

DEPARTMENT OF INTELLIGENT SYSTEMS

E-9

The Department of Intelligent Systems develops new methods and techniques for intelligent computer systems, with applications in the areas of the information society, computer science and informatics, and network communication systems. The main research areas are ambient intelligence, computational intelligence, agent and multi-agent systems, language and speech technologies, electronic and mobile health, and smart cities. The department collaborates closely with the Faculty of Computer and Information Science of the University of Ljubljana on the joint research program "Artificial Intelligence and Intelligent Systems", led by Prof. Dr. Ivan Bratko. The department also continuously collaborates with industry and contributes significantly to the inclusion of intelligent systems in products and services.

Intelligent systems simulate intelligence so that a typical user perceives them as truly intelligent. In reality, these systems use complex mechanisms and implement them on digital platforms to imitate human behaviour by exploiting raw, exponentially growing computer power. This field is somewhat broader than artificial intelligence, both are rapidly growing worldwide and enabling the development of the information society.

Ambient intelligence is a research area aiming to introduce technology into our everyday environment in a friendly way that is undemanding for the user. Health continues to be the main domain where we apply methods of ambient intelligence. We coordinate the H2020 project **HeartMan**, which developed an application to help congestive-heart-failure patients manage their condition: it monitors them with a sensing wristband, and provides advice on exercise, nutrition, etc. In 2018, the application was being evaluated in clinical trials. The objective of the H2020 project **CrowdHealth** is to mine health data to help craft better public-health policies. We developed methods that can forecast time-series data and assess health risks based on such forecasts. They were used on SloFit data describing the fitness of Slovenian primary- and high-school students in cooperation with the Faculty of Sports of the University of Ljubljana. The H2020 project **WellCo** aims to create a virtual coach to advise older users on well being and health. We developed a web service to administer food-frequency questionnaires, and are working on nutrition monitoring with a smart watch. We are also developing methods to recognize the users' emotions from their voice, to enable an affective user interface. We started the H2020 project **Insension**, in which we will help people with severe intellectual disability use digital services. We are developing methods for unobtrusive, camera-based, monitoring of physiological signals, as well as methods to reason about the users' intent from observations of them and their context. We also started a Flemish-Slovenian project **STRAW**, whose objective is to develop stress recognition from physiological signals and to learn more about stressors in the workplace. As a **doctoral research project**, we developed a method that can intelligently turn sensors on and off in such a way that the energy consumption is as small as possible, but without sacrificing a lot of quality of the results obtained with these sensors. Another doctoral student is working on sensor fusion, transfer learning and multi-task learning using deep neural networks on problems of affective computing. Finally, we participated in the **Sussex-Huawei Locomotion Recognition Challenge**, an international competition to develop the best method to recognise locomotion activities from smartphone sensor data, where we placed first and second.

Computational intelligence is the study of stochastic search, optimization and learning methods, inspired by biological and physical systems. Research in this area at the Department of Intelligent Systems focuses on evolutionary computation methods. We study evolutionary algorithms for multi-objective optimization, their acceleration through parallel computing and surrogate models, visualization of their results, benchmarking methodologies, and applications in engineering design and optimization problems. In the H2020 Twinning project **SYNERGY** we are



Head:
Prof. Matjaž Gams



Figure 1: A meeting about autonomous weapons took place at the UN in Geneva in November 2018. The JSI representative analyzed the AI viewpoint.

Our teams placed first and second at the Sussex-Huawei Locomotion Recognition Challenge, an international competition to develop the best method to recognise locomotion activities from smartphone sensor data.

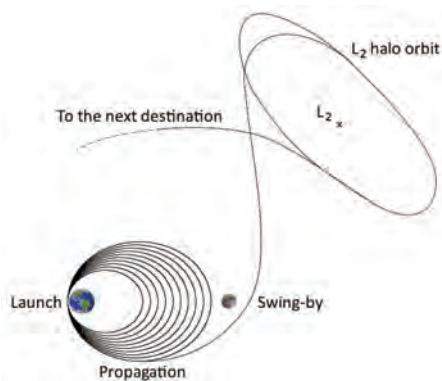


Figure 2: In the bilateral Slovenian-Japanese research project we collaborated with Shinshu University and the Japan Aerospace Exploration Agency (JAXA) on visualizing the trajectory optimization results for the Destiny space mission.

For a new casting device at the Štore Steel plant we developed a computer system for the multi-objective optimization of process parameters in order to improve the quality of the cast steel.



Figure 3: Organized under the Horizon 2020 project SYNERGY, the international summer school Efficient Multiobjective Optimization took place in Ljubljana during 27–31 August 2018. It was attended by 47 participants from 21 countries.

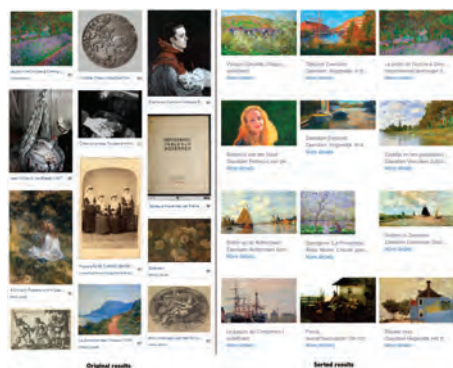


Figure 4: Results of a sorting algorithm that builds on Europeana's search engine. The left-hand side of the image shows the unprocessed results of Europeana. The right-hand side shows the sorted results after applying the image-ranking algorithm.

strengthening our research and innovation potential in parallelization, surrogate modelling and combining the two techniques in multi-objective optimization. The project is carried out by three partners with complementary expertise: the Jožef Stefan Institute, the University of Lille, and Cologne University of Applied Sciences. The expertise and solutions gained in this cooperation are targeted at both academic and industrial organizations, particularly those participating in the Slovenian Smart Specialisation Strategy. In 2018, the project consortium members organized the 8th International Conference on Bioinspired Optimization Methods and Their Applications, BIOMA 2018, in Paris, the Summer School on Efficient Multiobjective Optimization in Ljubljana, and the International Conference on High-Performance Optimization in Industry, HPOI 2018, in Ljubljana. We completed the **bilateral Slovenian-Japanese research project** aimed at enhancing the methodology of evolutionary, multi-objective optimization for real-world applications. We cooperated with Shinshu University, Nagano, and the Japan Aerospace Exploration Agency (JAXA) on visualizing the results of trajectory optimization for the Destiny space mission. Within the postdoctoral basic research project **Incorporating real-world problems into the benchmarking of multiobjective optimizers** we design real-world-based benchmark problems and integrate them into the state-of-the-art open-source COCO (Comparing Continuous Optimizers) platform for optimization algorithm benchmarking. The transfer of our knowledge and methods to industrial end users took place in the project **Upgrade of the optimization system for steel**

continuous casting (KN3) for the Štore Steel company. For a new casting device at the plant we developed a computer system for the multi-objective optimization of process parameters in order to improve the quality of the cast steel. In addition, we started an applied project **A Computer System to Schedule Flexible Offers for Electricity Production and Consumption** dealing with the scheduling of flexible offers for energy production and

consumption. Its goal is to develop an efficient scheduling algorithm to minimize costs due to the mismatch between available and needed energy, and assess its performance on real-world problem instances.

In the field of **agent and multi-agent systems** the key research areas are focused on the development of smart autonomous systems for the control of smart cities, smart homes and the preservation of cultural heritage. In the Slovenian Smart Specialisation program **EkoSMART** we continue with the research activities in the field of smart cities and communities. The purpose of the program is to develop a smart-city ecosystem with all the support mechanisms that are necessary for the efficient, optimized and gradual integration of different smart-city areas into a unified and well-connected system. Within the program we are involved in activities linked to the research and development projects “*Zasnova ekosistema pametnega mesta*” and “*Electronic and mobile health*” (EMH), where we are the leading partner. The main goal is to develop new and innovative devices and solutions to support the elderly and chronic patients at home. One of the prototypes is a smart watch with 16 functions for elderly (ura.ijs.si). We are also involved in the Smart Specialisation program **IQDOM** in the field of smart buildings and homes, coordinated by Gorenje. Our focus is on the development of smart home-automation services. The aim is to apply advanced machine-learning and optimization methods to build user models and consumption profiles for housing units in order to generate control strategies that increase user comfort and, at the same time, decrease the operational costs of the smart home. Similar approaches are also applied to heat pumps. The controller learns the behaviour of the use and formulates a strategy for water heating during periods of cheaper electricity and, at the same time, lowers the temperature of the stored water during days of lower consumption. In the Interreg **AS-IT-IC** project, we are developing an integrated tourist platform for cross-border tourist exchange, tour planning and effective communication between tourists and tourist offices. The platform will support natural language communication between the users and the system and the automatic creation of personalized itineraries based on the search concepts and preferences of the users. In the Horizon 2020 Twinning project **eHeritage** we continue to provide support to increase the capacity and quality of the research and innovation excellence of the Romanian partner in the area of cultural heritage preservation using intelligent methods and 3D modelling, and employing augmented and virtual reality. To this end, we are developing innovative applications that enable efficient search and richer visualisations of digital content related to cultural heritage from various internet sources and dedicated databases. The goal of

the bilateral Slovenian-Macedonian research project is to study and advance wearable and non-wearable sensors for detecting the user's physical and mental state.

In the field of **speech and language technologies** we work on speech synthesis, semantic analysis of text and question answering. Together with the companies Alpineon and Amebis we developed a new, high-quality speech synthesizer eBralec (<http://ebralec.si/>). The synthesizer is improved in terms of both the comprehensibility and natural perception of the speech. The software package has more than a thousand subscribers and is an indispensable tool for blind and visually-impaired users (it is the "official" speech synthesizer of the Slovenian Association for the Blind and Visually Impaired) and people with reading impairments (the Bravo association). For these users, eBralec is free of charge and can be ordered at the Library for the Blind and Visually Impaired (<http://www.kss-ess.si/ebralec-sintetizator-govora-slovenskega-jezika/>). eBralec is also an integral part of the DarsTraffic+ application, which provides traffic information, while its server version has been used by the National and University Library since 2017. We have also developed a service of speech synthesis for mobile devices (<http://dis.ijs.si/dyslex/>), which is free for anyone to use.

The **21th International Multiconference Information Society – IS 2018** (is.ijs.si) took place at the Jožef Stefan Institute from October 8 to 12, 2018. It consisted of 11 independent conferences with 200 presentations. Four conference awards were presented: for lifetime achievements ("Donald Michie and Alan Turing" award) to Prof. Saša Divjak, for current achievements in the field of information society to Assist. Prof. Marinka Žitnik, and the information strawberry (Yaskawa) and lemon (Slovenian science support) for the best and worst public information-society services.

Organization of conferences, congresses and meetings

1. Cvetković, B., Szeklicki, R., Janko, V., Lutomski, P., Luštrek, M. Real-time activity monitoring with a wristband and a smartphone. *Information Fusion*, 43 (2018), 77–93
2. Janko, V., Luštrek, M. Using Markov chains and multi-objective optimization for energy-efficient context recognition. *Sensors*, 18 (1) (2018), 80-1–80-17
3. Medvet, E., Virgolin, M., Castelli, M., Bosman, P., Gonçalves, I., Tušar, T. Unveiling evolutionary algorithm representation with DU maps. *Genetic Programming and Evolvable Machines*, 19 (3) (2018), 351–389
4. Tavčar, A., Gams, M. Surrogate-agent modeling for improved training. *Engineering Applications of Artificial Intelligence*, 74 (2018), 280–293

Awards and appointments

1. Jani Bizjak, Matjaž Gams, Anton Gradišek: Best innovation from public research organizations, TEE-The ultimate European assistant for the elderly, at IS 2018
2. Jani Bizjak, Vid Drobnič, Matjaž Gams, Martin Gjoreski, Vito Janko, Mitja Luštrek, Matej Marinko, Miha Mlakar, Nina Reščič, Gašper Slapničar: SHL Challenge – Sussex-Huawei Locomotion and Transportation Recognition Challenge, 1st Place Award; Singapore; Dr. Hristijan Gjoreski, University of Sussex (UK) & Ss. Cyril and Methodius University (MK), Dr. Lin Wang, University of Sussex (UK), Dr. Daniel Roggen, University of Sussex (UK), Dr. Kazuya Murao, Ritsumeikan University (JP), Dr. Tsuyoshi Okita, Kyushu Institute of Technology (JP); method for recognition of locomotion activity from smartphone sensors
3. Vid Drobnič, Matjaž Gams, Martin Gjoreski, Vito Janko, Mitja Luštrek, Matej Marinko, Nina Reščič, Gašper Slapničar: SHL Challenge – Sussex-Huawei Locomotion and Transportation Recognition Challenge, 2nd Place Award; Singapur; Dr. Hristijan Gjoreski, University of Sussex (UK) & Ss. Cyril and Methodius University (MK), Dr. Lin Wang, University of Sussex (UK), Dr. Daniel Roggen, University of Sussex (UK), Dr. Kazuya Murao, Ritsumeikan University (JP), Dr. Tsuyoshi Okita, Kyushu Institute of Technology (JP); method for recognition of locomotion activity from smartphone sensors

Organization of conferences, congresses and meetings

1. 32nd Slovenian Workshop on Nature-Inspired Algorithms, AVN, Donačka gora, 25. 5. 2018
2. Session Evolutionary Computation in Practice (ECiP) at the Genetic and Evolutionary Computation Conference, GECCO 2018, Kyoto, Japan, 17. 7. 2018
3. Genetic and Evolutionary Computation Conference, GECCO 2018, Kyoto, Japan, 15.-19. 7. 2018



Figure 5: At the Sussex-Huawei world-open competition presented at the Ubicomp conference in Singapore, where data from mobile phones were used to determine the type of transportation, two teams achieved the first and the second place. The estimated probability of such an event was 0.004, and therefore it is highly significant.

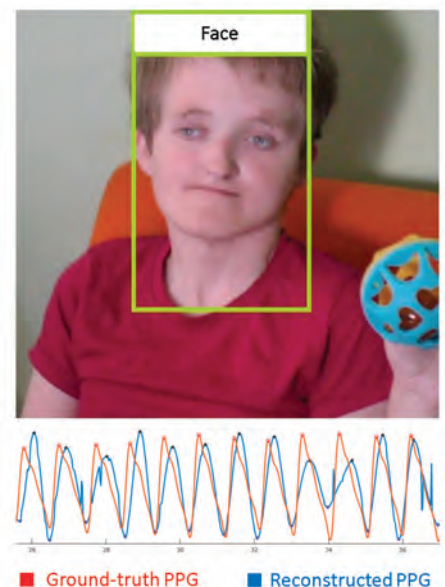


Figure 6: Prototype of an application that enables monitoring of physiological parameters, such as heart rate, using a camera. Heart rate is evaluated using the reconstructed PPG signal, which describes periodic changes of skin color in line with the beating of the heart.

4. BBOB (Blackbox Optimization Benchmarking) workshop at the Genetic and Evolutionary Computation Conference, GECCO 2018, Kyoto, Japan, 15. 7. 2018
5. GBEA (Game-Benchmark for Evolutionary Algorithms) workshop at the Genetic and Evolutionary Computation Conference, GECCO 2018, Kyoto, Japan, 15. 7. 2018
6. GECCO Job Market at the Genetic and Evolutionary Computation Conference, GECCO 2018, Kyoto, Japan, 17. 7. 2018
7. 21th International Multiconference Information Society, IS 2018, Ljubljana, Slovenia, 8. -14. 10. 2018; independent conferences:
 - International conference on cognitonics
 - Cognitive science
 - Collaboration, software and services in information society
 - Data mining and data warehouses
 - Facing demographic challenges
 - International conference of transfer of technologies
 - High-Performance Optimization in Industry, HPOI 2018
 - Slovenian conference on artificial intelligence
 - Workshop AS-IT-IC
 - Workshop electronic and mobile health and smart cities
8. 33rd Slovenian Workshop on Nature-Inspired Algorithms, AVN, Ljubljana, 14. 12. 2018

INTERNATIONAL PROJECTS

1. COST TD1405; ENJECT, European Network for the Joint Evaluation of Connected Health Technologies
Dr. Božidara Cvetković
Cost Office
2. CardioRNA - Catalysing Transcriptomics Research in Cardiovascular Disease
Dr. Mitja Luštrek
Cost Association Aisbl
3. H2020 - IN LIFE; INdependent Living support Functions for the Elderly
Prof. Matjaž Gams
European Commission
4. H2020 - eHERITAGE; Expanding the Research and Innovation Capacity in Cultural Heritage Virtual Reality Applications
Prof. Matjaž Gams
European Commission
5. H2020 - CrowdHEALTH; Collective Wisdom Driving Public Health Policies
Dr. Mitja Luštrek
European Commission
6. H2020 - INSESSION; Personalized Intelligent Platform Enabling Interaction with Digital Services to Individuals with Profound and Multiple Learning Disabilities
Dr. Mitja Luštrek
European Commission
7. H2020 - WellCo; Wellbeing and Health Virtual Coach
Dr. Mitja Luštrek
European Commission
8. H2020 - HeartMan; Personal Decison Support System for Heart Failure Management
Dr. Mitja Luštrek
European Commission
9. H2020 - SYNERGY; Synergy for Smart Multi-Objective Optimisation
Prof. Bogdan Filipič
European Commission
10. Advanced Methodology of Evolutionary Multi- and Many-Objective Optimization for Real-World Applications
Prof. Bogdan Filipič
Slovenian Research Agency
11. Patient Health Prediction and Diagnostics based on Sensor Data and Machine Learning
Prof. Matjaž Gams
Slovenian Research Agency

RESEARCH PROGRAM

1. Artificial Intelligence and Intelligent Systems
Prof. Matjaž Gams

R & D GRANTS AND CONTRACTS

1. Disentangling the sources and context of daily work stress: a comprehensive real-time modelling study using wearbles and technological detections
Dr. Mitja Luštrek
2. Intelligent home of the new generation designed on smart appliances and wood
Prof. Matjaž Gams
Ministry of Education, Science and Sport
3. Smart City Ecosystem - EkoSmart
Prof. Matjaž Gams
Ministry of Education, Science and Sport
4. Food for future - F4F
Dr. Mitja Luštrek
Ministry of Education, Science and Sport
5. Austrian-Slovenian Intelligent Tourist Information Center (AS-IT-IC)
Prof. Matjaž Gams
Government Office for Development and European Cohesion Policy
6. Strategic Research & Innovation Partnership (SRIP) Smart Cities and Communities
Prof. Matjaž Gams
Ministry of Economic Development and Technology
7. Self-management of physical and mental fitness of older workers
Dr. Mitja Luštrek
Ministry of Education, Science and Sport
8. 21st International Multiconference Information Society 2018, IS 2018, Ljubljana, Slovenia, 8 October 2018 - 12 October 2018
Prof. Matjaž Gams

NEW CONTRACTS

1. A Computer System to Schedule Flexible Offers for Electricity Production and Consumption
Prof. Bogdan Filipič
Inea d. o. o.
2. Implementing services within the CityVOICE project
Dr. Tomaž Šef
Amebis, d. o. o., Kamnik

VISITORS FROM ABROAD

1. Dr. Mihai Duguleana, Department of Automotive and Transport Engineering, Transilvania University of Brasov, Brasov, Romania, 29.-31. 1. 2018
2. Dr. Marcello Carrozzino, PERCRO Perceptual Robotics Laboratory, Scuola Superiore S. Anna, Pisa, Italy, 29.-31. 1. 2018
3. Prof. Dr. Hernán Aguirre, Taishi Ito, Shinshu University, Nagano, Japan, 14.-16. 3. 2018
4. Prof. Dr. Akira Oyama, Hiroaki Fukumoto, Japan Aerospace Exploration Agency (JAXA), Sagamiyama, Japan, 8.-10. 4. 2018

5. Peter Guillaume, Richard Louvancour, Yanis Kettou, Polytech Paris UPMC, Paris, France, 14. 5.–28. 7. 2018
6. Gaspard Delaurelle, Polytech Paris UPMC, Paris, France 21. 5.–27. 7. 2018
7. Prof. Dr. Luca Bortolussi, Dr. Eric Medvet, University of Trieste, Trieste, Italy, 13. 6. 2018
8. Nicolas Cheron, Polytech Paris Sorbonne, Paris, France, 18. 6.–18. 8. 2018.
9. Marija Trajanoska, Faculty of Electrical Engineering and Information Technologies, Skopje, Republic of Macedonia, 23. 7.–16. 9. 2018
10. Dr. Octavian Machidon, Department of Electronics and Computers, Transilvania University of Brasov, Brasov, Romania, 13.–31. 8. 2018
11. Prof. Dr. Enrique Alba, University of Malaga, Malaga, Spain, 28. 8. 2018
12. Dr. Pavel Krömer, Technical University of Ostrava, Ostrava, Czechia, 28. 8. 2018
13. Hiroaki Fukumoto, Japan Aerospace Exploration Agency (JAXA), Sagami-hara, Japan, 5.–8. 10. 2018
14. Prof. Dr. Thomas Bartz-Beielstein, Beate Breiderhoff, Frederik Rehbach, Jörg Stork, Cologne University of Applied Sciences (TH Köln), Gumpersbach, Germany, 8. 10. 2018
15. Dr. Wellington Rodrigo Monteiro, Pontifical Catholic University of Paraná, Curitiba, Brazil, 8. 10. 2018
16. Prof. Dr. El-Ghazali Talbi, University of Lille, Lille, France, 8. 10. 2018
17. Prof. Dr. Boris Naujoks, Cologne University of Applied Sciences (TH Köln), Gumpersbach, Germany, 11.–14. 12. 2018
18. Vanessa Volz, Queen Mary University of London, London, Great Britain, 11.–14. 12. 2018

STAFF

Researchers

1. Dr. Erik Dovgan
2. Prof. Bogdan Filipič
3. Prof. Matjaž Gams, Head
4. Dr. Anton Gradišek
5. Dr. Mitja Luštrek
6. Dr. Miha Mlakar
7. Dr. Tomaž Šef
8. Dr. Tea Tušar

Postdoctoral associates

9. Dr. Matej Guid
10. Dr. Rok Piltaver*
11. Dr. Aleksander Pivk*
12. Dr. Aleš Tavčar

Postgraduates

13. Dr. Božidara Cvetković, 09.07.18, transferred to Department E8
14. Martin Gjoreski, B. Sc.
15. Vito Janko, B. Sc.
16. Tine Kolenik, B. Sc.
17. Tomaž Kompara*, B. Sc.
18. Dr. Jana Krivec*
19. Damjan Kužnar, B. Sc., left 02.01.18
20. Aljoša Vodopija, B. Sc.
21. Jernej Zupančič, B. Sc.

Technical officers

22. Andrejaana Andova, B. Sc.
23. Luka Colarič, B. Sc., left 01.03.18
24. Mateja Drnovšek, B. Sc.
25. Gregor Grasselli, B. Sc.
26. Gašper Slapničar, B. Sc.
27. Maj Smerkol, B. Sc., left 01.10.18
28. Jure Šorn*, B. Sc., left 01.05.18
29. Jakob Valič, B. Sc.

Technical and administrative staff

30. Jani Bizjak, B. Sc.
31. Matej Cigale, B. Sc.
32. Grigory Evseev, B. Sc., left 16.05.18
33. Vesna Koricki, B. Sc.
34. Mitja Lasič
35. Liljana Lasič
36. Junoš Lukan, B. Sc.
37. Blaž Mahnič, B. Sc.
38. Pavel Maslov, B. Sc., left 17.10.18
39. Nina Reščič, B. Sc.
40. Luka Štepančič, B. Sc., left 01.02.18
41. Lana Zemljak

Note:

* part-time JSI member

BIBLIOGRAPHY

ORIGINAL ARTICLE

1. Janez Grad, Anton Gradišek, "Bumblebee brood temperature and colony development: a field study", *Acta entomologica slovenica*, 2018, **26**, 2, 219-232.
2. Anneleen Baert, Els Clays, Larissa Bolliger, Delphine De Smedt, Mitja Luštrek, Aljoša Vodopija, Marko Bohanec, Paolo Emilio Puddu, Maria Constanza Ciancarelli, Michele Schiariti, Jan Derboven, Gennaro Tartarisco, Sofie Pardaens, on behalf of the HeartMan consortium, "A personal decision support system for heart failure management (HeartMan): study protocol of the HeartMan randomized controlled trial", *BMC cardiovascular disorders*, 2018, **18**, 186.
3. Jan Jug, Tine Kolenik, André Ofner, Igor Farkas, "Computational model of enactive visuospatial mental imagery using saccadic perceptual actions", *Cognitive systems research*, 2018, **49**, 157-177.
4. Aleš Tavčar, Matjaž Gams, "Surrogate-agent modeling for improved training", *Engineering applications of artificial intelligence*, 2018, **74**, 280-293.
5. Erik Dovgan, Cristina Knapic, Massimo Sponza, Riccardo Smareglia, "A new archival infrastructure for highly-structured astronomical data", *Experimental astronomy*, 2018, **45**, 1, 41-55.
6. Eric Medvet, Marco Virgolin, Mauro Castelli, Peter Bosman, Ivo Gonçalves, Tea Tušar, "Unveiling evolutionary algorithm representation with DU maps", *Genetic programming and evolvable machines*, 2018, **19**, 3, 351-389.
7. Gašper Slapničar, Mitja Luštrek, Matej Marinko, "Continuous blood pressure estimation from PPG signal", *Informatica: an international journal of computing and informatics*, 2018, **42**, 1, 33-42.
8. Martin Gjoreski, Mitja Luštrek, Matjaž Gams, Blagoj Mitrevski, "An inter-domain study for arousal recognition from physiological signals", *Informatica: an international journal of computing and informatics*, 2018, **42**, 1, 61-68.
9. Alen Ajanović, Andrej Ulčar, Ana Marija Peterlin, Karolina Počivavšek, Gašper Feležorž, Anton Gradišek, Matjaž Gams, Mojca Matičič, "Application for viral hepatitis infection risk assessment - HEPY", *Informatica: an international journal of computing and informatics*, 2018, **42**, 2, 279-281.
10. Božidara Cvetković, Robert Szeklicki, Vito Janko, Przemyslaw Lutomski, Mitja Luštrek, "Real-time activity monitoring with a wristband and a smartphone", *Information fusion*, 2018, **43**, 77-93.
11. Tine Kolenik, "Seeking after the glitter of intelligence in the base metal of computing: the scope and limits of computational models in researching cognitive phenomena", *Interdisciplinary description of complex systems*, 2018, **16**, 4, 545-557.
12. Rok Piltaver, Hristijan Gjoreski, Matjaž Gams, "Identifying a person with door-mounted accelerometer", *Journal of ambient intelligence and smart environments*, 2018, **10**, 5, 361-375.
13. Uroš Zavrtanik, Junoš Lukan, Remy Loris, Jurij Lah, San Hadži, "Structural basis of epitope recognition by heavy-chain camelid antibodies", *Journal of molecular biology*, 2018, **430**, 21, 4369-4386.
14. Anton Gradišek, Mitja Krnel, Mark Paskevicius, Bjarne R. S. Hansen, Torben Rene Jensen, Janez Dolinšek, "Reorientation motions and ionic conductivity in (NH₄)₂B₁₀H₁₀ and (NH₄)₂B₁₂H₁₂", *The journal of physical chemistry. C, Nanomaterials and interfaces*, 2018, **122**, 30, 17073-17079.
15. Jana Krivec, Primož Rakovec, "Cognitive behavioral profile of stress experience among Slovenian students", *Kairos: slovenska revija za psihoterapijo*, 2018, **12**, 1/2, 67-86.

16. Clarissa P. C. Gomes, Antonio Salgado-Somoza, Ester E. Creemers Creemers, Yvan Devaux Dieterich, Mitja Luštrek, On behalf of the CardiolincTM network, "Circular RNAs in the cardiovascular system", *Non-coding RNA research*, 2018, **3**, 1, 1-11.
17. Miha Mlakar, Paolo Emilio Puddu, Maja Somrak, Silvio Bonfiglio, Mitja Luštrek, On behalf of the the Chiron and HeartMan research projects, "Mining telemonitored physiological data and patient-reported outcomes of congestive heart failure patients", *PLoS one*, 2018, **13**, 3, e0190323.
18. Vito Janko, Mitja Luštrek, "Using markov chains and multi-objective optimization for energy-efficient context recognition", *Sensors*, 2018, **18**, 1, 80.
19. Monika Simjanoska, Martin Gjoreski, Matjaž Gams, Ana Madevska Bogdanova, "Non-invasive blood pressure estimation from ECG using machine learning techniques", *Sensors*, 2018, **18**, 4, 1160.
20. Robert Oravec, Jerica Penko, Jana Suklan, Jana Krivec, "Prevalence of post-traumatic stress disorder, symptomatology and coping strategies among Slovene medical emergency professionals", *Sigurnost*, 2018, **60**, 2, 117-127.
11. Aleš Tavčar, Matjaž Gams, "Napredni pogovorni svetovalci", In: Matjaž Gams (ed.), Aleš Tavčar (ed.), *Workshop Electronic and mobile health and smart cities: proceedings of the 21st International Multiconference Information Society - IS 2018, 8-12 October, 2018, [Ljubljana, Slovenia]: volume I*, 2018, 53-56.
12. Tomaž Šef, "Postopki in priporočila za izgradnjo govorne zbirke za potrebe sinteze slovenskega govora", In: Matjaž Gams (ed.), Aleš Tavčar (ed.), *Workshop Electronic and mobile health and smart cities: proceedings of the 21st International Multiconference Information Society - IS 2018, 8-12 October, 2018, [Ljubljana, Slovenia]: volume I*, 2018, 46-49.
13. Mateja Drnovšek, Matjaž Gams, Aleš Tavčar, Gregor Grasselli, "Pregled asistentov IJS E9", In: Matjaž Gams (ed.), Aleš Tavčar (ed.), *Workshop Electronic and mobile health and smart cities: proceedings of the 21st International Multiconference Information Society - IS 2018, 8-12 October, 2018, [Ljubljana, Slovenia]: volume I*, 2018, 15-19.
14. Aljaž Glavač, Jernej Zupančič, Matjaž Gams, "The Summoner - "Izbirčnež"", In: Matjaž Gams (ed.), Aleš Tavčar (ed.), *Workshop Electronic and mobile health and smart cities: proceedings of the 21st International Multiconference Information Society - IS 2018, 8-12 October, 2018, [Ljubljana, Slovenia]: volume I*, 2018, 28-31.
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