmbH
Ludwig-Erhard-Strasse 3
65760 Eschborn, Germany
www.cisco.com

Huawei Technologies Deutschland GmbH
Dr.-Ing. Zhao Zhao
erc.zhaozhao@huawei.com
www.huawei-dialog.de/

Sateco XT AG
Sonnenbergstrasse 74
8603 Schwerzenbach, Switzerland
+41 44 905 6226
xt@satecogroup.com
www.satecogroup.com

Exhibitors

ETO MAGNETIC GmbH
Hardtring 8 • 78333 Stockach, Germany
+49 777 1809-1452
m.laufenberg@etogruppe.com
www.etogruppe.com

FGL-Netzwerk - Fraunhofer IWU
Nöthnitzer Str. 44 • 01187 Dresden, Germany
+49 351 4772-2320
andrea.boehm@iwu.fraunhofer.de
www.fgl-netzwerk.de

MaTecK Material-Technologie & Kristalle GmbH
Im Langenbroich 20 • 52428 Juelich, Germany
+49 2461 9352-0
info@mateck.de
https://mateck.com/

MDPI AG - Journal Actuators
St. Alban-Anlage 66 • 4052 Basel, Switzerland
+41 61683 7734
actuators@mdpi.com
www.mdpi.com/journal/actuators

Netzwerk Smart Production
Rathaus E5 • 68159 Mannheim
+49 173 68 44 248
+49 621 293 293 9
Stefan.Bley@mannheim.de
www.smartproduction.de/

Physik Instrumente (PI) GmbH & Co. KGr
Auf der Römerstraße 1 • 76228 Karlsruhe, Germany
+49 721 4846-0
info@pi.ws
www.physikinstrumente.com

VDE VDI GMM