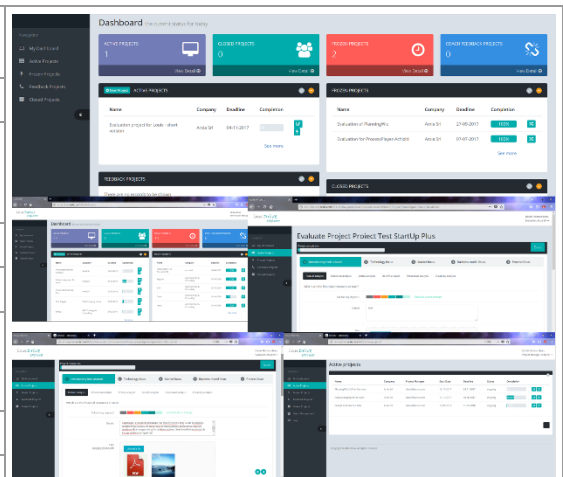


# RESEARCH CENTER FOR ENGINEERING AND MANAGEMENT OF INNOVATION

## Contact details

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InnDRIVE eXXplorer: expert system to evaluate start-ups businesses (technology transferred to Arxia)

## Areas of expertise

- **Innovation Engineering:** Methods and methodologies for innovation; Innovation through emerging technologies; Nature-inspired innovation.
- **Innovation Management:** Collaborative and polycentric innovation; Optimizations in innovation management; Resilient innovation in the context of global climate and economic changes.
- **Artificial Intelligence in Creativity and Inventive Design:** Generative design in industry with artificial intelligence; Structured innovation driven by artificial intelligence; Human-machine co-creation in inventive industrial design.
- **Artificial Intelligence in Robotics and Industrial Production:** Autonomous robots with self-learning capabilities; Intelligent industrial robots; Artificial intelligence and digital twins in the factory of the future.
- **Cognitive and Social Robotics:** Social robotics for industry; Affective robotics; Intelligent robots in non-industrial applications.

## Team

**Academic staff:** Stelian Brad, Stefan Craciun, Ionut Chis, Emilia Brad, Anca Stan, Dragos Bartos, Claudiu Nedeski  
**Researchers:** Marin Iuga, Vlad Trifan, Alex Cârlejan, Cosmin Mureşan, Bogdan Balog, Eya Deeb, Ovidiu Stan, Diana Velţan, Dan Bălan, Vlad Florian, Miruna Periş

## Representative projects

- *Fighting disinformation using decentralized actors featuring AI and blockchain technologies*, FiDisD, Grant Agreement no. 957228 for the implementation of the project Trusted and reliable content on future blockchains ("TruBlo") H2020
- *Cybersecurity Counter*, Acronym: GEIGER, Code: 883588, H2020, 2020-2022.
- *SMart INSpection tool for mariTIME containers*, Project – SMINTIME, H2020, 2022-2023; Horizon 2020 (H2020-SFS-2014-2)
- *Expert System for Smart Robots*, CSi Industries B.V. Holland, Code 2013111901
- *NetZeRoCities – National Competence Centre and solutions for the development of Climate Neutral and Smart Cities*, NetZeRoCities, NextGenerationEU
- *Computational models based on big data and predictive data analysis for the optimization and automation of insurance product distribution through the platform 24Broker.ro*, Financing contract no. 378 / 390054, MySMIS code 121104
- *The conception, design, execution, experimental testing, and optimization of an intelligent and network-connected equipment for the sublimation of benzoic acid from the resins of the StyraX plant*, no. 2366/28.01.2020
- *The conception, design, and creation of a semi-autonomous robotic system in the context of applying innovative methods of lavender harvesting and the adaptability of crops*, no. 6651/08.03.2022

## Significant results

### Papers:

- *Mapping the Evolutionary Journey of TRIZ and Pioneering Its Next S-Curve in the Age of AI-Aided Invention*. In: Cavallucci, D., Livotov, P., Brad, S. (eds) Towards AI-Aided Invention and Innovation. TFC 2023. IFIP Advances in Information and Communication Technology, vol 682. Springer, Cham. [https://doi.org/10.1007/978-3-031-42532-5\\_1](https://doi.org/10.1007/978-3-031-42532-5_1)

- *An Interactive Artificial Intelligence System for Inventive Problem-Solving*. In: Nowak, R., Chrzęszcz, J., Brad, S. (eds) Systematic Innovation Partnerships with Artificial Intelligence and Information Technology. TFC 2022. IFIP Advances in Information and Communication Technology, vol 655. Springer, Cham. [https://doi.org/10.1007/978-3-031-17288-5\\_15](https://doi.org/10.1007/978-3-031-17288-5_15), 2022.
- *Improving Path Accuracy of Mobile Robots in Uncertain Environments by Adapted Bézier Curves*. *Electronics* 2022, 11, 3568. <https://doi.org/10.3390/electronics11213568>
- *Design-Centric Obstacle Avoidance Algorithm for an Autonomous Mobile Robot and Its Testing Using Virtual Prototyping Technologies*, Acta Technica Napocensis Series-Applied Mathematics Mechanics and Engineering, v. 64, n. 4s, ISSN 2393–2988, 2021
- *Enhancing Creativity in Deep Learning Models with SAVE-Inspired Activation Functions*. In: Cavallucci, D., Livotov, P., Brad, S. (eds) Towards AI-Aided Invention and Innovation. TFC 2023. IFIP Advances in Information and Communication Technology, vol 682. Springer, Cham. [https://doi.org/10.1007/978-3-031-42532-5\\_12](https://doi.org/10.1007/978-3-031-42532-5_12)
- *Requirements Analysis in Disruptive Engineering Solutions Using the Paradigm of Living Systems*. *Appl. Sci.* 2021, 11, <https://doi.org/10.3390/app11219854>, 9854
- *Algorithm for Designing Reconfigurable Equipment to Enable Industry 4.0 and Circular Economy-Driven Manufacturing Systems*. *Applied Sciences*. 2021, 11, 4446. <https://doi.org/10.3390/app11104446>
- *Lifecycle Design of Disruptive SCADA Systems for Waste-Water Treatment Installations*, *Sustainability*, 2021, 13, 4950.
- *Domain Analysis with TRIZ to Define an Effective “Design for Excellence” Framework*. In: Borgianni Y., Brad S., Cavallucci D., Livotov P. (eds) Creative Solutions for a Sustainable Development. TFC 2021. IFIP Advances in Information and Communication Technology, vol 635. Springer, Cham
- *Using TRIZ To Handle Small Datasets In Artificial Intelligence*. Acta Technica Napocensis - Series: Applied Mathematics, Mechanics, And Engineering, [S.L.], V. 66, N. 2, May. 2023
- *Managing Business Model Innovation: An Innovative Approach towards Designing a Digital Ecosystem and Multi-Sided Platform*, *Business Process Model Management Journal*, Vol. 27 (2). <https://doi.org/10.1108/BPMJ-01-2020-0017>, ISSN: 1463-7154, pp. 415-438, 2021
- *Design of Smart Connected Manufacturing Resources to Enable Changeability, Reconfigurability and Total-Cost-of-Ownership Models in the Factory-of-the-Future*, *International Journal of Production Research*, 56 (6), 2018, 2269-2291, DOI: 10.1080/00207543.2017.1400705

**Technologies:**

- Autonomous mobile robotic platform for lavender harvesting.
- Expert system for the evaluation of innovative businesses.
- Cyber vulnerability assessment system.
- Intelligent installation for the extraction of benzoic acid from natural resins.
- AI-based system for inventive engineering.
- Neuro-symbolic algorithms and tools for automating the conceptualization process of solutions in engineering.
- AI-based chatbot in travel insurance management.
- Autonomous mobile robotic system for the inspection of containers in ports.
- AI-based algorithms and tools for support in inventive engineering.

**Patents:**

- *Intelligent automation system based on a distributed, reconfigurable and adaptive architecture*, OSIM Nr. 129401/2022

**The proposal for the business sector**

Research & development	<p><b>Emerging Technologies &amp; AI:</b> Development of cutting-edge AI applications for robotics, creative design, and industrial production.</p> <p><b>Nature-Inspired Innovation:</b> Research into biomimicry-based solutions for product and process innovation.</p> <p><b>Cognitive &amp; Social Robotics:</b> Advancement of autonomous, social, and affective robotics for non-industrial and industrial applications.</p>
Consulting	<p><b>Innovation Management Optimization:</b> Strategies for collaborative, resilient, and polycentric innovation management.</p> <p><b>Generative Design &amp; AI Integration:</b> Advisory on incorporating AI-driven generative design and human-machine co-creation in industrial settings.</p> <p><b>Smart Factory Transformation:</b> Implementation of AI and digital twins for operational efficiency and futuristic factory setups.</p>
Training	<p><b>Innovative Methodologies:</b> Workshops on methods and methodologies for innovation, including nature-inspired and emerging technology applications.</p> <p><b>AI &amp; Robotics Mastery:</b> Courses on utilizing AI in creativity, design, and robotics, tailored for industrial applications.</p> <p><b>Innovation Leadership:</b> Training programs focused on optimizing innovation management and fostering a culture of collaborative innovation.</p>

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