prof. dr hab. inż. Marcin Witczak

Stanowisko:	prof. zwyczajny
Jednostka organizacyjna:	- Zakład Systemów Informatycznyh i Obliczeń Inteligentnych - Instytut Sterowania i Systemów Informatycznych - Wydział Informatyki, Elektrotechniki i Automatyki - Uniwersytet Zielonogórski
Kampus:	A
Adres:	ul. prof. Z. Szafrana 2, 65-516 Zielona Góra
Budynek / Symbol:	Budynek Dydaktyczny / A-2 (Kampus: A)
Pokój:	420
Telefon(y):	683282387
Fax(y):	683284751
E-mail(e):	M.Witczak@issi.uz.zgora.pl
WWW:	www.issi.uz.zgora.pl
Lista publikacji:	Dane z systemu SKEP
Członek Senatu:	Nie
Członek Rady Wydziału:	Tak
Członek Rady Instytutu:	Tak
Status zatrudnienia:	I etat
Uwagi:	

Pełnione funkcje:

Jednostka:	Zakład Systemów Informatycznych i Obliczeń Inteligentnych
Funkcja:	Kierownik Zakładu

Pracownicy:

Stopień / Tytuł	Nazwisko Imię	Stanowisko	Status zatr.
dr inż.	Czajkowski_Andrzej	asystent	I etat
prof. dr hab. inż.	Korbicz_Józef	prof. zwyczajny	I etat
dr inż.	Kowal_Marek	adiunkt	I etat
dr inż.	Luzar_Marcel	asystent	I etat
dr inż.	Majdzik_Paweł	st. wykładowca	I etat
dr hab. inż.	Mrugalski_Marcin	profesor UZ	I etat
prof. dr hab. inż.	Obuchowicz_Andrzej	prof. zwyczajny	I etat
dr hab. inż.	Patan_Krzysztof	prof. nadzwyczajny	I etat
dr inż.	Pławiak-Mowna_Anna	adiunkt	I etat
prof. dr hab. inż.	Witczak_Marcin	prof. zwyczajny	I etat

CV of Prof. Marcin Witczak

0 Essential facts

- **Date of birth:** 19.12.1973
- **Place of birth:** Zielona Góra
- **Marital status:** married

1 Education

- **Full professor of technical sciences title**: Awarded by the President of Poland on 21.07.2015.
  Thesis title: Fault diagnosis and fault-tolerant control strategies for nonlinear systems.
- **D.Sc. (habilitation) in Electrical Engineering**: Awarded by the Faculty of Electrical Engineering, Computer Science and Telecommunications (University of Zielona Góra (UZ), Poland) on 06.12.2007.
  Thesis title: Modelling and estimation strategies for fault diagnosis of nonlinear systems.
- **Ph.D. in Control Engineering and Robotics** (with distinction): Awarded by the Institute of Engineering Cybernetics (Faculty of Electronics, Wrocław University of Technology, Poland) on 15.05.2002.
  Thesis title: Identification and fault detection of nonlinear dynamic systems. *Supervisor:* Prof. Józef Korbicz (University of Zielona Góra).
- **M.Sc. in Electrical Engineering**: Awarded by the Faulty of Electrical Engineering (Technical University of Zielona Góra, Poland) on 08.06.1998.
  Thesis title: Implementation of selected parameter identification and experimental design algorithms with Maple V. *Supervisor:* Prof. Dariusz Uciński (Technical University of Zielona Góra).

2 Professional experience

- **Full professor (2016-)**: Institute of Control and Computation Engineering (ISSI), UZ.
- **Visiting professor (31.08.2013-01.09.2013)**: Universite de Lorraine, Nancy, France.
- **Associated professor (2008-2016)**: ISSI, UZ.
- **Assistant professor (2002-2008)**: ISSI, UZ.
- **Research fellow (01.06.2002-01.09.2002):** Department of Engineering, University of Hull, Hull, United Kingdom (EC DAMADICS project).
- **Research assistant (1998-2002)**: ISSI, UZ.

3 Responsibilities

- Secretary of the Control Engineering and Robotics Committee of the Polish Academy of Sciences (2015-)
- Coordinator of the Technical and Medical Diagnostics Centre of the **Institute of Highway Technology and Innovation (**http://iati.pl/en/**) (2015-)**
- Head of the Information Technology Systems and Intellig. Computations, ISSI, UZ (2008-2016).
- Head of the doctoral studies, Faculty of Computer, Electrical and Control Eng., UZ (2012-).
- Expert of the National Science Centre in Poland (2014-)
- Expert of the National Centre of Research and Development in Poland (2015-)

4 Awards and scholarships

Awards:

- Prime Minister of Poland Award, 2009 (for the D.Sc. monograph: *Modelling and Estimation Strategies for Fault Diagnosis of Non-linear Systems* – Berlin: Springer).
- Minister of National Education in Poland award, 2002 (for a co-authorship of the book: *Diagnostyka Procesów. Modele, Metody Sztucznej Inteligencji, Zastosowania.* – Warszawa: WNT).
- President of Zielona Góra Award, 2015 (for the professorial title of technical sciences).

- President of Zielona Góra Award, 2015 (for the professorial monograph: Fault Diagnosis and Fault-tolerant Control Strategies for Nonlinear Systems – Berlin: Springer).
- President of UZ First Class Award, 2015 (for the professorial title of technical sciences).
- President of UZ First Class Awards, 2008, 2002 (for the D.Sc. and Ph.D. degree, respectively).
- President of UZ First Class Group Awards, 2016, 2015, 2011, 2010, 2007, 2006, 2005, 2000 (for outstanding scientific achievements).

Scholarships:

- Research fellowship, University of Hull, Hull, United Kingdom (three months, 2002), financed within the EC Research Training Network DAMADICS, 2000-2004, supervisor: Prof. Ron J. Patton
- University of Zielona Góra Ph.D. Scholarship, 2 years, 2000-2002
- University of Zielona Góra D.Sc. Scholarship, 1 year, 2006-2007

5 Publications in JCR journals

1. *A bounded-error approach to simultaneous state and actuator fault estimation for a class of nonlinear systems.* M. Buciakowski, M. Witczak, V. Puig, D. Rotondo, F. Nejjari, J. Korbicz, Journal of Process Control -2017.
2. *An LMI approach to robust fault estimation for a class of nonlinear systems.* M.Witczak, M. Buciakowski, V. Puig, D. Rotondo, F. Nejjari. Int. J. Robust and Nonlin. Control - 2016, (26)7, 530-1548
3. *Neural network-based robust actuator fault diagnosis for a non-linear multi-tank system.* M. Mrugalski, M. Luzar, M. Pazera, M. Witczak, Ch. Aubrun. ISA Transactions .- 2016, 61, 318-328
4. *Predictive actuator fault-tolerant control under ellipsoidal bounding.* M. Witczak, M. Buciakowski, Ch. Aubrun. Int. J. of Adaptive Control and Signal Processing - 2016, 30(2), 375-392
5. Robust unknown input observer for state and fault estimation in discrete-time Takagi-Sugeno systems. D. Rotondo, M. Witczak, V. Puig, F. Nejjari, M. Pazera. Int. J. Sys. Sci. .- 2016, 47(14), 1-16
6. *A practical test for assessing the reachability of discrete-time Takagi-Sugeno fuzzy systems.* M.Witczak, D. Rotondo, V. Puig, P. Witczak. Journal of the Franklin Institute - 2015, 352(12), 5936-5951
7. *A robust predictive actuator fault-tolerant control scheme for Takagi-Sugeno fuzzy systems.* P. Witczak, M. Witczak, J. Korbicz, Ch. Aubrun. Bull. Polish Academy of Sciences - 2015, 63(4), 977-987
8. *Automated generation and comparison of Takagi-Sugeno and polytopic quasi-LPV models.* D. Rotondo, V. Puig, F. Nejjari, M. Witczak. Fuzzy Sets and Systems - 2015,277, 44-64
9. *Towards Robust Neural-Network-Based Sensor and Actuator Fault Diagnosis: Application to a Tunnel Furnace.* M. Witczak, M. Mrugalski, J. Korbicz. Neural Proces. Lett. - 2015, 42(1), 71-87
10. *Towards robust predictive fault-tolerant control for a battery assembly system.* L. Seybold, M. Witczak, P. Majdzik, R. Stetter. Int. J. Appl. Mathematics and Computer Science - 2015, 25(4), 849-862
11. *A fault-tolerant control strategy for non-linear discrete-time systems: application to the twin-rotor system.* M. Witczak, V. Puig, S.M. De Oca. Int. J. Control - 2013, 86(10), 1788-1799
12. *Design of unknown input observers for nonlinear stochastic systems and their application to robust fault diagnosis.* M. Witczak, J. Korbicz, R. Józefowicz. Control and Cyber. - 2013, 42(1), 227-256
13. *Fault-tolerant control strategy for actuator faults using LPV techniques: application to a two degree of freedom helicopter.* S.M. De Oca, V. Puig, M. Witczak, Ł. Dziekan. Int. J. App. Math. and Comput. Science - 2012, 22(1), 161-171
14. *State-space GMDH neural networks for actuator robust fault diagnosis.* M. Mrugalski, M. Witczak. Advances in Electrical and Computer Engineering - 2012, 12(3), 65-72
15. *Active fault-tolerant control design for Takagi-Sugeno fuzzy systems.* Ł. Dziekan, M. Witczak, J. Korbicz. Bulletin of the Polish Academy of Sciences - 2011, 59(1), 93-102

16. *Impedance measurement with the D-optimum experimental conditions*. M. Witczak, R.Rybski, J. Kaczmarek. IEEE Transactions on Instrumentation and Measurement - 2009, 58(8), 2535-2543 102

17. *Confidence estimation of the multi-layer perceptron and its application in fault detection systems*. M. Mrugalski, M. Witczak, J. Korbicz. Eng. App. Artificial Intelligence - 2008, 21(8), 895-906

18. *Towards robustness in neural network based fault diagnosis*. K. Patan, M. Witczak, J. Korbicz . International Journal of Applied Mathematics and Computer Science - 2008, 18(4), 443-454

19. *A GMDH neural network-based approach to passive robust fault detection using a constraint satisfaction backward test*. V. Puig, M. Witczak, F. Nejjari, J. Quevedo, J. Korbicz. Engineering Applications of Artificial Intelligence - 2007, 20(7), 886-897

20. *Design of an extended unknown input observer with stochastic robustness techniques and evolutionary algorithms*. M. Witczak, P. Prętki. International Journal of Control - 2007, 80(5), 749-762

21. *LMI-based strategies for designing observers and unknown input observers for non-linear discrete-time systems*. J. Korbicz, M. Witczak, V. Puig. Bull Polish Academy of Sci. - 2007, 55(1), 31-42

22. *A GMDH neural network-based approach to robust fault diagnosis: application to the DAMADICS benchmark problem*. M. Witczak, J. Korbicz, M. Mrugalski, R.J. Patton. Control Engineering Practice - 2006, 14(6), 671-683

23. *A neuro-fuzzy multiple-model observer approach to robust fault diagnosis based on the DAMADICS benchmark problem*. F.J. Uppal, R.J. Patton, M. Witczak. Contr. Eng. Practice - 2006, 14(6), 699-717

24. *Advances in model-based fault diagnosis with evolutionary algorithms and neural networks*. M. Witczak, International Journal of Applied Mathematics and Computer Science - 2006, 16(1), 85-99

25. *Toward the training of feed-forward neural networks with the D-optimum input sequence*. M. Witczak. IEEE Transactions on Neural Networks - 2006, 17(2), 357-373

26. *A novel genetic programming approach to nonlinear system modelling : application to the DAMADICS benchmark problem*. M.F. Metenidis, M. Witczak, J. Korbicz. Engineering Applications of Artificial Intelligence - 2004, 17,363-370

27. *Genetic programming based approaches to identification and fault diagnosis of non-linear dynamic systems*. M. Witczak, A. Obuchowicz, J. Korbicz. Int. J. Control - 2002, 75(13), 1012-1031

6 Monographs - 4 monographs including 2 in Springer

1. *Fault diagnosis and fault-tolerant control for non-linear systems.* Marcin Witczak – Berlin: Springer, 2014.

2. *Modelling and estimation strategies for fault diagnosis of non-linear systems.* Marcin Witczak – Berlin: Springer, 2007.

7 Book chapters (15 book chapters)

2016*, 3 chapters in:* Advanced and Intelligent Comput. in Diagnosis and Control, Springer, Berlin.

2014*, 3 chapters in:* Aktualne problemy automatyki i robotyki, EXIT, Warsaw.

2010*, 3 chapters in:* Modeling, diagnostics and process control, Springer, Berlin.

2008*, 1 chapter in:* Sterowanie i automatyzacja: aktualne problemy i ich rozwiązania, EXIT, Warsaw.

2007*,2 chapters in:* Fault diagnosis and fault tolerant control, EXIT, Warsaw.

2005*, 1 chapter in:* Int. Control Sys. using Computational Intelligence Techniques, IEE Press, London.

2004*, 1 chapter in:* Fault diagnosis: models, artificial intelligence, applications, Springer, Berlin.

2002*,1 chapter in:* Artificial neural nets and genetic algorithms, Springer Berlin.

8 Peer-reviewed papers in conference proceedings

Note: The total number of peer-reviewed papers in conference proceedings is more than **120**:

- IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes - SAFEPROCESS (Budapest 2000; Washington DC 2003; Beijing 2006; Barcelona 2009, Mexico City 2012; Paris 2015);
- IFAC World Congress, Milano, Italy (Barcelona 2002; Pargue 2005; Seul 2008; Milano 2011,Cape Town 2014);
- IEEE Conf. Methods and Models in Automation and Robotics - MMAR (Międzyzdroje ,Poland: 2000, 2001, 2002, 2003,2004, 2007,2009,2010, 2011,2012,2013,2014,2015, 2016);
- International Work-Conference on Artificial Neural Networks - IWANN (Tenerife 2013; Palma de Mallorca 2015)
- IEEE Mediterranean Conference on Control and Automation - MED (Kusadasi 2004; Ajaccio 2008; 2010 Marrakech; Corfu 2011,Barcelona 2012; Torremolinos 2015; 2016 Athens)
- IFAC Symposium on Nonlinear Control Systems - Nolcos (Pretoria 2007)
- IFAC Symposium on System Identification SYSID (Newcastle, Australia, 2006)
- International Conference on Intelligent Computation in Manufacturing Engineering - CIRP (Capri 2015);
- IFAC European Workshop on Advanced Control and Diagnosis - ACD (Karlsruhe 2004; Nancy 2006; Grenoble 2007; Coventry 2008; Zielona Góra 2009; Ferrara 2010; Budapest 2011; Copenhagen 2012; Berlin 2014,Pilzen 2015).
- European Control Conference - ECC (Porto 2001; Zurich 2013; Strasbourg2014)
- IEEE Multiconference on Systems and Control - MSC (Antibes, 2014);
- Int. Conf. Artificial Intelligence and Soft Computing - ICAISC (Zakopane 2014);
- Int. Conf. Control and Fault-Tolerant Systems - SysTol (Nice 2010; Nice 2013; Barcelona 2016);
- Int. Conf. Development and Application Systems - DAS (Suceava 2012)
- Int. Conf. Diagnostics of Processes and Systems - DPS (Kazimierz 1999; Łagów 2001; Gdańsk 2003; Zamość 2011,Łagów 2013; Ustka 2015).
- Polish Control Conference (Zielona Góra 2002; Warsaw 2005; Wrocław 2014)

9 Invited plenary lectures

1. Int. Conf. Automation-Innovations and future perspectives, AUTOMATION 2016, Warsaw, Poland, 2016
2. Polish Control Conference, KKA 2014, Wrocław, Poland, 2014
3. 5th International Summer School on Fault Diagnosis of Complex Systems, Madrit, Spain, 2013
4. Conf. European Society for Fuzzy Logic and Technology Conference, EUSFLAT, Barcelona, Spain, 2005

10 Organization of conferences (11 conferences)

1. IFAC Symp. Fault Detection, Supervision and Safety of Technical Processes, SAFEPROCESS 2018, Warsaw, Poland, vice-chair of the organizing committee.
2. IEEE Int. Conf. on Control and Fault-Tolerant Systems, SysTol, Barcelona, 2016, invited sessions chair.
3. IEEE Int. Conf. Int. Sys. and Control, ISCO, Coimbatore, India, 2015, member of advisory committee.
4. European Workshop on Control Eng. for Industry, CEIND, Głogów, Poland, 2012, 2015, program chair.
5. IEEE Multi-Conf. Syst. and Control, MSC, Nice/Antibes, France, 2014, tutorial/workshop chair.
6. Int. Conf. Diagn. Processes and Syst., DPS, Łagów, Poland, 2013, member of the organizing committee.
7. European Workshop on Advanced Control and Diagnosis, ACD, Zielona Góra, Poland, 2009, chairman of the organizing committee.

8. Int. Conf. Diagnostics of Processes and Systems, DPS, Słubice, Poland, <u>vice-chair of the organizing committee.</u>
9. IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes, SAFEPROCESS 2006, Beijng, China, <u>member of the organizing committee.</u>
10. Conference on Automatic Control, KKA 2002, Zielona Góra, 2002, <u>member of the organizing committee.</u>

11 Membership in IPC of international conferences

- IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes, SAFEPROCESS 2018, Warsaw, Poland, 2018
- 3rd IEEE International Conference on Control and Fault-Tolerant Systems, SysTol 2016, Barcelona, Spain, 2018
- The 2014 International Conference on Intelligent Unmanned Systems, ICIUS, Montreal 2014, Quebec, Canada
- IEEE Multi-Conference on Systems and Control , MSC 2014, Antibes Congress Center, Nice/Antibes 2014, France
- IEEE Conf. Control and Fault-Tolerant Systems, SysTol, Nice 2010, 2013, France, Barcelona 2016, Spain
- IEEE Med. Conf. Control and Automation, MED 2012, Barcelona 2012, Spain, Torremolinos 2015, Spain
- Int. Conf. Diagnostics of Processes and Systems, DPS, Słubice, 2007, Gdańsk 2009, Zamość 2011, Łagów Lubuski 2013, Ustka 2015, Poland
- IFAC European Workshop on Advanced Control and Diagnosis, ACD: Zielona Góra 2009, Poland, Ferrara 2010, Italy, Budapest 2011, Hungary, Copenhagen 2012, Denmark, Budapest 2013, Hungary, Berlin 2014, Germany, Plzen 2015, Czech Republic, Lille 2016, France
- European Workshop on Control Engineering for Industry, CEIND: Głogów 2012, Poland, Nancy 2013, France, Weingarten 2014, Germany, Głogów 2015, Poland, Nancy 2016, France, Weingarten 2017

12 Editorial positions

- *Editorial Board:* International Journal of Applied Mathematics and Computer Science, AMCS, since 2010
- *Editorial Board:* Lecture Notes in Control and Computer Science, UZG Press, since 2009

13 Membership in professional societies

- The IFAC Technical Committee (TC) on Fault Detection, Supervision and Safety of Technical Processes (SAFEPROCESS) (http://tc.ifac-control.org/6/4/members)
- Control Engineering and Robotics Commission of the Polish Academy of Sciences
- Control Eng. and Computer Science Commission of the Polish Academy of Sciences (Poznań Branch).
- Polish Society for Measurement, Automatic Control and Robotics (POLSPAR).
- Institute of Electrical and Electronics Engineers (IEEE).
- Lubuskie Scientific Society (http://www.ltn.uz.zgora.pl).
- **Institute of Highway Technology and Innovation** (http://iati.pl/en/)

14 Funded research projects

Projects funded by European Commission

1. **1998-1999:** IQ2FD COPERNICUS, No. Pl 964383: *Integration of quantitative and qualitative fault diagnosis methods within the framework of industrial application*, <u>member of the research team.</u>
2. **2000-2004:** Research Training Network, No. RTN-1999-00392: *Development and Application of Methods for Actuator Diagnosis of Industrial Control Systems, DAMADICS*, <u>member of the research team.</u>

1. **2001-2002:** *Identification and fault detection of non-linear dynamic systems*, <u>main executor.</u>
2. **2003-2006:** *Modelling and identification of non-linear dynamic systems in robust fault diagnosis schemes*, <u>main executor.</u>
3. **2007-2009:** *Intelligent fault diagnosis and control system for industrial processes*, DIASTER, <u>main executor</u>
4. **2007-2010:** *Fault-tolerant control in non-linear automation systems*, <u>main executor</u>
5. **2009-2010:** Fault-tolerant control for Takagi-Sugeno fuzzy systems, <u>project coordinator</u>
6. **2011-2014:** Predictive fault-tolerant control in non-linear control systems, <u>main executor</u>
7. **2013-2015:** Research and Develop on the Key Technology of Fault Tolerant and Robust Control for the Novel Wind Power Generator System, Under Polish-Chinese bilateral framework, <u>project coordinator</u>
8. **2014-2017**: Hybrid fault-tolerant control for non-linear systems with analytical and soft computing, <u>main executor</u>.
9. **2015-2016**: Fault-tolerant control for mobile applications, POLONIUM, Under Polish-French bilateral framework, <u>project coordinator</u>

15 Research visits

- **Research fellow:** UK, University of Hull, 2002, 3 months
- **Visiting Professor:** France, Universite de Lorraine, 2013, 1 month
- **Visiting professor - one week stays**:
  - France, Universite de Lorraine: 2011, 2012, 2013, 2014, 2015, 2016
  - Spain, Technical University of Catalonia: 2011, 2012, 2013, 2014, 2015, 2016
  - Italy, University of Ferrara: 2010, 2011, 2012
  - Germany, University of Applied Sciences Ravensburg-Weingarten: 2010, 2011, 2012, 2013, 2014, 2015, 2016

16 Participation in industrial innovations

- *Intelligent fault diagnosis and control system for industrial processes*, DIASTER