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ICT in Life

Book of Abstracts

Editors: Ivana Đurđević Babić and Vjekoslav Galzina

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Work Organisation Models in the Age of Artificial Intelligence: A Typology and Human-Function-Based Identification Framework

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Abstract

The rapid diffusion of artificial intelligence (AI) across contemporary organisations is profoundly transforming work structures, decision-making processes and the roles of employees. This article develops a theoretical and methodological framework for identifying and specifying work organisation models in conditions of AI adoption, with particular attention to human functions and competencies as key determinants of organisational interaction patterns. The article situates the analysis within the broader trajectory of technical progress — specifically the transition from skill-biased change to AI-augmented employee creativity, enabled in practice by Cloud Computing and AI as a Service — and draws on an established normative model typology and the dualistic ontology of organisational theory. Four consecutive models are distinguished: the traditional model, the AI-supported model, the AI-collaboration model and the cognitive organisation model. The article concludes by proposing a human-function-based identification method grounded in competency analysis, enabling practitioners to assess an organisation's actual model, detect competency gaps and define development pathways in conditions of growing AI system autonomy.

Keywords: artificial intelligence, work organisation models, Cloud Computing, competency analysis, cognitive organisation

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The Use of Information and Communication Technologies in Swimming: Applications, Benefits, and Challenges

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Abstract

Digital technologies have significantly reshaped modern aquatic sport by enabling data-driven performance analysis, enhanced coaching strategies, and improved safety monitoring. This paper reviews recent developments in wearable inertial sensors, body sensor networks, intelligent analytics platforms, virtual reality systems, and embedded monitoring technologies applied in competitive and educational aquatic environments. Current evidence demonstrates that waterproof wearables equipped with accelerometers, gyroscopes, and attitude-heading reference systems allow accurate assessment of stroke mechanics, turns, body alignment, and workload. Real-time biomechanical feedback and cloud-based artificial intelligence analytics support individualized training optimization and long-term performance modeling. Technology-assisted instruction, including video modeling, immersive simulation, and mobile learning applications, enhances motor skill acquisition, reduces fear-related barriers, and strengthens psychological readiness. Beyond performance and learning, embedded computer vision and Internet of Things architectures contribute to drowning detection and risk monitoring, expanding the role of digital systems in aquatic safety. Despite rapid progress, several limitations remain, including high implementation costs, underwater signal transmission constraints, lack of metric standardization, data privacy concerns, and gaps in coach education for biomechanical data interpretation. Overreliance on technological systems may also challenge traditional coaching expertise. Overall, the integration of advanced sensor technologies and intelligent analytics presents substantial opportunities for performance enhancement, instructional innovation, and safety improvement in aquatic sport, provided that technical, ethical, and accessibility challenges are systematically addressed.

Keywords: Wearable inertial sensors, real-time biomechanical feedback, body sensor networks.

From Reaction to Anticipation: Cultivating Future Literacy in SMEs – Key Findings from the MegaStrat Project

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Abstract

The MegaStrat project addresses the critical 'temporal gap' in strategic planning by empowering Small and Medium-sized Enterprises (SMEs) and vocational educators through Long-Term Opportunity Foresight (LTOF). To bridge this gap, a web-based training program was developed, using a co-design approach involving strategic managers and innovation professionals. This collaborative process resulted in a learning journey structured around four core modules: Future Literacy – Establishing the Horizon (Module 1), Analytical Frameworks – Environmental Scanning (Module 2), Scenario Construction – Modeling Plausible Futures (Module 3), and Strategic Integration – From Insight to Action (Module 4). Each module is supported by real-life case studies, foresight method overviews, and practical toolkits for industry implementation. This study evaluates the piloting phase of the MegaStrat curriculum across Germany, Denmark, and Spain, where the framework was tested in real-world professional environments using qualitative piloting sessions and a quantitative online questionnaire. Empirical findings demonstrate a high degree of practical utility: 90% of participants reported acquiring knowledge directly relevant to their strategic needs, with no negative feedback regarding content relevance. Notably, trainers and educators reported the highest levels of satisfaction, with module-specific evaluation scores consistently ranging between 4.1 and 4.3 out of 5. Furthermore, approximately 80% of professional participants expressed a strong intent to integrate the LTOF toolkit into their permanent strategic activities. The study concludes that the MegaStrat framework effectively bridges the gap between highlevel futurology and actionable business strategy, fostering Strategic Autonomy and a culture of proactive innovation within the European industrial ecosystem.

Keywords: Futures Literacy, Long-Term Opportunity Foresight (LTOF), Web-Based Training, Piloting

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Didactic transformation of teaching in a digital environment: the role of futurological methods in the integration of ICT

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Abstract

The digital transformation of education in the last 15 years has significantly raised the issue of real didactic change in conditions of intensive application of information and communication technology (ICT). Despite the wide availability of digital tools, the integration of ICT often remains at the level of technical implementation, without a systematic reconstruction of didactic scenarios. Starting from the theoretical premises of didactics, digital pedagogy and the scientific approach to studying and creating the future in education, this paper analyzes the potential of futurological methods in planning and shaping the didactic transformation of teaching. The theoretical-analytical approach is based on a qualitative analysis of recent scientific literature and a conceptual synthesis of relevant pedagogical and methodological approaches. The findings indicate that futurological methods, such as scenario planning, the Delphi method and backcasting methods, enable anticipatory and reflexive shaping of didactic strategies, thereby reducing the risk of technological determinism and ad hoc digitalization. In conclusion, the integration of ICT becomes didactically sustainable only when it is linked to long-term pedagogical goals, the development of the competences of teaching participants and the strategic planning of educational changes.

Keywords: didactics, digital environment, futures studies, didactic transformation, educational innovation

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The Role of Information and Communication Technology in Contemporary Education

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Abstract

Information and Communication Technology (ICT) occupies an increasingly important position in modern educational systems and significantly influences teaching methods, learning experiences, and the organization of the instructional process. The aim of this paper is to analyze the pedagogical potential of ICT integration in education, with particular emphasis on its contribution to learning quality, the development of student competencies, and the professional growth of teachers. The paper is based on a theoretical understanding of ICT as a set of digital tools, communication systems, and network technologies that enable access to information, collaboration, and interactive learning. Special attention is given to the impact of ICT on student motivation and engagement, opportunities for personalized learning, and the development of digital literacy and 21st-century skills. The role of ICT in teachers' professional practice is also examined, particularly in the areas of assessment, monitoring student progress, and organizing instruction. In addition to numerous benefits, the paper analyzes challenges in ICT implementation, including insufficient infrastructure, inadequate teacher training, and resistance to change. In conclusion, it is emphasized that the effectiveness of ICT depends on its pedagogically sound integration into teaching and systematic support for teachers and educational institutions.

Keywords: ICT in education, digital literacy, contemporary teaching, educational technology, inclusive education

Integrating Artificial Intelligence in Literature Education: A Pedagogical Framework for Teaching Folklore

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Abstract

Albanian schools have traditionally been characterized by classical teaching models focused on linear knowledge transmission. However, within medium- and long-term educational development strategies, concrete steps have been taken toward the integration of pedagogical and technological innovation. This transformation begins in university education, where today's students represent the future teachers of literature. The aim of this paper is to analyze how these students will adapt to a new generation of learners closely connected to the digital environment and Artificial Intelligence (AI) tools. The study examines the suitability of AI for constructing contemporary teaching models in literature, particularly in the treatment of folkloric materials such as legends, as well as its role in preserving or transforming cultural heritage. The research is based on a structured questionnaire assessing students' familiarity with AI, their perceptions of its role in teaching, and their ability to develop interpretative, creative, critical, and digital competencies. Special attention is given to how legend of besa/the given word, Constandine and Doruntine can be recontextualized in a contemporary framework through technological mediation while maintaining their cultural essence. Conclusions suggest that it is necessary to provide new models for teaching cultural heritage and the future teachers should be trained as soon as possible to be prepared for new century professional competencies.

Keywords: Artificial Intelligence (AI), literature teaching, folklore education, legend, digital pedagogy.

National Security and Cybercrime in the European Union: Strategic Vulnerabilities, Regulatory Innovation, and Integrated Defense Mechanisms

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Abstract

In the European Union, cybercrime has turned out to be more of a national security problem than a technical or criminal justice problem. The continuous digitalization of critical infrastructure, government administration, economies and democratic practices has left strategic vulnerabilities that may be exploited by state and non-state actors.

This paper explores the concept of cybercrime and cyber threat as a multidimensional threat to EU national security, the creation of EU regulation, security of critical infrastructure, emerging dangers on a technological front and institutional collaboration.

The authors identify some of the enduring challenges that include regulatory fragmentation, the absence of a consistent implementation power among the Member States, institutional complexity and pace of technological change outpacing legal change through the analysis of some of the main EU legal instruments including NIS2 Directive, Cyber Resilience Act, Critical Entities Resilience Directive and Cyber Solidarity Act.

It presents the argument that to govern cybersecurity in the European Union successfully, it will be necessary to create integrated regulatory frameworks, improve technological security, increase cooperation between the public and the private sector, augment the cooperation between countries and devote more attention to basic rights and democratic values.

Keywords: european union, cybercrime, national security, critical infrastructure, cybersecurity governance

Interrelationship between User Experience and Content Personalization: Users' Attitudes and Expectations

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Abstract

This paper explores the interrelationship between user experience (UX) and content personalization in contemporary digital environments, with a particular focus on users' attitudes, expectations, and concerns regarding privacy. As digital platforms increasingly rely on personalization strategies to manage information overload and improve engagement, understanding how these practices impact the overall user experience has become a key research question. The study combines a theoretical overview of key concepts of UX and personalization with empirical research based on a survey conducted among 129 respondents. The research examined internet usage habits, perceptions of website design, awareness of content personalization, users' attitudes and expectations toward content personalization and user experience of websites and their interrelationship as well as users' privacy concerns. The findings show that usability, clarity and intuitive navigation are perceived as primary determinants of a positive user experience, while content personalization plays a secondary and supporting role. While respondents generally recognize the potential benefits of personalization, their acceptance is strongly influenced by transparency, perceived relevance and trust in data handling practices. Privacy concerns emerged as a significant factor shaping user attitudes, with many participants prioritizing data protection over personalized experiences. The results suggest that personalization can only improve user experience when implemented ethically, transparently and in line with user expectations.

Keywords: content personalization, user experience, websites

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Musical creativity with ICT tools for students with autism spectrum disorder

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Abstract

Humans are inherently musical beings. Enhanced musical interaction may play a significant role in improving social engagement among students with autism spectrum disorder (ASD) and progress in musical interaction is strongly associated with increased musical creativity. The aim of this study is to examine the potential impact of Information and Communications Technology (ICT) tool use in supporting and enhancing musical creativity in students with ASD. A qualitative case study design was employed involving three fifth-grade students enrolled in a specialized educational program at the Autism Center, each working individually with the researcher. Over the course of eight sessions conducted once a week over a two-month period, within a music therapy framework, students were encouraged to create original musical compositions using the free digital music tool Chrome Music Lab. The researcher systematically observed and documented changes in musical engagement, originality, and creative expression, with an emphasis on participants' use and development of core musical elements, including rhythm, melody, harmony, and timbre, across sessions. The results of this study will contribute to the scientific understanding of the role of ICT tools in supporting and enhancing musical creativity among students with ASD suggesting that ICT-supported music therapy may be an effective approach for fostering creative development in students with autism spectrum disorder.

Keywords: musical creativity, ASD, ICT, music therapy

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Analysis of Facebook use in the context of school-parent cooperation: the example of primary schools in Baranja

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Abstract

The use of digital tools and social networks is part of everyday communication, so parent-teacher cooperation is also being digitalized. This paper analyzes the way in which elementary schools in the Baranja region use the social network Facebook as a tool for communication and cooperation with parents. The aim of the research was to determine which forms of digital cooperation with parents appear in Facebook posts and which of them are the most common. The research was conducted using the method of content analysis of publicly available posts on the official Facebook pages of schools during the 2024/2025 school year (from September 1, 2024 to August 31, 2025). Epstein's model of parental involvement (parenting, communicating, volunteering, learning at home, decision-making, and collaborating with the community) was used as the theoretical framework for the research. The analysis shows that elementary schools in Baranja primarily use the social network Facebook as a channel for informing parents about school activities and projects. Although cooperation with the community is visibly represented, dimensions that imply active cooperation with parents, such as support for home learning, parent volunteering and participation in decision-making, are almost completely absent. The research results show disagreement in the forms of cooperation between parents and schools, because although the importance of modern tools is emphasized, the traditional form of cooperation still prevails.

Keywords: cooperation, facebook, parents, school

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Usage habits and perceived usefulness of AI tools among music students

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Abstract

The rapid development of information and communication technology, especially generative artificial intelligence (AI), is significantly changing modern education. This paper investigates the usage habits and perceived usefulness of AI tools among music students at the Academy of Arts and Culture in Osijek. The aim of the research was to determine for what purposes students use AI tools and whether there are differences in their attitudes with respect to gender and year of study. The research was conducted on a sample of 64 students using an anonymous questionnaire. The results indicate a high rate of integration of AI technology (84.4%), with ChatGPT being the most common tool (88.9%). It was found that students primarily use AI for general academic tasks such as preparing exams and writing term papers, while its application in specifically artistic processes, such as analyzing scores or composing, is still in its early stages. The analysis of perceived usefulness shows that students see AI as a useful complement to traditional methods. The results of the Mann-Whitney U-test did not show a statistically significant difference in the perception of usefulness of AI tools with respect to gender and year of study. Despite recognizing the potential for personalizing learning, it can be concluded that there is a need to develop critical AI literacy so that technology serves as a support, not a substitute, for artistic creativity.

Keywords: use of AI tools, perception of usefulness, music students

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Literary Platforms in the Digital Age: Reader Engagement and Their Impact on Literary Culture

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Abstract

The digital transformation of contemporary culture has profoundly reshaped literary reading practices and modes of reception. This paper investigates how Albanian-language digital platforms - blogs, online literary communities, and social media - reconfigure the relationship between reader, text, and author by fostering participatory and algorithmically mediated forms of engagement.

The study is grounded in reception theory (Jauss, Iser) and critical reflections on authorship (Barthes), situating digital literary culture within a broader shift from stable interpretative hierarchies to more dialogic and decentralized meaning-making processes. Methodologically, it draws on a mixed-methods questionnaire administered to university students in literature and related humanities. Quantitative findings map patterns of access, participation, and perceived influence, while qualitative responses illuminate readers’ reflections on aesthetic authority, authorship, and value formation.

The results reveal a structurally aware readership: most participants perceive algorithms as significantly shaping the circulation of literary value, while online discussions exert a more moderate but tangible influence on individual text selection. Although digital platforms are considered efficient and accessible, active creative participation remains limited, suggesting a gap between perceived impact and actual engagement. Respondents express ambivalent attitudes toward digital mediation, praising its accessibility and community-building potential while raising concerns about fragmentation, performative reading practices, and the privileging of viral visibility over aesthetic depth.

The paper argues that digital platforms do not diminish literature but foreground its dialogic nature, democratizing literary discourse while destabilizing traditional cultural authority.

Keywords: digital platforms, algorithmic culture, digital literary culture, literature, authorship

Strategic ICT Integration in Education as a Driver of Intelligent and Lifelong Learning Development

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Abstract

The rapid digital transformation of contemporary society has positioned Information and Communication Technologies (ICT) as a central element of educational innovation. This paper examines the primary goal of identifying how the strategic integration of ICT in education can foster lifelong learning competencies and contribute to intelligent societal development. Rather than viewing technology as a mere instructional tool, the study conceptualizes ICT as a pedagogically grounded framework that enhances sustainable educational practices.

The research adopts a conceptual and analytical approach, drawing upon contemporary educational theory and reflective professional practice in formal learning environments. It analyzes how digital platforms, interactive applications, and technology-enhanced instruction support learner autonomy, digital literacy, critical thinking, and self-regulated learning. These competencies are recognized as fundamental for lifelong learning in dynamic social and professional contexts.

The findings indicate that effective ICT integration requires systematic planning, continuous teacher professional development, and alignment with long-term educational objectives. Key challenges include digital inequality, insufficient pedagogical training, and ethical considerations related to data security and responsible technology use.

The paper concludes that strategically implemented ICT not only improves instructional effectiveness but also empowers individuals to engage in continuous learning, thereby supporting intelligent and sustainable development in education and society.

Keywords: ict in education, lifelong learning, intelligent development, digital competencies, educational innovation

Reading - writing and using ICT in their learning

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Abstract

This paper aims to examine and analyze the policy used for the learning of the first language (L1) based on two components, reading and writing. Learning to read and write is a very important, but also complicated process that is important for the intellectual formation of students and creates a good basis for learning foreign languages, therefore we think that the approach to new methodologies and strategies can help overcoming difficulties in this field.

The traditional methodology of language learning (L1 or L2) seems to not always meet our expectations; therefore it is being demanded that technology and especially Artificial Intelligence be included as much as possible in education and especially in language learning.

A few years ago, the concepts and mechanisms of AI referred more to high school, education at this stage, in recent years everything has changed. AI technology and concepts are also being incorporated into K-12 education. This appears to be a challenge for both teachers and students. Some of these concepts are more popular for learning process of foreign languages, we will prove how known they are to the teachers who teach the Albanian language.

Are the teachers ready for the inclusion of AI in the teaching of the Albanian language? How well have they acquired digital skills? National programmes are prioritizing the use of technology in education, but how much are they used in the function of learning Albanian? How can we integrate AI in the first steps of mother tongue learning?

The paper draws on semi-structured interviews with K-12 teachers, who teach the Albanian language, chosen from urban and rural areas, with an average teaching experience of 10 years. We also assisted in several classes to closely observe the teacher's work. The teachers were interviewed individually face to face during the period from April to June 2025. In general, the teachers need a support for new challenges of implementation of AI education.

Keywords: artificial intelligence; language learning; mother tongue (L1); reading; writing.

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Development of creativity in primary education with responsible GenAI practices

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Abstract

Generative AI tools are rapidly entering primary classrooms, raising a tension between “outsourcing” student work and expanding what young learners can imagine and express. This study examines how GenAI relates to creativity development in primary education, focusing on conditions under which GenAI constrains or amplifies creative learning. We combine (1) a structured review of peer-reviewed research published in the last five years and (2) a teacher survey based on a random sample of Croatian primary school teachers.

The literature review maps dominant conceptualizations of creativity (e.g., divergent thinking, creative process, multimodal expression), typical GenAI classroom use cases (idea generation, drafting, visualization, music/video prototyping), and reported risks (dependency, reduced practice of foundational skills, homogenisation of outputs, and assessment integrity concerns). The survey captures teachers’ current GenAI practices, perceived impacts on pupils’ creativity and core skills, confidence in designing “AI-supported but student-authored” tasks, and safeguards used in everyday teaching.

We propose an “amplification” framework that distinguishes GenAI as (a) product generator that can displace skill practice when used to deliver finished answers, versus (b) creativity scaffold that extends ideation, exploration, and multimodal representation when used under teacher-guided constraints (e.g., iterative prompting, critique-and-revise cycles, provenance reflection, and process-based assessment). The paper reports practical design principles for intelligent, responsible integration of GenAI in primary education aimed at preserving skill development while widening pupils’ creative possibilities.

Keywords: artificial intelligence, creativity, primary education, multimodal learning, teacher perceptions

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AI and Bloom's 2-Sigma Problem: Between Potential and Empirical Evidence

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Abstract

Bloom's 2-sigma problem has long represented one of the central open questions in education: how to achieve the effectiveness of one-to-one tutoring within conventional classroom settings. Bloom demonstrated that students receiving individual tutoring performed, on average, two standard deviations above those in traditional instruction, highlighting the substantial benefits of personalized learning.

The development of Intelligent Tutoring Systems (ITS) and contemporary AI-based solutions has renewed interest in whether technology can help bridge this gap. This paper reviews scientific studies published over the past fifteen years (with the exception of Bloom's original work) in order to examine empirical evidence regarding the impact of ITS on student achievement. Based on selected keywords, searches were conducted using databases and search engines such as Google Scholar, ERIC, IEEE Xplore, and Scopus.

Preliminary findings indicate consistent improvements compared to standard instruction, with reported effect sizes typically ranging from approximately $d \approx 0.6$ to $d \approx 0.8$. While these results suggest meaningful educational potential, they remain substantially below the 2-sigma effect ($d \approx 2$) identified by Bloom in the context of individual tutoring. More recently, systems based on large language models (LLMs) have emerged, and their educational effects are still being systematically examined. The paper discusses the extent to which contemporary AI approaches approximate the ideal of personalized instruction and considers implications for educational practice.

Keywords: 2-sigma problem, artificial intelligence, education, intelligent tutoring systems (ITS), personalized learning

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Effectiveness of Online Learning in Higher Education – Challenges and Opportunities

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Abstract

This review paper examines contemporary online learning with a focus on its challenges and opportunities in higher education. Based on recent scholarly literature, it outlines the evolution of online education from early distance-learning models to current integrations of advanced technologies such as artificial intelligence, learning analytics and virtual reality. The paper discusses key pedagogical challenges—student engagement and motivation, teachers' role adaptation, and the provision of social interaction and emotional support in virtual environments—as well as technological barriers including the digital divide and insufficient digital literacy. The thematic synthesis highlights trends such as the gradual introduction of technology in teaching, the importance of interactive strategies to reduce isolation, and the need for continuous technological and pedagogical support. The discussion integrates findings and practical examples, and the concluding section proposes improvements ranging from strengthening student engagement and teacher competences to upgrading infrastructure and support services. The paper concludes that, with appropriate strategic interventions, online learning can enhance access, flexibility and educational quality while mitigating challenges through innovative solutions.

Keywords: online learning, e-learning, distance education, digital pedagogy, educational innovation

The Albanian world in the work of the painter Abdurrahim Buza

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Abstract

This study aims to analyze the creativity of the painter Abdurrahim Buza and his role in shaping the modern identity of Albanian visual art. The research aims to highlight how Buza, through an original coloristic and symbolic vision, has represented the Albanian world, transforming historical and social reality into a distinct and identifiable artistic language.

The research process has been developed on the basis of a qualitative methodology, where the main literatures in Albanian and foreign languages, archival and study sources have been examined, as well as direct observation of the author's works has been carried out at the National Gallery of Arts and in the studio-museum of the Buza family. The analysis of this material has enabled to follow the artistic development of the painter, from the early impressionist and expressionist influences, to the creation of a codified, symbolic and decorative style, with a strong national accent.

The results of the study show that Buza's work represents an important synthesis between Albanian tradition and artistic modernity, turning the human figure into a powerful humanist tool and a carrier of identity symbolism. His creativity continues to remain a source of inspiration for new generations of artists and a point of reference in the history of Albanian art, through its distinctive coloring, expressive energy and clear cultural messages.

Keywords: Abdurrahim Buza, painting, art, Albania

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ICT-Supported Creative Inclusive Education in Primary Schools: Advancing Intelligent Development

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Abstract

The rapid digital transformation of contemporary society requires education systems to integrate Information and Communication Technology (ICT) in ways that promote intelligent development and inclusive practices. Intelligent development in education refers to the strategic integration of digital tools, pedagogical innovation, and inclusive principles to enhance learning outcomes and ensure equal participation for all students.

This study examines the role of ICT-supported creative methodologies—particularly digital storytelling and puppet theatre—in creating inclusive learning environments. Grounded in constructivist theory and the Universal Design for Learning (UDL) framework, the study adopts a qualitative case study approach conducted in a lower secondary school in Shkodra, Albania. The findings are based on interviews, questionnaires, and focus groups with both students and teachers.

The results indicate that combining ICT with creative pedagogy increases student engagement, improves communication skills, and strengthens participation, including among students with speech and language difficulties. The findings suggest that intelligent educational development requires the intentional integration of technology, teachers’ professional competence, and inclusive pedagogical principles. When used with clear pedagogical purpose, ICT becomes a transformative tool for equitable and sustainable educational innovation.

Keywords: ICT in education; intelligent development; inclusive education; digital storytelling; creative pedagogy

Challenges of digital parenting

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Abstract

The rapid advancement of digital technologies at the end of the 20th century has influenced the development and upbringing of children, both in the educational environment and in their free time. The influence can have both positive and negative effects, and it is up to parents to manage this influence. In this context, parents are faced with challenges that sometimes they themselves are unsure how to manage.

The aim of the research is to examine the level of parental involvement in children's digital activities, the digital technologies and risks to which children are exposed, the parents' digital literacy, and their attitudes towards digital technologies.

116 parents of children aged 7-10 from Osijek-Baranja County, Croatia, participated in the study. Data were collected via an online questionnaire between 9.5.2025. and 13.6.2025.

The results showed that mothers are more involved in children's digital activities, and that parental age influences involvement. The child's chronological age is associated with exposure to digital technologies and parents' attitudes toward them. In addition, greater digital literacy implies greater parental involvement.

The limitations of this research are related to the instrument developed for the study and the adequacy of the research sample.

Keywords: children, digital literacy, digital technology, involvement, parents

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A review of existing TPACK measurement instruments

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Abstract

The TPACK theoretical framework was developed in 2006. Since then, it has been widely applied in different contexts and systematically upgraded. In accordance with this development and wide application, numerous measurement instruments have been developed. The diversity of TPACK measurement instruments allows their application in a large number of different contexts and for different populations of respondents. The aim of this research is to provide a systematic overview of available TPACK measurement instruments, indicating their basic characteristics.

The research was conducted using the PRISMA 2020 methodology for a systematic literature review. The search was conducted in the Web of Science and Scopus databases on November 25, 2025. The analysis included works that represent the development or validation of instruments for measuring TPACK. The following criteria were analyzed for each measurement instrument: author and year of instrument development, type of instrument, response format, target population, TPACK dimensions that the instrument measures, and context.

The result of the research is a structured data set that provides researchers with the opportunity to select an appropriate instrument for measuring TPACK.

Keywords: measurement instrument, PRISMA, TPACK.

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Generative Artificial Intelligence in English as a Foreign Language Teaching and Learning: An Integrative Review of Benefits and Challenges

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Abstract

Generative Artificial Intelligence (GenAI) has become increasingly prevalent across many aspects of human life, including education. This trend is particularly true in the field of English as a Foreign Language (EFL) teaching and learning, where GenAI offers teachers and learners new affordances for language use, practice, and interaction. Current literature indicates a need for the synthesis and evaluation of multiple methodologies and theoretical frameworks on the topic. Therefore, the aim of this integrative literature review is to critically examine and synthesize the benefits and challenges associated with the integration of GenAI in EFL teaching and learning. The analysis of existing research highlights benefits primarily related to language skills development, higher-order thinking, the affective domain, and teacher-related benefits. These benefits include personalized learning, timely feedback, increased affective factors such as learner motivation, improved learning outcomes, and a reduction in teacher workload. However, the literature also identifies several significant challenges, including over-reliance on AI tools, issues of accuracy and bias, risks of academic dishonesty, and concerns related to privacy and ethics.

Furthermore, the reviewed literature suggests several practical recommendations, such as the need for teacher-mediated use of GenAI, improvements in teacher and student AI literacy, the encouragement of learner autonomy and self-regulated learning, and increased awareness regarding the ethical use of GenAI. The findings of this review contribute to the emerging theoretical understanding of GenAI in EFL context and may inform policymakers and practitioners by outlining key trends and critical considerations for the future use of GenAI in EFL teaching and learning.

Keywords: English as a Foreign Language, Generative Artificial Intelligence, Integrative Literature Review, Language learning

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Digital fatigue and student wellbeing in higher education: a cross-sectional analysis

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Abstract

Digital fatigue represents a multidimensional phenomenon characterized by physical, cognitive, and emotional exhaustion resulting from prolonged engagement with digital devices. This cross-sectional, descriptive-analytical study will be conducted on undergraduate and graduate students enrolled at the University of Osijek to obtain data on digital fatigue levels. Data will be collected through an online survey questionnaire (Google Forms) distributed from February to March, 2026, targeting a minimum sample of 200 participants via stratified convenience sampling by academic year and gender.

The research tests three primary hypotheses: (H1) Students reporting higher pressure to be constantly available on digital platforms will indicate significantly elevated anxiety and stress symptoms. (H2) Students who regularly disable notifications will indicate significantly lower digital fatigue, higher academic performance, and lower psychological distress compared to those who do not manage notifications. (H3) Students who fall asleep while using mobile devices will significantly predict digital fatigue and negatively predict sleep quality, daytime functioning, and academic performance. Collected data will undergo statistical processing including descriptive statistics (means, frequencies), inferential tests and multiple regression for hypothesis testing. The study examines manifestations across multiple dimensions, including physical symptoms such as ocular strain and musculoskeletal complaints; psychological impacts including anxiety, depression, and burnout; effects on academic performance and cognitive functioning; and influences on social connectedness and sense of belonging.

The results will provide insight into the level of digital fatigue among students and recommendations for prevention strategies to enhance student wellbeing and academic success in increasingly digital educational environments.

Keywords: digital fatigue, digitalization, mental health, student wellbeing

Role of postural stability in identifying risks for neurological and behavioral disorders in younger school-age children

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Abstract

Postural control involves mechanisms that regulate body movements and positioning, particularly challenging for younger schoolchildren who rely on continuous sensory processing and adaptive motor responses for balance. The information and communication technology - ICT tools, such as baropodometry and digital stabilometric platforms, enable objective assessment of postural risks linked to neurological and behavioral disorders like attention-deficit/hyperactivity disorder - ADHD, developmental coordination disorder - DCD, and autism spectrum disorder - ASD, often preceding stabilometry for comprehensive evaluation.

The objective of this is to systematically analyzes literature on postural control in cognitive and behavioral disorders, highlighting ICT applications in assessment and management. Children with ADHD show increased postural sway, reduced stabilization efficiency, and oculomotor deficits. Those with DCD struggle with sensory organization and postural adaptation under cognitive load, risking system overload. ASD children display atypical balance regulation, motor planning issues, and elevated muscle tone due to sensory integration deficits.

Virtual reality-based neurorehabilitation offers automated tracking and adaptive task difficulty, proving effective for these pediatric populations. These findings emphasize postural stability assessments' diagnostic and therapeutic potential.

Keywords: ICT, neurobehavioral disorders, postural stability.

Privacy and Data Protection in Online Learning Platforms: A Systematic Review of Data Collection Practices, Governance Risks, and Institutional Safeguards

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Abstract

Online learning has fundamentally changed the way education is delivered, assessed, and supported in the schools and universities. However, these platforms usually gather, handle and distribute large amounts of personal data, such as identity, behavioral, academic, and in some cases biometric data. The emergence of digital education is continuously increasing the necessity for concrete evidence of privacy risks, governance shortcomings, and the effectiveness of existing safeguards. The aim of this paper is to systematically analyze peer-reviewed literature addressing privacy and data protection issues in online learning platforms, with a focus on learning management systems, virtual classrooms, and related educational technologies. The research follows the PRISMA methodology and draws on information from major academic databases. The Mixed Method Appraisal Tool (MMAT) is used to assess the methodological quality of studies included in review, and thematic analysis is applied to synthesize the findings. The results provide a structured overview of privacy risks and protective measures in online learning platforms, a more detailed description of the governance gaps between educational institutions and technology vendors, and a set of evidence-based recommendations for educational leaders and policymakers.

Keywords: online learning platforms, privacy risks, protective measures

ICT as Support for the Constructivist Approach in Technical Culture Education through Activities of the Croatian Association of Technical Culture and its Unions

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Abstract

The paper explores the potential of information and communication technologies (ICT) to promote the constructivist approach in technical culture education through extracurricular and out-of-school activities of the Croatian Association of Technical Culture (HZTK) and its unions, emphasizing active knowledge construction, problem-solving, and collaborative learning. The study aims to analyze the experiences of these unions in using ICT tools (simulations, digital design, block programming) and their effects on the development of technical competencies of participants, motivation, and organizational practices.

The study is conducted as a descriptive-qualitative research with multiple case study design on a sample of 19 national technical culture unions. Data are collected through: (1) semi-structured interviews with key actors (union representatives, N=38–57), (2) document analysis (activity reports, projects, materials with ICT integration), and (3) direct/indirect observation of selected activities (competitions, workshops). Data analysis is performed using thematic analysis according to Braun & Clarke (2006), with source triangulation for validity. Key themes are expected to be identified, such as the impact of ICT on the innovativeness of activities, implementation challenges, and recommendations for future practices.

The conclusion will emphasize that ICT significantly enriches constructivist principles in the work of national technical culture unions, but requires standardized training and resources. Wider collaboration of unions with educational institutions is recommended in accordance with regional STEM initiatives.

Keywords: constructivism, technical culture, STEM education, extracurricular activities, active learning

Parental Awareness of Media Influence on Preschool Children: Knowledge, Attitudes, and Digital Content Control*

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Abstract

The pervasiveness of digital technologies has fundamentally reshaped childhood, making media exposure an unavoidable aspect of early development. Grounded in Bronfenbrenner's ecological systems theory, which emphasizes the role of the environment in shaping child development, this paper explores how parents of preschool-aged children perceive, understand, and respond to their children's media and internet use. Drawing on the premise that parents serve as key mediators between children and digital content, a study was conducted in Croatia during the 2024/2025 academic year. Findings reveal that while most parents are aware that media use carries both benefits and risks, their knowledge remains largely partial and their mediation practices inconsistent. Parents generally recognize the potential of digital tools for developing future competencies, yet simultaneously express concern about risks such as addiction, reduced physical activity, and exposure to inappropriate content. Crucially, setting screen time limits and actively monitoring content quality are practices that do not consistently coexist: a considerable number of parents apply one in the absence of the other. These findings align with broader research literature suggesting that the impact of media on children is not inherently positive or negative, but is shaped by how content is used and guided. The results underscore the need for targeted parental education and a more holistic understanding of digital content quality, age-appropriateness, and the importance of co-viewing and open communication within the family. The insights gained from this initial study served as a motivating basis for the design of a larger-scale research endeavour conducted within the PedNet project.

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Keywords: digital media literacy, internet safety, parental mediation, preschool children, screen time

Multilingual Access and Learning Success in Digital Education Through Massive Open Online Courses

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Abstract

Massive Open Online Courses (MOOCs) have transformed access to digital education worldwide, yet learner success remains constrained by linguistic accessibility. While technological infrastructure and digital access have been widely studied, multilingual access, a critical factor affecting engagement and course completion, remains underexplored. This study examines how language availability across eight major MOOC platforms, including Coursera, edX, Udemy, Swayam, MiriadaX, FUN MOOC, XuetangX, and K-MOOC, influences learner participation and completion, particularly for users in developing regions with varying English proficiency. A comparative descriptive analysis of platform characteristics, including course quantity, registered users, languages offered, and reported completion rates, highlights substantial variation in multilingual access and engagement outcomes. Results indicate that limited language options increase cognitive load, reduce learner confidence, and negatively affect sustained participation, while platforms offering courses in learners' native languages exhibit higher completion rates. The study further identifies that learner motivation, course design quality, subtitles, translations, and technological access moderate the impact of multilingual accessibility on learning outcomes. A conceptual framework is proposed to illustrate the pathways through which language availability shapes engagement and success in digital education. These findings emphasize the importance of expanding multilingual offerings, improving instructional clarity, and providing language support mechanisms to foster equitable and effective learning experiences. By addressing linguistic barriers, MOOCs can enhance learner engagement, completion, and human capital development across diverse global contexts.

Keywords: Digital Education, MOOCs, Linguistic Accessibility, E-Learning

Perceived Usefulness Of Artificial Intelligence Tools: Artificial Neural Networks Framework

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Abstract

It is undeniable that artificial intelligence tools have a significant daily impact on people's lives. However, the rapid development of artificial intelligence and its associated tools is causing concern among some individuals, which is reflected in their use of these technologies. It is well known that attitudes towards something are influenced by many factors. The same applies to artificial intelligence (AI) tools. Therefore, the aim of this paper is to explore the capability of an artificial neural network (ANN) model in identifying perceived AI usefulness, specifically in management, efficiency, or access to information. The developed multilayer perceptron (MLP) neural network model achieved an overall classification accuracy of 70% and a higher accuracy (83.33%) in detecting participants with a positive attitude towards AI usefulness. The variable with the greatest impact on the model's accuracy was the use of online tools for shopping, suggesting that frequent use of well-designed AI-driven shopping platforms can lead to a more favourable attitude towards AI.

Keywords: artificial intelligence, artificial neural networks, attitudes, students

Problem-Solving in Daily-Life Through the Perspective of Discrete Structures From the Field of Computer Science Using ICT Tools

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Abstract

Discrete as the opposite of continuous means consisting of separable/sectional/divisible parts that are distinct/unique. Structures are objects made up from the simpler ones based on a certain pattern. Discrete structures (DS) are on the other hand structures that are discrete. The concepts and principles of DS from the field of computer science are widely used in many areas such as biology, economics, engineering, image processing, linguistics, mathematics, philosophy, and science. Additionally, the topics and techniques related to DS are closely related to computing. Within this scope, the skills of abstract-thinking and problem-solving are needed for people to make abstract things concrete and work on non-abstract things. As a well-known fact, there are some things in life with no gray-areas. This means all/nothing, completion/non-completion, and do/do-not-do types of situations/events/circumstances/cases are involved in many tasks, processes, procedures, and issues in life. Moreover, these are distinguishable things such as zero-one / false-true / black-white that are discrete. In this study, we deal with solving daily-life problems through this perspective of DS that can be useful for rational thinking. Regarding how to approach to the solution, the utilization of ICT tools is addressed with some real-world examples. To solve any particular problem, it is a must to represent/define it well. DS knowledge helps people define problems this way. Gaining the perspective mentioned is significant to understand the differences not only between continuous and discrete (like real/natural numbers) or analog and digital (for data/operations), but also between real-world (non-computer world/environment) and digital computers (computer world).

Keywords: problem-solving, daily-life, discrete structures, computer science, and ICT.

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Gamification in Teaching Children's Literature: Its Impact on Students Motivation

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This paper aims to analyze the motivational impact of gamification in the context of teaching children's literature, with particular emphasis on improving student engagement and learning outcomes. This research combines quantitative data obtained through structures questionnaires and quantitative data obtained through semi structured interviews. The research is conducted with pre-service teachers and seeks to evaluate the impact of gamified practices in improving reading engagement and comprehension of different texts of children's literature.

The findings suggest that the combination of gamified practices with reading strategies improves effectiveness of text comprehension, enhances the quality of the learning environment, optimizes the motivation and engagement of the pre-service teachers, and boosts inclusiveness. Pre-service teachers demonstrated increased participation, sustained attention, positive attitude and even enthusiasm towards reading and analyzing literary texts.

As a result, a balanced combination between traditional and gamified practices brings better learning outcomes at pre-service teachers. Moreover, new methodological approaches towards teaching children's literature brings enthusiasm and deeper connection with the literary texts, both of which are crucial for the development of the future educators.

Keywords: gamifies practices, children's literature, pre-service teachers, engagement, enthusiasm, etc.

EFFECT OF DIFFERENT TYPES OF CREATINE SUPPLEMENTATION ON ACUTE MUSCLE STRENGTH

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Doctoral Study Programme: Educational Sciences and Perspectives of Education

Abstract

This study examined the effect of short-term supplementation with different forms of creatine on acute muscle strength of the upper and lower extremities. Thirty physically active kinesiology students aged 21–26 years participated in the study and were randomly assigned to three groups: placebo, creatine monohydrate, and creatine complex. Maximal muscle strength of the m. biceps brachii and m. quadriceps femoris was assessed using a digital handheld dynamometer (microFET2), which enables precise electronic measurement and recording of muscle force. Data collection and processing were supported by ICT-based measurement technology, enabling precise recording and analysis of muscle strength data. Statistical analysis was performed using statistical software and one-way analysis of variance (ANOVA) with a significance level of $p < 0.05$, demonstrating the application of ICT technologies in sports science research. Participants consumed 5 g of the assigned supplement daily during a seven-day supplementation period. The results showed an increase in muscle strength in most participants who used creatine supplements. The greatest increase in biceps brachii strength was observed in the creatine complex group, while the largest increase in quadriceps femoris strength was found in the creatine monohydrate group. However, no statistically significant differences between groups were observed. These findings suggest a potential positive effect of short-term creatine supplementation on muscle strength.

Keywords: creatine, supplementation, muscle strength, dynamometry, ict

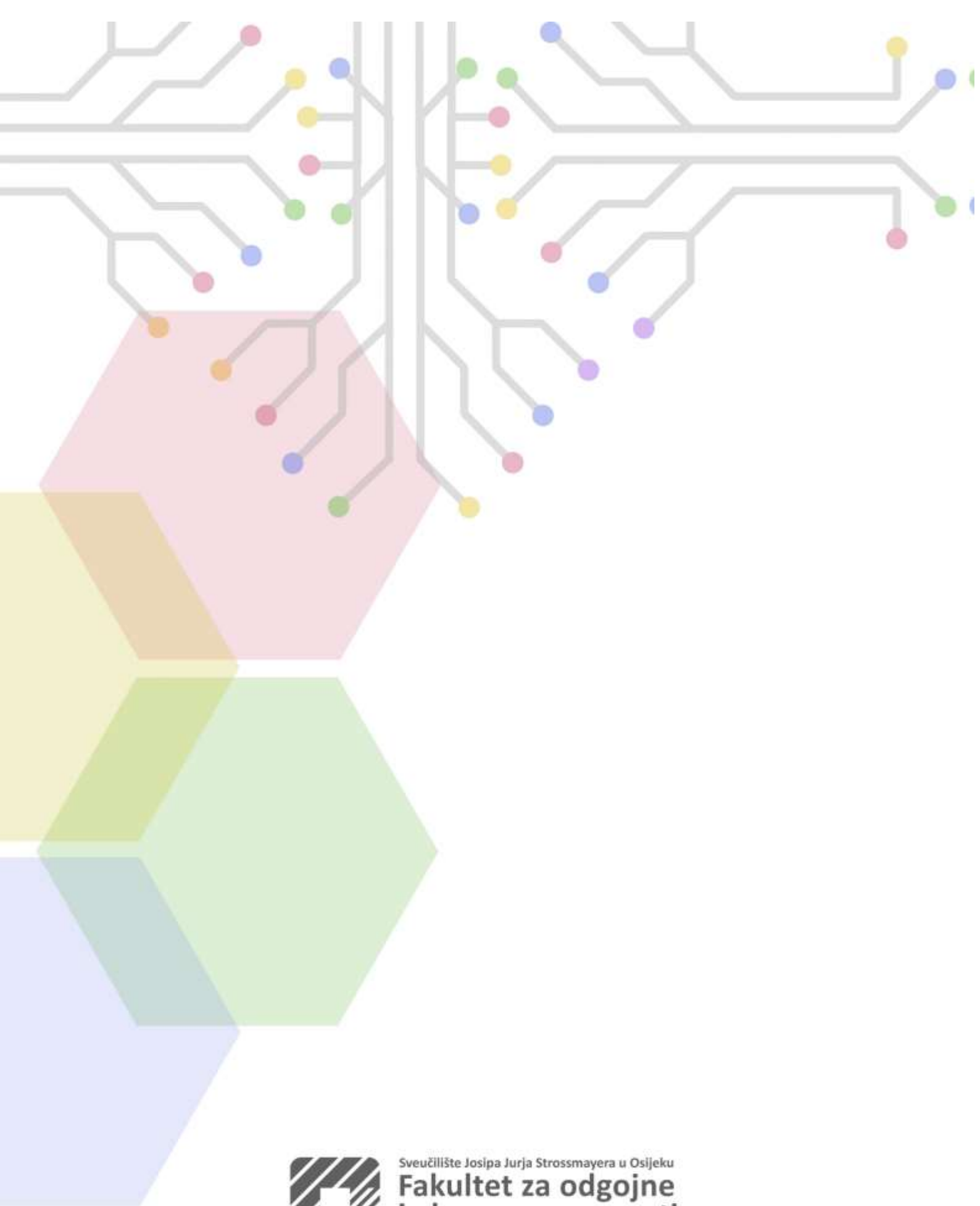
IoT BASED OBSTACLE AVOIDING ROBOT WITH CAMERA A PROJECT REPORT

Sivashree Boobesh

Abstract

The rapid advancement of robotics and Internet of Things (IoT) technologies has enabled the development of intelligent autonomous systems for real-time monitoring and navigation. However, many low-cost robotic systems still face challenges such as lack of realtime obstacle detection, limited environmental awareness, and absence of remote monitoring capabilities. To address these limitations, the project titled “IoT Based Obstacle Avoiding Robot with Camera” is developed. The primary objective of this system is to design an autonomous robot capable of detecting obstacles, avoiding collisions, and providing live visual monitoring through an IoT-based interface. The system utilizes ultrasonic and infrared sensors to continuously monitor the surrounding environment and detect obstacles in real time. Based on the sensor data, the embedded microcontroller processes the information and controls the movement of the robot using a motor driver module. When an obstacle is detected within a predefined threshold distance, the system automatically alters its path to ensure smooth and collision-free navigation. This enhances the robot’s ability to operate efficiently in dynamic environments without human intervention. In addition to obstacle detection, a camera module is integrated into the system to provide real-time video streaming. The video feed is transmitted through a wireless network, enabling remote monitoring and situational awareness. The IoT functionality allows users to access live data and monitor the robot’s activity from a remote location, thereby improving operational flexibility and control. The system is designed using low-cost hardware components such as ESP32/Arduino, ultrasonic sensors, motor drivers, and wireless communication modules, making it suitable for practical implementation. Furthermore, the system ensures stable navigation through efficient motor control and optimized decision-making algorithms. Challenges such as sensor noise, power fluctuations, and communication instability are addressed to improve system reliability. The proposed system demonstrates the effective integration of embedded systems, IoT, and realtime processing techniques to achieve autonomous navigation and remote monitoring.

Keywords: IoT, Obstacle Avoidance, Ultrasonic Sensor, Embedded Systems, Camera Module, Autonomous Robot, Real-Time Monitoring



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