CHIRA 2025

9th International Conference on Computer-Human Interaction Research and Applications

Final Program and Book of Abstracts

Marbella, Spain

20 - 21 October, 2025

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9th International Conference on Computer-Human Interaction Research and Applications

Marbella - Spain
October 20 - 21, 2025

Sponsored by
INSTICC - Institute for Systems and Technologies of Information, Control and Communication

ACM In Cooperation
SIGMIS - ACM Special Interest Group on Management Information Systems

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EUSSET - European Society for Socially Embedded Technologies

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Foreword

This book contains the abstracts and final program of the 9th International Conference on Computer-Human Interaction Research and Applications. This year, CHIRA is held in Marbella, Spain, on October 20-21, 2025. It was sponsored by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC). CHIRA 2025 was also organized in cooperation with the ACM Special Interest Group on Management Information Systems (SIGMIS) and the European Society for Socially Embedded Technologies (EUSSET).

The purpose of the International Conference on Computer-Human Interaction Research and Applications (CHIRA) is to bring together professionals, academics and students who are interested in the advancement of research and practical applications in its field of interest, covering different aspects of Computer-Human Interaction, including Human Factors and Information Systems, Interactive Devices, Interaction Design and Adaptive and Intelligent Systems.

CHIRA 2025 received 106 paper submissions from 30 countries, of which 20% were accepted and published as full papers. A double-blind paper review was performed for each submission by at least 2, but usually 3 or more, members of the International Program Committee, which is composed of established researchers and domain experts.

The high quality of the CHIRA 2025 program is enhanced by the two invited talks delivered by internationally distinguished speakers: Alexander Maedche,Alice Chirico (Catholic University of Sacred Hearth, Italy) with “Road to Awe: Perils, Challenges, Findings, and Open Questions”; Alexander Mädche (Karlsruhe Institute of Technology, Germany) with “Biosignal-Adaptive Systems for Better Work and Life”.

All presented papers will be submitted for indexation by DBLP, Google Scholar, EI-Compendex, INSPEC, Japanese Science and Technology Agency (JST), Norwegian Register for Scientific Journals and Series, Mathematical Reviews, SCImago, Scopus, zbMATH and Web of Science / Conference Proceedings Citation Index.

Several awards, based on the combined marks of paper reviewing, as assessed by the Program Committee, and the quality of the presentation, as assessed by session chairs at the conference venue, are conferred at the conference’s closing session to recognise the best contributions.

The program for this conference required the dedicated effort of many people. Firstly, we must thank the authors, whose research efforts are reported here. Next, we would like to thank the members of the Program Committee and the auxiliary reviewers for their diligent and professional review.

We would also like to deeply thank the invited speakers for their invaluable contribution and for taking the time to prepare their talks. Finally, a word of appreciation for the hard work of the INSTICC team; organising a conference of this level is a task that can only be achieved by the collaborative effort of a dedicated and highly competent team.

We wish you all an exciting and inspiring conference. We hope to have contributed to the development of our research community, and we look forward to having additional research results presented at the next edition of CHIRA, details of which are available at https://chira.scitevents.org.

Josef F. Krems, Chemnitz University of Technology, Cognitive and Engineering Psychology, Germany
Hugo Plácido da Silva, IT- Instituto de Telecomunicações, Portugal
Pietro Cipresso, Department of Psychology, University of Turin, Italy

Social Event and Banquet

Venue: An evening at Tikitano featuring dinner and a Flamenco performance
Tuesday, 21st of October- 19:00 – 23:00 Perched along the golden coastline of Estepona, **Tikitano Restaurant** stands as one of the Costa del Sol's most captivating culinary destinations. This seaside haven blends the laid-back charm of southern Spain with the sophistication of fine Mediterranean dining, creating a truly unforgettable experience.

From the moment you arrive, Tikitano's magic is undeniable. With sweeping views of the Mediterranean and the Rock of Gibraltar, guests are treated to a dining experience where refined cuisine meets effortless coastal elegance. The restaurant's architecture harmonizes modern design with tropical allure -high ceilings, open terraces, and lush gardens evoke a sense of tranquility that is both luxurious and welcoming.

Tikitano's menu presents a contemporary interpretation of Mediterranean and international flavors, crafted from the finest locally sourced ingredients. Each dish reflects a balance of creativity, freshness, and precision that delights the senses.

A cherished favorite among both locals and travelers, Tikitano continues to define the essence of elegant seaside dining in southern Spain.
Adding to its allure, guests are invited to immerse themselves in the passion and artistry of live flamenco performances - an experience that captures the soul of Andalusia. From the first haunting strum of the guitar to the last resonant tap of the dancer's heel, every moment radiates emotion and rhythm. The powerful vocals, expressive handclaps, and mesmerizing dance moves weave together stories of love, joy, and longing.


More than just a show, it's a celebration of Spanish heritage - an evening where music, movement, and emotion come together under the Mediterranean sky. The passion of flamenco at Tikitano will leave you inspired long after the final note fades.

Source: Tikitano and Adobe Stock

Important Information

Internet Access
Please check at the welcome desk the information to connect to the wireless network.

Event App
Download the Event App from the Play Store and App Store now, to have mobile access to the technical program and also to get notifications and reminders concerning your favorite sessions.

Create Your Own Schedule *
The option “My Program” gives you the possibility of creating a selection of the sessions that you plan to attend. This service also allows you to print-to-pdf all papers featured in your selection thus creating a pdf file per conference day.

Digital Access to the Receipt *
By clicking on the option “Delegate Home” and then “Registration Documents” it will enable you to access the final receipt which confirms the registration payment.

Photos Availability
The photos taken at the venue will be shared with you shortly after the event is finished. There will be an option entitled “Photo Gallery” in PRIMORIS. There, besides having access to the photos, you can also create your own personal albums by selecting “My Albums ”Create New Album” and also be able to tag yourself in those photos, using the option “Tag Me”.

Keynotes Videos
The keynote lectures will also be available on video on the website after the event, as long as the appropriate authorization from the keynote is received, so you will be able to see them again or watch them should you have missed one.

Survey
Every year we conduct a survey to assess the participants’ satisfaction with the conference and gather the suggestions. You will receive an e-mail after the event with the detailed information. Your contribution will be carefully analysed and a serious effort to react appropriately will be made.

* Please login to PRIMORIS (www.insticc.org/Primoris), select the role “Delegate” and the correct event.

If you have any doubt, we will be happy to help you at the Welcome Desk.

General Information

Welcome Desk/On-site Registration
Sunday, October 19 – Open from 16:00 to 18:00
Monday, October 20 – Open from 09:45 to 17:15
Tuesday, October 21 – Open from 08:30 to 18:30

Opening Session
Monday, October 20, at 10:30 in the Gran Marbella room.

Welcome Drink
Monday, October 20, at 17:15 in the Foyer room.

Closing Session & Awards Ceremony
Tuesday, October 21, at 18:15 in the Gran Marbella room.

Meals
Coffee-breaks will be served in the Foyer to all registered participants.
Lunches will be served in the Restaurant to all registered participants. Please check the hours in the Program Layout.

Communications
Wireless access will be provided free of charge to all registered participants.

Secretariat Contacts
CHIRA Secretariat
Address: Avenida de S. Francisco Xavier, Lote 7 Cv. C
2900-616 Setúbal, Portugal
Tel.: +351 265 520 184
Fax: +351 265 520 186
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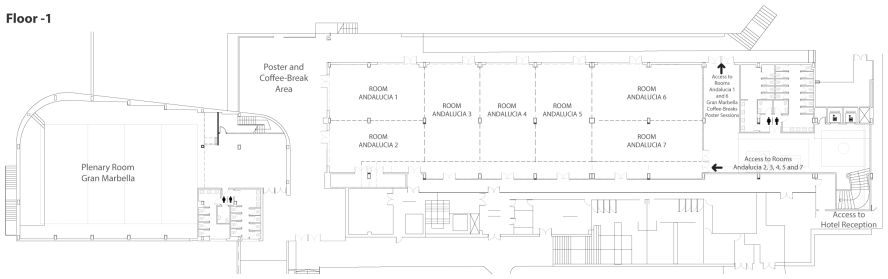
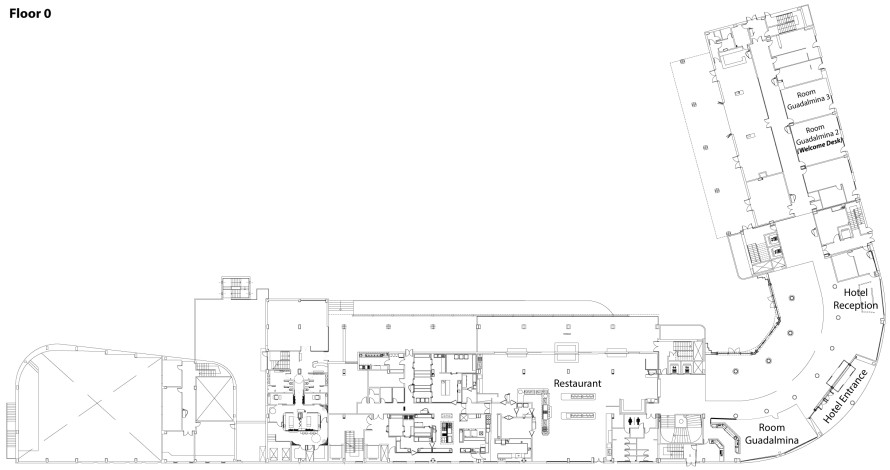
Rooms Layout

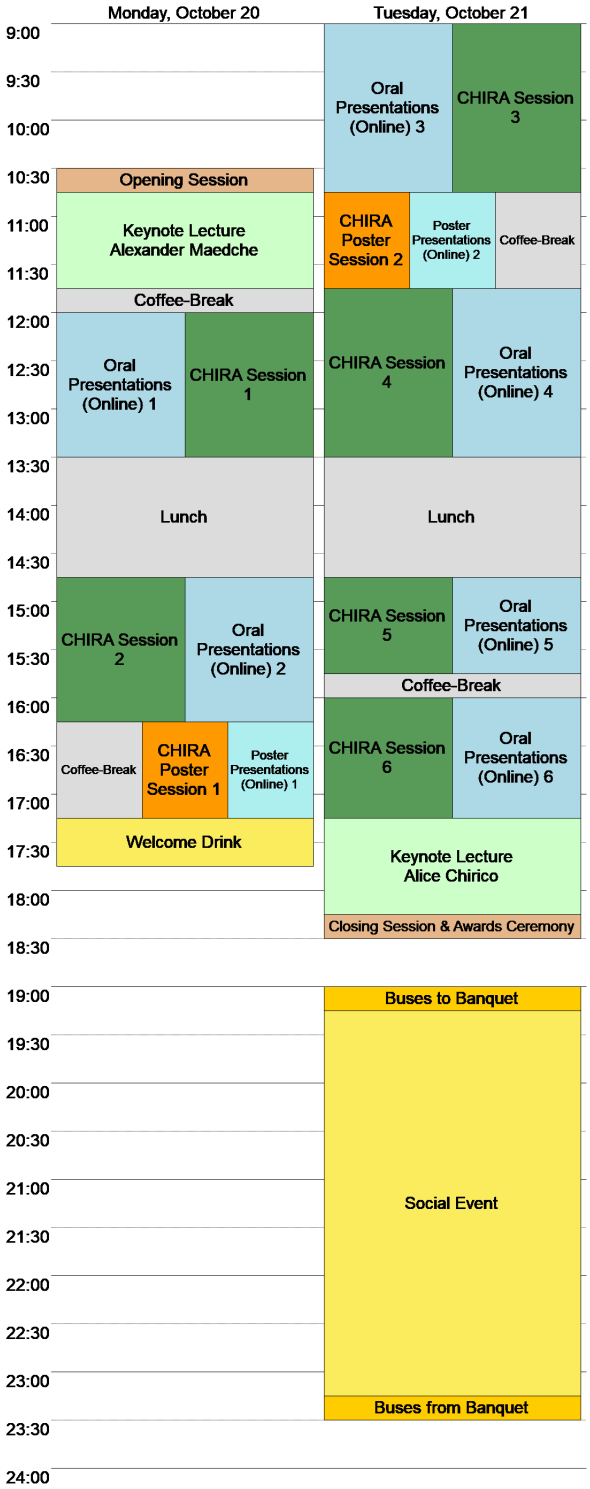
Floor -1



Floor 0



Program Layout



Final Program and Book of Abstracts

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Monday Sessions: October 20

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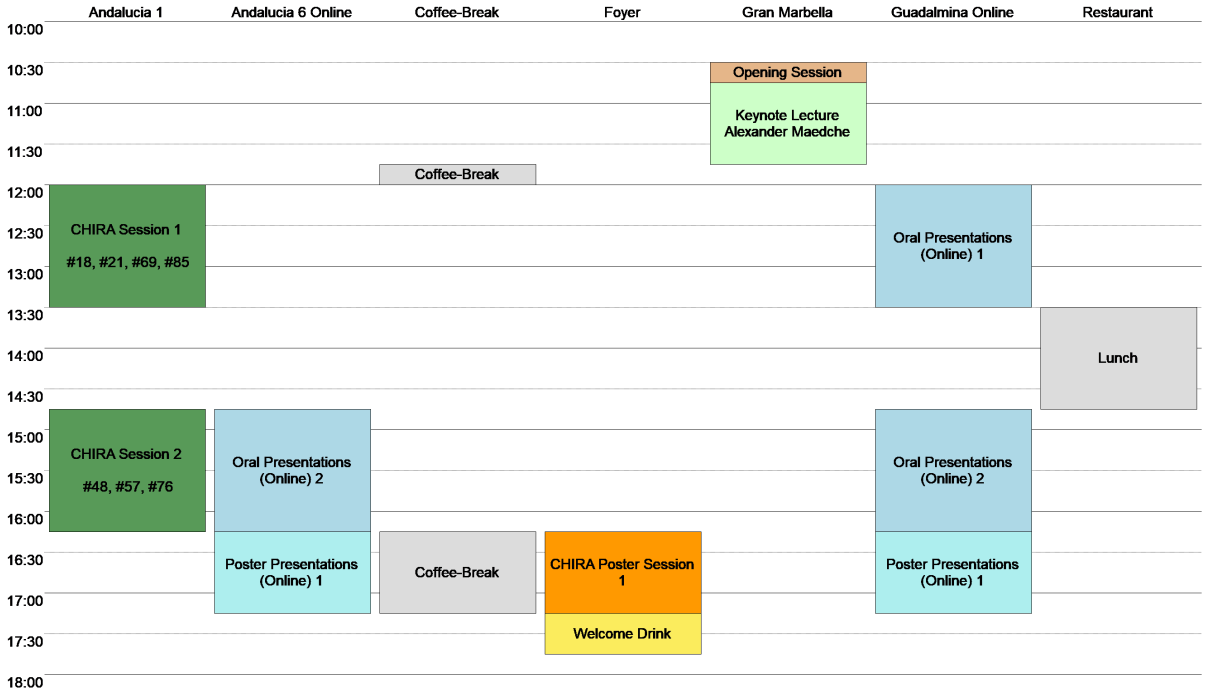

Opening Session	CHIRA
10:30 - 10:45	Room Gran Marbella

Keynote Lecture	CHIRA
10:45 - 11:45	Room Gran Marbella

Biosignal-Adaptive Systems for Better Work and Life

Alexander Maedche
Karlsruhe Institute of Technology (KIT), Germany

Abstract: Biosignal-adaptive systems represent a new class of human-centered systems that use sensor technology — such as eye-tracking or photoplethysmography (PPG) sensors — to capture both visible and non-visible human activities with biosignals. Biosignals are autonomous signals produced by the living organism, energetically measurable in physical quantities using sensors. Biosignals are interesting because, in addition to self-reported or behavioral data, they provide objective and often unconscious information about physical and psychological user states. The collected biosignals are processed in real-time and used to recognize user states such as attention, flow, mental workload & fatigue by leveraging artificial intelligence (AI) technologies. Being aware of user states in real-time lays the foundation for designing personalized interactions advancing human-computer interaction. In my keynote lecture, I will introduce the conceptual foundations of biosignal-adaptive systems and share findings from lab and field studies that we conducted over the past decade. These studies demonstrate how such systems can enhance work and everyday life by improving performance and supporting well-being. In particular, I will showcase the potential of biosignal-adaptive systems in the fields of virtual collaboration as well as personal companions for desktop productivity, learning and emotion regulation. I will conclude my keynote lecture with a number of open research challenges and a call for responsible design of biosignal-adaptive systems.

Oral Presentations (Online) 1	CHIRA
12:00 - 13:30	Room Guadalmina Online
Interaction Design	

Complete Paper #23

A Usability and Universal Design Investigation into Scrolljacking for Web Pages

Bianca Voinea and Pietro Murano
Oslo Metropolitan University, Postboks 4, St. Olavs plass, 0130, Oslo, Norway

Keywords: Scrolljacking, Non-Scrolljacking, Scroll Hijacking, Web Page Scrolling, User Interface Scrolling, Usability, User Experience, Universal Design, Design for All, Evaluation.

Abstract: Scrolljacking is a feature used in web development to hijack and modify the speed, direction, and overall native behaviour of scrolling on a web page. This research study investigated how scrolljacking can influence the usability and the Universal Design of web pages. Two prototypes were designed and developed as part of this research. One prototype had a non-scrolljacking user interface and the other prototype had the same user interface as the first prototype but with scrolljacking functionality. The two prototypes were evaluated in an experiment with 20 participants, where they had to perform similar task-driven actions in the two user interfaces. Accuracy, user satisfaction, and speed were some of the main aspects investigated in this experiment. To measure these aspects, the total time to complete the tasks and the number of errors made per task were collected, as well as the scrolljacking familiarity and the participant's opinion about the topics of ease-of-use control, frustration, and fun during the experiment. Data was collected during the experiment and was analysed by using paired t-tests and Wilcoxon signed-rank tests. The data analysis revealed that there was no statistically significant difference in speed between the two user interfaces. However, there was a statistically significant difference in the accuracy and user satisfaction between the two user interfaces, as the interface using scrolljacking had lower accuracy and user satisfaction scores than the non-scrolljacking interface. The research study suggests that scrolljacking negatively influences the usability and the Universal Design of a web page.

Complete Paper #113

In-Situ Audio Experiences: Leveraging RAG and TTS for Accessible, Hyperlocal Heritage Engagement

Marcus Winter
University of Brighton, Brighton, U.K

Keywords: Retrieval Augmented Generation (RAG), Text-to-Speech (TTS), Location-Based Interaction, Hyperlocal Media, Cultural Heritage, Accessibility.

Abstract: This position paper presents an application concept combining Retrieval Augmented Generation (RAG) with Text-to-Speech (TTS) technology to create continuous audio narrations for locative media experiences. It contextualizes this concept on a technical level in efforts to focus the outputs of Large Language Models (LLMs) on specific bodies of knowledge while minimizing hallucinations, and on a human-computer interaction level in the creation of alternative media representations that convey content in-situ to increase its relevance and cater for audiences who are not able to, or not inclined to, read written materials. The concept is illustrated with a prototype application in the cultural heritage domain, aiming to engage visitors in a target area with its local history by delivering hyperlocal audio narrations based on users' current location and related archive materials.

Complete Paper #20

A Front-End UI Incorporating an Error Detection Function and a Virtual Execution Environment for Setting Rules for IoT Device Behaviors

Masaki Omata and Ayumu Nakano
University of Yamanashi, Kofu, Yamanashi, Japan

Keywords: IoT, Rule Setting, Visual Programming, Front-end UI.

Abstract: This paper describes a visual programming interface that enables even inexperi-enced users to intuitively and easily set automation rules for IoT devices and the usability evaluation. We developed a front-end GUI that allows users to set up rules visually by dragging and dropping blocks with no-code, an "error detection function" that detects and immediately notifies an error, and a "virtual execution function" allows the user to virtually check whether the set rules work as intend-ed. After that, we conducted the usability evaluation experiment to compare the proposed UI with the Node-RED's UI in terms of operation time, accuracy, and subjective satisfaction. The results show that the proposed UI was significantly more effective in reducing operation time and was equivalent to Node-RED' UI in terms of accuracy of operation, and that the proposed UI was highly evaluated in terms of ease of use

and recommendation intention.

Complete Paper #45

An Exploratory Study of User Perceptions and Experiences with User Interfaces that Use Artificial Intelligence: Implications for Design

Gilbert Drzyzga

Institute for Interactive Systems, Technische Hochschule Lübeck, Germany

Keywords: Artificial Intelligence, Human-Computer Interaction, User Interface Design, User Perception, User Experience, Interaction Problems.

Abstract: This study examines how user perception and recognition of Artificial Intelligence (AI) influence experiences with AI-based User Interfaces (UIs). Addressing critical gaps in the understanding of user awareness and interaction with AI-based UIs, the research investigates the relationship between users' awareness of AI functionality and the problems they encounter. An online survey ($n = 386$) was conducted in English and German to capture cross-linguistic insights into the User Experience (UX) with AI- enabled software, applications, and websites. The data were analyzed using a 3×3 matrix framework to map perception of AI use against interaction problems. The results revealed that 25% of the users could judge AI usage, 47% could not, and 28% were uncertain. A statistically significant positive correlation ($r = 0.299$, $p < 0.001$) was found between perceived AI usefulness and the frequency of encountered issues. This suggests that users who view AI positively report fewer problems, though challenges remain. Qualitative feedback from users who experienced issues highlights recurring problems, such as inaccurate or unhelpful responses, slow performance, privacy concerns, and inappropriate outputs. These findings offer actionable guidance for designing transparent, trustworthy, and usable AI-based UIs by UX, addressing system performance, accuracy, and privacy.

Session 1A **CHIRA**
12:00 - 13:30 **Room Andalucia 1**
Design and Evaluation

Complete Paper #18

Visual Feature Preferences for Human Vehicle Communication in Mixed Traffic

Lars Gadermann[1], Julia Schröder[1], Daniel Holder[1], Miriam Bottesch[2], Cristián Acevedo[2] and Thomas Maier[1]

[1] *Institute for Engineering Design and Industrial Design, University of Stuttgart, 70569 Stuttgart, Germany*

[2] *studiokurbos GmbH, Königstraße 32, 70173 Stuttgart, Germany*

Keywords: eHMI, Conjoint-Analysis, Vehicle Design Engineering, Mixed Traffic, Human-Machine-Interaction.

Abstract: With the increasing number of automated vehicles (AV) in future mixed traffic, new challenges arise in the interaction between human road users (HRU) and AVs. External human-machine interfaces (eHMI) are considered a promising approach to bridging the resulting communication gap. Despite numerous investigations and studies, there is still no consensus regarding a satisficing design of eHMI in terms of perceived safety, clarity, and aesthetic appeal. The present paper examines the influence of individual design features on the perception and evaluation of different stakeholders by means of a conjoint analysis. For this purpose, 20 high-quality and professionally created stimulus pattern combinations, based on the features technology, location, colour, and graphic type, were evaluated by 127 participants in an online study. The results show that the feature graphic has the greatest influence of all investigated parameters on the evaluation criteria. Text-based displays particularly enhance clarity and perceived safety, while animations promote aesthetic appeal. A combination of different feature levels could combine positive effects. The study provides specific design indications and highlights the importance of perception- and design-related factors in the development of eHMI.

Complete Paper #69

A Narrative Visualization Tool for Personalized Exploration of Long-Distance Hiking Trails

Anna Dahlgren, Karen Drewsen, Julie Rosenlund, Esben Sørensen, Jakob Kusnick and Stefan Jänicke

Department of Mathematics and Computer Science, University of Southern Denmark, Campusvej 55, 5230, Odense, Denmark

Keywords: User-Centered Design, Geospatial Storytelling, Trail Planning.

Abstract: We introduce a visualization-based storytelling system designed to support the exploration and planning of long-distance hikes, exemplified through the Pacific Crest Trail. Designed to aid hikers and enthusiasts in understanding the trail's dynamics, our tool integrates trail-segment-based narratives with interactive geospatial maps, elevation profiles, and icon-based trail facilities and wildlife information. The system adapts to user-defined travel speed and rest patterns, generating customized narrative segments enriched with multimedia and trailspecific data, including weather, water sources, wildlife, campsites, and resupply points. To assess the tool's effectiveness and relevance, we conducted a preliminary evaluation with members of the hiking community, which highlighted the system's usability and potential to enhance trail familiarization. The resulting feedback informed iterative design improvements of how data storytelling can enrich both the practical and experiential dimensions of trail presentations, fostering more informed, engaging hiking experiences.

Complete Paper #85

Leveraging Augmented Reality for Enhanced Smart and Connected Product Design: An Experimental Approach

Pedro Acuna[1], Khansaa Alzein[1], Jean Camille[2] and Ruding Lou[1]

[1] *Arts et Métiers Institute of Technology, LISPEN, F-71100, Chalon-sur-Saône, France*

[2] *Arts et Métiers Institute of Technology, LCPI, F-75013 Paris, France*

Keywords: Smart and Connected Product Design, Augmented Reality, Sensors, User Experience.

Abstract: The Internet of Things (IoT) is transforming all sectors by enabling traditional products to become smart and connected, capable of collecting, ana-lyzing, and exchanging data. In parallel, Augmented Reality (AR) has emerged as a promising technology to support product design by offering immersive and interactive ways to visualize and iterate ideas. This paper presents an AR-based application developed to assist designers during the early ideation phase of IoT product conception. The system enables visualization of virtual objects and in-teraction with 14 sensor capability cards and 12 user experience elements. An experimental study involving 14 undergraduate engineering students was con-ducted to compare the proposed AR tool with

a traditional 2D paper-based method, using two design cases: a connected bicycle and a smart window. Quan-titative results from NASA-TLX and SUS questionnaires indicate that the AR method maintained or reduced perceived workload, particularly in terms of com-plexity and time pressure, while achieving usability scores comparable to or bet-ter than the traditional approach. These findings demonstrate the potential of AR as an effective and cognitively sustainable tool for enhancing creativity in early-stage product design.

Complete Paper #21

Exploring Design Alternatives for Automated Web GUI Generation

Hermann Kaindl[1], Roman Popp[2] and David Raneburger[2]

[1] *TU Wien, Univ. for Continuing Education Krems, Vienna Univ. of Economics and Business, Vienna, Austria*

[2] *Private, Austria*

Keywords: Interaction Design, Design Alternatives, Automated Web GUI Generation.

Abstract: For the evaluation of interaction design, usually prototypes are created. For creating high-fidelity prototypes, automated generation may be an option, at least in the case of graphical (Web) user interfaces (GUIs). However, the usability of fully-automatically generated GUIs is considered unsatisfactory. In our opinion, a major reason is that most previous approaches to automated GUI generation do not sufficiently explore *alternatives* in the design space of GUIs, in particular not automatically. Can existing techniques for automated Web GUI generation from high-level representations of interaction design comprehensively support the exploration of design alternatives? We explain and address this problem and research question, and investigate exploring alternatives (at different stages), both by the designer and the generator tool, which receives high-level representations of interaction design as its input. For the designer, exploring alternatives involves providing alternative high-level models and transformations, selecting from Web GUI interaction strategies (e.g., scrolling vs. using tabs) and defining customizations. Exploring alternatives means for the AI-based generator tool creating alternative widgets and layouts in the course of a heuristic search, and tailoring for different target devices, according to the Web GUI interaction strategy selected by the designer. For making automated GUI generation applicable in the context of general interaction design, we also propose a new iterative and incremental interaction design *process* centered around automated generation.

Oral Presentations (Online) 2 **CHIRA**
14:45 - 16:15 **Room Andalucia 6 Online**
Computer-Human Interaction Research and Applications

Complete Paper #84

Improving Human-Robot Communication in Noisy Environments with Visual Voice Activity Detection

Arunima Gopikrishnan[1], Adrian Auer[2] and Lisa Gutzeit[2,3]

[1] *MARUM-Center for Marine Environmental Sciences, University of Bremen, 28359 Bremen, Germany*

[2] *Robotics Research Group, Department of Computer Science, University of Bremen, 28359 Bremen, Germany*

[3] *German Research Center for Artificial Intelligence, 28359 Bremen, Germany*

Keywords: Human-Robot Interaction, Visual Voice Activity Detection, Multimodal Dialogue, Speech Recognition.

Abstract: This paper investigates the integration of Visual Voice Activity Detection (VVAD) into human-robot dialogue systems to enhance communication in noisy environments. Usually, speech recognition systems often falter under acoustic interference, limiting their effectiveness in real-world human-robot interactions. By leveraging visual cues, especially lip movements, VVAD supports more accurate speech detection and turn-taking. In this paper, we present a multimodal dialogue system combining VVAD with speech recognition, dialogue management, and context-aware intention recognition. The system is evaluated through a user study involving 30 participants in a noise-rich, simulated restaurant scenario. Results show a substantial improvement in task completion rates and user satisfaction when VVAD is enabled, alongside with a significant reduction in false activations. These findings underscore the value of visual input in robust, socially aware human-robot interaction and suggest VVAD as a critical component in the design of next-generation interactive robots.

Complete Paper #71

Exploring the User Experience of Digital Identity Wallets in e-Commerce: An Expert-Based and User-Based Evaluation

Simone Braun[1], Max Sauer[2], Jan Sürmeli[2] and Jonas Thessen[1]

[1] *University of Applied Sciences Offenburg, 77652 Offenburg, Germany*

[2] *FZI Research Center for Information Technology, 76131 Karlsruhe, Germany*

Keywords: N/A

Abstract: Digital identity wallets are software systems that allow users to securely store, manage, and share personal data. While existing approaches have mainly focused on storing identity-related information such as ID cards or driver's licenses, the use of wallets for use cases beyond, such as managing and sharing shopping data in e-commerce, is still largely unexplored, particularly in terms of user experience (UX). In e-commerce, such wallets offer a promising way for users to share shopping data with online shops in return for, e.g., personalized product recommendations. However, this extended functionality introduces unique UX challenges that differ from traditional identity scenarios. As the success of these systems strongly depends on user adoption, delivering a seamless and intuitive UX is essential. This study evaluates the UX of a wallet prototype designed for managing and sharing shopping data. The evaluation combined

an expert-based analysis using a Cognitive Walkthrough with user-based testing involving Thinking aloud, eye tracking, and UX questionnaires. The results revealed several UX issues specific to the shopping data context, as well as recurring challenges already observed in traditional digital identity use cases.

Complete Paper #93

A New Visualization Technique for Teaching and Learning Recursion

Ying Zhu
Georgia State University, U.S.A.

Keywords: Visualization, Recursion, Learning, Mental Model, Interaction.

Abstract: Recursion is one of the most challenging concepts for students learning data structures and algorithms. Its self-referential nature often leads to confusion, making it difficult to form a clear and accurate mental model. To address this, various visualization techniques have been developed. However, most existing visualizations focus primarily on control flow and tend to overlook the equally important data flow in recursive processes. Additionally, traditional call stack- or recursion tree-based visualizations often fail to represent the backflow of recursion, limiting their effectiveness. In this work, we analyze the difficulties of understanding recursion and, based on this analysis, introduce a novel interactive visualization technique. Our method employs a chained-circle visual metaphor and explicitly depicts forward flows, backward flows, and data flows, providing a more intuitive and comprehensive understanding of recursion.

Complete Paper #94

Extreme Reality Helmet in Simulated Smoke Test

Yang Cai
Visual Intel Studio, Pittsburgh, U.S.A.

Keywords: Extreme Reality, Training, Haptic, Thermal, Simulated Smoke.

Abstract: Emergency responses, such as firefighting, take place in extremely hazardous environments where visibility and communication are often abysmal. Spatial navigation, imaging, and communication interfaces are critical in first response scenarios where common perceptual channels, like visual and auditory, are reduced or unavailable. See-through interfaces are also valuable in advanced simulation training, as they bring physical touch into immersive professional field training. Extreme Reality (EXR) is to superimpose extreme situations and live sensory data onto the physical scene. In this study, we tested haptic helmet interface and thermographic helmet interface within the simulated smoke environment. Our multimodal EXR interfaces show their potential in real-time operation and training with zero visibility. We also found that the usability of the interfaces can be measured by navigation time, clarity, and reaction time. The thermography can be optimized by highlighting contours.

Oral Presentations (Online) 2 **CHIRA**
14:45 - 16:15 **Room Guadalmina Online**
Artificial Intelligence

Complete Paper #16

Implicit and Explicit Attitudes Towards Virtual Agents in Education: An Experimental Study

Chiara Scuotto[1] and Masiar Babazadehr[2]
[1] *Department of Psychology and Education, Pegaso University, Naples, Italy*
[2] *Dipartimento Formazione e Apprendimento, SUPSI: Scuola Universitaria Professionale Della Svizzera Italiana, Italy*

Keywords: Implicit Attitudes, E-Learning, Virtual Agents, Artificial Intelligence, Conversational Pedagogical Agents.

Abstract: Virtual Reality and Artificial Intelligence (AI) offer interesting opportunities for education. For example, conversational pedagogical agents could assist students and possibly automatize some teaching activities. Within virtual environments, these could be presented as embodied conversational agents or virtual educational agents (VEAs), namely digital anthropomorphic figures that are guided by AI. However, in order to orient the implementation of such resources in education, it is useful to analyze people's attitudes towards them, both implicit and explicit. In the present study, 20 participants responded to questions about general AI tools and VEAs' utilizability in educational contexts. Moreover, participants completed a version of the Implicit Association Test (IAT) that assessed their implicit attitudes towards virtual agents compared with human teachers. Results showed that participants had significantly more positive explicit attitudes towards the implementation of AI in general than VEAs specifically in educational contexts. Consistently, the IAT test revealed a strong bias against VEAs compared with human teachers and educators. Projects implementing embodied conversational agents in education should take into account that users may harbor suspicion and negative attitudes towards these tools and carefully consider whether such resources are appropriate to any specific educational contest or population.

Complete Paper #65

Does Adding Multimodal Emotional Input to an LLM Chatbot Improve the User's Affective Experience?

Yifei Li[1], Hunter Fong[2], Maurizio Mancini[1] and Radoslaw Niewiadomski[2]
[1] *Department of Computer Science, Sapienza University of Rome, Rome, Italy*
[2] *Department of Informatics, Bioengineering, Robotics and Systems Engineering, University of Genoa, Genoa, Italy*

Keywords: Chatbot, LLM, Emotion-Aware, Multimodal.

Abstract: This study investigates whether incorporating multimodal emotional input (self-reported emotion and facial emotion) can enhance users' emotional experiences in interactions with LLM-based chatbots. Twenty-eight participants engaged with four chatbot conditions: (A) text-only, (B) self-reported emotion, (C) facial emotion, and (D) combined input. Despite the hypothesis, perceived empathy was slightly higher in conditions without facial emotion input. However, participants with lower trait emotional expressivity reported more positive affect when facial emotion cues were included. Qualitative interviews further revealed varying perceptions of chatbot sensitivity to emotional needs. Partici-

pants with prior chatbot experience also felt a stronger social connection when conversations began with emotional topics. Additionally, older adults, women, and experienced users rated their interactions more positively. These findings suggest that emotional input may not universally enhance affective experiences but could benefit specific user profiles. The study advocates for a personalized, trait-sensitive approach to emotion-aware chatbot design rather than a one-size-fits-all multimodal strategy.

Complete Paper #81

Early Detection of ASD Risk in Children Through a Web Application with Random Forest

Alvaro Ramos, Cesar Ccorahua and Alejandrina Junes
Peruvian University of Applied Sciences, Lima 15023, Peru

Keywords: Autism Spectrum Disorder, Early Detection, Machine Learning, Random Forest, Web Application.

Abstract: Autism Spectrum Disorder (ASD) is a developmental disorder that affects social communication and behavior. Early detection is crucial for initiating interventions that promote child development. However, in resource-limited settings such as Peru, access to specialized diagnostic tools is scarce. This paper presents a web application designed for parents and caregivers to estimate the risk of Autism Spectrum Disorder (ASD) in children aged 12 to 36 months, using the Q-CHAT-10 questionnaire and a Random Forest machine learning model. The system was trained with a real-world, public dataset composed of 1,560 records collected through online forms and mobile applications. The model achieved an accuracy of 97.76%, a precision of 98.14%, a sensitivity of 98.60%, an F1-score of 98.37%, and an AUC-ROC of 99.79%, demonstrating a high predictive capacity. The tool allows for the generation of an automated, immediate prediction accessible from any device, offering a noninvasive alternative for early ASD risk screening. Although the results are promising, further clinical validation in real-world settings is required to support its use in public health contexts.

Complete Paper #107

Enhancing DDoS Mitigation Through AI Coaching: A Network-Oriented Computational Analysis of Adaptive Human-AI Defense Dynamics

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Keywords: AI-Coaching, DDoS attack, Cybersecurity, Network Modeling.

Abstract: Multi-vector Distributed Denial of Service (DDoS) attacks present a growing challenge to cybersecurity operations by combining various attack techniques across multiple network layers, often overwhelming both infrastructure and hu-man decision-making. This study models the mental and technical response pro-cesses of a cybersecurity operator during such attacks using adaptive network modeling. Two models were developed: a base model simulating operator behavior without AI support, and an enhanced model featuring an adaptive AI-coach designed to assist in belief formation and attack mitigation. Both models integrate mental, physiological, and technical states and simulate responses over multiple attack cycles. Simulation results reveal that while the base model shows initial learning capacity, operator fatigue leads to performance decline and early mitigation collapse. In contrast, the AI-coach model maintains learning levels during later stages in the simulations through adaptive support, enabling prolonged mitigation effectiveness.

Session 2A **CHIRA**
14:45 - 16:15 **Room Andalucia 1**
Artificial Intelligence

Complete Paper #48

NordDRG AI Benchmark for Large Language Models

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Keywords: Large Language Models (LLMs), LLM Software Agents, Diagnosis-Related Groups (DRG), NordDRG, Clinical Coding, Healthcare Reimbursement, CaseMix Systems, Benchmarking and Reproducibility, Grouper Emulation.

Abstract: **Problem.** LLMs are being piloted for clinical coding and decision support, yet no open benchmark targets the *hospital-funding* layer where Diagnosis-Related Groups (DRGs) determine reimbursement. In most OECD systems, DRGs route a substantial share of multi-trillion-dollar health spending through governed grouper software, making transparency and auditability first-order concerns rather than mere implementation details.
Research Question. *To what extent can LLMs emulate, explain, and apply DRG-based hospital payment rules?*
Contribution. *NordDRG-AI-Benchmark* is released, the first public, *rule-complete* test-bed for DRG reasoning. It bundles **(i)** machine-readable ∼ 20-sheet NordDRG definition tables and **(ii)** expert manuals and change-log templates that capture governance workflows, and exposes two suites: a 13-task *Logic* benchmark (code lookup, cross-table inference, grouping features, multilingual terminology, and CC/MCC validity checks) and a 13-task *Grouper* benchmark that requires *full DRG-grouper emulation* with strict exact-match scoring on *both* the DRG and the triggering `drg_logic.id`. Lightweight reference agents (LogicAgent, GrouperAgent) enable artefact-only evaluation.
Results. Under an artefact-only (no-web) setting, on the 13 Logic tasks *GPT-5 Thinking* and *Opus 4.1* score **13**/**13**, *o3* **12**/**13**; mid-tier models (*GPT-5 Thinking Mini*, *o4-mini*, *GPT-5 Fast*) achieve **6–8**/**13**, and the remaining models score **5**/**13 or below**. On full grouper emulation across 13 tasks (exact match on *both* DRG and `drg_logic.id`), *GPT-5 Thinking* solves **7**/**13**, *o3* **6**/**13**, and *o4-mini* **3**/**13**; *GPT-5 Thinking Mini* solves **1**/**13**, and all other tested endpoints score **0**/**13**. *Answer to RQ:* Top-tier LLMs reliably master rule-level DRG reasoning; the strongest models can *partially* emulate the full DRG grouping logic. To available knowledge, this is the first public report of an LLM *partially emulating* the complete NordDRG grouper logic with governance-grade traceability.
Significance. Coupling a rule-complete release with exact-match tasks and open scoring reveals domain-specific strengths and weaknesses that generic leaderboards miss and provides a reproducible yardstick for head-to-head and longitudinal evaluation in hospital funding.
Availability. All artefacts and scripts are available at https://github.com/longshoreforrest/norddrg-ai-benchmark.

Complete Paper #76

Immersive Training of Artillery Observers with Integrated Artificial Intelligence

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[3] *Department of Fire Support, Faculty of Military Leadership, University of Defence, Kounicova 65, 602 00 Brno, Czech Republic*

Keywords: Artillery, Virtual Reality, Augmented Reality, Artificial Intelligence, Education, Training.

Abstract: Military education and training face a fundamental paradox, the demands for operational readiness are continuously increasing, while realistic training is constrained by safety, logistical, financial, and ethical considerations. In the context of artillery operations, particularly for Forward Observers (FO) and Joint Fires Observers (JFO), the ability to coordinate fire effectively and accurately is crucial for mission success and minimizing collateral damage. One of the new promising approaches is the use of Virtual Reality (VR) and Augmented Reality (AR) to train decision-making and tactical skills in a simulated environment. This paper discusses the development of a simulator that represents a significant advancement over previous generations of artillery trainers. Its main innovation lies in the integration of Artificial Intelligence (AI), which evaluates user performance in real time. This approach may contribute to increased training effectiveness and the personalization of performance assessment. The aim is to move closer to the vision of individualized, performance-oriented training that replaces universal and rigid instructional models—without endangering personnel safety, requiring the deployment of forces and assets in the field, or consuming material resources. Preliminary results confirm that AI-supported VR training can effectively reinforce observer skills while reducing dependence on live-fire exercises.

Complete Paper #57

From Asking to Understanding: A Human-Centered Approach for Human-AI Interaction

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PUC-Rio - Departamento de Informática, Rio de Janeiro, Brazil

Keywords: Human-AI Interaction, Context-Aware Systems, Knowledge Graphs, Large Language Models, Clarification Question, User-Centered Design.

Abstract: In human-AI interaction, users often begin with vague, incomplete, or imprecise queries that limit the system's ability to provide meaningful support. While much attention has been given to generating accurate answers, the capacity of intelligent systems to guide users in formulating better questions remains underexplored. This paper proposes a methodology that supports users in the co-construction of knowledge through context-aware clarification questions. By combining semantic representations from knowledge graphs with the generative capabilities of large language models, the approach dynamically detects informational gaps and offers targeted prompts that refine user intent. This method fosters more natural, adaptive, and cognitively aligned interactions, improving user engagement, decision-making, and exploratory search. We discuss implications for designing intelligent systems that not only respond, but also proactively assist users in asking better questions.

Poster Session 1 **CHIRA**
16:15 - 17:15 **Foyer**

Abstract #121

Dissecting the Uncanny Valley: Perceptual and Social-Cognitive Mechanisms

Dawid Ratajczyk

Adam Mickiewicz University in Poznan, Poznan, Poland

Keywords: Uncanny Valley, Human-Robot Interaction, Social Categorization, Artificial Agents, Facial Perception.

Abstract: As artificial agents increasingly enter social and service contexts, the uncanny valley presents a persistent challenge in human–computer interaction. It refers to a drop in comfort or affinity people experience when an artificial agent appears almost–but not fully–human. Research shows that the uncanny valley is multidimensional, encompassing visual, behavioural, and mental aspects of humanlikeness (Diel et al., 2021). However, conflating these dimensions can blur the distinct mechanisms involved, contributing to inconsistent findings. For example, studies suggest the existence of two distinct dips in affinity–one for moderately and another for highly humanlike robots–indicating that separate processes may be responsible (Kim et al., 2022).
I argue that this effect has two semi-independent roots: a perceptual uncanny valley and a social-cognitive uncanny valley. The perceptual component arises from the sensitivity of human visual processing to deviations in facial structure. Subtle violations of canonical facial geometry–such as misaligned eyes, unnatural skin texture, or disproportionate feature spacing–disrupt configural processing and trigger immediate negative affect. Because similar aversive responses are observed even with distorted photographs of real humans, these effects appear to reflect domain-general mechanisms rather than reactions specific to artificial agents.
The social-cognitive component is qualitatively different. Here, discomfort is driven by learned social scripts, cultural narratives, and intergroup categorization. Robots and advanced AI systems occupy an ambiguous social status: neither mere tools nor fully accepted social partners. Historical associations–such as the origin of the word robot, from the Czech robota, meaning forced labor–together with popular narratives of machine rebellion contribute to persistent anxieties about dominance, autonomy, and human replacement. In this talk, I will outline a conceptual distinction between the perceptual and social-cognitive components of the uncanny valley. Making this distinction explicit can help resolve theoretical ambiguities and improve empirical designs.

Diel, A., Weigelt, S., & Macdorman, K. F. (2021). A meta-analysis of the uncanny valley's independent and dependent variables. ACM Transactions on Human-Robot Interaction (THRI), 11(1), 1-33.
Kim, B., de Visser, E., & Phillips, E. (2022). Two uncanny valleys: Re-evaluating the uncanny valley across the full spectrum of real-world human-like robots. Computers in Human Behavior, 135, 107340.

Complete Paper #13

Tech Specs Matter: A Comparison of a Professional and a Standard Mouse

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Keywords: Ergonomics, Mouse, Pointing Device, Fitts' Law, Movement Time.

Abstract: There are a wide range of mouse input devices available on the market. We wanted to explore if there are any observable differences between a mouse with high specifications compared to a mouse with more moderate specifications. A simple controlled experiment was conducted using a Fitts's law methodology. The results showed that the mouse with higher technical specifications resulted in a significantly shorter movement time than the mouse with moderate specifi-cations. The results suggest that technical specifications do matter when select-ing a mouse as it may affect work efficiency.

Complete Paper #40

Exploring Automated Customer Journey Analysis with User Journey Games

Ophelia Prillard[1], Paul Kobialka[2], Ragnhild Halvorsrud[1] and Knut Kvale[3]
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[2] *University of Oslo, Norway*
[3] *Telenor Research, Norway*

Keywords: Customer Journey, User Journey Games, Customer Experience, Automated Journey Analysis.

Abstract: The growing digital footprint of service consumption offers new opportunities for analyzing interactions between service providers and customers at scale. Customer Journey Analysis (CJA) is an effective approach for capturing and visualizing customers' detailed interactions and experiences with a service provider, using the Customer Journey Modeling Language (CJML) as its modeling language. However, the qualitative nature of CJA makes the approach resource-intensive. In this paper, we investigate a weighted game approach to customer journeys, described through CJML, which enables analysis beyond the event logs of a single system and allows for the capture of journeys extending outside the traditional data space. The game approach generates graphs with weighted edges calculated using a gas function, a metric that quantifies the "patience" drained from the customer throughout their journey. The objective is to assess the two analysis approaches, explore how they could be integrated, and investigate whether gas can reflect customer experience. The results show that, although the weighted game approach initially seems to offer useful insights into customer experience, there are significant discrepancies in the lowest-scoring experiences. This indicates that further research is needed to draw firm conclusions about the correlations. However, the method used for comparison can serve as a basis for future studies. Moreover, combining the qualitative depth of CJA with the scalable analytics of user journey games offers the potential for insights at both individual and aggregated journey levels and can, in the future, help advance the development of automating the journey analysis process across the entire customer journey.

Complete Paper #80

Analysis of Trust and Attitudes of Autonomous System Operators in Civilian and Military Environments with Emphasis on Artillery

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[2] *Armed Forces Academy of General M. R. Štefánik, Liptovský Mikuláš, Slovak Republic*

Keywords: Autonomous System, Attitudes, Operators, Military Technologies.

Abstract: Autonomous systems are driving significant changes in the military domain, particularly in artillery operations, where they enhance the precision and efficiency of fire support. Automated fire control systems and unmanned platforms reduce response times and alleviate cognitive load on operators, thereby transforming traditional models of battlefield coordination. However, these technologies also raise important questions regarding effective human-machine collaboration, especially in high-stakes and safety-critical environments. This paper investigates operator attitudes toward autonomous systems with the primary objective of understanding their level of trust in and willingness to adopt such technologies. A particular focus is placed on identifying key factors that influence the success of implementation from the user's perspective, such as demographics, prior experience, and how the system is introduced. The theoretical section outlines the taxonomy of autonomous military systems, discusses their operational advantages and limitations, and identifies common user concerns relevant to the field of Human-Computer Interaction (HCI). The empirical section presents findings from a quantitative experimental study utilizing a truck-driving simulator. The participants primarily professional truck drivers were chosen due to their practical experience with complex vehicular systems. The scientific contribution of this study lies in its analysis of user trust and acceptance of autonomous systems through a controlled experimental framework. The results offer new insights into the psychological and ergonomic dimensions of human-machine interaction, and may inform the design of user interfaces, training protocols, and deployment strategies for autonomous systems in real-world military and civilian contexts.

Complete Paper #99

The Challenging Appropriation of Generative AI at Work

Robin Héron and Myriam Frejus
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Keywords: GenAI, Work, Ergonomics.

Abstract: The development of AI-based systems has enabled the delegation of tasks traditionally associated with human cognition to machines. With the ad-vent of so-called "generative AI" (GenAI), public interest has surged, cul-minating in what Time magazine headlined on 27 February 2023 as an ongo-ing "arms race" among major corporations. Within this context, numerous reports – particularly from grey literature – highlight gains in productivity, efficiency, and, less frequently, quality, when employees utilise GenAI sys-tems. Empirical studies conducted in real-world settings remain limited, with findings largely focused on quantitative indicators (e.g., Brynjolfsson et al., 2023), yet they nonetheless provide insight into the application of GenAI in the workplace. Other studies have turned their attention to

the emergent mode of interaction known as "prompting", which underscores a transformation in production activities and the concomitant need for new skillsets (e.g., Mahdavi Goloujeh et al., 2024; Suh et al., 2021). To address the current gap between productivity-focused perspectives on GenAI in work contexts and broader understandings of human–AI interac-tion outside the workplace, this study aims to explore how the integration of a generative AI–based tool within an existing sociotechnical system re-configures employees' work practices. The objective is to investigate how workers engage with and adapt to this evolving technological landscape.

Complete Paper #100

The Role of AI and LLMs in Controlling Human Attached Devices

Anne-Cathérine Kranz and Margaret Packer
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Keywords: Large Language Models (LLMs), Prosthetics, Multi-Modal Control, Human-in-the-Loop, Voice Control, User-Centric.

Abstract: Commercial prostheses still rely largely on single-modality electromyography (EMG) control. This entails unreliable signals and forces users to perform mode switching and calibration. Advances in artificial intelligence (AI) techniques, specifically LLMs, promise further advances for prosthetic devices. 13 semi-structured interviews with clinicians, researchers and manufacturers reveal three converging needs: (i) reliable multi-modal intent recognition beyond EMG, (ii) AI-guided socket-design and real-time socket fit optimisation, and (iii) intuitive, personalised, low-cognitive-load human-prosthesis interaction, potentially via Large Language Models (LLMs). Synthesizing these findings with recent literature, we outline the current state of AI adoption and barriers that cause a research-to-practice gap. Multi-modal control remains confined to laboratory settings, while commercial adoption is hindered by fears of over-complexity. We highlight human-in-the-loop continuous calibration games and prioritize speaker-dependent voice commands with LLM reasoning. These findings provide an agenda for engineers, clinicians and researchers to translate AI techniques, specifically LLMs, into user-centric and comfortable prosthetic devices.

Complete Paper #120

On Creating Conversational Speech Interfaces

Evangelia Panteliadou[1], Roman Graf[1], Margarete Dippel[2] and Martin Hitz[1]
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Keywords: Voice User Interfaces, User Experience, Multimodal Interfaces, Latency Optimization, Prompt Engineering.

Abstract: Since the recent proliferation of voice-based agents such as Alexa, Siri, Google Assistant and ChatGPT, it seems appropriate to equip a wide variety of applications with such an interaction modality. We show the use of voice-based technologies using a simple demonstration example with the aim of making it easier for developers of classic applications to get started with this technology. In the course of our work on our demonstration example, a number of questions arose which – in addition to explaining our individual development steps – are addressed.

Poster Presentations (Online) 1 **CHIRA**
16:15 - 17:15 **Room Andalucia 6 Online**

Complete Paper #14

Transforming User Interface Designs for Mixed Reality Using a Meta-UI Tool Prototype

Alecsandru Grigoriu and Sabin-Corneliu Buraga
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Keywords: HCI, UI, Distributed User Interface, Meta-UI, Software Tool, Mixed Reality, AR, VR, Design Process, Design Evaluation, Usability Study, Prototype, Educational Platform.

Abstract: Designing interfaces for Mixed Reality (MR) applications when transitioning from Web/mobile/desktop platforms presents significant challenges. Transitioning to a 3D Augmented/Virtual Reality environment can complicate the design process. Current practices encompass various approaches, including direct interface translation and creating new versions. We devise a high-fidelity prototype for a multi-purpose Meta-UI tool that assists designers and developers in configuring the applications' UI design for MR. To illustrate the proposal's benefits, we demonstrate how our Meta-UI could transform the design of an educational platform dedicated to increasing sustainable ocean awareness. Furthermore, we recruited over 60 university students enrolled in Human-Computer Interaction classes to envision, sketch, and design UIs for their class projects, with our original prototype serving as a guiding framework while interacting with MR devices. The results revealed a decrease in difficulty when designing by using our prototype.

Complete Paper #30

Exploring Persuasive Explanations to Motivate the Adoption of SOLID Principles

Ingo Pribik, Sebastian Lubos and Alexander Felfernig
Graz University of Technology, Austria

Keywords: Explanations, Persuasion, Software Engineering.

Abstract: Adopting the *SOLID* principles in software engineering has various benefits, including improved code maintainability, easier testing, reduced technical debt, and better team collaboration. These principles provide a foundation for developing scalable, adaptable, and high-quality software systems. However, consistent application in daily work remains challenging, as software developers may perceive the principles as complex, struggle to understand their value, or face time constraints. To address these challenges, we explore how persuasive explanations can motivate developers to adopt *SOLID* principles in their daily work. In a preliminary user study, we asked software developers to evaluate persuasive explanations following Cialdini's principles of persuasion. We evaluated responses on effectiveness across varying experience levels to identify the most promising strategies to support long-term adoption of SOLID principles, which can help improve software quality.

Complete Paper #47

From Curiosity to Comfort: Older Adults in Retirement Homes Navigating Independent Use of Voice-based AI Chatbot, Barriers, and Social Connection.

Cornelia Ursprung[1], Simone Eicher[1], Monika Schoch[1], Sandro Pezzutto[2] and Dennis Eitner[2]

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Keywords: Accessibility, AI, Chatbot, Independent Use, Older Adults, Loneliness, Social Inclusion, Technology Acceptance, Technology Barriers, Usability, VAI.

Abstract: In an increasingly digital world, the adoption of technology to support older adults is crucial for enhancing their quality of life and social inclusion. Despite the growing interest in voice-based artificial intelligence (VAI) chatbots, there is limited understanding of how older adults in retirement homes independently navigate these technologies, including the barriers they face and the potential impact on social connections. This preliminary usability study aims to explore the acceptance, usability, and concerns of older adults regarding the VAI assistant *Alfred* during its independent use, focusing on usage patterns, privacy concerns, and its exploratory self-reported influence on social connection, loneliness, and quality of life. Utilizing a mixed-methods approach, the research collected quantitative and qualitative data at three intervals (pre-, peri-, and postintervention). Key findings reveal that initial curiosity and a sense of duty drive engagement with *Alfred*, older adults in retirement homes perceive VAI chatbots as promising tools for enhancing daily life, with hopes for innovative solutions to support aging populations. Participants responded positively to *Alfred*, appreciating its voice quality and group usability, while suggesting improvements for accessibility and envisioning its role in fostering social connections, especially for vulnerable individuals. The preliminary study underscores the importance of addressing usability issues to enhance acceptance and independent use among older adults. By identifying optimization potential for *Alfred* based on these insights, the project contributes to establishing an innovative solution for fostering digital inclusion and social connection in aging populations.

Complete Paper #95

Using Nielsen's Heuristics for Redesigning an App for Supporting Mental Health of College Students

Martín Ortiz Gerardo, José Armando Alvarado Loaiza, Karen Lucía Garcia Ramirez, Sherlyn Haydee Hernández Chávez, Evelyn Alessandra Zurita Barajas, Pedro David Guevara Rodriguez, Hector Zatarain Aceves and Karina Caro

Autonomous University of Baja California (UABC), Ensenada, Mexico

Keywords: College Students, Mental Health, Mobile App, Nielsen's Heuristics.

Abstract: Several studies have shown how students' mental health is affected when they begin college. When starting college, their mental health can be influenced by emotional, social, or academic challenges. It is crucial to offer tools that support the mental well-being of this group. In this paper, we present the redesign and validation of the Emotions&Care app, a mobile application designed to support the mental health of college students. Using results from the latest validation session and applying Nielsen's heuristics, we enhanced the app's user interface design and conducted a validation session with 17 college students. Our results show that, although the app's design has been improved, there are still critical issues to address to ensure its long-term use. These findings highlight the importance of evaluating digital mental health interventions, such as mobile apps, for their usability and acceptability among users, with the ultimate goal of enhancing students' engagement with these apps.

Complete Paper #101

Facial Gesture Detection for Individuals with Reduced Hand Mobility Using Graph Neural Networks

Erick Urbizagastegui Alvarez and Jorge Diaz Suarez

Universidad Peruana de Ciencias Aplicadas, Prolongación Primavera 2390, Lima 15023, Peru

Keywords: Eye Tracking, Facial Gesture Recognition, Human-Computer Interaction, Assistive Technology, Graph Neural Network.

Abstract: Currently, Human-Computer Interaction has evolved beyond traditional periph-erals, enabling new forms of control through computer vision technologies. This paper addresses the limited digital accessibility faced by individuals with reduced hand mobility and explores how to overcome it. An efficient facial gesture recog-nition model is proposed, designed to operate based on facial landmarks (Facial Mesh) extracted using Mediapipe's Face Mesh technology. The model incorpo-rates a graph neural network (GNN) with a lightweight architecture and low computational complexity to detect facial gestures on the user's face, enabling smooth execution on low-performance computers without significantly compro-mising user experience. The work presented may be of interest to researchers fo-cused on digital accessibility for individuals with motor impairments in their hands.

Complete Paper #118

Human-Centred LLMs in Personalized Healthcare: A Survey

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Keywords: Large Language Models, Patient-Centered Design, Personalized Health Informatics, Recommendations, Human-AI Interaction, Explainable AI.

Abstract: The integration of Large Language Models (LLMs) into personalized, patient-centric healthcare represents an emerging paradigm and transformative frontier in digital medicine. This new paradigm is reshaping how patients interact with digital systems, introducing new possibilities for patient-centered experiences. However, this growing field remains fragmented across technical, clinical, and interactional dimensions, making it difficult to synthesize common patterns and design principles. In this survey, we address this gap by presenting a comprehensive taxonomy that organizes current research across four human-centric pillars: Application Domains, Interaction Architectures, Data Integration for Patient Modelling, and Evaluation Methodologies. We emphasize how LLMs are being embedded into tools that support patient engagement, emotional support, and decision-making, raising essential questions about explainability, trust, safety, and the evolving role of clinicians in human-in-the-loop systems. Through

this lens, our analysis reveals a critical tension at the heart of the field: while architectural innovation in areas such as Retrieval-Augmented Generation and multimodal systems is accelerating, progress is fundamentally hindered by persistent challenges in clinical reliability, data privacy, and justified skepticism from healthcare professionals. By bridging the perspectives of HCI, AI, and Health Informatics, we lay the groundwork for building more usable, equitable, and trustworthy systems for personalized care.

Poster Presentations (Online) 1 **CHIRA**
16:15 - 17:15 **Room Guadalmina Online**

Complete Paper #17

Designing for Wow: Empowering Women Through a Pelvic Health App

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Keywords: User Empowering Design (UED), Human-Computer Interaction (HCI), Co-Design, Women's Health Technology.

Abstract: In the dynamic realm of technology design, the User Empowering Design (UED) emerges as the next frontier, elevating user interfaces from merely functional and engaging to profoundly impactful. UED is a framework that extends beyond usability and user experience (UX) to address users' sense of control, self-perception, and personal growth. Drawing on layered psychological needs and the Kano model of user expectations, UED positions empowerment as the "wow" factor in interaction design—enabling technologies to support not just task completion or emotional satisfaction, but personal development. We present the case of EZpeeZ, a mobile application designed to empower women managing pelvic floor challenges. Developed through a value-driven, co-design process that integrates playful physiotherapy exercises, humorous interaction, and empathic microcopy, EZpeeZ demonstrates how UED can reshape stigmatized health topics into experiences of control, confidence, and dignity. Finally, we outline plans for evaluating the app's impact on users' quality of life and emotional well-being, including focus groups and eye-tracking studies. This work contributes a concrete example of UED in practice and argues for empowerment as a practical imperative in human-centered design.

Complete Paper #67

Extreme Reality Training with Complex Gestures

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Visual Intelligence Studio, Pittsburgh, Pennsylvania, U.S.A.

Keywords: Extreme Reality, Training, Natural Gesture, Emergency Response.

Abstract: Extreme Reality (EXR) is to superimpose extreme situations and live sensory data to the physical scene. In this study, we explore gesture capture and interaction technology for emergency response training, which includes extreme gaits such as crawling through the floor and real-time gesture control of the user's movement in the training scenarios. Our multimodal EXR interfaces show their potential in real-time operation and training. The usability of EXR interfaces can be tested in a simulated environment and measured with instruments objectively.

Complete Paper #77

Improving Communication in the Metaverse Using 3-Dimensional Space for LLM and Autocomplete Integration

Nathan Green

Marymount University, School of Technology and Innovation Marymount Applied Research in Artificial Intelligence, U.S.A.

Keywords: LLM, Input Devices, VR.

Abstract: This research introduces a novel XR/VR keyboard prototype, coupled with a large language model(LLM) and n-gram models for sentence prediction. While traditional VR keyboards have been ported from phone interfaces, we demonstrate a design that can fully use the 3D space and blend LLM and new AI technologies into traditional designs. The proposed keyboard is a merger of conventional interfaces, but allows for the development of AI suggestions in additional 3D space, setting the stage for future development in AI-driven interactions within virtual spaces.

Complete Paper #86

Self-Nudging Using the Digital Wellbeing App

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Keywords: Nudge, Screen Time, Smartphone Overuse, Digital Addiction, Behavior Change.

Abstract: Design of smartphones and their apps can conflict with users' personal goals and negatively impact well-being, motivating tech companies to develop tools aimed at self-monitoring and altering smartphone usage. This mixed-method study describes the use of self-nudges within Android's native *Digital Wellbeing* app as a tool to achieve smartphone usage goals. Students (N = 63) were encouraged to use the *Digital Wellbeing* app for several weeks, but were given the freedom to select their preferred strategies to curb smartphone usage. Specifically, they could set personal smartphone usage goals and employ features like app 'Time Limits', "Grayscale" mode, and "Focus" mode. Results revealed that 58% of participants reported using at least one *Digital Wellbeing* feature. App time limits were the most utilized, reported by 62.2% of participants, followed by "Do not disturb" mode (43.2%), and "Grayscale" mode (32.4%). Despite this, participants did not rate the *Digital Wellbeing* app as particularly useful, regardless of whether they used features of the app or not. Participants reported no significant differences in life satisfaction, sleep quality, stress, and happiness before versus after the intervention period. Therefore, self-nudging with the *Digital Wellbeing* app might not be sufficiently useful and effective due to low engagement and lack of enforcement mechanisms in the app's tools, which are often bypassed. Based on our findings, we propose implications for future design of digital well being tools, including the integrations of behavioral insights, centering interventions around activity patterns, lowering barriers for uses of those apps, and leveraging machine learning algorithms to adjust intervention strategies over time.

Complete Paper #92

Multi-Stakeholder Alignment in LLM-Powered Collaborative AI Systems: A Multi-Agent Framework for Intelligent Tutoring

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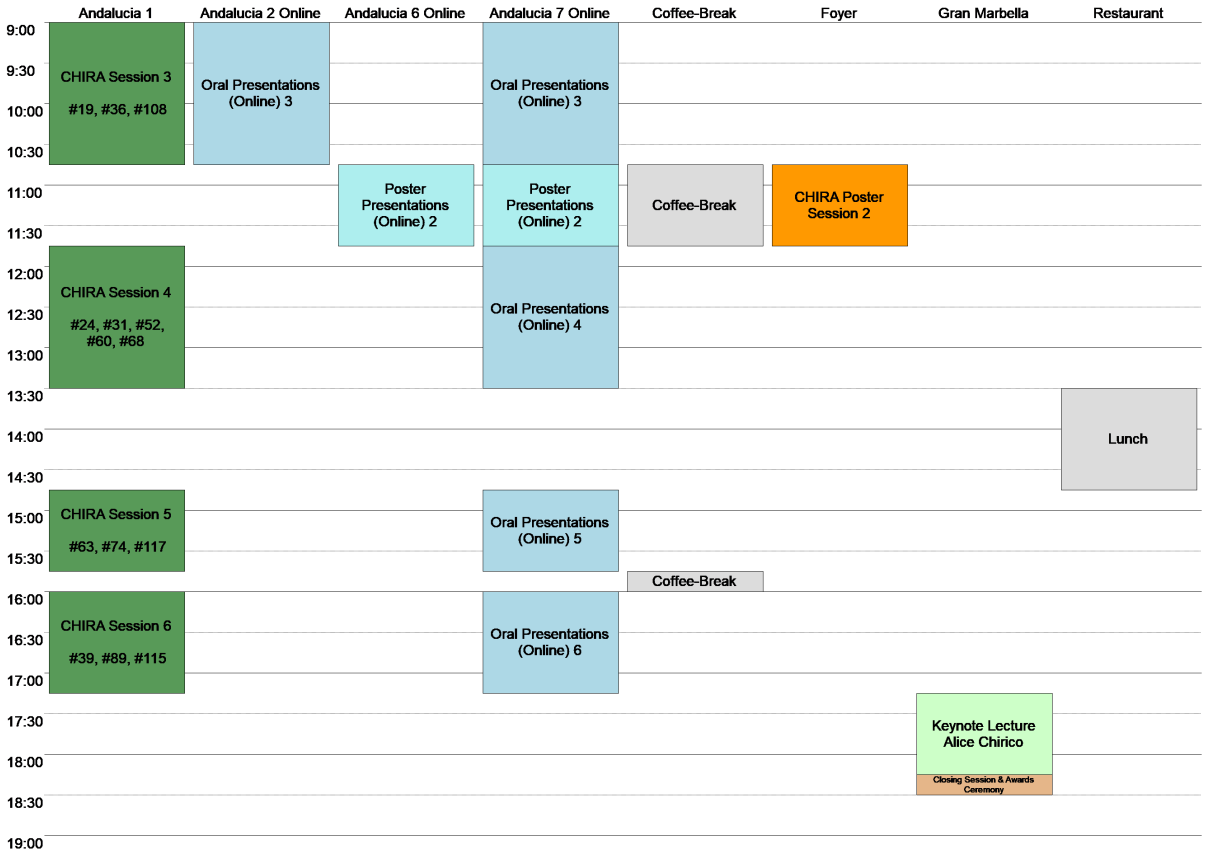
Keywords: AI Governance, Intelligent Tutoring Systems, LLM Multi-Agent.

Abstract: The integration of Large Language Models (LLMs) into Intelligent Tutoring Systems (ITS) presents significant challenges in aligning with the diverse values, preferences and constraints of students, parents, teachers, and institutions. Existing ITS architectures lack formal mechanisms for negotiating these conflicting priorities, creating risks in accountability and bias. This paper introduces the Advisory Governance Layer (AGL), a non-intrusive, multi-agent framework designed to enable distributed stakeholder participation in AI governance. The AGL employs specialized agents representing stakeholder groups to evaluate pedagogical actions against their specific policies in a privacy-preserving manner. Through a novel policy taxonomy and conflict-resolution protocols, the framework provides structured, auditable governance advice to the ITS without altering its core pedagogical decision-making. This work contributes with a reference architecture and technical specifications for aligning educational AI with multi-stakeholder values, bridging the gap between high-level ethical principles and practical implementation.

Tuesday Sessions: October 21

Tuesday Sessions: October 21 Program Layout



Session 3A **CHIRA**
09:00 - 10:45 **Room Andalucia 1**
Adaptive and Intelligent Systems

Complete Paper #108

Keywords Are not Always the Key: A Metadata Field Analysis for Natural Language Search on Open Data Portals

Lisa-Yao Gan[1], Arunav Das[2], Johanna Walker[2] and Elena Simperl[2,3]

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Keywords: Conversational Information Retrieval, Dataset Discovery, Conversational Search.

Abstract: Open data portals are essential for providing public access to open datasets. However, their search interfaces typically rely on keyword-based mechanisms and a narrow set of metadata fields. This design makes it difficult for users to find datasets using natural language queries. The problem is worsened by metadata that is often incomplete or inconsistent, especially when users lack familiarity with domain-specific terminology. In this paper, we examine how individual metadata fields affect the success of conversational dataset retrieval and whether LLMs can help bridge the gap between natural queries and structured metadata. We conduct a controlled ablation study using simulated natural language queries over real-world datasets to evaluate retrieval performance under various metadata configurations. We also compare existing content of the metadata field 'description' with LLM-generated content, exploring how different prompting strategies influence quality and impact on search outcomes. Our findings suggest that dataset descriptions play a central role in aligning with user intent, and that LLM-generated descriptions can support effective retrieval. These results highlight both the limitations of current metadata practices and the potential of generative models to improve dataset discoverability in open data portals.

Complete Paper #19

Roadwatch: An Integrated Architecture for AI-Powered Surveillance and Anomaly Detection in Traffic Areas

Roberto Saia, Alessandro Sebastian Podda, Livio Pompianu, Mirko Marras, Nicola Floris and Salvatore Carta

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Keywords: Smart Cities, Artificial Intelligence, Surveillance, Security.

Abstract: The increasing complexity of urban traffic management necessitates advanced surveillance and anomaly detection solutions. The proposed Roadwatch architecture is a comprehensive system integrating Artificial Intelligence (AI) and Computer Vision to monitor vehicular and pedestrian traffic effectively. By leveraging interconnected software and hardware components, Roadwatch identifies objects captured by cameras and provides essential meta-information for detecting specific anomalies. This assists in crucial tasks such as traffic management, pedestrian safety, incident detection, and optimal resource allocation for urban infrastructure. AI plays a pivotal role in processing camera feeds, enabling object detection, identification, and tracking. With configurable rule-based detection, Roadwatch offers an innovative approach to intelligent surveillance, enhancing safety and security in diverse real-world traffic environments while utilizing existing camera infrastructure.

Complete Paper #36

Forecasting Surprises in Machine-Learning-Driven Interaction Systems: Lessons from the Transformer Breakthrough

Tapio Pitkäranta

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Keywords: Artificial Intelligence AI, Large Language Models LLM, Generative AI GenAI, Human-Centred AI, Computational Interaction, Explainable AI, Forecasting Error, Transformer Architecture.

Abstract: The unexpectedly rapid capabilities unlocked by large language models (LLMs) and generative AI (GenAI) systems built on the Transformer architecture constitute one of the largest forecasting errors in recent AI. An architecture introduced for machine translation in 2017 [36] enabled, within a few years, broadly capable LLM/GenAI systems across tasks and modalities. A qualitative case study integrates document analysis, an expert-prediction audit, and synthesis of contemporaneous forecasts and discourse to explain this surprise, identifying three recurring mechanisms: (i) attribution drift among the architecture, the training procedure, and the data; (ii) conflation of empirical shortcomings of particular trained systems with fundamental limits of the model class; and (iii) misestimation of how scaling laws and infrastructure constraints jointly shape the feasible capability envelope.
Many claims that aged poorly targeted implementation artifacts rather than properties of the underlying model family. In response, an attribution-disciplined forecasting framework is proposed: capability and limitation claims should be stated at the level of the model class, anchored to executable specifications of its computational graph, and paired with explicit models of compute, data, and training-procedure scale. The contribution includes practical guidelines for capability attribution in LLM/GenAI and human–AI interaction settings, and outlines open problems for formal analysis of deep-learning architectures, with the aim of reducing future forecasting error.

Oral Presentations (Online) 3 **CHIRA**
09:00 - 10:45 **Room Andalucia 7 Online**
User Experience

Complete Paper #22

Interaction Design and Divergent Paths in VR Learning: A Structural Modeling Approach

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Keywords: Virtual Reality, Immersive Learning, Virtual Reality in Education, Embodied Interaction.

Abstract: Immersive virtual reality (VR) has the potential to transform learning, but its success depends not only on technical design but on how learners experience value, agency, and discomfort. This study models how technical efficacy (TE), technology adoption (TAM), and embodied presence (PRES) interact with dizziness (DIZ) and task design to shape performance in VR. Using structural equation modeling (SEM), generalized additive models (GAM), and multivariate regression, we found that TAM fully mediated the impact of TE on PRES (β = .542, p <.001), suggesting that technical fluency only enhances immersion when learners perceive the system as meaningful. Presence increased dizziness (β = .36, p = .001), but only TAM—rather than TE—sustained immersion under strain. A nonlinear moderation effect showed that effort (EFFSYS) predicted performance (PERFSYS) more strongly under high DIZ—especially in exploratory designs, where learners retained behavioral flexibility. In contrast, linear paths suppressed this dynamic, flattening performance variance. Despite similar DIZ levels across conditions, only exploratory paths enabled "productive strain," converting discomfort into engagement. Our findings suggest that immersive learning emerges from the alignment of effort, motivation, and interaction design—not from realism alone. Designing for persistence, not just presence, is critical: discomfort can fuel engagement if learners can act, adapt, and understand why it matters.

Complete Paper #34

Exploring Social Robot-Based Games for Enhancing Sustainable Living at Home: A Co-Design Study with Families with Children

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Keywords: Social Robots, In-Home Social Robots, Family-Centered Design, Co-Design, Environmental Sustainability.

Abstract: Social robots have been utilized in education, healthcare, customer service, and domestic environments. However, there is limited research on their role in promoting sustainable living at home through playful interactions. This study extends the theme of family-robot interaction (FRI) within human-robot interaction (HRI) by integrating social robots and game-based interactions to enhance sustainability at home. We conducted a one-month qualitative study with 32 participants (parents and children) from eight families, using a family-centered design approach and participatory co-design method. Each family hosted a robot at home for one month. Through co-design sessions, they first shared their expectations for how social robots could support eco-friendly living, then ideated robotbased games to promote sustainability. Our findings showed that social robots were perceived as more engaging and appealing to children than adults. Children saw social robots as companions and were eager to learn pro-environmental practices through the robots' interactive and playful features. The study's eco-friendly focus, along with the co-design tasks around the robot, inspired some children to participate in sustainable living practices at home and encouraged their parents to do the same. The ideated robot-based games incorporated competition, collaboration, and reward elements, aiming to enhance interest and eco-friendly living and awareness. Overall, adults were more reserved about social robots, expressing concerns about the robots' ability to maintain long-term engagement once the novelty effect fades. This study suggests that social robots have the potential to raise intergenerational environmental awareness at home, with children acting as the primary interest group who transfer their eco-friendly knowledge to their parents.

Complete Paper #54

The Compass Menu

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Keywords: Human Computer Interaction, Interaction Design, Graphical Menu Design, Radial Layout, Gesture-Based Interaction, Expert Evaluation, Mechanical Ventilation, Augmentative and Alternative Communication.

Abstract: Approximately 20% of intensive care patients in Germany require mechanical ventilation due to illness or post-operative conditions, which impairs their ability to communicate effectively. This poses significant challenges for patients and their caregivers. Augmentative and alternative communication concepts from other fields can be adapted to the context of intensive care to support ventilated patients. We developed an assistive system designed for the needs of the user group that is controlled by a ball-shaped interaction device. In this paper we introduce the central element of the assistive system, a radial menu technique called Compass Menu. It is systematically described using a taxonomy of menu properties. Our prototype was evaluated by six HCI experts in a pilot study. They evaluated how well design decisions made in development met previously identified menu design objectives as well as usability, applicability, user experience, and aesthetics. For the evaluation, we developed a comprehensive questionnaire tailored to menu design. The results indicate that the menu design could be suitable for implementation in interactive systems that support mechanically ventilated intensive care patients.

Complete Paper #35

Visual Engagement in Immersive VR: Modeling Nonlinear Dynamics of Presence and Technology Acceptance

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Keywords: Virtual Reality, Eye-Gaze Tracking, Presence.

Abstract: Immersive Virtual Reality (VR) environments create new opportunities for interactive learning by integrating embodied control, real-time feedback, and spatial attention. To understand how learners engage with these environments, we use gaze-ray casting—a lightweight proxy for attention based on headset orientation—to examine how visual focus on avatar gestures shapes task behaviour and perceived system interactivity. Our findings show that gaze predicted system interaction (β = .726, R^2 = .61), but this effect only enhanced presence for learners with high technological efficiency (interaction β =.59). Crucially, gaze only predicted task activity when the UI overlays did not compete with avatar gestures. When interface elements occluded gesture space, gaze engagement dropped, and presence declined. Nonlinear analyses also revealed a tipping point: when both gaze and efficacy were high, dizziness reports spiked, an overload pattern missed in linear models. These results suggest that gaze-based engagement fosters immersion only when learners can fluently interpret system cues. Without adaptive support, active users may encounter strain rather than flow. Gaze-ray data, thus, offer a scalable diagnostic for detecting alignment, or friction, between learner attention and system design. Designing for immersive learning requires synchronising visual demands with user confidence and capacity, ensuring that interaction remains a source of motivation, not disruption.

Oral Presentations (Online) 3 **CHIRA**
09:00 - 10:45 **Room Andalucia 2 Online**
Computational Interaction

Complete Paper #50

Supply Chain Risk Management of Insider Threats: A Network-Oriented Computational Analysis

Daniël de Jongh[1], Yulian de Ridder[1], Esmee Hobbelink[1], Nina Zięcik[1], Debby Bouma[1], Jan Treur[1,2] and Peter Roelofsma[1]

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Keywords: Cybersecurity, Insider Threats, Computational Analysis.

Abstract: The research reported here investigates insider threats in supply chain contexts by simulating the behavioural trajectory of a disgruntled employee using an adaptive network model. It introduces a scenario grounded in the real-life case of Kandula Nagaraju, illustrating how organisational change and psychological disengagement can trigger malicious actions. Using network-oriented modelling, the system captures interlinked state variables representing cognitive states, organisational responses, and escalation dynamics. The model's architecture is structured in a multilevel manner and includes adaptive feedback mechanisms. A baseline simulation demonstrates how undetected disengagement can escalate into data theft, highlighting vulnerabilities in static organisational systems. What-if analyses manipulate detection speed, access misuse thresholds, and learning efficiency, showing that faster detection and organisational adaptability significantly reduce risk. The discussion emphasises the importance of feedback loops, particularly between detection and learning, in disrupting threat escalation cycles. Finally, the study offers practical recommendations and proposes future research to refine some of the assumptions and enhance insider threat prevention strategies.

Complete Paper #79

Mitigating Authentication Risks Through AI-Coaching: An Adaptive Dynamical System Analysis

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Keywords: Authentication Management, Adaptive Network, Human-AI Interaction, Knowledge Level, AI Coach.

Abstract: In an era where cybersecurity threats are increasing, a strong authentication system is one of the foundations of digital security. This paper presents a computational analysis of the dynamic collaboration of a system-level authentication model, a human decision-making process, and an AI Coach as supervisor and performance enhancer. To simulate this, an adaptive dynamical system model has been developed that shows how risks related to contextual variables influence an admin's stress level and, consequently, its risk assessment of the situation. The model was designed as an adaptive network model and uses adaptive mechanisms and an AI coach that detects misjudgements by the admin and helps to correct during the decision-making process. A What-If analysis was conducted to investigate the impact of important variables such as stress sensitivity and persistence levels on risk assessment accuracy. Results show that the AI Coach plays a critical role and is an important addition to the model.

Complete Paper #43

An Integrated Framework for Evaluating e-Service Quality, Usability and User Experience of Web-Based Applications: A Qualitative Expert Review

Samuel Ssemugabi

University of South Africa, Pretoria 0001, South Africa

Keywords: e-Service Quality, Usability, User Experience, Human Factors, Web-Based Applications, Qualitative Expert Review, Evaluation Framework, e-SQUUX.

Abstract: Recent growth in the complexity and reach of web-

based applications (WBAs) has created a pressing need for comprehensive evaluation tools that address usability, user experience (UX), and e-service quality (e-SQ). While each of these constructs is well-studied individually, there is a lack of integrated frameworks capturing their interdependencies within interactive systems. This paper presents the development and refinement of the e-SQUUX framework, an integrated and implementable model designed to evaluate WBAs holistically. Originating from a rigorous systematic literature review of 264 sources, the initial model was critically examined through an expert-review process involving four domain specialists in human-computer interaction (HCI). This iterative process resulted in a reduced yet robust framework with 16 categories and 101 evaluation statements across three key domains: usability, UX, and e-SQ. The study highlights the importance of human factors in system evaluation and demonstrates the framework's flexibility and practical relevance to both researchers and practitioners. Implications for adoption in diverse WBA environments are discussed, and recommendations for future empirical validation using statistical modelling techniques (e.g., PLS-SEM) are provided. Furthermore, this model has highlighted that it is also suitable for the evaluation of mobile applications. s. Keywords

Complete Paper #49

MeteoChat: A Fine-Tuned and RAG-Based LLM for Semi-Automatic Report Building in Environmental Monitoring

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Keywords: Data Analysis, LLM, Report Building, Environmental Monitoring.

Abstract: In environmental monitoring, producing high-quality reports is crucial for timely intervention in critical situations such as natural disasters and emergencies. However, generating these reports often requires a significant amount of time and resources. This article presents MeteoChat, a system that automates the creation of environmental reports by combining Large Language Models (LLMs), fine-tuning techniques, and Retrieval Augmented Generation (RAG). The goal is to maintain high report quality while reducing the time and resources needed for their production. MeteoChat operates in two phases. In the first phase, an environmental expert defines a set of generic key questions, context, and corresponding answers independent from specific data. These question-context-answer tuples are then used to fine-tune the LLM. In the second phase, the fine-tuned LLM is integrated into an RAG-based chatbot system, which combines specific environmental data. The environmental expert can interact with MeteoChat through an intuitive web chatbot and download the final report.

Poster Session 2 **CHIRA**
10:45 - 11:45 **Foyer**

Complete Paper #33

Assessing Users' Momentary Experience with the Experience Sampling Method: A Comparison of Time-Based ESM, Event-Based ESM, and DRM

Robert Cobb and Tom Gross

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Keywords: User Experience, User Experience Research, Experience Sampling Method, Day Reconstruction Method, Comparison.

Abstract: The Experience Sampling Method (ESM) is commonly used in human-computer interaction for capturing subjective and situational experiences of users in real time. It can be time-based or event-based. The Day Reconstruction Method (DRM) asks about experiences only on the following day and should therefore be less disruptive for participants. To determine how the three methods differ in terms of quantity and quality of the answers, we conduct a direct and systematic comparison in a between-subject study (N = 17). We compare the count and duration of experience episodes (N = 157) of each method in a quantitative analysis. We find a significant difference between the durations of episodes of the time-based ESM and the DRM, which may indi-cate a reduced time accuracy with the DRM. Then, we compare the answers obtained in a post-study survey, which do not indicate a greater satisfaction of participants of the DRM for short study periods.

Complete Paper #55

AI-Generated Incremental Adaptive Data Storytelling for Young Learners

Marina Buzzi[1], Barbara Leporini[2], Angelica Lo Duca[1], Veronica Punzo[3] and Daniela Rotelli[4]

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Keywords: Data Storytelling, Generative AI, STEM Education, Primary School Data Literacy.

Abstract: In a world increasingly shaped by data, developing data literacy at an early age is essential. This paper introduces a visionary framework that reimagines how primary school students can develop data literacy through AI-generated incremental and adaptive data storytelling (IADS). Teachers leverage a User-Rendered Context-Augmented (URCA) AI model to craft personalised, evolving educational narratives that align with classroom context and student progress. These data-driven stories adapt over time to reinforce misunderstood concepts and scaffold increasingly complex data ideas, transforming learning into a dynamic, inclusive, and emotionally engaging experience. By uniting generative AI with pedagogically informed narrative design, we propose a novel path for technology-enhanced learning that fosters accessibility, inclusion, and deeper understanding. This paper sets the foundation for a new generation of AI-driven educational tools and outlines future directions for empirical validation, with the potential to reshape how we teach data, support teachers, and bridge educational divides.

Complete Paper #56

From Case Files to Virtual Reality: An Artificial Intelligence-Based 3D Apartment Generation Tool

Firas Adleh and Julius Schöning
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Keywords: 3D Apartment Generation, Artificial Intelligence (AI), Virtual Reality (VR), 3D Indoor.

Abstract: The generation of 3D indoor scenes has implications for various fields, from virtual reality (VR) via video games to architecture. This undertaking is by no means trivial, as it consists of several components, such as floor plans, walls, doors, windows, and furniture objects. The visual appeal of the generated scenes of the 3D apartment is contingent upon the quality of the utilized 3D model for furniture objects and the naturalness of their positions, orientations, and inter-object relationships, which can significantly impact user experience and engagement. To address this challenge, numerous tools have been developed to facilitate the generation of 3D indoor scenes, employing diverse generation methods to achieve this objective. This paper presents a novel tool that uses various artificial intelligence (AI) models to generate 3D-furnished interiors that can be easily customized and interacted with in VR applications, e.g., based on case file descriptions. The tool enables user-driven customization of apartments based on textual descriptions and numerous parameters. To assess the usability of the generated 3D apartments, a range of metrics is used to evaluate the tool's performance compared to manually designed 3D apartments. The results show that the presented generation tool achieves results comparable to those of human-designed apartments.

Complete Paper #64

Thematic and Task-Based Categorization of K-12 GenAI Usages with Hierarchical Topic Modeling

Johannes Schneider[1], Béatrice Hasler[1], Michaela Varrone[2], Fabian Hoya[3], Thomas Schroffenegger[3], Dana-Kristin Mah[4] and Karl Peböck[3]
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Keywords: Generative AI, Education, K-12, Topic-Modeling.

Abstract: We analyze anonymous interaction data of minors in class-rooms spanning several months, schools, and subjects employing a novel, simple topic modeling approach. Specifically, we categorize more than 17,000 messages generated by students, teachers, and ChatGPT in two dimensions: content (such as nature and people) and tasks (such as writing and explaining). Our hierarchical categorization done separately for each dimension includes exemplary prompts, and provides both a high-level overview as well as tangible insights. Prior works mostly lack a content or thematic categorization. While task categorizations are more prevalent in education, most have not been supported by real-world data for K-12. In turn, it is not surprising that our analysis yielded a number of novel applications. In deriving these insights, we found that many of the well-established classical and emerging computational methods, i.e., topic modeling, for analysis of large amounts of texts underperform, leading us to directly apply state-of-the-art LLMs with adequate pre-processing to achieve hierarchical topic structures with better human alignment through explicit instructions than prior approaches. Our findings support fellow researchers, teachers and students in enriching the usage of GenAI, while our discussion also highlights a number of concerns and open questions for future research.

Complete Paper #78

Towards Defining an Intelligent System to Enhance Dentistry Experience for Children with Autism Spectrum Disorder

Marco Ajovalasit[1], Gustavo Cardenas[1], Sara Comai[2] and Fabio Salice[2]
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Keywords: Autism, Human Centred Design, Sensors, ICT.

Abstract: This article proposes a human-centred systemic solution to enhance the dental experience for children with autism spectrum disorders (ASD). Current dental procedures focus on desensitizing ASD patients to prevent agitation or use sedation, which reconditions their behaviour and overlooks their natural neural diversity. Additionally, communication difficulties and the need for routine make children with ASD resistant to treatment, as they are overstimulated and exposed to unfamiliar environments. There is a need for human-centred innovation in dentistry to incorporate technology that measures patient anxiety and reassures them during treatment. This paper reviews existing literature and proposes a theoretical concept for an intelligent, human-centred system to facilitate dental visits for children with ASD. It analyses the technical feasibility of solutions aimed at reducing anxiety before, during, and after treatment, categorized into technological, spatial, and communication aspects. The proposed solution integrates various technological elements, such as sensors, facial cameras, and adaptable room settings, to create a familiar and comfortable environment tailored to the needs of autistic children during dental visits. By addressing the entire dental visit process, the solution aims to reduce anxiety levels, improve patient experience, and provide dentists with real-time information, ultimately enhancing oral health outcomes for autistic children.

Complete Paper #98

Technology for Collecting, Tracking, Monitoring, and Assessing Developmental Skills of Children with Autism Spectrum Conditions

Silvia Verdugo-Rábago, Karina Caro and Oscar Cayetano
Autonomous University of Baja California (UABC), Ensenada, Mexico

Keywords: Autism Spectrum Conditions (ASC), Technological Tools, Developmental Skills, Mapping Review.

Abstract: Autism Spectrum Conditions (ASC) are neurodevelopmental disorders affecting communication, social interaction, and behavior. Many centers manually collect and track children's developmental skills using printed forms, creating a heavy administrative burden for therapists who spend significant time organizing information. This paper presents a mapping review of research on technological tools used for collecting, tracking, monitoring, and assessing children with ASC. The search was conducted in the ACM Digital Library, IEEE Xplore, and Scopus databases, covering the period from 2011 to 2024. The inclusion criteria focused on the following: data collection, monitoring,

tracking, or assessing the developmental skills of children with ASC or other neurodevelopmental conditions. The methodology for conducting the mapping review consisted of three main phases: planning, execution, and reporting. Initially, 583 records were identified, and 26 studies were selected after applying the inclusion and exclusion criteria to align with the review's objectives. The findings indicate that 88.46% of the reviewed technological tools focused on data collection, 50% on tracking, 15.38% on monitoring, and 15.38tools for therapeutic work with ASC, highlighting opportunities to develop more integrated solutions that enable continuous monitoring and adaptability across various intervention methods.

Poster Presentations (Online) 2 **CHIRA**
10:45 - 11:45 **Room Andalucia 7 Online**

Abstract #83

Limited Field of View Is not the Cause of Distance Underestimation, also in Real Environments

Jacek Matulewski[1], Filip Kowalik[2] and Jacek Matulewski[2]

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Keywords: N/A

Abstract: The depth perception in real, virtual, and augmented environments, considering factors like field of view limitation (FoVL), is still the subject of research because of its importance to augmented and virtual reality (AR and VR) interfaces. We aimed to resolve the discrepancy between the findings presented in [1] and [2] regarding the impact of FoVL on distance estimation ability. First study suggests that FoVL leads to depth perception disorders resulting from limited visual cues, while the latter indicates that FoVL is of little significance. These discrepancies may be due to the different methodologies used in both experiments, such as the use of devices with different parameters, different experimental conditions, different scenes (static or dynamic environments, indoors and outdoors), and, above all, the method of depth assessment (blind walking vs. verbal assessment).
In a very straightforward experiment, we tested how FoVL affects depth perception and, consequently, the ability to judge the distance to objects. To simplify it, we got rid of the virtual environment by conducting the ex-periment in an 8.3×6 m room using physical stimuli placed in various distances and using the goggles without electronics, but only with shutters leaving circular holes with a diameter of 5.5 cm, 4.10 cm, 2.75 cm, and 1.4 cm, without imitation of AR helmet inertia [1]. Thus, although the research question stems from issues related to AR, the experiment finally focused on human perception rather than technology.
The results obtained are fundamentally different from those from [1] and are closer to those from [2]. In [1] distances, measured by walking, were most underestimated by about 10.4% compared to actual distances, and in the case of triangulated walking by 19.3%. It is significantly more than in the current experiment, in which the average relative error calculated verbally was 5.5% and by walking was 5.2%. In the [2], the indicated distance was 94.4% (walking) and 98.8% (verbal) of the actual distance, which are similar to values obtained in the current article, i.e., respectively 94.8% and 94.5%. We also compare the results with those obtained in our laboratory using AR goggles [3].

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2. Knapp, J. M., & Loomis, J. M. Limited field of view of head-mounted displays is not the cause of distance underestimation in virtual environments. Presence: Teleoperators & Virtual Environments, 13(5), 572-577. (2004)
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Complete Paper #37

AI and Co-Design to Support Dementia: Lessons from a First Co-Creation Session

Ana Ferreira[1], Joana Muchagata[1], Marteyn van Vangasteren[2], Lukas Radbruch[3], Diana Marques[4], Rosa Almeida[4], Izidor Mlakar[5], Muhammad Irfan[6], Holger Brunsch[3], Kseniya Simbirtseva[7], Luísa Castro[8], Pedro Vieira-Marques[1] and Francisca Rego[1]

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Keywords: Dementia, Artificial Intelligence (AI), Virtual Reality (VR), Co-Creation, Co-Design, Usability, mHealth, Non-Pharmacological Interventions.

Abstract: The purpose of this study is to describe and discuss the development of a high-fidelity prototype that aims to support people with dementia (PwD) in dealing and mitigating non-cognitive symptoms associated with their disease, like anxiety, depression or pain. The prototype comprises interactive mockups to enable a co-creation session and subsequent usability testing with healthcare professionals of PwD. Its innovative contribution lies in combining multiple evidence-based inter-ventions (reminiscence therapy, music therapy, journaling, VR mindfulness) with an AI-powered conversational agent within a unified, co-designed interface spe-cifically adapted for dementia care. The prototype was designed with input from existing evidence and guidelines on dementia as well as from expertise from healthcare professionals treating PwD during a first co-creation workshop with those professionals where valuable feedback will be integrated for the next itera-tion. Key findings include specific design requirements for AI safety in dementia care, privacy protection strategies, and a validated methodology for iterative co-design that bridges professional expertise with end-user needs. Researchers can now adapt for specific needs and challenges that can come up in the next co-creation sessions, with materials and contents that were thoroughly revised and tested, potentially more adequate for successful interactions with PwD. Future steps include a second co-creation session with PwD and informal caregivers to collect perceptions, preferences, needs and concerns regarding the prototype.

Complete Paper #62

Media Bias in The Guardian: Sentiment and Semantics in Israeli-Palestinian Coverage

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Keywords: Media Framing, Sentiment Analysis, Emotion Analysis, Word Embeddings, Named Entity Recognition, News Analysis.

Abstract: This study investigates media framing in the coverage of the Israeli-Palestinian conflict across several decades, using advanced natural language processing (NLP) techniques to analyze sentiment, emotion, named entity recognition (NER), and semantic bias. Using a multi-method approach—integrating lexicon-based (VADER, TextBlob), transformer-based (RoBERTa), and word embedding (Word2Vec) models—we examine sentiment patterns, emotional valence, entity-level sentiment, and framing differences between headlines and article content. Additionally, we incorporate a transformer-based large language model (LLM) for emotion detection to complement the NRC Emotion Lexicon analysis.

Results reveal that media tends to exhibit more negative sentiment towards Palestinian mentions than Israeli ones, with gaps increasing during conflict escalations (e.g., 2014 Gaza escalation, 2023 Hamas-Israel escalation). Emotion analysis highlights fear as the dominant emotion for both groups, with NRC showing fear 8.1% higher in Israeli contexts and LLM showing a smaller difference of 6.3%. Anger shows divergent trends, with NRC indicating 9.5% higher prevalence in Palestinian contexts, while LLM shows almost no difference (-0.2%). Sadness is consistently higher in Israeli contexts according to NRC (+71.2%), but LLM shows it as more prevalent in Palestinian contexts (-10.3%). These complementary findings demonstrate the robustness of combining lexicon-based and transformer-based methods for emotion detection. Headlines display greater sentiment polarity than article bodies, with a negative bias in 59.5% of cases, amplifying conflict-oriented framing. Word embeddings indicate stronger associations of violence-related terms, with the conflict escalations periods. Named Entity Analysis reveals that sentiment towards prominent individuals—such as political leaders and military figures—shifts significantly with conflict intensity, offering insight into how public figures are emotionally framed in media narratives. The findings highlight systematic framing differences that may influence public perception.

Complete Paper #88

Virtual Reality for Surface Topography Analysis

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Keywords: Virtual Reality, Metrology, Surface Topography, Texture Analysis.

Abstract: Immersive technologies, such as virtual reality (VR), have seen widespread adop-tion across multiple sectors, including product design and usage simulation, ow-ing to their interactive and intuitive capabilities that have transformed visualization and user engagement in these fields. Nevertheless, the application of VR in sur-face topography analysis remains notably limited. Although VR has significant potential to facilitate detailed and immersive examination of surface characteris-tics, its integration within this domain has not yet matched its use in other indus-tries. This paper presents a VR-based framework for surface analysis, providing an interactive platform for in-depth exploration of surface features. The proposed tool is intended to advance both the understanding and practical application of surface topography.

Complete Paper #105

LunaAI: Healthcare Guidance Bot Being Polite and Fair

Yuvarani Ganesan[1], Salsabila Harlen[1], Azfar Fazul Rahman[1], Akashdeep Singh[1], Zahra Fathanah[1], Raja Jamilah Raja Yusof[1] and Victor Kaptelinin[2]

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[2] *Umeå University, Sweden*

Keywords: Healthcare Chatbot, LLM, Fairness, Politeness, Human-Centered Design.

Abstract: Whilst conversational AI offers an ample amount of potential for the healthcare sector, many current systems fall short in the areas of emotional intelligence, fairness, and politeness—qualities that are essential in building patients' trust. This disparity undercuts the promise of digital health solutions and frequently causes worry among users. This study addresses the difficulty of integrating these ethical guidelines into practice by creating and assessing LunaAI, an innovative chatbot for healthcare assistance. Utilizing user-centered design concepts and a thorough literature review as a foundation, we built sophisticated conversational scenarios that addressed hostile user behaviour. These concepts were developed into a functional prototype using the assistance of Google's Gemini API and a mobile-focused Progressive Web App (PWA) created with React, Vite, and Firebase. To ensure its efficacy, we conducted preliminary testing with a small individual group, analyzing their responses with established frameworks such as the Godspeed Questionnaire. Furthermore, a comparative analysis was undertaken between LunaAI's personalized responses and the initial outputs of an uncustomized Large Language Model (LLM). The results demonstrated that LunaAI has made significant improvements in multiple key areas; users rated it 4.7/5 for politeness and 4.9/5 for fairness. These findings have substantial effects on the future development of human-computer interaction, particularly in sensitive domains like healthcare, and emphasize the significance of purposeful, ethical conversational design.

Complete Paper #116

Classical Media vs. Extended Reality in eLearning: A Study on User Engagement and Knowledge Retention on Apple Vision Pro

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Keywords: Human Computer Interaction (HCI), Extended Reality (XR), Mixed Reality (MR), visionOS, Apple Vision Pro, Augmented Reality (AR), Virtual Reality (VR), User Interface (UI), User Experience (UX), eLearning.

Abstract: This study investigates the comparative effectiveness of traditional digital media and Extended Reality (XR) environments in eLearning for students. Participants engaged with academic content presented through both conventional digital formats—such as text-based documents, slide presentations, and pre-recorded video lectures—and an immersive XR environment using the Apple Vision Pro headset. The aim was to assess differences in user engagement, knowledge retention, and overall learning experiences across these two modalities. Data were gathered through pre- and post-experiment questionnaires, which evaluated subjective experiences, usability, and retention. The findings revealed a clear preference for traditional media for reading and writing tasks, while XR proved to enhance engagement, particularly with visually rich content like video and slide presentations. However, retention was lower for text-heavy materials in XR, suggesting that immersive environments may be less effective for deep reading. Despite this, the majority of participants expressed interest in using XR for educational purposes again, highlighting its potential as a complementary tool in learning. The study concludes with suggestions for refining XR interfaces and the integration of immersive technologies in higher education to support multimodal learning experiences.

Poster Presentations (Online) 2 **CHIRA**
10:45 - 11:45 **Room Andalucia 6 Online**

Complete Paper #12

Why the Long Face? The Influence of Robot Screen Proportions and Orientation on Human Perception and Interaction

E. Liberman-Pincu and T. Oron-Gilad
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Keywords: Human-Robot Interaction, Service Robots, Robot Appearance, Screen Proportions.

Abstract: This study explores how altering a robot's screen design by adjusting proportions and orientation affects human perception of the robot's role and characteristics. We employed two research methods: an Online Questionnaire and a Semi-Live Online Job Interview. The online questionnaire aimed to assess general feelings and attitudes toward social robots. We collected responses from 97 participants. In the semi-live online interaction, 45 participants engaged in a job interview with a robotic recruiter in one of four randomly chosen robot design options that varied by their screen layout and proportion. The interview consisted of standard questions commonly asked in junior engineering job interviews. The orientation and proportion of the screen were found to play a crucial role in shaping user perceptions of gender and character traits. Our findings offer valuable insights for optimizing screen design in human-robot interactions, enhancing user experiences, and ensuring robots effectively fulfill their intended roles.

Complete Paper #25

Development of the PEDADI Educational Gamification Design Framework

Marisa Venter
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Keywords: Motivational Design, Player Type, Instructional Design, Learning Experience Design.

Abstract: Gamification has emerged as a promising approach to enhance student motivation and engagement in various educational settings. Despite its growing adoption, there remains limited guidance on how to design effective and pedagogically sound gamified learning experiences. This paper addresses this gap by presenting the PEDADI educational gamification design framework, which consists of four key phases: Preparation, Engagement Design, Activity Design, and Implementation. Drawing on established gamification models, the framework provides a structured, step-by-step process to support the development of educational gamification systems. Additionally, the paper introduces a motivation and engagement design template aimed at helping educators and instructional designers tailor experiences to diverse student needs. The PEDADI design process is also outlined, highlighting how each phase in-forms the next. The framework serves as a practical tool for educators and instructional designers to design engaging, learner-centered educational experiences. It lays the foundation for future research focused on its application across disciplines, as well as its integration with emerging educational technologies.

Complete Paper #27

Evaluation of Gesture Control with Mid-Air Haptics in a Static Driving Simulator

Lukas Fuchs, Netmi Narasinghe, Ruolin Li, Peter Schmid and Thomas Maier
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Keywords: Human-Machine Interaction, Ultrasound, Mid-Air Haptics, Universal Design, Palm Surface Area

Abstract: Touchscreen are now the most widely used human machine interface (HMI) in cars, they are both intuitive and distracting, which leads to a high number of off-road glances. A promising alternative HMI technology is mid-air haptic feedback for gesture control. In order to be perceived by the skin ultrasonic waves of mid-air haptics with modulation frequencies below 300 Hz are used. This study evaluates study parameters tested in two previous studies and their combinations in a more advanced static driving simulator. The participants moved a virtual slider with gestures to a target snap point while driving in a simulator. During the study objective parameters were recorded and after each testrun subjective parameters were recorded. Eight study parameter combinations (SP) with different combinations of modulation frequency (50, 80, 128 and 200 Hz), feedback location (palm, middle finger), three different slider modes (symmetric, asymmetric and continuous) and one solely visual SP are investigated. Participants palm surface area (PSA) was estimated based on pictures. Two older participants were excluded due to not recognizing the mid-air haptics and one due to motion sickness. Remaining participants: 27 older participants with average age of 63.0 years old, 30 younger participants with average age of 28.1 years old. Significant differences between the two age groups were found for setting time, precision, learnability and mental demand rating. Significant correlations to PSA were found for setting time and Lane Change Test mean speed. The solely visual feedback led to highest task fulfilment and the highest number off-road glances.

Complete Paper #53

Enhancing Industrial Efficiency and Sustainability: A Web-based Interoperable Solution for Industrial Forms Management

José Cosme[1], Armindo Fernandes[2], Vasco Amorim[1,3] and Vítor Filipe[1,3]

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Keywords: Digital Transition, Industry 4.0, Industry 5.0, Paperless Factory, Industrial Checklists, Ramp-up.

Abstract: One of the main challenges in modern industrial environments is managing the large amount of physical documentation obtained during the production process. Companies increasingly seek to adopt paperless alternatives to promote production efficiency and reduce their industrial environmental impact. On the shop floor, each production line relies on standardised forms to verify parameters and conditions before and after production begins; however, the large volume of paper documentation generated from these records led to the need to develop a digital platform capable of streamlining and digitising forms, enhancing process sustainability and efficiency. The proposed interoperable web application provides various features that allow users to create, customise, submit and approve forms digitally. It also integrates automated notifications and alerts for specific situations, enabling more effective responses to the production process's momentary needs. By unifying all processes related to forms management within a digital infrastructure, this solution aligns with the current industrial paradigm, reducing reliance on paper, optimising workflow efficiency, and incorporating innovative and industrial advancements.

Complete Paper #119

Navigating the Cybersecurity Maze: Women's Practices, Awareness and Vulnerabilities in Bangladesh

Maliha Tasnim, Maisha Tasnim, Samsad Laila, Seham Al Haque, Tanzuma Tabassum, Md Tasin, Taiabul Haque and Farida Chowdhury

BRAC University, Dhaka, Bangladesh

Keywords: Cybersecurity Awareness, Digital Security Practices, Women in Technology, Developing Countries.

Abstract: In the era of technological advancement, cybersecurity is an indispensable component of progress. Along with men, women's participation in the digital landscape is paramount to ensuring equal rights to technological advancement. However, in developing countries, societal barriers pose significant challenges for women, limiting their access to opportunities, which in turn impacts their understanding and practices within the digital landscape. These factors influence the adoption, practices and awareness surrounding cybersecurity, making women in developing countries more vulnerable to cyber-related threats. Thus, it is crucial to assess the state of cybersecurity practices and awareness among women in countries like Bangladesh. This research aims to examine cybersecurity practices and awareness across key components, including password security, information security, device privacy and protection, incident reporting and malware detection, among different demographics of Bangladeshi women. The study employs a quantitative approach using a large-scale survey (n = 1,202) to explore the cybersecurity practices and awareness of three groups of women: high school students, university students and working women. By investigating digital habits and practices, this study addresses women's perceptions, knowledge and response strategies concerning cybersecurity awareness. The findings reveal a significant gap in women's cybersecurity awareness, highlighting vulnerable practices related to password security, information security, phishing awareness, lack of confidence in handling cybersecurity incidents and limited knowledge of malware detection mechanisms. These findings provide insights into the vulnerabilities of women's cybersecurity practices in developing countries and lay the groundwork for investigating digital interventions to address these issues. Furthermore, the research sheds light on the substantial barriers contributing to women's digital insecurity, emphasizing the need to tackle these challenges to ensure women's online safety and well-being.

Session 4A **CHIRA**
11:45 - 13:30 **Room Andalucia 1**
Interaction Design

Complete Paper #68

Interactive Visualization of the Changing Light Environment in the Arctic Ocean

Esben Sørensen[1], Jakob Kusnick[1], Karl Attard[2] and Stefan Jänicke[1]

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Keywords: Geospatial Visualization, User-Centered Design, Arctic Marine Research.

Abstract: The Arctic Ocean is experiencing rapid environmental change due to climate-induced warming, significantly altering underwater light conditions and the implications for benthic primary producers are uncertain. Through an iterative design process involving domain experts in Arctic marine science, we developed an interactive visualization tool that integrates large-scale remote sensing datasets to enable multi-scale exploration of temporal light dynamics. The tool features a geospatial map for regional and local analysis, a heatmap for visualizing monthly percentage changes across Arctic regions and fjords, and a line chart for examining and comparing temporal trends. Users can filter data based on minimum light requirements for four benthic primary producers and extract filtered subsets for further offline analysis. Qualitative evaluation with domain experts confirmed the tool's effectiveness in supporting research tasks and revealed insights about changing patterns of light availability in the Arctic Ocean, which has significant implications for understanding how this sensitive ecosystem responds to rapid climate change.

Complete Paper #24

Effect of 360-Degree Video with View Manipulation on Communication and Creative Output in Hybrid Work Environments

Takumi Ishikawa[1], Ichiro Umata[2], Tsuneo Kato[1] and Sumaru Niida[2]

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Keywords: Hybrid Working Environment, 360-degree Camera, Controller.

Abstract: Video conferences, which rapidly became widespread due to the COVID-19 pandemic, have since become established as a hybrid working arrangement. However, significant challenges remain with respect to remote collaboration, particularly the issue that members' performance is not fully utilized in creative collaborative work. This study focuses on the asymmetry in communication in a hybrid work environment where main and remote workplaces coexist, and quantitatively evaluates a system that promotes engagement from the remote workplace using a 360-degree camera. To control the 360-degree video view, two novel interfaces, a hand-gesture interface and a touch panel, were proposed in addition to the standard mouse-based operation. The experimental evaluation focused on four metrics: total speaking time, speech-overlap rate, and creativity indicators (fluency and originality). The results showed that the touch-panel operation maximized total speaking time and speech-overlap rate and significantly improved both fluency and originality in creative tasks. The mouse operation increased the amount of speech but did not significantly impact creativity, while the hand-gesture operation produced no substantial benefits. These findings suggest that providing remote participants with intuitive touch-panel operation of 360-degree video views effectively enhances social presence and collaborative creativity in hybrid working environments. The main contribution of this paper is that it quantitatively demonstrates the effectiveness of intuitively operable 360-degree video information in hybrid work environments.

Complete Paper #31

Playing by Ear: Advancements in Sound-Based Game Accessibility

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Keywords: Accessibility, Video Games, Sound Design, Plugin Development, Disability Inclusion.

Abstract: Video games have cemented their role as an influential cultural force, shaping experiences and communities across the world. However, there is a lack of accessibility features for blind players, denying this group access to an important part of culture. To address this issue, we are developing an accessible framework for the Unreal Engine, designed specifically to streamline the process of creating audio-centric experiences for blind players. This approach seeks to establish a new standard in accessibility, underscoring the idea that games, when designed with inclusion in mind, can change lives for the better. By integrating sound-based navigational mechanics, we found that players could successfully navigate game environments without relying on visual elements. The results suggest that the system successfully enhances navigation and engagement for blind players , providing a solid foundation for further development and refinement, aligning well with the goal of improving accessibility in gaming.

Complete Paper #52

Santa Clara 3D: Digital Reconstruction and Storytelling of a Francoist Concentration Camp

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Keywords: N/A

Abstract: This paper explores the potential of digital reconstruction and interactive storytelling to preserve historically suppressed sites. The main objective of an interdisciplinary team of data scientists from the MEMORISE project and associates of the memory association Asociación Recuerdo y Dignidad was to preserve the memory of the Francoist Santa Clara concentration camp in Soria, Spain, through the use of digital technology. Combining archival research, 3D modelling, 360° photography, and web development, a prototype digital platform was created to visualise the transformation of the site across three historical phases: its origin as a convent, its use as a Francoist concentration camp, and its present-day condition. The platform allows users to navigate through spatial and temporal layers. Clickable media markers encourage exploration and interaction. Drawing on principles of participatory design, narrative visualisation, and open-ended user engagement, the project demonstrates how digital tools can support memory work, public engagement, and historical reflection. Our low-cost concept is especially adaptable to other physical sites that have been erased or forgotten.

Complete Paper #60

Designing Interactive Technology Roadmaps: A Visual Analytics Approach

Pawandeep Betz[1], Karen Kuribayashi[2], Christian Ulrich[2], Stephan Schmid[2] and Andreas Gerndt[1,3]

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Keywords: Technology Roadmaps, Visual Analytics, Design Study.

Abstract: Technology Roadmaps (TRMs) have become indispensable tools for aligning research and development efforts with strategic objectives. Highly graphical in nature, TRMs often receive criticism for their static nature and designs. In this study, we propose the integration of visual analytics (VA) techniques to enhance the usability, insights, and interactivity of TRM applications. Following a user-centered design approach, we collected requirements from seven stakeholders and developed two interactive prototypes: a flat-style Dashboard design and a nested-style Drill-down design. Comparative user evaluations revealed differing strengths, favoring Dashboard design particularly for its simplicity and ease of access. Based on our findings, we present a set of generalized design guidelines and introduce a Three-Stage Design Model that guides developers from structuring data to enabling user sensemaking in TRMs.

Oral Presentations (Online) 4 **CHIRA**
11:45 - 13:30 **Room Andalucia 7 Online**
Human Factors for Interactive Systems, Research, and Applications

Complete Paper #28

Do Cookies Taste Different? The Impact of Options and Website Type When Setting Cookie Preferences

Rafael Vrecar[1], Barbara Geld[1], Anna Dobrosovestnova[1], Michaela Čolakovová[2,1] and Astrid Weiss[1]

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[2] *Czech Technical University in Prague, Faculty of Biomedical Engineering, Department of Information and Communication Technologies in Medicine, Czech Republic*

Keywords: Cookie Banners, Informed Consent, GDPR.

Abstract: Since the General Data Protection Regulation (GDPR) came into effect in 2018, cookie banners have become ubiquitous. For many users, interacting with cookie banners remains an annoyance, while some operators deliberately make it more difficult for users to reject optional cookies. Existing studies have examined various factors that influence how users interact with cookie banners, such as framing, default options, and dark patterns. Building on this work, we conducted an online vignette study using four realistic website mock-ups to investigate how cookie familiarity, website type, and the presentation of options affect users' decisions. Our findings show that the set of options available in a cookie banner is the most significant factor that affects user decisions, more so than website type or familiarity with cookies. We recommend standardizing both the options and their placement to enable user consent to be more informed and intuitive.

Complete Paper #29

PAVE: A Performance-Based Adaptive Virtual Environment for Public Speaking Training for STEM Students

Amal Yassien[1], Sarah Botros[2], Alia El Bolock[3] and Slim Abdennadher[1]

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Keywords: Virtual Reality, Public Speaking, Adaptive Virtual Audience, STEM.

Abstract: STEM students often lack oral communication confidence despite strong technical skills. We present PAVE (Performance-Adaptive Virtual Environment), a novel VR-based public speaking trainer that heightens evaluation pressure through real-time, performance-driven audience adaptation. Unlike prior systems, PAVE uses 34 virtual avatars whose facial expressions shift every 30 seconds based on four live behavioral metrics: movement, gestures, gaze, and filler word use. This exaggerated, synchronized feedback is designed not to mimic realism, but to induce evaluation apprehension and support self-efficacy through emotionally salient mastery experiences. In a 2×2 mixed-design study with 20 STEM students, PAVE significantly increased willingness to communicate and social presence. Our findings underscore the potential of adaptive, affective VR systems for building communication confidence in technical education.

Complete Paper #51

Exploring the Use of Generative AI for Assessing Data-Driven Stories

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Keywords: Generative AI, Data Storytelling, Data Story Evaluation.

Abstract: Evaluating the potential effectiveness of data-driven stories is a resource-intensive process, especially during the early design phases. We propose using Generative AI, specifically ChatGPT-4, as a simulated audience to support early-stage evaluation. We created two visual narratives on temperature trends for distinct audiences (climate-concerned versus skeptical) and asked 310 Mechanical Turk participants to evaluate them. Next, we clustered the answers to extract different types of audiences. We focused on two clusters (Skeptical but Attentive and Engaged Believers) to prompt ChatGPT with a detailed persona to answer the same questions as humans and compared its Likert-scale responses to human answers across cognitive and affective dimensions. Results show a good alignment across all the dimensions for engaged believers, and a strong alignment for skeptical but attentive personas in comprehension and clarity, with lower agreement in emotional engagement and perceived agency. Despite varying results in different simulations, AI responses broadly mirrored the selected persona. Our findings suggest AI can serve as a low-cost tool for early testing of data stories, provided its limitations are understood.

Complete Paper #110

Adaptive AI Coaching for Cybersecurity: Analysis of Resilience Against Phishing and Deepfakes

Zeide Kayyal[1,2], Jan Treur[1,2] and Peter H. M. P. Roelofsma[2]

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Keywords: Cybersecurity, Phishing, Adaptive Networks, Simulation-Based Analysis, Risk Assessment, AI Coach.

Abstract: This paper presents a simulation-based analysis on the impact of realtime AI coaching in reducing cybersecurity risks associated with phishing and deepfake attacks. Using multi-level network-oriented modeling, the study models human cognitive and emotional behavior under stress, time pressure, and dynamic learning conditions. Two models are evaluated: a baseline reflecting traditional training methods, and an extended model introducing an AI Coach with perfect learning. Results show that while employee learning in the baseline model deteriorates significantly under stress, the AI Coach stabilizes learning and significantly improves secure decision making. A What-If analysis further demonstrates the AI Coach's effectiveness across different levels of message quality and stress susceptibility, while the risk assessment highlights a reduction in learning and decision risk. Although the AI Coach does not fully eliminate risk, it proves to be an effective, adaptive tool for supporting decision-making in human-centered cybersecurity defense.

Complete Paper #112

Analysis of Ethnic Inter-Embeddedness and Its Driving Factors in Sichuan Province, China, for a Period of 2000–2020

Linghua Zhang and Zeyu Li
Sichuan University, School of International Studies, Chengdu, China

Keywords: Ethnic Inter-Embeddedness, Driving factors, GIS, Geodetector.

Abstract: The pattern of ethnic inter-embeddedness serves both as a mirror of the current dynamics of inter-ethnic relations and as a framework shaping their future evolution. This study employs ArcGIS and GeoDetector, in combination with demographic and socio-economic datasets, to investigate the spatial transformation and underlying drivers of ethnic inter-embeddedness in Sichuan Province between 2000 and 2020. The findings indicate that socio-economic advancement has played a significant role in facilitating the spatial embeddedness of diverse ethnic groups within the province. Specifically, economic modernization — marked by the expansion of the secondary and tertiary sectors — together with the development of educational systems and the improvement of transportation infrastructure, emerges as the most influential set of factors promoting spatial interweaving among ethnic communities. The study concludes that, with the continued socio-economic progress in Sichuan, the spatial configuration of ethnic groups is likely to evolve toward deeper interembeddedness, thereby providing enduring spatial platforms for inter-ethnic contact, interaction, and the enhancement of mutual recognition and understanding

Session 5A **CHIRA**
14:45 - 15:45 **Room Andalucia 1**
User Behaviour Analysis

Complete Paper #63

EMS Haptic Feedback for Multiplayer Boxing Fight

Philipp Rapp, Stefan Radicke and Willi Schorrig
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Keywords: Electrical Muscle Stimulation (EMS), Haptic Feedback, Virtual Reality (VR), Teslasuit, Multiplayer, Motion Capture, Full-Body Haptics.

Abstract: This paper addresses the influence of EMS haptic feedback on the physical and tactical behavior of players in a VR multiplayer boxing fight with live motion capturing. A custom prototype was developed, using *Unity*, the *Teslasuit* and a *Photon PUN 2* cloud server. A within-subjects user test with a mixed-methods approach was conducted, collecting quantitative and qualitative data in *EMS-enabled* and *EMS-disabled* conditions. The analysis of the data showed heterogeneous user responses with some participants showing an increase and some participants showing a decrease in their recorded metrics. In general, EMS feedback led to increased tactical decision-making, enhanced realism and a stronger sense of embodiment. Statistically significant differences were found primarily among participants with increased recorded values under EMS-enabled condition. These differences were found in *punch counts*, *movement range*, *covered area* and *body orientation* metrics. Most players showed an increase in their defense. As the results showed to be highly dependent on individual factors, a generalization of the results is limited.

Complete Paper #74

Prompting in Mathematical Education: A Case Study

Tudor-Dan Mihoc[1], Manuela Petrescu[2], Oana-Maria Persa-Boc[2] and Emilia Pop[2]
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Keywords: LLM, Mathematical Education, Prompting, Survey, HCI.

Abstract: The integration of Large Language Models (LLMs) in education has emerged as a key strategic direction on a global scale. The main purpose of the study is to assess the prompting habits regarding the use of LLM in a mathematical context. We aim to understand how users position themselves regarding the prompt formulation of mathematical problems when using LLM-based tools. An evaluation of the impact of prompt formulation is performed on perception of AI output accuracy, user satisfaction, and perceived usability. The findings underscore the critical role of prompt clarity in shaping user satisfaction and AI accuracy, while also revealing that mathematical proficiency is not a sufficient predictor of effective prompting. The diversity of challenges faced by users reinforces the importance of adaptive interfaces and targeted educational interventions to bridge the gap between AI capabilities and user needs.

Complete Paper #117

Trust-Driven Intent Analysis for Investigating Misbehavior in Smart Dynamic Ecosystems

Dasa Kusnirakova[1], Tereza Novotna[2] and Barbora Buhnova[1]
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Keywords: Misbehavior Investigation, Intent, Trust, Digital Evidence, Smart Dynamic Ecosystems, Autonomous Systems, Forensic Readiness.

Abstract: As smart dynamic ecosystems, represented e.g. by (semi-) autonomous vehicles in smart city settings, become more prevalent, determining liability and accountability for these systems becomes increasingly complex. This raises serious concerns about the course of the investigation and fair judgments in case of incidents such as rule violations or accidents, which directly impact humans affected by these systems. The current research gap lies in distinguishing between intentional and unintentional misbehavior within these ecosystems, which depend on interpreting human action and user interactions with the autonomous system. This paper addresses this multidisciplinary challenge through three main contributions. First, we consider both technological and human factors for intent classification in post-incident investigations. Second, we extend human-like analysis to autonomous systems to evaluate their intent in a manner consistent with legal reasoning. Third, we propose a comprehensive, context-aware conceptual framework grounded in legal theory, which integrates trust modeling and social metrics to support the identification of intent for investigating misbehavior within smart dynamic ecosystems.

Oral Presentations (Online) 5 **CHIRA**
14:45 - 15:45 **Room Andalucia 7 Online**
Human Factors for Interactive Systems, Research, and Applications

Complete Paper #102

An Empirical Concept Model of Difficulties in Agile Adoption

Dan Mircea Suciu, Simona Motogna and Manuela Petrescu

Faculty of Mathematics and Computer Science, Babeş-Bolyai University, Cluj Napoca, Romania

Keywords: Agile Software Development, Agile Principles, Empirical Study, Human Factor.

Abstract: Agile software development promotes adaptability, collaboration, and continuous delivery. However, implementing Agile principles remains a challenge for many organizations due to complex organizational, cultural, and interpersonal factors. Building on a previous empirical study that identified the most difficult Agile principles to apply and their underlying causes, this paper extends the investigation by analyzing the barriers that practitioners perceive as limiting Agile adoption in Romanian IT industry exploring human factors compared to computer science world wide industry. Using a mixed-method approach and Straussian Grounded Theory, we developed a concept model that links causes, barriers, and mitigation strategies. The results indicate that barriers often emerge from unresolved causes and can reinforce them over time, leading to persistent implementation difficulties. The study identifies five major categories of barriers and highlights that successful mitigation requires both process-level improvements and cultural transformation. The findings provide actionable insights for practitioners and contribute to a more nuanced understanding of Agile implementation challenges.

Complete Paper #91

Between Likes and Silence: Activity and Passivity on Social Media and Their Impact on Mental Health

Cristiane Martins, Claudia Motta, Jano Moreira De Souza and Daniel Schneider

Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil

Keywords: Social Media, Activity, Passivity, Mental Health, Digital Wellbeing.

Abstract: Investigating the impact of active and passive social media behaviors on mental health—including self-esteem, anxiety, and belonging—this study presents an integrative review of 18 peer-reviewed articles. We uncover that while passive engagement, often stemming from social comparison and dysfunctional cognition, consistently correlates with increased anxiety, depression, and body dissatisfaction in vulnerable groups, active engagement driven by authentic interaction tends to boost self-esteem and emotional wellbeing. Crucially, our findings challenge the simplistic active–passive dichotomy, demonstrating that the psychological outcomes are mediated by interdependent variables such as emotional intent, cognitive profiles, and the inherent design architecture of social media platforms. This highlights the necessity for more refined behavioral models and suggests avenues for future mixed-methods, longitudinal, and intervention-focused research to cultivate healthier digital interactions. Ultimately, this work deepens the understanding of digital wellbeing and highlights the importance of considering the psychological and social factors that mediate social media use. It provides a foundation for the creation of more ethically conscious and psychologically beneficial social media interfaces, enabling designers to build platforms that mitigate adverse psychological impacts and foster emotionally sustainable online environments.

Complete Paper #96

Analyzing Patterns In Hofstede's Cultural Dimensions Towards Individual AI Receptiveness for Affective Experiences

Maggie Yang and Javier Gonzalez-Sanchez

Department of Computer Science & Software Engineering, California Polytechnic State University, San Luis Obispo, California, U.S.A.

Keywords: Hofstede's Cultural Dimensions, Affective Computing, EEG, PAD Values, Human-AI Interaction.

Abstract: Artificial intelligence (AI) has significantly advanced efficient decision-making, but as AI becomes increasingly embedded in everyday life, it is essential to examine how our cultural values affect trust in AI in subjective contexts that extend beyond purely quantitative analysis, like art interpretation. This paper utilizes Hofstede's cultural dimensions to investigate potential patterns in receptiveness towards perceived AI predictions during art interpretation, providing insight on individual susceptibility to psychological bias in AI-assisted assessment of affective experiences. This work contributes (1) a novel study design integrating EEG, PAD values, SAM, and machine-learning predictions in art interpretation, and (2) new qualitative insights into introspective behavior regardless of cultural dimensions. Through regression modeling, no statistically significant relationship was found between any cultural dimension and the number of responses altered after viewing AI predictions. However, 26 out of the total 35 college-student participants acknowledged experiencing self-reflection or persuasion when exposed to such recommendations, regardless of one's cultural dimensions. The exploration of how these findings align or expand upon prior research reveals opportunities for further investigation specifically within the psychological and cultural elements of AI adoption.

Session 6A **CHIRA**
16:00 - 17:15 **Room Andalucia 1**
User Experience

Complete Paper #39

Serious Games for Climate Change Engagement: A User-Centered Design Approach

Dorina Rajanen and Anjalee Wanigarathne

Interact Research Unit, Faculty of Information Technologies and Electrical Engineering, University of Oulu, Oulu, Finland

Keywords: Climate Change, Serious Games, User-Centered Design, User Experience, Gamification, Game Design, Sustainability.

Abstract: Climate change is a critical global challenge that requires innovative educational tools to promote awareness and engagement. This paper examines the potential of serious games as an interactive media tool for climate change engagement, offering a framework and recommendations for future serious game design in this context. To validate the framework, we developed a serious game concept and prototype EcoLand using

the proposed recommendations. Furthermore, the EcoLand was created utilizing a user-centered design approach, which integrated gamification techniques and user experience principles to enhance engagement and educational impact. The research process follows the design science research process and includes literature review, game review, conceptual framework development, prototype creation, and user testing through structured tasks and a questionnaire. Our findings suggest that user-centered serious games can effectively simulate real-world climate challenges, enhance experiential learning, and support sustainable thinking and action. This study highlights the value of involving users in the design process to improve both user engagement and communication effectiveness. This paper contributes with both a theoretical design framework and recommendations for designing serious games that make climate change more relatable and actionable for diverse users, as well as empirical findings.

Complete Paper #89

Beyond Student Polling: Creating Classroom Tools that Help Teachers Respond

Markus Hovde, Mari Elde, Line Aandal and James Wen
Molde University College, Molde, Norway

Keywords: Student Response Systems, SRS, Classroom Response Systems, CRS, Teacher Response Systems, TRS, Audience Response Systems, ARS, Teacher Responsiveness, Interactive Teaching Tools, Pedagogical Technology, Educational Technology, EDTECH, Human Computer Interaction, HCI.

Abstract: Student Response Systems have long promised to enhance classroom en-gagement, yet adoption across higher education remains modest. To explore barriers to uptake, we interviewed teachers who have used such technology in their classes. Their experiences revealed three key challenges: steep learn-ing curves, rigid constraints from pre-scripted quizzes, and disruptions to natural lecture flow. Drawing on Human-Computer Interaction principles, we translated these insights into design guidelines that emphasize learna-bility, flexibility, and minimal disruption. We developed a prototype Teacher Response System that enables students to signal confusion or pose questions anonymously, offering teachers low-friction, real-time feedback. This work positions a complementary approach that combines contrasting response systems to bridge structured student-centric interaction with dy-namic, teacher-led responsiveness to support the situated practices of class-room teaching.

Complete Paper #115

Design Implications for Virtual Humans: Insights from a User Preference Study

Poonam Patil[1], Surej Mouli[1,2] and Zhuangzhuang Dai[1]
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[2] *Engineering for Health Research Centre, Aston University, Birmingham, U.K.*

Keywords: Virtual Human Personalisation, User-Centred Interaction Design, Age-Based Customisation, Human-Computer Interaction.

Abstract: Virtual Humans (VHs) are rapidly emerging as key interfaces in Human-Computer Interaction (HCI) across domains such as education, healthcare, and customer services. While their technical capabilities continue to advance, a core challenge remains; designing VHs that meaningfully align with the expectations of diverse user groups. This study investigates how user age influences preferences for key VH attributes, including perceived agent age and emotional responsiveness. Based on responses from 773 participants aged 18 and above, we identify clear age-based differences in preferences for visual age and interactional expressiveness. Younger users tend to favour emotionally responsive, younger-looking VHs, while older users show preferences for mature agent personas. While context-specific VH preferences may vary, these findings reinforce the position that VH systems should, in general, incorporate adaptive, age-sensitive designs to promote inclusivity and adoption.

Oral Presentations (Online) 6 **CHIRA**
16:00 - 17:15 **Room Andalucia 7 Online**
Interaction Design

Complete Paper #75

Designing for (Digital) Nomad-AI Interaction

Daniel Schneider[1], Marcos Antonio de Almeida[1], Mariangela Nascimento[1], António Correia[2] and Jano Moreira De Souza[1]
[1] *Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil*
[2] *Faculty of Information Technology, University of Jyväskylä, Jyväskylä, Finland*

Keywords: Digital Nomads, Digital Nomadism, Generative AI, Nomad-AI Interaction.

Abstract: Digital nomadism, a lifestyle defined by location independence and the deep pursuit of autonomy, faces inherent challenges, including significant mobilization work and the continuous effort of adapting to diverse environments. This paper introduces an emergent Human-Computer Interaction (HCI) paradigm at the convergence of digital nomadism and Generative Artificial Intelligence (GAI). We argue that GAI moves beyond the role of a tool, emerging as a transformative agent that can redefine the nomad's experience by providing support across key domains—ranging from bureaucracy management, destination selection, and agenda planning to professional tools, community integration, and even occupational reinvention. This integration presents a critical paradox: while GAI can mitigate the cognitive load of mobility and support a more fluid and enriching nomadic journey, it also introduces new challenges like job market disruptions and threats to digital well-being. To guide the development of effective GAI technologies in this evolving landscape, we propose seven design principles aimed at fostering a symbiotic Nomad-AI partnership. The paper further discusses critical design implications, navigating dilemmas such as user autonomy versus AI automation, and exploring crucial opportunities to empower digital nomads. We outline future directions for HCI research that seek to establish a symbiotic relationship between nomads and AI, one that enriches the digital nomad experience while promoting holistic wellbeing.

Complete Paper #82

An Architecture for Predictive Path Planning on Simulated Robotics

Lucio Rocha
Federal University of Technology, Campus Apucarana, Brazil

Keywords: Multi-Agent System, Machine Learning, Operating Research.

Abstract: This paper proposes an architecture for predictive path planning applied to transportation problems for simulated robotics. The aim is to evaluate scenarios where Machine Learning (ML)

strategies contribute to optimizing the path planning in environments modeled as multi-layered flat networks and formulated as Linear Programming (LP) problems. This proposal reduces the computational time to obtain large logical trajectories in navigation maps queried by mobile robots to reach targets at minimum cost. In the proposed architecture a dataset with feasible solutions is produced to represent the optimization of link costs, and the ML strategies use this dataset to discover alternative paths on demand in reduced time. In mobile robotics, multi-layer networks for path planning have importance for complex dynamic systems, and the modeling is generally done with neural networks and deep reinforcement learning. In this paper, the focus is on the evaluation of ML algorithms for the discovery of routes for simulated robotics with the extraction of features from logical links. The statistical results reveal a gain in performance in predicting the optimum solution for a large supervised dataset.

Complete Paper #26

Human-Centered Design for a Usable Privacy SCALE in Healthcare

Catarina Silva[1,2], Rita Alves[3], Isaac Nunes[3], Joana Pinto[3] and Ana Ferreira[4]

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Keywords: Healthcare Privacy, Privacy Quantification, User Empowerment, Privacy SCALE, Usability.

Abstract: The pervasive adoption of digital technologies in healthcare has resulted in an exponential increase in the volume of sensitive patient data being collected, processed, and shared. This necessitates a paradigm shift towards enhanced transparency and user empowerment regarding data handling practices. Privacy quantification can help address such challenges by translating complex policy analyses into easily interpretable, quantifiable metrics that provide users with actionable insights into the privacy risks associated with different healthcare services. In this paper, we propose a prototype of an application, named SCALE, which focuses on providing a user-friendly design interface to represent the results of privacy quantification in an accessible way. SCALE aims to enable users to make informed decisions and exercise greater control over the privacy of their personal health information. We discuss the usability tests and metrics used to evaluate our proposed prototype. Most tasks were completed efficiently, and generally, users considered the privacy SCALE adequate for its purpose. After analyzing the results, we also propose a set of recommendations for this type of privacy representation.

Keynote Lecture **CHIRA**
17:15 - 18:15 **Room Gran Marbella**

Road to Awe: Perils, Challenges, Findings, and Open Questions

Alice Chirico

Catholic University of Sacred Hearth, Italy

Abstract: Over the past decade, research has increasingly focused on the multifaceted nature of awe, which transcends simple positive and negative valences. Here, I discuss the key findings and theoretical developments that have emerged from this extended investigation, from my research perspective, emphasizing the significance of awe in psychological processes and its potential for practical application. Initially, research focused on defining and measuring awe. It has been conceptualized as an emotion elicited by stimuli perceived as vast—either conceptually or perceptually—triggering a need for cognitive accommodation. Though awe has long been considered a transformative emotion, theoretical evidence suggests that its intensity is often diminished in laboratory settings. In order to address this gap, I refined both the operational definition of awe and the methods used to elicit it by utilizing novel technologies such as virtual reality (VR). Additionally, I began to question the construct validity of existing instruments used to assess awe in experimental settings. The use of immersive videos, which rely on perceptual spatiality, has demonstrated to be more effective than conventional 2D videos in eliciting intense emotions of awe - but only when they are built on content that has been pre-validated as being capable of eliciting such emotion. By incorporating these insights, we were able to develop novel, interactive, VR-based scenarios to elicit awe both in the lab and in everyday settings. The potential of VR-elicited awe has emerged not only in enhancing short-term creative thinking but also as an epistemic emotion—that is, one capable of motivating learning by bridging knowledge gaps. The PROMETHEUS project, funded by the Cariplo Foundation, capitalized on awe's epistemic properties to design new teaching methodologies and intervention strategies in educational settings marked by high dropout rates. However, awe holds even greater promise for both individual and societal well-being. Through the PONE EU REACT project, we explored the potential of awe-inspiring VR scenarios to foster pro-environmental behaviours—particularly "socially engaging behaviors"—as a result of awe's connection-related appraisals. As evidence for awe's positive impact on psychological and social well-being grows, two further steps are now crucial. First, we must translate lab-based findings on awe and VR into real-world applications. To this end, we have developed and tested a new awe-based training module in social VR aimed at enhancing creativity. Second—and perhaps more challengingly—we must return to the foundational issue of construct validity in awe assessment, especially across cultures. Beyond ongoing cross-cultural validation of dispositional and state scales, there is now an urgent need to revisit and refine the construct itself and the conditions under which it is validly assessed. To this end, I have initiated a novel interdisciplinary research line exploring the relationship between awe and the sublime, with a particular focus on European cultural contexts.

Closing Session & Awards Ceremony **CHIRA**
18:15 - 18:30 **Room Gran Marbella**

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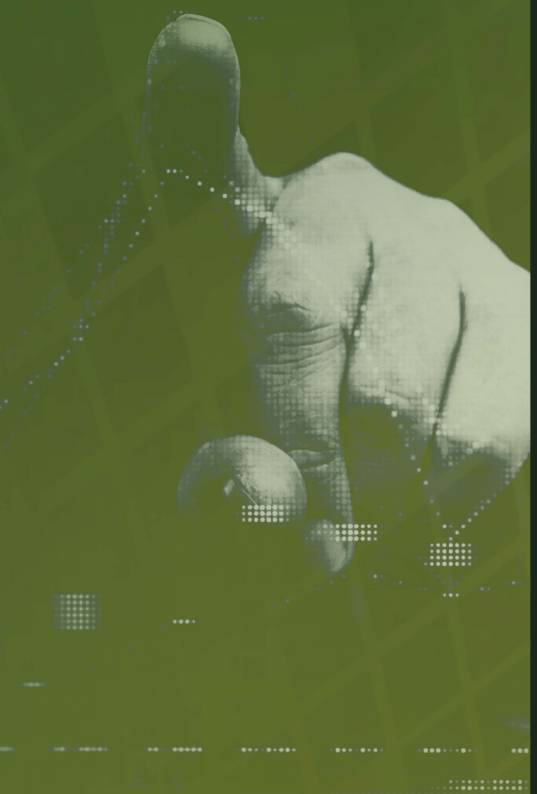

Final Program and Book of Abstracts of CHIRA 2025

9th International Conference on Computer-Human Interaction Research and Applications

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