

# DEPARTMENT OF ELECTRICAL ENGINEERING AND MECHATRONICS

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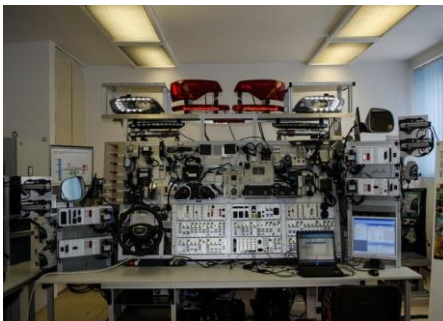
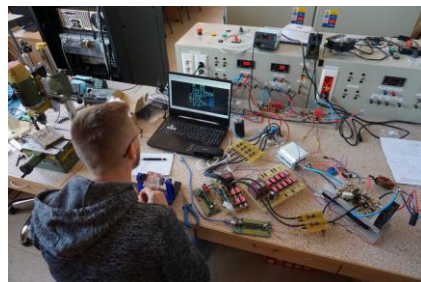


## 1 DEPARTMENT PROFILE

The Department was founded in 1969, coinciding with the establishment of the Faculty of Electrical Engineering. Originally known as the Department of Electrical Drives, it traces its roots back to the Department of Electrical Engineering, which was established in 1953, together with the founding of the Technical University of Košice. Over the years, the department's name has evolved to better reflect its expanding activities and areas of expertise.

The department's faculty members possess extensive experience across diverse domains of electrical engineering, including automotive electrical engineering, mechatronics, and robotics, which they leverage in both teaching and research activities. Currently, the department oversees education and research in various areas of electrical engineering, with specific focus on power and industrial electronics, electrical machines and apparatus, sensors, electromechanical systems, controlled drives, multi-motor drives, control systems, and industrial and automotive mechatronic systems, including robotic drives.

The Department offers a comprehensive range of academic programs, encompassing bachelor's, master's, and PhD programmes.



## 2 STAFF

**Professors:** prof. Ing. Pavol Fedor, PhD.  
prof. Ing. Daniela Perduková, PhD.

**Associate Professors:** doc. Ing. František Ďurovský, PhD.  
doc. Ing. Želmíra Ferková, PhD.  
doc. Ing. Peter Girovský, PhD.  
doc. Ing. Ján Kaňuch, PhD.  
doc. Ing. Karol Kyslan, PhD.  
doc. Ing. Milan Lacko, PhD.  
doc. Ing. Marek Pástor, PhD.  
doc. Ing. Jaroslava Žilková, PhD.

**Assistant Professors:** Ing. Ján Bačík, PhD.  
Ing. Peter Bober, PhD.  
Ing. Viktor Šlapák, PhD.  
Ing. Viktor Petro, PhD.

**Senior Scientists:** Ing. Peter Hajsák  
doc. Ing. Viliam Fedák, PhD.  
doc. Ing. Michal Kostelný, CSc.  
prof. Ing. Pavel Záskalický, PhD.

**Technical Staff:** Zuzana Olexová

**Full time Ph.D. Students:** Ing. Tomáš Basarik  
Ing. Daniel Gordan  
Ing. Ladislav Hric  
Ing. Matej Hric  
Ing. Tadeáš Kmecik  
Ing. Daniel Marcin (till August 2025)  
Ing. Roland Molnár (since September 2025)  
Ing. Lukáš Pancurák (till June 2025)  
Ing. Erik Podracký (since September 2025)  
Ing. Peter Šofranko (since September 2025)

### 3 LABORATORIES

- Power Electronics Laboratory
- Simulation Systems Laboratory (COSMOS, ProEngineer, MATLAB, PSpice, and applied SW, ABBRobotStudio, EPLAN, AVL)
- Laboratory of Industrial Automation
- Laboratory of Electrical Machines and Electrical Drives
- Laboratory of Controlled Electrical Drives
- Automotive Electrical Engineering Laboratory
- Laboratory of Electrical Devices and Applied Electronics
- Laboratory of Electric Drives Applications
- BSH Motor Control Laboratory

### 4 TEACHING

#### 4.1. Undergraduate Study (Bc.)

##### a) Bachelor study programme in Automated Electrical Systems (title: Bc.)

Subject	Semester	Lectures/exercises (hours per week)	Lecturer
Computer Applications	2 <sup>nd</sup>	2/2	Perduková
Electrical Machines Fundamentals	3 <sup>rd</sup>	2/2	Ferková
Automotive Electrical Systems	3 <sup>rd</sup>	2/2	Đurovský
Industrial Electronics	3 <sup>rd</sup>	2/2	Pástor
Sensors and Measurement in Electrical Engineering	3 <sup>rd</sup>	2/2	Girovský
Electrical Drives	4 <sup>th</sup>	2/2	Žilková
Fundamentals of Microcomputer programming	4 <sup>th</sup>	2/2	Lacko
Modelling and Simulation in Electrical Engineering	4 <sup>th</sup>	2/2	Fedor
Power Electronics	4 <sup>th</sup>	3/3	Pástor
Control of Industrial Systems	4 <sup>th</sup>	2/2	Perduková
Pneumatic and Hydraulic Systems	4 <sup>th</sup>	2/2	Bober
Controlled Electric Drives	5 <sup>th</sup>	2/2	Đurovský
Fundamentals of Robotics	5 <sup>th</sup>	2/2	Žilková
Human-Machine Interface Design	5 <sup>th</sup>	2/2	Perduková
Bachelor Project	5 <sup>th</sup>	0/8	Supervisor
Bachelor's Thesis	6 <sup>th</sup>	3/9	Supervisor
Simulation of Production Systems	6 <sup>th</sup>	2/2	Girovský
Electrical Engineering Design and Documentation	6 <sup>th</sup>	2/2	Lacko
Electrical Apparatus	6 <sup>th</sup>	2/2	Ferková

#### 4.2. Graduate Study (Ing.)

##### a) Master study programme in Electrical Systems (title: Ing.)

Subject	Semester	Lectures/exercises (hours per week)	Lecturer
Power Semiconductor Systems	1 <sup>st</sup>	2/2	Pástor
Servo Systems	1 <sup>st</sup>	2/3	Kyslan
Dynamical States of Electric Machines	1 <sup>st</sup>	2/2	Záskalický
Electrical Machines for Automation	1 <sup>st</sup>	2/2	Ferková
Digital Signal Controllers	1 <sup>st</sup>	2/3	Kyslan

Applications of Signal Microcontrollers	2 <sup>nd</sup>	2/3	Šlapák
Vehicle Mechatronics	2 <sup>nd</sup>	2/2	Đurovský
Construction and Design of Converters	2 <sup>nd</sup>	2/2	Pástor
Control of Assembly Lines with Programming Controllers	2 <sup>nd</sup>	2/2	Fedor
Master Project 1	2 <sup>nd</sup>	0/4	Supervisor
Master Project 2	3 <sup>rd</sup>	2/6	Supervisor
Electromechanical Production Systems	3 <sup>rd</sup>	2/2	Đurovský
Intelligent Control of Electrical Systems	3 <sup>rd</sup>	2/2	Žilková
3D Modelling and Simulation	3 <sup>rd</sup>	2/2	Ferková
Design of Documentation in Electrical Engineering	3 <sup>rd</sup>	1/3	Lacko
Master's Thesis	4 <sup>th</sup>	9/9	Supervisor

### 4.3. Undergraduate and Graduate Study for Foreign Students (in English)

All subjects listed above are offered in English language for foreign students.

### 4.4. Ph. D Postgraduate Course on Electrical Systems

Subject	Semester	Lectures/exercises (hours per week)	Lecturer
Power Electronics	1 <sup>st</sup>	2/0	Pástor
Ph.D. Project I	1 <sup>st</sup>	0/2	Supervisor
Foreign Language I	1 <sup>st</sup>	2/0	Dept. of Foreign Languages
Servosystems	2 <sup>nd</sup>	2/0	Fedor
Ph.D. Project II	2 <sup>nd</sup>	0/2	Supervisor
Foreign Language II	2 <sup>nd</sup>	2/0	Dept. of Foreign Languages
Ph.D. Project III	3 <sup>rd</sup>	0/4	Supervisor
Subject of Specialization	3 <sup>rd</sup>	2/0	According to the subject
Scientific Activity	3 <sup>rd</sup>	0/8	Supervisor
Ph.D. Project IV	4 <sup>th</sup>	0/2	Supervisor
Scientific Activity	4 <sup>th</sup>	0/8	Supervisor
Ph.D. Project IV	5 <sup>th</sup>	0/2	Supervisor
Scientific Activity	5 <sup>th</sup>	0/8	Supervisor
Ph.D. Thesis	5 <sup>th</sup>	0/9	Supervisor

## 5 RESEARCH PROJECTS

- *Research on High-efficiency Electromechanical Systems with Applications for Electromobility*, Project VEGA 1/0363/23, Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences, Principal investigator: KYSLAN, K. (2023-2025).
- *PAEPEDE: Pathways to Excellence in Power Electronics and Electrical Drives Education*, Project ID 22420041, International Visegrad Fund, Principal investigator: KYSLAN, K.
- *Digital twins of industrial systems driven by electric drives with the use of dynamic load emulation*, Project 09I05-03-V02-00018 Call to support research projects focused on digitalization of the economy in TRL levels 1-3, Principal investigator: PERDUKOVÁ, D. (2025-2026).
- *Support for the development of practical skills in the field of measurement and processing of quantities for autonomous systems*. KEGA 032TUKE-4/2024 Project Cultural and Educational Grant Agency Ministry of Education,

Research, Development and Youth of the Slovak Republic. Principal investigator: GIROVSKÝ, P. (2024-2025).

- *The Improvement of Students' Professional and Team Skills in the Study Program Industrial Electrotechnics*, Project KEGA 059TUKE-4/2024, Cultural and Education Grant Agency of the Ministry of Education, Research, Development and Youth of the Slovak Republic, Principal investigator: ŠLAPÁK, V. (2024-2026)
- *Isolated DC/DC Converters with Unidirectional and Bidirectional Power Flow*, Project supported by the Slovak Research and Development Agency under contract No. APVV-23-0521. Principal investigator: PÁSTOR, M. (2024-2027).
- *Isolated DC/DC Converters with High efficiency of Electrical Energy Conversion*, Project VEGA 1/0584/24, Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences, Principal investigator: PÁSTOR, M. (2024-2026).
- *Software AI modules for multipurpose use within UAS systems*, Project SEMOD-EL76/93-11/2025, Principal investigator: BAČÍK, J. (2025-2027).

## **6 CO-OPERATION**

### **6.1. Co-operation in Slovakia**

The Department co-operates with many industrial enterprises in Slovakia having joint projects at modernising of the electrical drive systems, control and mechatronic applications: U.S.STEEL Košice, SIEMENS, ABB, B&R Automation – A member of the ABB Group, BSH Drives and Pumps Michalovce, Redox Prešov, Křížík Prešov, Schneider Electric Slovakia, Spell Procont Prešov, Spinea Prešov, Vonsch Brezno, TEKO Košice, ENERGO CONTROL Košice, ŽP Podbrezová, Bukóza Hencovce, Embraco Slovakia Spišská Nová Ves, Slovak Union for Quality, Innovation and Design Q-IMPULZ, Košice, SEZ Krompachy, DATAKON Košice, STATON Turany, ROŠERO-P, Spišská Nová Ves, ComAp, s.r.o. Košice, Siemens Healthcare Košice, Mitsubishi Electric, s.r.o. Košice, SOLUTIONS JMD s.r.o., Košice.

### **6.2. International Co-operation**

- University of Zagreb, Croatia
- Brno University of Technology, Czech Republic
- Technical University of Liberec, Czech Republic
- VŠB -Technical University of Ostrava, Czech Republic
- West Bohemian University, Pilsen, Czech Republic
- University of Technology and Economy, Budapest, Hungary
- University of Miskolc, Hungary
- Silesian University of Technology, Gliwice, Poland
- Széchenyi István University, Győr, Hungary
- Delft University of Technology, The Netherlands
- Czech Academy of Science, Prague, Czech Republic.
- University of Oradea, Romania
- University of Maribor, Slovenia
- University of Zagreb, Croatia

- University of Novi Sad, Serbia
- CAG Electric Machinery, Český Brod, Czech Republic
- Wrocław University of Technology, Wrocław, Poland

### **6.2.1. Visits of Staff Members to Foreign Institutions**

- FERKOVÁ, Ž.: KOPES Žilina, University of Žilina, 21 – 23 January 2025
- BASARIK, T.: Technical University of Brno (CZ), March 2025.
- GORDAN, D., KMECÍK, T.: West Bohemian University of Pilsen (CZ), March 2025
- KYSLAN, K., PÁSTOR, M., BASARIK, T., GORDAN, D., HRIC, M., KMECÍK, T., MOLNÁR, R., PODRACKÝ, E.: EDPE 2025, International Conference on Electrical Drives and Power Electronics. September 24-26, 2025, Dubrovnik (Croatia).
- MOLNÁR, R.: Intership in Lab of High Voltage and Electromagnetic compatibility, Bern University of Applied Sciences (CH), September 2025
- PÁSTOR, M.; KYSLAN, K., PODRACKÝ, E.; HRIC, M.: Széchenyi István University, Győr, Hungary, PAEPEDE project activities, September 8-11, 2025.
- PÁSTOR, M.; KYSLAN, K., PANCURÁK, L.; GORDAN, D.: Wrocław University of Science and Technology, Wrocław, Poland, PAEPEDE project activities, January 20-23, 2025.

### **6.3. Membership in International Organizations, Societies and Committees**

- FERKOVÁ, Ž, KYSLAN, K., PÁSTOR, M.: IEEE members.
- PÁSTOR, M.: Power Electronics and Motion Control Council (PEMC), member.
- PERDUKOVÁ, D.: Member of Programme Committee: 20<sup>th</sup> International Conference on Soft Computing Models in Industrial and Environmental Applications – SOCO 2025, Salamanca, Spain, 16. -17. October 2025.
- KYSLAN, K.: Member of the KEGA committee for integration and diversification of higher education.

### **6.4. Membership in Slovak Professional Bodies**

- FEDÁK, V.; KAŇUCH, J.; ZÁSKALICKÝ, P.; FEDOR, P.; FERKOVÁ, Ž.; GIROVSKÝ, P.; HAJŠÁK, P.; LACKO, M.; PERDUKOVÁ, D.: members of The SES (Slovak Electrotechnical Society), Branch at FEI TU Košice.
- FERKOVÁ, Ž.: Member of Technical Standards Commission on Electrical Machines in Slovak Republic.
- PERDUKOVÁ, D.: Council of the Secondary Technical School for EE, Košice (delegate of the FEI TU Košice) (till May 2025)
- Lacko, M.: Council of the Secondary Technical School for EE, Košice (delegate of the FEI TU Košice). (since May 2025)

### **6.5. National Educational Projects**

### **6.6. Editorial Boards**

- BOBER, P.: Editorial board of journal “Quality Innovation Prosperity”, ISSN 1335-1745 (print), ISSN 1338-984X (online).
- FEDOR, P: Editorial board of Acta Electrotechnica et Informatica – AEI.

Journal of the Faculty of Electrical Engineering and Informatics. ISSN 1335-8243.

- KYSLAN, K.: Associate Editor of journal „Power Electronics and Drives“, Wrocław, Poland, ISSN 2543-4292.
- PÁSTOR, M.: Associate Editor of journal „Power Electronics and Drives“, Wrocław, Poland, ISSN 2543-4292.
- PERDUKOVÁ, D.: Editorial board of Elektroenergetika journal, ISSN 1337-6756.
- ZÁSKALICKÝ, P.: Editorial board of Acta Technica CSAV. Journal of Czech Academy of Science, Prague. Czech Republic. ISSN 0001-7043.
- ZÁSKALICKÝ, P.: Editorial board of KOMEL, Branzowy osrodek badawczo-rozwojowy Maszyn elektrycznych, Katowice, Poland. ISSN 0239-3646.
- KAŃUCH, J.: Editorial board of journal „Maszyny elektryczne, Zeszyty Problemowe“, Sieć Badawcza Łukasiewicz – Górnośląski Instytut Technologiczny, Gliwice, Poland. ISSN 0239-3646

## 7. THESES Defended Theses in 2024

- FEDOR, M.: *Selected modern methods of modelling and control of nonlinear systems*. Supervisor: Perduková, D.

Thesis type	Bachelor	Master	Doctoral
Number	19	17	1

## 8 OTHER ACTIVITIES

### 8.1. Symposia, Workshops, Conferences

*2025 International Conference on Electrical Drives and Power Electronics (EDPE 2025). 12<sup>th</sup> Joint Croatia-Slovakia Conference, September 24-26, 2025, Dubrovnik (Croatia). Co-organized by the department.*

### 8.2. Projects for Industry

- *Training in Siemens power converters*. For Innomatics s.r.o., Košice. Co-ordinator: Ďurovský, F., 2025.
- *Analysis of PCU and its firmware*. Glunz & Jensen, s.r.o. Prešov. Co-ordinator: Šlapák, V., 2025
- *Closed conveyor system - Training line for Volvo Cars Slovakia*. For PAIC Sjf TU Košice. Final customer: Volvo Cars Slovakia., Co-ordinator: Girovský, P., 2025.
- *Nut milling device*. For PAIC Sjf TU Košice. Final customer: JAVYS a.s. Jaslovské Bohunice., Co-ordinator: Girovský, P., 2025/2026.
- *Design and implementation of project documentation and construction of the switchgear cabinet and complete electrical wiring for a training line for Volvo Slovakia, 4/2025 – 8/2025*, Co-ordinator: Lacko, M.
- *Charging robot – preparation of project documentation for the electrical system and design and implementation of a control panel for the Nuclear Power Research Institute, Inc., Trnava, 6/2025 – 11/2025 (for PaIC Sjf)*. Co-ordinator: Lacko, M.
- *Cleaning robot – preparation of project documentation for the electrical*

*system and design and implementation of a control panel for the Nuclear Power Research Institute, Inc., Trnava, 6/2025 – 11/2025 (for PaIC SJF). Co-ordinator: Lacko, M.*

- *Design and implementation of switchgear cabinet project documentation for a dual flotation cell. For the Institute of Earth Resources, FBERG, Technical University of Košice, 6/2025 – 9/2025. Co-ordinator: Lacko, M.*
- *Development of a System to Support the Treatment of Alzheimer's and Parkinson's Diseases and to Enhance Athletes' Motor Skills and Abilities – Hardware Development. Implemented within the EDIH Cassovium Project, 2025. Co-ordinator: Lacko, M.*
- *Analysis of the control system of the Eisspeicher latent heat storage and design of charging and discharging control of the storage tank using a solar absorber and a heat pump. For Banik a syn s.r.o., Vranov n/Topľou. Co-ordinator: Perduková, D., 2025*

### 8.3. Student Competitions and Rewards

- GORDAN, D.: Award in Competition for the best doctoral thesis from scientific point of view at the Technical University of Košice. The part of the Week of Science and Technology in Slovakia 2025.

### 8.4. Compositions for Dissertation Examinations

- BASARIK, T.: *Research of the control of MAB converters.* Supervisor: Lacko, M.
- GORDAN, D.: *Isolated DC/DC converters with high efficiency.* Supervisor: Pástor, M.
- KMECÍK, T.: *Artificial intelligence in the control of electromechanical systems.* Supervisor: Girovský, P.

## 9 PUBLICATIONS

### 9.1. Books and book chapters

### 9.2. Textbooks

### 9.3. Scientific Journals

#### Journals indexed in Thomson Reuters “Current Contents” database

- [1] BODNÁR, Dávid - RAM CHANDRA MOULI, Gautham - ĎUROVSKÝ, František - BAUER, Pavol - QIN, Zian: **Semi-Empirical Model of Nickel Manganese Cobalt (NMC) Lithium-Ion Batteries Including Capacity Regeneration Phenomenon.** 2025. In: IEEE Transactions on Transportation Electrification. - Piscaway (USA): Institute of Electrical and Electronics Engineers, 2015 Roč. 11, No.1 (2025), pp. 797-813 [online]. ISSN 2332-7782 (online). Access: <https://doi.org/10.1109/tte.2024.3396277>.
- [2] LIANG, Yawen - BODNÁR, Dávid - RAM CHANDRA MOULI, Gautham - RAGNI, Daniele - BAUER, Pavol: **Charging Demand Prediction: Small All-Electric Aircraft and Electric Vertical Takeoff and Landing Aircraft.** 2025. In: IEEE Transactions on Transportation Electrification. - Piscaway (USA): Institute of Electrical and Electronics Engineers, 2015 Roč. 11, No.1 (2025), pp. 2732-2747 [online]. ISSN 2332-7782 (online). Access:

<https://doi.org/10.1109/tte.2024.3427841>.

- [3] GUTTEN, Miroslav - KORENČIAK, Daniel - KOŇARIK, Roman - KAŇUCH, Ján: **Comparative Analysis of Distribution Transformers with Varying Ratings and Insulation States via Frequency Domain Spectroscopy and Capacitance Ratio**. 2025. In: Applied sciences. Bazilej (CH): Multidisciplinary Digital Publishing Institute, 2011 Roč. 15, No.9 (2025), pp. [1-16] [online]. ISSN 2076-3417 (online). Access: <https://www.mdpi.com/2076-3417/15/9/4715>.

### Foreign Journals

- [1] PÁSTOR, Marek - GORDAN, Daniel - MAXWELL, Chiemeka L.: **From IGBT to GaN implementation in phase-shifted full-bridge converter**. 2025. In: Electrical Engineering: Archiv für Elektrotechnik. Berlin (D): Springer Science+Business Media Roč. 107, No. 9 (2025), pp. 11831-11845 [print, online]. ISSN 0948-7921. Access: <https://doi.org/10.1007/s00202-025-03125-4>.

### Journals indexed in Web of Science or Scopus databases

- [1] HRIC, Ladislav - BAČÍK, Ján ml. - PERDUKOVÁ, Daniela: **Real-time object detection of simple drawings using YOLO11 on constrained datasets**. 2025. In: MM Science Journal. Praha (CZ): MM Publishing. 2025 (2025), pp. 8108-8112 [print, online]. ISSN 1803-1269. Access: <https://www.mmscience.eu/journal/issues/march-2025/articles/real-time-object-detection-of-simple-drawings-using-yolo11-on-constrained-datasets>
- [2] BAČÍK, Ján ml. - HRIC, Ladislav - PERDUKOVÁ, Daniela: **Design of a security concept utilizing BVLOS flights and yolo-based object detection**. 2025. In: MM Science Journal. - Praha (CZ): MM Publishing, June (2025), pp. 8282-8286 [print, online]. ISSN 1803-1269. Access: [https://doi.org/10.17973/mmsj.2025\\_06\\_2025022](https://doi.org/10.17973/mmsj.2025_06_2025022)
- [3] ZÁSKALICKÝ, Pavel - PERDUKOVÁ, Daniela - KAŇUCH, Ján: **Modelling of dynamic states of five-phase induction motor**. 2025. In: Communications (Komunikácie): Scientific letters of University of Žilina. Žilina (SK): EDIS. Roč. 27, No. 4 (2025), pp. 70-77 [print, online]. ISSN 1335-4205.
- [4] FEDOR, Pavol – PERDUKOVÁ, Daniela, **Modeling of Dynamic Phenomena in Small Hydropower Plant: Case Dobšina III-Slovakia**. *Acta Polytechnica Hungarica*, 22(11), pp.203-222. DOI: 10.12700/APH.22.11.2025.11.12

### National Journals

- [1] PERDUKOVÁ, Daniela - FEDOR, Pavol: **Development of the complete model of the SHP with an asynchronous generator**. 2025. In: Elektroenergetika: International Scientific and Professional Journal on Electrical Engineering: Medzinárodný vedecký a odborný časopis pre elektroenergetiku. Košice: Fakulta elektrotechniky a informatiky. Roč. 18, č. 1 (2025), pp.14-19 [print]. ISSN 1337-6756. Access: <https://jeen.fei.tuke.sk/index.php/jeen/article/view/567>.

### Patents and Utility Models

- [1] FERKOVÁ, Želmíra – BOBER, Peter: **Rotor synchronónneho reluktančného motora s vložkami z orientovaných elektrotechnických plechov** [Rotor of a synchronous reluctance motor with inserts made of oriented electrical steel sheets]. Utility Model No. 10392. Banská Bystrica: Industrial Property Office of the Slovak Republic (ÚPV SR), 2025. 6 p. Available at: <https://wbr.indprop.gov.sk/WebRegistre/UzitkovyVzor/Detail/50122-2024?csrf=17031625430165731332>

**9.4. Other publications** (papers in conference proceedings, etc.)

Publication Type	Conferences		Other
	Foreign	Home	
Number	4	9	18