ADMISSION TO DOCTORAL STUDIES Session September 2024

Field of doctoral studies: ELECTRICAL ENGINEERING

Doctoral supervisors:
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Jacques Curély (Université de Bordeaux, France)

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Formal study of fuzzy systems / FUZZY CONTROL IN NAVIGATION SYSTEMS*

Contents / Main aspects to be considered – *to be adapted/ completed/ deleted*

Recommended bibliography:

Prerequisites / Remarks: *to be adapted/ completed/ deleted*

X Scientific Doctorate (full-time only)
☐ Professional Doctorate – in the fields of Music and Science of sport and physical education (full-time or part-time)

X without tuition fee (state budget funded)
☐ with tuition fee or with funding from other sources than the state budget

Contents / Main aspects to be considered – *to be adapted/ completed/ deleted*

Description of situations in which fuzzy rule control can be used

Formulation of the control law by fuzzy rules

Basis of rules for fuzzy inferences

Membership features

Fuzzification methods and applications in fuzzy control

Expert Fuzzy Systems

Design of fuzzy control systems

Implementation of techniques based on fuzzy logic in navigation systems (Maximum power point tracking techniques for photovoltaic systems)

Recommended bibliography:

1.Matía, F., Marichal, G., Jiménez, E. (eds) Fuzzy Modeling and Control: Theory and Applications. Atlantis Computational Intelligence Systems, vol 9. Atlantis Press, Paris. https://doi.org/10.2991/978-94-6239-082-9_8

2.Al-Hadithi, B. M., Jiménez, A., & Matía, F. (2012). A new approach to fuzzy estimation of Takagi- Sugeno model and its applications to optimal control for

nonlinear systems. *Applied Soft Computing*, *12*, 280–290.

3.A. Zakiev, et al., Path planning for Indoor PartiallyUnknown Environment Exploration and Mapping, in Int.Conf. on Artificial Life and Robotics (2018), p.399-402.

4.M. Pecka, K. Zimmermann and T. Svoboda, "Fast simulation of vehicles with non-deformable tracks", *Proc. IEEE/RSJ Int. Conf. Intell. Robots Syst.*, pp. 6414-6419, Sep. 2017.

5.Christiano, Paul, et al. "Transfer from simulation to real world through learning deep inverse dynamics model." *arXiv preprint arXiv:1610.03518* (2016).

6. Al-Majidi SD, Abbod MF, Al-Raweshidy HS (2018) A novel maximum power point tracking technique based on fuzzy logic for photovoltaic systems, *International Journal of Hydrogen Energy* 43 (31): 14158–14171.

7.Bingül Z, Karahan O (2011) A fuzzy logic controller tuned with PSO for 2 DOF robot trajectory control. *Expert Systems with Applications* 38(1): 1017–1031.

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Doctoral supervisors,

Prof. Dr.Habil.eng.Aurel Fratu

Signature

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Prof. Dr. .Jacques Curély.. ...

Signature

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Coordinator of the field of doctoral studies,

Prof. Dr. Ing. Corneliu Marinescu

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