

**Dr.-Ing.  
Kirill Koulechov**

Institute of Micro Technology and Medical Device Technology  
Faculty of Mechanical Engineering / Medical Faculty  
Technische Universität München  
D – 85748 Garching, Germany  
[www.mimed.de](http://www.mimed.de)  
eMail: [kirill.koulechov \[at\] tum.de](mailto:kirill.koulechov[at]tum.de) Tel: +49 89 289 151 89



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Born: 05.04.1977

**Career**

- 05/2006-present Postdoctoral Researcher at MiMed – Dept. of Micro Technology and Medical Device Technology (Prof.Dr. Tim C. Lüth)
- 2005-05/2006 Research Assistant at MiMed – Dept. of Micro Technology and Medical Device Technology (Prof. Dr. Tim C. Lüth)
- 2003-2005 Research Assistant at BCMM – Berlin Centre for Mechatronical medical Devices, Charité University Medicine Berlin (Prof. Dr. Tim C. Lüth)
- 2002 Research at the DaimlerChrysler Research and Technology North America Inc., Palo Alto, Ca, USA.

**Research Interests**

Navigated Control, Hard tissue navigation, Medical Device Development,  
Computer Aided Planning and –Surgery systems, Application of navigation Technology in the medical field,  
Miniaturized Medical Robotics, Biological Signals

**Honours**

- 2006 Rudolf-Schmidt-Burkhardt-Award at the TU Muenchen for the Dissertation (Ph.D.)
- 2000/2001 Deutscher Studienpreis für eine Gruppenarbeit mit dem Titel "Körper und Seele einer neuen Maschine" in der Ausschreibung Body Check
- 2000-2003 DaimlerChrysler Fellowship

**Activities**

*Organizing Committee:*

Organizing Committee Automed 2007 (Automatisierungstechnische Verfahren für die Medizin)

**Most important Publications** (selected and most recent)

- **Koulechov K.**, T. C. Lueth: A new metric for drill location for Navigated Control in navigated dental implantology. CARS, Computer Assisted Radiology and Surgery, Chicago, U.S.A, 23rd - 26th June, 2004. Reprinted in Proceedings of CARS 2004 Computer Assisted Radiology and Surgery the 18<sup>th</sup> International Congress and Exhibition, Elsevier Science Publishers (North-Holland), pp. 1220-1225.
- **Koulechov K.**, T. Tita, T. C. Lueth : Freie Isozentrik und 3D-Rekonstruktion mit einem Standard CBogen. atp - Automatisierungstechnische Praxis, 5/2005 (2004), pp. 51-60.
- Strauss G., **K. Koulechov**, R. Richter, A. Dietz, T. C. Lueth: Navigated Control in functional endoscopic sinus surgery. Int J Medical Robotics and Computer Assisted Surgery, 1(3) (2005), pp. 31-41.
- **Koulechov K.**, T. C. Lueth, G. Strauss, R. Richter, C. Trantakis: Mechatronical assistance for paranasal sinus surgery. CARS, Berlin, Germany, June 22 - 25, 2005.
- Strauss G., M. Hofer, W. Korb, C. Trantakis, D. Winkler, O. Burgert, T. Schulz, A. Dietz, J. Meixensberger, **K. Koulechov**: Accuracy and precision in the evaluation of computer assisted surgical systems. A definition. HNO, 2006 Feb; 54(2), pp. 78-84.
- Stopp S., **K. Koulechov**, D. Szymanski, N. Adolphs, T. C. Lueth: A System For Navigated And Power Controlled Remove Of Bone And The First Clinical Application. CAS-H, Berlin, Germany, August 25-27, 2005.
- Strauß, G., **K. Koulechov**, S. Stopp, M. Strauss, A. Pankau, M. Hofer, W. Korb, A. Dietz, J. Meixensberger, T. C. Lueth: Verbesserte Umsetzung der Resektionsgrenzen in der Nasennebenhöhlenchirurgie mit dem navigiert-kontrollierten Shaver. Laryngo-Rhino-Otologie, 85 (2006), pp. 1-8.
- **Koulechov K.**, T. Rapoport, T. C. Lueth: Miniaturized, autoclavable Robot. at - Automatisierungstechnik, Spezialausgabe zur Robotik 2006, pp. 213-221.

- **Koulechov K.**, G. Strauss, A. Dietz, M. Strauss, M. Hofer, T. C. Lueth: FESS-Control: Realization and Evaluation of Navigated Control for Functional Endoscopic Sinus Surgery. Computer Aided Surgery, 2006, pp. 147-159.
- **Koulechov K.**, M. Buettner, T. C. Lueth: Geometrically constrained registration for ENT surgery. CARS, Computer Assisted Radiology and Surgery, Osaka, Japan. June 28 - July 1, 2006. Reprinted in Proceedings of CARS 2006 Computer Assisted Radiology and Surgery the 20Th International Congress and Exhibition, Elsevier Science Publishers (North-Holland), pp. (in press).

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## Miniaturized Robots for Surgical Procedures

Kirill Koulechov

MIMED • Lehrstuhl Mikrotechnik und Medizingerätetechnik  
Prof. Dr. Tim C. Lüth and Prof. Dr.-Ing. Joachim Heinzl  
Technische Universität München • Boltzmannstr. 15, D- 85748 Garching  
[www.mimed.de](http://www.mimed.de)

**Abstract:** The goal of this contribution is to present new approaches for medical robots. Previous approaches for the usage of industrial robots for surgical applications have proven to have several disadvantages: they are often too expensive, too complex for the daily use, and are not sufficiently adapted to the clinical needs. Therefore, the authors propose a simple, dedicated robot design that meets the demands of the surgical teams. This design comprises miniaturized and autoclavable kinematics. Several motorization concepts exist, e.g. standard direct current motor, autoclavable brushless motors and novel piezo-motors. The chosen design allows for instrument positioning (e.g., endoscope holder) or telemanipulation. The recent advances lead to further miniaturization of the robot, which now comprises an autoclavable kinematics with 4 degrees of freedom and the height of 2 cm.