



Şcoala Doctorală Interdisciplinară
(SDI)

Domeniul de doctorat:

Ingineria Sistemelor

Conducător doctorat:

Prof. dr. ing. MOLDOVEANU Florin Dumitru

TEME (TEMATICĂ) PENTRU CONCURS

TEMA 1: *Sisteme de reglare cu structură variabilă, funcţionând în regim de alunecare*

Conţinut / Principalele aspecte abordate - teoria reglării în regim de alunecare; regimuri de alunecare convenţionale şi estimatoare; regulatoare în regim de alunecare de ordin ridicat; studiu de caz.

Bibliografie recomandată:

1. Hung, J. Y., Gao, W., Hung, J. C. "Variable Structure Control: A Survey", IEEE Transactions on Industrial Electronics, Vol. 40, No. 1, February 1993, pp. 2-22.
2. Edwards, Ch., Spurgeon, S. K. "Sliding Mode Control. Theory and Applications", Taylor & Francis, London, 1998.
3. Utkin, V., Guldner, J., Shi, J. "Sliding Mode Control in Electromechanical Systems", Taylor & Francis, London, 1999.
4. Shtessel, Y., Edwards, Ch., Fridman, L., Levant, A. "Sliding Mode Control and Observation", Control Engineering, Birkhauser Verlag, Springer, 2014.

Note /Precondiţii / Obs: cunoştinţe consistente de matematici superioare, teoria sistemelor, ingineria reglării.

TEMA 2: *Structuri de reglare pentru acţiunile electrice cu maşini de inducţie*

Conţinut / Principalele aspecte abordate - motoare de inducţie trifazate; modele matematice ale motoarelor electrice; sisteme de acţiune cu motoare de inducţie; studiu de caz.

Bibliografie recomandată:

1. Kelemen, A., Imecs, M. "Sisteme de reglare cu orientare după câmp ale maşinilor de curent alternativ", Editura Academiei Române, Bucureşti, 1989.
2. Kazmierkowski, M. P., Tunia, H. "Automatic Control of Converter-Fed Drives", Vol. 46, 1st Ed., Elsevier Science, USA, 1994.
3. Ogata, K. "Modern Control Engineering", 4th Ed., Prentice Hall, New Jersey, 2001.
4. De Doncker, R., Pille, D. W. J., Veltman, A. "Advanced Electrical Drives: Analysis, Modeling, Control", Springer, 2011.

Note /Precondiţii / Obs: cunoştinţe consistente de matematici superioare, acţiuni electrice, ingineria reglării.

TEMA 3: Sisteme dinamice cu evenimente discrete

Conținut / Principalele aspecte abordate - sisteme dinamice cu stări discrete, pilotate de evenimente; modele și tehnici utilizate în studierea sistemelor cu evenimente discrete; analiza proprietăților comportamentale și structurale; tehnici de sinteză; studiu de caz.

Bibliografie recomandată:

1. Antsaklis, P. J., Moody, J. O. "Supervisory Control of Discrete Event Systems Using Petri Nets", Kluwer Academic Publishers, 1998.
2. Păstrăvanu, O., Matcovschi, M., Mahulea, C. "Aplicații ale rețelelor Petri în studierea sistemelor cu evenimente discrete", Ed. Gh. Asachi, Iași, 2002.
3. David, R., Alla, H. "Discrete, Continuous, and Hybrid Petri Nets", Springer, Berlin, 2005.
4. Cassandras, C., Lafortune, S. "Introduction to Discrete Event Systems", 2nd Ed., Springer, London, 2010.

Note /Precondiții / Obs: cunoștințe consistente de matematici superioare, teoria sistemelor, ingineria reglării.

TEMA 4: Sisteme de conducere a roboților

Conținut / Principalele aspecte abordate - modelarea robotului; dinamica electromecanică; proiectarea și performanța structurii de control; studiu de caz.

Bibliografie recomandată:

1. Corke, P. I. "Visual Control of Robotics", John Wiley & Sons Inc., New York, 1997.
2. Ogata, K. "Modern Control Engineering", 4th Ed., Prentice Hall, New Jersey, 2001.
3. Khalil, W., Dombre, E. "Modeling, Identification and Control of Robots", Elsevier Ltd., 2004.
4. Siciliano, B., Sciavicco, L., Villani, L., Oriolo, G. "Robotics. Modelling, Planning and Control", Springer-Verlag, London, 2010.

Note /Precondiții / Obs: cunoștințe consistente de matematici superioare, robotică, ingineria reglării.

TEMA 5: Utilizarea tehnicilor bazate pe inteligență artificială pentru automatizarea evaluării patologiilor cardiovasculare folosind RMN cardiac

Conținut / Principalele aspecte abordate – inteligență artificială; rețele neurale adânci; generare de date sintetice; diagnosticare patologii cardiovasculare pornind de la imagini medicale preluate prin RMN cardiac.

Bibliografie recomandată:

1. Goodfellow, I., Bengio, Y., Courville, A. "Deep Learning", Adaptive Computation and Machine Learning Series, MIT Press, 2016.
2. Chollet, F. "Deep Learning with Python", Manning, 2017.
3. Jing, L., Tian, Y. "Self-supervised Visual Feature Learning with Deep Neural Networks: A Survey", <https://arxiv.org/abs/1902.06162>, 2019.
4. Ranschaert, E. R., Morozov, S., Algra, P. R. (Eds.), "Artificial Intelligence in Medical Imaging: Opportunities, Applications and Risks", Springer, 2019.

Note /Precondiții / Obs: cunoștințe consistente de matematici superioare, inteligență artificială,

procesare de imagini, imagistică medicală (RMN).

TEMA 6: *Evaluarea automată a stenozelor coronariene folosind imagini medicale și rețele neurale adânci*

Conținut / Principalele aspecte abordate – inteligență artificială; rețele neurale adânci; generare de date sintetice; diagnosticare patologiei cardiovasculare pornind de la imagini medicale preluate prin CT.

Bibliografie recomandată:

1. Goodfellow, I., Bengio, Y., Courville, A. "Deep Learning", Adaptive Computation and Machine Learning Series, MIT Press, 2016.
2. Chollet, F. "Deep Learning with Python", Manning, 2017.
3. Zipes, D. P., Libby, P. "Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine", Elsevier, 2019.
4. Ranschaert, E. R., Morozov, S., Algra, P. R. (Eds.), "Artificial Intelligence in Medical Imaging: Opportunities, Applications and Risks", Springer, 2019.

Note /Precondiții / Obs: cunoștințe consistente de matematici superioare, inteligență artificială, procesare de imagini, imagistică medicală (CT).

Conducător doctorat:

MOLDOVEANU Florin Dumitru





Transilvania
University
of Brasov

ADMISSION TO DOCTORAL STUDIES

2020-2021

Session: September 2020

**Interdisciplinary Doctoral School
(SDI)**

Field of doctoral studies:

Systems Engineering

PhD supervisor:

Prof. MOLDOVEANU Florin Dumitru, PhD

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Variable Structure Control*

Content / Main aspects to be considered - Theory of Sliding Mode Control; Conventional Sliding Modes and Observers; Higher-order Sliding Mode Controllers; Case Study.

Recommended bibliography:

1. Hung, J. Y., Gao, W., Hung, J. C. "Variable Structure Control: A Survey", IEEE Transactions on Industrial Electronics, Vol. 40, No. 1, February 1993, pp. 2-22.
2. Edwards, Ch., Spurgeon, S. K. "Sliding Mode Control. Theory and Applications", Taylor & Francis, London, 1998.
3. Utkin, V., Guldner, J., Shi, J. "Sliding Mode Control in Electromechanical Systems", Taylor & Francis, London, 1999.
4. Shtessel, Y., Edwards, Ch., Fridman, L., Levant, A. "Sliding Mode Control and Observation", Control Engineering, Birkhauser Verlag, Springer, 2014.

Prerequisites / Remarks: consistent knowledge of advanced mathematics, systems theory, control engineering.

TOPIC 2: *Control Structures for Induction Motor Electric Drives*

Content / Main aspects to be considered - Three Phase Induction Motor; Mathematical Models of Electric Motors; Induction Motor Drive Systems; Case Study.

Recommended bibliography:

1. Kelemen, A., Imecs, M. "Sisteme de reglare cu orientare după câmp ale mașinilor de curent alternativ", Editura Academiei Române, București, 1989 (in Romanian).
2. Kazmierkowski, M. P., Tunia, H. "Automatic Control of Converter-Fed Drives", Vol. 46, 1st Ed., Elsevier Science, USA, 1994.
3. Ogata, K. "Modern Control Engineering", 4th Ed., Prentice Hall, New Jersey, 2001.
4. De Doncker, R., Pulle, D. W. J., Veltman, A. "Advanced Electrical Drives: Analysis, Modeling, Control", Springer, 2011.

Prerequisites / Remarks: consistent knowledge of advanced mathematics, electrical drives, control engineering.

TOPIC 3: *Discrete Event Dynamic Systems*

Content / Main aspects to be considered - Discrete State Event Driven Dynamic Systems; Models and Techniques for Approaching the Discrete Event Systems; Analysis of Behavioral and Structural Properties; Synthesis Techniques; Case Study.

Recommended bibliography:

1. Antsaklis, P. J., Moody, J. O. "Supervisory Control of Discrete Event Systems Using Petri Nets", Kluwer Academic Publishers, 1998.
2. Păstrăvanu, O., Matcovschi, M., Mahulea, C. "Aplicații ale rețelelor Petri în studierea sistemelor cu evenimente discrete", Ed. Gh. Asachi, Iași, 2002 (in Romanian).
3. David, R., Alla, H. "Discrete, Continuous, and Hybrid Petri Nets", Springer, Berlin, 2005.
4. Cassandras, C., Lafortune, S. "Introduction to Discrete Event Systems", 2nd Ed., Springer, London, 2010.

Prerequisites / Remarks: consistent knowledge of advanced mathematics, systems theory, control engineering.

TOPIC 4: *Robots Control Systems*

Content / Main aspects to be considered - Modelling the Robot; Electro-mechanical Dynamics; Control Design and Performance; Case Study.

Recommended bibliography:

1. Corke, P. I. "Visual Control of Robotics", John Wiley & Sons Inc., New York, 1997.
2. Ogata, K. "Modern Control Engineering", 4th Ed., Prentice Hall, New Jersey, 2001.
3. Khalil, W., Dombre, E. "Modeling, Identification and Control of Robots", Elsevier Ltd., 2004.
4. Siciliano, B., Sciavicco, L., Villani, L., Oriolo, G. "Robotics. Modelling, Planning and Control", Springer-Verlag, London, 2010.

Prerequisites / Remarks: consistent knowledge of advanced mathematics, robotics, control engineering.

TOPIC 5: *Employing Artificial Intelligence based Techniques for Automating the Assessment of Cardiovascular Pathologies from Cardiac MRI*

Content / Main aspects to be considered - Artificial Intelligence; Deep Neural Networks; Synthetic Data Generation; Diagnosing Cardiovascular Pathologies based on Cardiac MRI Images.

Recommended bibliography:

1. Goodfellow, I., Bengio, Y., Courville, A. "Deep Learning", Adaptive Computation and Machine Learning Series, MIT Press, 2016.
2. Chollet, F. "Deep Learning with Python", Manning, 2017.
3. Jing, L., Tian, Y. "Self-supervised Visual Feature Learning with Deep Neural Networks: A Survey", <https://arxiv.org/abs/1902.06162>, 2019.
4. Ranschaert, E. R., Morozov, S., Algra, P. R. (Eds.), "Artificial Intelligence in Medical Imaging: Opportunities, Applications and Risks", Springer, 2019.

Prerequisites / Remarks: strong know-how in mathematics, artificial intelligence, image

processing, medical imaging (MRI).

TOPIC 6: *Medical Imaging and Deep Neural Network based Automated Assessment of Coronary Stenoses*

Content / Main aspects to be considered - Artificial Intelligence, Deep Neural Networks, Synthetic Data Generation, Diagnosing Cardiovascular Pathologies based on Cardiac CT Images.

Recommended bibliography:

1. Goodfellow, I., Bengio, Y., Courville, A. "Deep Learning", Adaptive Computation and Machine Learning Series, MIT Press, 2016.
2. Chollet, F. "Deep Learning with Python", Manning, 2017.
3. Zipes, D. P., Libby, P. "Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine", Elsevier, 2019.
4. Ranschaert, E. R., Morozov, S., Algra, P. R. (Eds.), "Artificial Intelligence in Medical Imaging: Opportunities, Applications and Risks", Springer, 2019.

Prerequisites / Remarks: strong know-how in mathematics, artificial intelligence, image processing, medical imaging (CT).

PhD supervisor:

MOLDOVEANU Florin Dumitru

