

# Curriculum Vitae

## Karel Roubík

### Personal Data:

Family name: Roubík  
First name: Karel  
Date of birth: May 11, 1971  
Place of birth: Náchod, Czech Republic  
Nationality: Czech  
Citizenship: Czech Republic, EU

### Contacts:

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### Education and Professional Studies:

Degree: Professor (prof.) in Electronics and Medical Devices. Institution: Czech Technical University in Prague, Faculty of Electrical Engineering; 2014

Degree: Associate Professor (doc.) in Biomedical Engineering (i.e. habilitation); Institution: Technical University in Kosice, Slovakia, Faculty of Mechanical Engineering; thesis for habilitation: “Unconventional regimens of artificial lung ventilation”; 2006

Degree: Ph.D.; Institution: Czech Technical University in Prague, Faculty of Electrical Engineering; thesis: “Optimization of artificial lung ventilation”; 2001

Degree: M.Eng. (Ing.); Institution: Czech Technical University in Prague, Faculty of Electrical Engineering; thesis: “ISFET-based sensors for biomedical applications”; 1994

**Short time courses:** Pulmonary Function Testing 2014 (AARC, Nov 17, 2014, Las Vegas, NV, USA), Mechanical Ventilation 2012 (AARC, Nov 9, 2012, New Orleans, LA, U.S.A.); Current Issues in Mechanical Ventilation (AARC, Dec 5, 2010, Las Vegas, NV, U.S.A.); Fluid dynamics of biological flows (VKI – von Karman Institute for Fluid Dynamics, May 17–21, 2010, Sint-Genesius-Rode, Belgium); Mechanical Ventilation (AARC, Dec 4, 2009, San Antonio, TX, U.S.A.); Statistics for Biomedicine and Health Care (The European Centre for Medical Informatics, Statistics and Epidemiology (EuroMISE Centre),

Department of Medical Informatics, Institute of Computer Science of the Academy of Sciences of CR, 2008: summer semester, Prague, Czech Republic), etc.

### **Appointments:**

Date: 2004 – present  
Organization: Czech Technical University in Prague, Faculty of Biomedical Engineering  
Position: Professor (since 2014), Associate Professor (since 2006), Assistant Professor (since 2004 to 2006), Researcher, deputy head of the Department of Biomedical Technology (2007–2009 and 2011–present)

Date: 2014 – present  
Organization: The Military University Hospital in Prague, Charles University in Prague, First Faculty of Medicine, Department of Anesthesiology, Resuscitation and Intensive Care Medicine.  
Position: Professor

Date: 1999 – 2010  
Organization: Charles University in Prague, First Faculty of Medicine  
Position: Senior Lecturer

Date: 1994 – 2004  
Organization: Czech Technical University in Prague, Faculty of Electrical Engineering  
Position: Assistant Professor, Researcher

Date: 1998 – present  
Organization: Institute for Postgraduate Medical Education in Prague (IPVZ)  
Position: Faculty member of IPVZ, external lecturer

### **Consultancy:**

Company: Linet Ltd., Želevčice, Czech Republic (2003 – present)  
Activity: Consultant and Biomedical Engineering Specialist (projects aimed at development of beds and stretchers for critically ill patients; lung vibration therapy; technical solutions of medical equipment)

Company: TNO, Physics and Electronics Laboratory, The Hague, The Netherlands (2002 – 2004)  
Activity: Consultant and researcher on CCTV and the human visual system performance in security technology

### **Research Co-operation:**

Establishment: VU University Medical Center, Pediatric Intensive Care, Amsterdam, The Netherlands (2005 – present)

- Research Topics: Optimization of artificial lung ventilation, design and development of the Demand Flow System, Electrical Impedance Tomography in respiratory care
- Company: SensorMedics (CareFusion), Yorba Linda, CA, USA (2004 – present)  
 Research Topic: Design and development of the Demand Flow System for SensorMedics 3100 A/B high-frequency oscillatory ventilators
- Establishment: Charles University, First Faculty of Medicine, Faculty Hospital Kralovske Vinohrady, Department of Anesthesia and Critical Care Medicine, Prague (2001 – present)  
 Research topics: Clinical research of high-frequency oscillatory ventilation in adults, monitoring of HFOV, animal studies
- Establishment: Charles University, First Faculty of Medicine, Faculty Thomayer Hospital, Prague – Krč, Department of Anesthesia and Critical Care Medicine (2007 – present)  
 Research topics: Technical solution of heliox application, clinical research of heliox effects in COPD patients
- Establishment: Clean-Air, s. s r. o., and Malina Safety, s. s r. o., Jablonec nad Nisou, Czech Republic (2010 – present)  
 Research topics: Mechanical ventilation and mechanical lung ventilators for contaminated and decontamination zones and for mass casualty incidents.
- Establishment: Population Protection Institute, Ministry of Interior of the Czech Republic, Fire and Rescue Services of the Czech Republic. (2010 – present)  
 Research topics: Mechanical ventilation and mechanical lung ventilators for contaminated and decontamination zones and for mass casualty incidents.
- Establishment: The Military University Hospital, Department of Anesthesiology, Resuscitation and Intensive Care, Charles University in Prague, First Faculty of Medicine, (2011 – present)  
 Research topics: Clinical research of electrical impedance tomography, high-frequency oscillatory ventilation and medical equipment.

### **Professional Foreign Activities, Experience and Training:**

- Country: Colombia  
 Date: April-May 2014  
 Details: Universidad Autónoma de Bucaramanga (UNAB), Colombia. Expertise and consultancy: introduction of Biomedical Engineering Curriculum at UNAB; lectures for students of medical and technical programs, lectures for staff of FOSCAL hospital and UNAB Fac. of Medicine.
- Country: United States of America  
 Date: November 2011  
 Details: Fellowship: International fellowship of ARCF (American Respiratory Care Foundation) and AARC (American Association for Respiratory

Care). Christiana Care Health System, Respiratory Department, Newark, Delaware, USA, and Freeman Health System, Respiratory Services, Joplin, Missouri, USA (3 weeks)

Country: United States of America  
Date: December 2009  
Details: Louisiana State University, Virginia K. Shehee Biomedical Research Institute, 1501 Kings Highway Suite 5303, Shreveport, LA 71103, USA: a short study visit (1 week)

Country: Ireland  
Date: May – June 2005  
Details: Sligo Institute of Technology, Ballinode, Sligo: Research on biomedical engineering (modeling in biomedicine), a study visit

Country: Ireland  
Date: May – June 2004  
Details: Sligo Institute of Technology, Ballinode, Sligo: Lectures, seminars and research on biomedical engineering

Country: The Netherlands  
Date: February 2004  
Details: TNO Physics and Electronics Lab, Oude Waalsdorperweg 63, 2509 JG The Hague, The Netherlands: research on visual perception and its modeling

Country: France  
Date: January – February 2000  
Details: TIMA laboratory, INPG and University of J. Fourier, Grenoble: Research and solution of a research project: “Ion-Sensitive Field Effect Transistors (ISFET) for Ion Concentration Measurements in Medicine”

### **Awards and Honors:**

Prize of the Faculty of Medical Bioengineering, Grigore T. Popa University of Medicine and Pharmacy. Iași, Romania, November 21, 2015. The presented study: Ort V., Roubík K.: The Effect of Dynamic Hypoinflation during High Frequency Oscillatory Ventilation in an in Vitro Model of the Respiratory System.

13<sup>th</sup> Annual John H. Emerson Award for research, awarded on March 25, 2010 at 27<sup>th</sup> High-Frequency Ventilation of Infants, Children, and Adults Conference, Snowbird Resort, Utah, USA. March 23–27, 2010. The presented study: K. Roubik, M. van Heerde, V. Kopelent, D.G. Markhorst: Spontaneous Breathing During High Frequency Oscillatory Ventilation in a Porcine Model: Improvement of Lung Aeration and Ventilation Shown by Electrical Impedance Tomography.

10<sup>th</sup> Annual John H. Emerson Award for research, awarded on March 29, 2007 at 24<sup>th</sup> High-Frequency Ventilation of Infants, Children, and Adults Conference, Snowbird Resort, Utah, USA. March 28–31, 2007. The

presented study: K. Roubik, M. van Heerde, V. Kopelent, D.G. Markhorst: Maintaining Spontaneous Breathing and the Imposed Work of Breathing Reduction during HFOV in Pigs.

9<sup>th</sup> Annual John H. Emerson Award for research (Award presented to M. van Heerde, the main author), 23<sup>rd</sup> High-Frequency Ventilation of Infants, Children, and Adults Conference, Snowbird Resort, Utah, USA. March 29–April 1, 2006. The presented study: M. van Heerde, K. Roubik, V. Kopelent, M. Sinaasappel, F.B. Plötz, D.G. Markhorst: Reduction of Imposed Work of Breathing during High-Frequency Ventilation: A Bench Study.

Award of the Czech Ministry of Education. 40<sup>th</sup> International Film Festival TECHFILM 2002. Awarded for educational video “Tomographic Imaging Systems in Medicine—Computed Tomography” (Co-author with J. Hozman).

A Silver Medal (Class II) of the Czech Ministry of Education, Youth and Physical Training. 40<sup>th</sup> International Film Festival TECHFILM 2002. Awarded for educational video “Tomographic Imaging Systems in Medicine—Computed Tomography” (Co-author with J. Hozman).

Siemens Award for the best dissertation. Awarded in 2001 by Siemens for the doctoral thesis “Optimization of artificial lung ventilation”.

The best conference papers: at several conferences: 9<sup>th</sup> Congress of ČSARIM (Czech society for anesthesiology and critical care medicine); International conference Poster; International Conference on Advanced Engineering Design, etc.

Outstanding Research Results Award, awarded by the Rector of Czech Technical University in Prague, 2007.

Listed in Who’s Who (Marquis):

Who’s Who in Medicine and Healthcare (since 2004)

Who’s Who in the World (since 2005)

Who’s Who in Science and Engineering (since 2005).

### **Professional Memberships:**

Committee member: IMEKO—International Measurement Confederation, Technical Committee TC-13: Measurements in Biology and Medicine. Budapest, Hungary (since 2006)

Committee member: The International Association of Science and Technology for Development (IASTED), Technical Committee on Biomedical Engineering. Calgary, Alberta, Canada (since 2003)

Member: American Association for Respiratory Care (AARC). Irving, TX, U.S.A. (since 2003)

Member: American Chemical Society (ACS). Washington, DC, U.S.A. (since 2010)

Committee member: Czech Society for Biomedical Engineering and Medical Informatics. Prague, Czech Republic (member since 2000, committee member since 2005)

Member: Czech Medical Association of Jan Evangelista Purkinje. Prague, Czech Republic (since 2000)

### **Teaching experience:**

Czech Technical University in Prague, Faculty of Biomedical Engineering, since 2004 to present. Bachelor's and master' subjects: Equipment for Anesthesiology and Resuscitation, Respiratory Therapy 1–4, Fundamentals of Critical Care Medicine, Techniques in the Prehospital and Hospital Emergency Care, Physical Chemistry, Tomographic Imaging Systems in Biology & Medicine, Medical Devices & Equipment, Conventional Imaging Systems in Biology & Medicine, Magnetic Resonance Imaging and Impedance Tomography, Work with Information Sources and Research Methodology, Devices in Radiology, Biological signals. Doctoral subjects: Unconventional Artificial Lung Ventilation, Methodology of Biomedical Research, Biological Signals.

Charles University in Prague, First Faculty of Medicine, since 1999 to 2010. Subjects: Technical Aspects of Medical Devices 1 and 2, Imaging Systems in Medicine 1 and 2.

Czech Technical University in Prague, Faculty of Electrical Engineering, since 1994 to 2004 many bachelor and master subjects; since 2004 to present. The doctoral subjects only: Biomedical Instrumentation, Genesis and Analysis of Biological Signals.

Institute for Postgraduate Medical Education in Prague, since 1998 to present. Several biomedical subjects during the postgraduate programs: Biomedical Engineer, Biomedical Technician, Clinical Engineer, Clinical Technician.

Single courses: Medical and Engineering Summer School in Dublin, Ireland, 2009 and 2010 (organized by ESEM—European Society for Engineering and Medicine); lecture series at Sligo Institute of Technology, Ireland.

### **Selected invited lectures:**

Roubík K.: High Frequency Ventilation Monitoring—Technical and Clinical Aspects. International Conference on e-Health and Bioengineering EHB 2015, Iasi, Romania, November 19, 2015.

Roubík K.: Mechanical Ventilation. UNAB (Universidad Autónoma de Bucaramanga), Facultad de Ingenierías Físico-Mecánicas, Facultad de Ingeniería de Sistemas y Facultad de Ciencias de la Salud, Bucaramanga, Campus Central de la UNAB, Avenida 42 No. 48–11, edificio D, Columbia, April 30, 2014.

Roubík K.: Electrical Impedance Tomography in optimisation of High Frequency Oscillatory Ventilation. FOSCAL Clinic, Urbanización El Bosque, Autopista a Floridablanca, Bucaramanga, Columbia, April 29, 2014.

Roubik K.: Spontaneous breathing during high-frequency ventilation. University Hospital, RWTH Aachen University, Pauwelsstraße 30, 52074 Aachen, Germany, November 19, 2010.

Roubik K.: Mechanism of gas exchange in high frequency oscillatory ventilation. Louisiana State University, Virginia K. Shehee Biomedical Research Institute, 1501 Kings Highway Suite 5303, Shreveport, LA 71103, USA., December 9, 2009.

Roubik K.: Electrical impedance tomography in optimisation of artificial lung ventilation strategy. 8th Czech-Slovak Conference Trends in Biomedical Engineering, Bratislava, September 16, 2009.

Roubik K.: Artificial Lung Ventilation. JUST—Jordan University of Science and Technology, Faculty of Engineering, Irbid 22110, September 25, 2007.

Roubik K.: How would dinosaurs improve our jerky breathing: A lesson from the physiology of the largest animals ever to walk the earth. 4th YBERC 2010 conference, June 1, 2010. Košice, Slovak Republic.

Roubik K., Pachel J.: Problems of high-frequency ventilation. International Symposium: Acute Lung Injury, Acute Respiratory Distress Syndrome, Pneumonias in Critical States, July 2, 2007, Prague.

### **Other experience:**

Editor-in-chief, The Clinician and Technology Journal (in Czech: Lékař a Technika). The official journal of Czech Society for Biomedical Engineering and Medical Informatics.

Chairman of the State Examination Committee of the Czech Ministry of Health: Recognition of the professional qualifications: Biomedical Engineer, Clinical Engineer, Biomedical Technician and Clinical Technician. Guaranteed by the Institute for Postgraduate Medical Education (IPVZ), Prague.

Chairman, the Academic Senate of the Faculty of Biomedical Engineering, Czech Technical University in Prague (2005 – 2011).

A member of the Scientific Board of the Faculty of Biomedical Engineering, Czech Technical University in Prague.

A member of an expert team for expert analyzes of technical and economical parameters of medical equipment and devices, CTU in Prague, FBMI.

Supervising doctoral students: currently 7 doctoral students and 3 have already completed the PhD studies.

**Selection of the research grants (where I am the recipient and principal investigator):**

Grant Agency of the Czech Ministry of Health (IGA MZ ČR No. NS 10087-4/2008)  
“Introduction of novel method of heliox application in patients with exacerbation of chronic obstructive pulmonary disease” (Zavedení nové metody aplikace helioxu v léčbě akutní exacerbace chronické obstrukční plicní nemoci). Years 2009–2011, responsible for the part solved at CTU FBMI: 1 337 000 Kč (approx. 78 000 USD).

Grant Agency of The Ministry of The Interior of The Czech Republic (VG20102015062)  
“Research in the Fire Rescue Service and other constituents of the Integrated Rescue System of the Czech Republic/Ventilator for artificial lung ventilation of patients in contaminated and decontaminating areas” (Výzkumná podpora HZS ČR a dalších složek IZS ČR/Vývoj ventilátoru pro umělou plicní ventilaci pacientů v kontaminované a dekontaminační zóně). Years 2010–2015, responsible for the part solved at CTU FBMI: 14 894 632 Kč (approx. 875 000 USD).

Grant Agency of The Czech Republic (GAČR GD102/08/H018) “Modeling and simulation of the fields” (Modelování a simulace polí). Years 2008–2011, responsible for the part solved at CTU FBMI: 2 984 000 Kč (approx. 175 000 USD).

Other grants from the Czech Ministry of Education, Youth and Physical Training (various projects mostly aimed at education in the field of medical devices and equipment, biomedical engineering, etc.).

**Patent:**

Patent No. PV302127: Roubík K., Páchl J., Zábrodský V.: A device assuring volume-controlled high frequency ventilation. Industrial Property Office, November 3, 2010.

**Selected Publications:**

Roubík K, Sieger L., Sykora K.: Work of breathing into snow in the presence versus absence of an artificial air pocket affects hypoxia and hypercapnia of a victim covered with avalanche snow: a randomized double blind crossover study. *PLOS ONE* 10(12): e0144332. doi:10.1371/journal.pone.0144332. (IF=3.23)

Jurickova I, Roubík K, Muller M.: Delivery of heliox with a semi-closed circuit during spontaneous breathing: a comparative economic theoretical study. *BMC Pulmonary Medicine* 2015; 15 (65): 1-8. ISSN 1471-2466. DOI 10.1186/s12890-015-0060-9. (IF=2.40)



Roubík K, Zazula R, Strnadová A, Zábrodský V, Spálený A, Müller M, Chlumský J, Tyll T: Spontaneous breathing of heliox using a semi-closed circuit: A bench study. *Int J Artif Organs* 2012; 35 (6): 466-470. ISSN 0391-3988. DOI: 105301/ijao.5000088.

Roubik, K., Rafl, J., van Heerde, M., Markhorst, D.G.: Design and Control of a Demand Flow System Assuring Spontaneous Breathing of a Patient Connected to an HFO Ventilator. *IEEE Transactions on Biomedical Engineering*, 2011, vol. 58, No. 11, pp. 3225-3233. ISSN 0018-9294, DOI: 10.1109/TBME.2011.2165541.

Roubik, K., Pachtl, J., Zabrodsky, V.: Normocapnic High Frequency Oscillatory Hyperventilation Increases Oxygenation in Pigs. *Physiological Research*. 2011, vol. 60, no. 5, pp. 749-755. ISSN 0862-8408.

van Heerde M., Roubík K., Kopelent V., Kneyber M. C. J., Markhorst D. G.: Spontaneous breathing during high-frequency oscillatory ventilation improves regional lung characteristics in experimental lung injury. *Acta Anaesthesiologica Scandinavica*, vol. 54, no. 10, pp. 1248-1256, 2010.

van Heerde M., Roubik K., Kopelent V., Plotz F.B., Markhorst D.G.: Demand flow facilitates spontaneous breathing during high-frequency oscillatory ventilation in a pig model. *Critical Care Medicine*, vol. 37, no. 3, pp. 1068-1073, 2009.

van Heerde M., Roubik K., Kopelent V., Plötz B.F., Markhorst D.G.: Unloading work of breathing during high-frequency oscillatory ventilation: a bench study. *Critical Care*, vol. 10, no. 4, R103, 2006.

van Heerde M., van Genderingen H.R., Leenhoven T., Roubik K., Plotz F.B., Markhorst D.G.: Imposed work of breathing during high-frequency oscillatory ventilation: a bench study. *Critical Care*, vol. 10, no. 1, R23, pp. 23–29, 2006.

Pachtl J., Roubik K., et al: Normocapnic High-Frequency Oscillatory Ventilation Affects Differently Extrapulmonary and Pulmonary Forms of Acute Respiratory Distress Syndrome in Adults. *Physiological Research*, vol. 55, no. 1: 15-24, 2006.

Pachtl J., Brož L., Kripner J., Fric M., Roubík K. et al.: Initial Optimal HFOV Continuous Distension Pressure in Prone in a Paediatric Burn: Case Report. *Burns*, vol. 30, no. 2, pp. 192–196, 2004.

Pachtl J., Roubík K.: Fundamentals of anesthesia and critical care medicine in adults and children [in Czech: Základy anesteziologie a resuscitační péče dospělých i dětí]. Textbook. Reimpression of 1<sup>st</sup> ed. Carolinum, Praha, 2005, 376 pages. ISBN 80-246-0479-5.

Roubík K., Hozman J.: Tomographic Imaging Methods in Medicine – CT (English and Czech versions, in Czech: Tomografické systémy v lékařství – CT). Educational video presentation, CTU, 2003 (Czech) and 2004 (English).

Roubík, K., O'Neill, C., Smith, S.: English for Biomedical Professionals. 1. ed. CTU Publishing House, Praha, 2005. 107 pp. ISBN 80-01-03224-8.

Roubík, K., Motyčková E., Denney P., Poncová E.: English for Biomedical and Electrical Engineering Scientists. 1. ed. CTU Publishing House, Praha, 2009. 214 pp. ISBN 978-80-01-04283-0.

Roubík, K.: Physical Chemistry for Biomedical Engineering – Textbook [in Czech: Fyzikální chemie pro biomedicínské inženýrství]. CTU Publishing House, Praha 2007. 145 pp. ISBN 978-80-01-03788-1.

Roubík, K. Rožánek M., Grunes R.: Equipment and sensors in medicine – Textbook [in Czech: Speciální sensorová a přístrojová technika]. CTU Publishing House, Praha 2008.

**Citations:**

Number of citations in ISI Web of Knowledge:	118
Additional citations in SCOPUS:	28

**h-index according to ISI Web of Knowledge: 7**