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Jay Kalra
Nancy J. Lightner
Redha Taiar *Editors*

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Advances in Human Factors and Ergonomics 2021

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12th International Conference on Applied Human Factors and Ergonomics and the Affiliated Conferences (AHFE 2021)

Proceedings of the AHFE 2021 Virtual Conference on Human Factors and Ergonomics in Healthcare and Medical Devices, July 25–29, 2021, USA.

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Preface

This book is concerned with human factors and ergonomics in healthcare and medical devices. The utility of this area of research is to aid the design of systems and devices for effective and safe healthcare delivery. New approaches are demonstrated for improving healthcare devices such as portable ultrasound systems. Research findings for improved work design, effective communications and systems support are also included. Healthcare informatics for the public and usability for patient users are considered separately but built on results from usability studies for medical personnel.

Quality and safety are emphasized, and medical error is considered for risk factors and information transfer in error reduction. Physical, cognitive and organizational aspects are considered in a more integrated manner so as to facilitate a systems approach to implementation. New approaches to patient handling ergonomics, emergency and operating rooms, healthcare, medical device design, human factors and ergonomics measurement and model validation are included. Recent research on special populations, collaboration and teams, as well as learning and training, allows practitioners to gain a great deal of knowledge overall from this book.

Explicitly, the book is organized into sixteen sections that contain the following subject areas:

Healthcare and Medical Devices

1. Healthcare Advancement and Patient Safety
2. Healthcare Issues and Risk Assessment
3. Innovative Healthcare Technologies
4. Advances in Medical Devices and Techniques
5. Healthcare Innovation
6. Diagnostics and Usability in Healthcare

Human Factors in Aging and Special Needs

7. Safety, Integration and interaction for Aging Population
8. Human Performance improvement and Training
9. Human Performance and Variability
10. Innovative Health Care Technologies
11. Aging and Wellbeing

Global Issues: Human Factors in Disease Control and COVID-19 Pandemic Prevention

12. Healthcare Strategies and Design during COVID-19 Era
13. Pandemic Prevention and Management
14. Pandemic Impacts and Coping
15. Factors Affecting COVID-19 Response
16. Human Factors in Global Issues and Disease Control

Each of the chapters of the book was either reviewed by the members of Scientific Advisory and Editorial Board or germinated by them. Our sincere thanks and appreciation go to the Board Members listed below for their contribution to the high scientific standard maintained in developing this book.

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This book would be of special value internationally to those researchers and practitioners involved in various aspects of healthcare delivery.

July 2021

Jay Kalra
Nancy J. Lightner
Redha Taiar

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Diagnostics and Usability in Healthcare

Safety, Integration and interaction for Aging Population

Human Performance and Variability

Chatty Bot: An Alternative to Implement a Memory Training Option for the Upcoming Older Adults in Indonesia

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Abstract. Indonesia, the world's fourth most populous nation, is an aging country. The significant demographic changes force this middle-income developing country to prepare for the new society. We proposed chatbot usage as a new medium for the baby-boomers to interact. This cohort will or already enter their retirement age soon. We argue this technology suitable due to familiarity with the usage. This research uses quasi-experimental research in the form of within-subject measurement implemented to the people older than 55 years old and user of cross-platform messaging service with simple memory training. A chatbot prototype called Chatty Bot was developed to learn the participants' ability to detect the features given. Chatty Bot has proven acceptable for its system's usability and predicted to still be used by the majority of the participants for at least one month. The simple chatbot technology recommended enhances the effective communication channel, related but not limited only to healthy aging.

Keywords: Chatbot · Communication channel · Elderly · Memory training

1 Introduction

Indonesia, the world's fourth most populous nation, is an aging country. The significant demographic changes, together with the shift of technology, social, economic, and other life aspects [1], reshape the world's future and enforce this middle-income developing country to prepare the new society. Even though the attribute to communicate rapidly takes new forms, but the people itself gradually changing. People still live day by day, and the purpose of socializing, interacting, respect, or communicate has hardly changed for

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decades. However, the debate of using digital technologies or digital games to communicate with family members may result in the elderly feels stressed, ignored, emotionally excluded, and motivationally impeded [2] supposed not to be ignored. Hence, feasibilities of the elderly readiness to use the specific communication technology independently, also the critical component to proposed design as the elderly now is the generation of baby boomers which familiar with a visual display (i.e., Television) and touch screen smartphone [3] with the implementation of capacitive touch screen.

This study is a part of ongoing research related to changing elderly behavior toward a physically active lifestyle, which has already proven lower than the other comparison communities, and demand continuous companionship for their physical activities [4]. Nevertheless, in our recent studies, we found out that the communication pattern between the elderly and the younger generation have tendencies to lean towards dominant figure. Fortunately, both family leaders use the same communication medium: smartphones–especially for the elderly from the baby boomer generation and their children. Nevertheless, the interaction of the next generation elderly with their smartphone for Indonesian communities never been explored before.

The importance of this study is to learn the ability of the participants to detect the features given in chatbot deployed on their familiar cross-platform messaging apps, which arguably more comfortable for them to operate because of no need of downloading the application as well as the familiarity with responding to the notification given by the cross-over platform messaging. In details, this research will focus on four following aspects to evaluate the proposed design:

1. The participants' consistencies in using chatbot correlate with given notification.
2. The participants' ability to do the training sessions in three types of memory training (recall, mnemonic, detail).
3. The participants' motivation to contribute to the next training if they get personal feedback on their performance.
4. The usability of the system using System Usability Scale (SUS).

The result will become the recommendation of suitable technological based design to enhance the effective communication channel to provide beneficial interaction, related but not limited only to healthy aging.

2 Cognitive Declining, Motivation, and Next Generation Elderly

Old age will have significant implications and directly associated with physical and mental disturbances and reduce plasticity and brain size. Normally occurred in most people, not all declining processes and acceleration are considered normal. Reviews on observational studies show that cognitive training, physical activities, leisure activities, and dietary factors might be protected from or decreased to 18% risk of cognitive decline [5]. Despite the content to prevent cognitive decline, an intrinsic motivation from the elderly, arguably significant for successful changes in their programmed training and changing their behavior. The feasibility of the proposed design in this research also takes into account the concept of Cattel's Crystallized Intelligence (G_c) which related to wisdom,

including the ability to view a problem from multiple perspectives and the possibility to maintain [6, 7]—instead of the utopian ideal of enhancing this type of intelligence through education. Baby boomers are the term for people born between 1946–1964 with the distinctive characteristics for being hard-working, prefer to manage, loyal, balance work and family, formal to authority, confident, and comparatively more aware of health-conscious than generations precede them. This generation tends to like being involved in their health care decisions and treat them more like the younger population [8, 9]. The ability to learn the electrical-based technology embedded with their lifestyle, as they were born and grew up with the usage of telephone and television, and in their productive age when email usage gradually changed the postal mail. Not to mention, once people are familiar with technology or interface, they often do not switch to promise better performance [10]. Therefore, the barrier of using the latest technology is a qualitative issue that differs from one society to others. Feasibility of shifting media communication into adopting specific technology to keep up with the world associated with internet adoption will increase social engagement, create positive behavioral change, improve psychological well-being, and strengthen the learning confidence of the elderly [11]. The term Behavioral intervention technologies (BITs) already implemented as the unique ways of using various media (e.g., internet intervention, mobile apps, video games, and chatbot) as an acceptable innovation channel, emphasize on social-oriented interaction style [12, 13].

3 Methodology

3.1 Method

This study is following User-Centered Design (UCD) methodology [14], which has an iterative process as follows:

1. Specify the usage context. The limitation of this study is for baby-boomers smartphone user. The increase of user from the middle to late boomers is more than 2.5 times higher [15] in Indonesia, indicating internet usage are rapidly increasing for the late Indonesian boomers.
2. Specify requirements. In this study, we conduct the experiments using the arguably common for smartphone users: Cross Platform messaging service integrate with chatbot. A chatbot or conversational assistant is a computer program that allows humans to interact with technology using a variety of input methods and widely known in recent years to use in a customer service environment to support marketing and another service area with the use of natural language [16]. In this study, the positive action will appear in the form of memory training activities, divided into three types of training: Recalling, Mnemonic [17, 18], and details.
3. Produce design solution. Chatbot prototype in this study was deployed in LINE and Telegram, with the support of Engati (https://www.engati.com/) as the chatbot platform integrate with LINE account manager (https://manager.line.biz/).
4. Evaluation. Evaluation of this study will use the back-translated SUS with its cut of points 68 out of 100 (https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html). Moreover, to understand the interaction, we also conducted a questionnaire for better explanation.

3.2 Sampling Structures

The study adopted quasi-experimental research in between and within-subject measurement implemented to the people older than 55 years old. All of the participants should be Indonesian adults, with prior experience in interacting with the designated cross-platform messaging service (Telegram or LINE), and willing to give their informed consent by filling the inform consent voluntarily. Participants will eventually drop out if they cannot finish any level of the training in a chatbot, they cannot manage their smartphone to open the directed link to the training (linked to google forms) and finish the end questionnaire.

3.3 Procedures

The experiments took 16 days, including one day for early notification about the starting date of the experiment, 14 days of training, and one day to fill the end questionnaire. The recruitment was done purposively by the researcher and snowballs by the recruited participants. Chatty Bot Experiment Procedures are presented in Table 1. Chatty Bot Experiment Procedure.

Table 1. Chatty bot experiment procedure

Day	Timeline	Description
Day 0	Recruitment	Recruiting participants according to inclusion criteria
	Briefing	Brief of what should participants done
Day 1–14	Start experiment	
	08.00 AM	First broadcast to add chat bot + greetings new user (in chatbot)
	08.10 AM	Bio reminds (10 min after automatic/manual greetings LINE/Telegram)
	08.00 AM (day 2–14)	Broadcast Encouragement/Leaderboards of previous training
	12.01 PM–12.02 PM	Broadcast Greetings+ Load Training Option (all option/ greetings returning user)
	12.01–17.01 PM	Independent training
	17.00 PM	Broadcast the specific training path
	20.00 PM – night	Researcher check the new submission level from the participants
Day 15	08.00 AM	Broadcast the instruction to fill the final questionnaire
	All day	Participants fill the final questionnaire
	18.00 PM–22.00 PM	Researcher check the submission
		Researcher count the eligible participants to get the token of appreciation + share it

3.4 Design Solution: Chatty Bot

This study using Chatty Bot as the prototype design. Overall, the prototype deployed in LINE and Telegram identical features. However, since each platform contains a different configuration, there are some adjustments in how the participants can access and respond. Chatty bot has three main paths and smart response to interact with the participants: (1) Welcome new user (contains the greeting for the new user, explanation about general chatting topic, and collecting participants biodata). In this path, if the participants needed further explanation about the experiments, then Chatty Bot will be able to explain with the function optional conversation. Nevertheless, if the participants already willing to continue to the next step and become returning user, they will have shortened path of conversation with Chatty Bot. For this path, Engati were used for both Telegram and LINE bot; (2) Greet returning users, contains re-greetings of the participants who already open the Chatty Bot for the second time or more. The participants will be provided with three training types (Recall, Mnemonic, and Eye of Details); and (3) Smart response/Auto-response message. The function of these features is as the response of pre-scheduled conversation (in the form of encouraging/leaderboards, load training, and suggested training).

4 Results

4.1 Participants

Between December 3rd to 18th, 2020, 22 people (6 men, 16 women) participated in this study. The platform is divided into LINE (1 man, 11 women) and Telegram (5 men, five women). However, two participants (2 women, both using LINE) were dropped due to personal and technical reasons. Participant's age range was 55 to 76 years old (average: 60.48 years old). Two participants were retirees, and the other 18 participants still active working. All of the participants live in an urban area (Bandung and Jakarta) in Java Island and able to do basic activities of daily living (BADL).

4.2 Findings

This study using Chatty Bot as the prototype design. Overall, the prototype deployed in LINE and Telegram identical features. However, since each platform have different configuration, there are some adjustments in how the participants can access and respond. Comparison between two deployed system mention in Fig. 1 and 2.

According to the aim of the study, Chatty Bot has proven its usability, however we would like to mention several recommendations based on findings: (1) Estimating the level provided and frequently update or add the new session, so the participants were continuously able to keep up with their performance without having re-done the duplicating session; (2) As more practice might not resulting in a better result, it is better for the designer to make every session worth doing, challenging but not frustrating; (3) Specifically provided sessions still preferable by most of the participants. However, the baseline cognitive capacity of every participant is different from one another. If it is possible, then test the water for measuring the participant's condition before choosing the real training

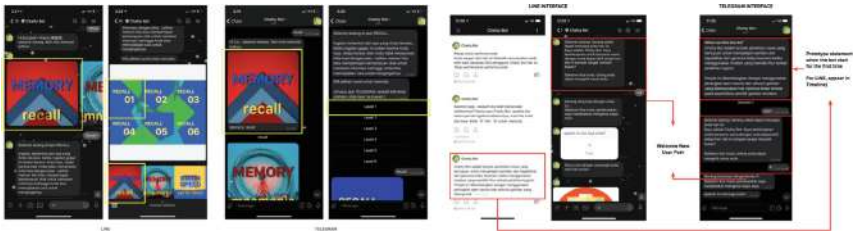

Fig. 1. Telegram – LINE interface: (e.g. Placement for 1st Level. Fruits, Prototype statement and user path

option is beneficial; (4) The first-time experience in using the chatbot arguably gives the highest impact. Therefore, messages for the new user should be meticulously selected; (5) The urgencies of notification came in different degrees. Since the notification cannot be re-activated, then the notification given time should be explored more to the most likely suitable for most participants; (6) Notification frequencies need to reduce to avoid the overlapping notification; (7) Motivational words similar to leaderboards effectively motivate participants. However, the content should not discourage (for not ever mentioned in the leaderboards) or duplicating (chatbot become 'less' human). Thus, focusing to participant's contribution more effective than mentioning other's achievement; (8) A lot of missed training session by participants needs to be taken seriously; (9) Two direct manipulation modes of input (typing and press button both are affordable for the participants. However, different types of language keyboards might become an issue when the chatbot is deployed on a larger scale; and (10) Participants' experience in perceiving the level name based on the number is also should reconsider, as the number is directly perceived as the level of difficulties for what it is inside.

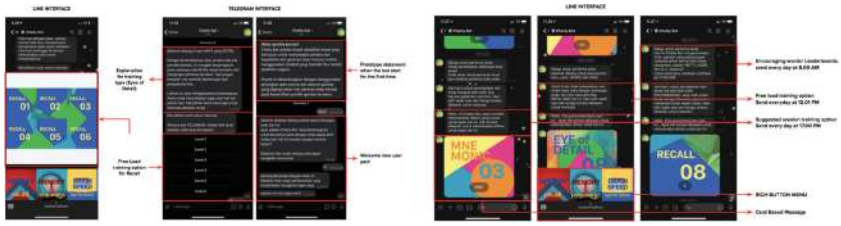

Fig. 2. Telegram– LINE interfaces: Drop down vs Rich Messages, Rich Button and Card Based Messages

5 Discussion and Conclusion

5.1 Discussion

Smartphone usage inevitably already shifted from mobile phones into a multimedia gadget. These phenomena show that the participants and their cohort are ready to interact

independently with their smartphones. Human ability has ways to adapt to the system. Nonetheless, recognizable cues from the device purposely will make effortless interaction [19] in the relation between human-computer interaction.

The habit of using a cross-platform messaging service as a regular communication channel enables the chatbot to switch its function from customer service to health assistant. No matter what kind of messaging service platform, as long as the user is already familiar with the messaging service concept, then using LINE and Telegram as the second-choice platform still results as applicable system for using the chatbot training platform. Therefore, we argue that despite of the limitation of chatbot compare with the stand-alone application, which enables to customize based on the user expectation, chatbot still has an advantage for not to be installed in the first place. Without installing the application, chatbots will emerge in the user's every day and regular activities in the form of a new friend'. This advantage also underlines the low learning curve, as most users only acquire some base function and learn additional function on demand.

5.2 Conclusion

In this study, we explore the use of chatbots as a feasible communication channel implemented for the next generation older adult in Indonesia. As a result of using the SUS inventory questionnaire (75.375), this prototype meets the standard usability score. Nevertheless, further technical details will be required for implementation on a larger scale. Cognitive capacity baseline, catching up with the smartphone usage frequencies, and how to 'package' the importance of doing these training in the first place, are the three most crucial aspects to be the focus on further development. Finally, chatbot as the tools is arguably suitable to act as independent communication media for the next generation elderly and potentially extended with broader thematic purposes.

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2021 AHFE International

12th International Conference on Applied Human Factors and Ergonomics

jointly with

Global Issues Challenge: Human Factors in Disease Control and Pandemic Prevention
1st International Conference on Human Dynamics for the Development of Contemporary Societies
2nd International Conference on Creativity, Innovation and Entrepreneurship
3rd International Conference on Industrial Cognitive Ergonomics and Engineering Psychology
3rd International Conference on Human Factors for Apparel and Textile Engineering
4th International Conference on Human Factors in Artificial Intelligence and Social Computing
4th International Conference on Kansei Engineering
4th International Conference on Additive Manufacturing, Modeling Systems and 3D Prototyping
4th International Conference on Advanced Production Management and Process Control
4th International Conference on Interdisciplinary Practice in Industrial Design
4th International Conference on Human Factors in Aging and Special Needs
4th International Conference on Human Factors and Assistive Technology
5th International Conference on Human Factors and Wearable Technologies
5th International Conference on Human Error, Reliability, Resilience, and Performance
5th International Conference on Human Factors in Communication of Design
5th International Conference on Human Factors in Virtual Environments and Game Design
6th International Conference on Design for Inclusion
6th International Conference on Cognitive Computing and Internet of Things
6th International Conference on Human Factors and Simulation
6th International Conference on Human Factors in Management and Leadership
7th International Conference on Human Factors in Cybersecurity
7th International Conference on Human Factors and Systems Interaction
7th International Conference on Human Factors in Robots, Drones and Unmanned Systems
7th International Conference on Human Factors in Sports, Injury Prevention and Outdoor Recreation
7th International Conference on Human Factors, Business Management and Society
7th International Conference on Human Factors in Energy
7th International Conference on Human Factors in Training, Education, and Learning Sciences
8th International Conference on The Human Side of Service Engineering
8th International Conference on Human Factors, Software and Systems Engineering
8th International Conference on Architecture, Sustainable Urban Planning and Infrastructure
8th International Conference on Safety Management and Human Factors
9th International Conference on Affective and Pleasurable Design
9th International Conference on Human Factors in Transportation
9th International Conference on Ergonomics in Design
10th International Conference on Cross-Cultural Decision Making
10th International Conference on Human Factors and Ergonomics in Healthcare and Medical Devices
10th International Conference on Digital Human Modeling and Applied Optimization
12th International Conference on Physical Ergonomics and Human Factors
12th International Conference on Usability & User Experience
12th International Conference on Neuroergonomics and Cognitive Engineering
12th International Conference on Social & Occupational Ergonomics
22nd International Conference on The Human Aspects of Advanced Manufacturing: Managing Enterprise of the Future

Final Program

25-29 July, 2021

Virtual Conference, USA

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Opening Plenary Session and Keynote Address

Monday 15:00-16:30 (EDT), July 26, 2021
Virtual Room: IBM Watson Digital

INTRODUCTORY REMARKS
Waldemar Karwowski - General Conference Chair

Human Systems Integration: The Flexibility Challenge

Dr. Guy Andre Boy
France

Abstract: Human System Integration (HSI) is about orchestrating technology, organization and people in a flexible way. Flexible sociotechnical systems, called "FlexTech," are based on anticipation, preparation, creativity and experience. These systems contrast with those stemming from technology-centered engineering that produces objects and machines with the immensely codified and rigid practices we know today. Most of the time, technologies are designed and developed for normal situations, leaving users to manage abnormal and emergency situations themselves, sometimes under unforeseen, extreme and/or dangerous conditions. Putting humans at the center of the design of flexible sociotechnical systems means imagining possible futures, modeling them, simulating them and leading them down the right paths. This keynote is for the designers who seek to better understand the roles of humans and organizations developing complex life-critical systems. It is also for those who train future human-centered designers who will have to take into account the well-being, safety, sustainability and efficiency of the actors of future sociotechnical systems. The aim of the flexibility challenge is to put the artificial at the service of the natural, and not the other way around.

Bio: Dr. Guy Boy is FlexTech Chair Institute Professor at Paris Saclay University (Centrale Supélec) and ESTIA Institute of Technology, France. He has worked for 40 years in the field of human-centered design (HCD) of complex systems, discovering repeatedly that automation leads to rigidity, especially when things go wrong. It is high time we had a new paradigm where flexibility is a major asset in human-system integration. HCD is seen here as the combination of practices and technologies for the future.

Virtual Conference program schedule is listed in Eastern Daylight Time (EDT) - New York Timezone

Access to the Virtual Conference Scientific and Technical Program will be available through the AHFE 2021 Submission System

Detailed access for all sessions will be sent to Registered Participants

Tutorials

Virtual Conference program schedule is listed in
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Pre-conference Tutorials

Half-day tutorials at introductory, intermediate, and advanced levels will cover the entire spectrum of the conference. Tutorials will be offered on Sunday, July 25 and Monday, July 26. Tutorials registration is required.

JULY 25, 2021

TUTORIAL GROUP A - 9:00 - 12:30 (EDT)		Room
T-1	**Fundamentals in Data Visualization and Dashboard Design** Presenter: Abbas Moallem, San Jose State University	AHFE 1
T-2	**Design, User Experience and Usability** Presenter: Javed Sheikh, University of Sialkot	AHFE 2
T-3	**Prototyping HMIs for Partially and Highly Automated Vehicles: A Balanced Human Systems Integration Approach** Presenter: Marcel Baltzer, Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE	AHFE 3

JULY 25, 2021

TUTORIAL GROUP B - 13:00 - 16:30 (EDT)		Room
T-4	**Eye Tracking Methods and Applications** Presenter: Jan Watson, Drexel University	AHFE 1
T-5	**User-Centered Design: Creating Effective Personas** Presenter: Everett McKay, UX Design Edge	AHFE 2
T-6	**Human Factors and Cybersecurity** Presenter: Abbas Moallem, San Jose State University	AHFE 3

JULY 26, 2021

TUTORIAL GROUP C - 9:00 - 12:30 (EDT)		Room
T-7	**Towards Data Science: Modelling Techniques in Predictive Analytics with Python** Presenter: Javed Sheikh, University of Sialkot	AHFE 1
T-8	**Cognitive Neuroscience for the Human Factors Practitioner and Fundamentals of Brain Imaging** Presenter: Adrian Curtin, Drexel University	AHFE 2

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#	Session Title	Room	Track
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1	Plenary: Neuroergonomics and Cognitive Engineering	AHFE 1	CN
2	How to Address Complexity in the Emerging Platform Society	AHFE 2	HSSE
3	HMI, ADAS and Electric Vehicles I	AHFE 3	RR
4	Applications and Implications of Automated Technologies for Performance Assessment in Aircrew Training	AHFE 4	TELS
5	Cognitive Assessment and Physical Strain of First Responders and Action Forces	AHFE 5	CCIoT
6	User Research and Product Design I	AHFE 6	ED
7	Complex Human-System Interactions	AHFE 7	SYSI
8	Safety, Integration and interaction for Aging Population	AHFE 8	HFAS
9	Health Care Strategies and Design during COVID-19 Era	AHFE 9	DCPP
10	Usability and User Experience Applications I	AHFE 10	UUE
11	Communication Between Human and Machine	AHFE 11	APD
12	Cross-Cultural Decision Making I	AHFE 12	CCDM
13	Digital Human Modelling and Applied Optimization I	AHFE 13	DHMAO
14	Ergonomics in Building and Architecture I	AHFE 14	SUPI
	Session Time: 11:00 – 12:30 (pages 14 - 20)		
15	Systemic-Structural Activity Theory Session	AHFE 1	CN
16	Re-Balancing Benefits in the Digital Age: Public and Private Sector Resilience and Citizens Fundamental Rights	AHFE 2	HSSE
17	User Research and Product Design II	AHFE 3	ED
18	Usability and User Experience Applications II	AHFE 4	UUE
19	HMI, ADAS and Electric Vehicles II	AHFE 5	RR
20	Ergonomics in Building and Architecture II	AHFE 6	SUPI
21	Cognitive Living Spaces by Using IoT Devices	AHFE 7	CCIoT
22	Brain-Machine Interface (BMI) and Neuroinformatics	AHFE 8	ICEEP
23	Risk Assessment and Safety Training I	AHFE 9	SMHF
24	Wearable Sensing in Physical Ergonomics Assessment and Safety	AHFE 10	PEHF
25	Production Management in Industry	AHFE 11	MFG
26	Communication of Design I	AHFE 12	HFCD
27	Education	AHFE 13	CIE
28	Pandemic Impacts and Coping	AHFE 14	DCPP
	Session Time: 13:00 – 14:30 (pages 20 - 24)		
29	Real-World Human State Assessment: Victories and Remaining Challenges	AHFE 1	CN
30	Emerging Research Innovations in AI, User Experience, New Technology, and Design: Industry, Business, and Education	AHFE 2	HSSE
31	User Research and Product Design III	AHFE 3	ED
32	Usability and User-Centered Design I	AHFE 4	UUE
33	Educational Design	AHFE 5	ED
34	Advanced Learning Technologies	AHFE 6	TELS
35	Human Technology Approach to Governance	AHFE 7	HFML

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#	Session Title	Room	Track
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37	Kansei Engineering I	AHFE 9	KE
38	Health Care Issues and Risk Assessment	AHFE 10	EHMD
39	Communication of Design II	AHFE 11	HFCD
40	Virtual Reality and Game Design in Education	AHFE 12	HFGD
41	Human Factors in Artificial Intelligence and Social Computing I	AHFE 13	AISC
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44	Augmenting Service Capabilities in the With/Post-Pandemic Era	AHFE 2	HSSE
45	Design and Evaluation Research for Enhanced Product Usability and User Experience	AHFE 3	ED
46	Design Issues in Research	AHFE 4	ED
47	Usability and User-Centered Design II	AHFE 5	UUE
48	Design for Inclusion in the Living Environment	AHFE 6	DI
49	Human Factors on Security and Crises Management	AHFE 7	SYSI
50	Computational Modeling Approaches in Politics and Economics	AHFE 8	HFSIM
51	Human Factors and Assistive Technology I	AHFE 9	HFAT
52	Advanced Production Management and Process Control I	AHFE 10	APMPC
53	Sustainability and Ecodesign	AHFE 11	HDCS
54	Human Factors in Artificial Intelligence and Social Computing II	AHFE 12	AISC
55	Explorations in Industrial Design Education	AHFE 13	IPID
56	Human Performance and Variability	AHFE 14	HFAS
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58	Human Factors and Unmanned Aerial Vehicles	AHFE 2	HFRDUS
59	Human Factors and Wearable Technologies I	AHFE 3	HFWT
60	Implementation of Learning Technologies in Education	AHFE 4	TELS
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62	Decision Support System and Human Factors	AHFE 6	HFSSE
63	Human Performance improvement and Training	AHFE 7	HFAS
64	Sensory Engineering and Emotion	AHFE 8	APD
65	Applications in Interaction Design	AHFE 9	ED
66	Social, Occupational, Physical Ergonomics and Work-Related Musculoskeletal Disorders	AHFE 10	SOE
67	User Interface and Accessibility	AHFE 11	UUE
68	Automated Vehicles I	AHFE 12	RR
69	Implementation of Novel Technology and Gamification for Training and Certification	AHFE 13	TELS
70	Human Factors, Business Management and Society I	AHFE 14	HFBMS

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73	Design for People. Design as Catalyst	AHFE 3	ED
74	Ergonomics Design and Evaluation in Transportation	AHFE 4	ED
75	UX Design and Evaluation	AHFE 5	UUE
76	Automated Vehicles II	AHFE 6	RR
77	Human Factors, Business Management and Efficiency	AHFE 7	SOE
78	Design for Inclusion in Learning Experiences	AHFE 8	DI
79	Human Factors in Software and Systems Engineering I	AHFE 9	HFSSE
80	Cognitive Neuroscience, Health Care and Artificial Intelligence (AI) Systems	AHFE 10	ICEEP
81	Risk Assessment and Safety Training II	AHFE 11	SMHF
82	Virtual and Augmented Reality	AHFE 12	HFSIM
83	Advanced Production Management and Process Control II	AHFE 13	APMPC
84	Human Factors in Artificial Intelligence and Social Computing III	AHFE 14	AISC
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86	Education, Training, and Technology Facilitating a Future Workforce	AHFE 2	HSSE
87	Anthropometry in Ergonomic Design I	AHFE 3	ED
88	Usability Evaluation	AHFE 4	UUE
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90	Human Factors in Software and Systems Engineering II	AHFE 6	HFSSE
91	Kansei Engineering II	AHFE 7	KE
92	Intelligent Computing and Cognitive Computing in Healthcare	AHFE 8	CCIoT
93	Design, Human–Machine interaction and Learning Systems	AHFE 9	ICEEP
94	Education and Health Based on Accessible and Inclusive Technology	AHFE 10	SYSI
95	Human Interaction and Communication in Industry	AHFE 11	HDCS
96	Creativity and Thinking Styles	AHFE 12	CIE
97	Human Factors in Artificial Intelligence and Social Computing IV	AHFE 13	AISC
98	Innovative Health Care Technologies: Aging and Special Needs	AHFE 14	HFAS
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99	Neurobusiness Applications	AHFE 1	CN
100	Ergonomics in Buildings and Living Spaces	AHFE 2	ED
101	Ergonomics in Urban Design II	AHFE 3	SUPI
102	Analysis of Learning Strategies and Learning Performance	AHFE 4	TELS
103	Robots in Transportation Systems	AHFE 5	HFRDUS
104	Human Factors in Cybersecurity I	AHFE 6	CYBER
105	Design for Inclusion in Everyday Life and Behaviors I	AHFE 7	DI

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107	Assistive Technologies, Accessibility and Human Systems Applications	AHFE 9	SYSI
108	Human Factors, Business Management and Society II	AHFE 10	HFBMS
109	Simulation and Human Factors for Nuclear Control Rooms	AHFE 11	HFSIM
110	Culture and Globalization	AHFE 12	CIE
111	Health Care Organization and COVID-19 Responses	AHFE 13	DCPP
112	Emerging Design Matter	AHFE 14	IPID
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114	Creating Value in Teams, Organizations, Communities, and Societies I	AHFE 2	HSSE
115	Accessibility and User Experience Applications	AHFE 3	UUE
116	Social & Occupational Ergonomics	AHFE 4	SOE
117	Virtual Environments in Ergonomics and Design	AHFE 5	ED
118	Health Care Advancement and Patient Safety	AHFE 6	EHMD
119	Innovative Health Care Technologies	AHFE 7	EHMD
120	Safety and Human Factors	AHFE 8	SMHF
121	Physical Ergonomics and Human Factors: Case Studies and Job Analysis	AHFE 9	PEHF
122	Human Factors, Business Management and Society III	AHFE 10	HFBMS
123	Panel: Applications for the Use of Synthetic Crew Members in Aircrew Training	AHFE 11	HFSIM
124	Communication of Design III	AHFE 12	HFCD
125	Human Factors in Virtual Environments and Game Design	AHFE 13	HFGD
126	Knowledge and New Technology	AHFE 14	CIE
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128	Kansei Engineering III	AHFE 2	KE
129	Design Education Strategy	AHFE 3	IPID
130	Cross-Cultural Decision Making II	AHFE 4	CCDM
131	Digital Human Modelling and Applied Optimization II	AHFE 5	DHMAO
132	Anthropometry in Ergonomic Design II	AHFE 6	ED
133	Social Inclusion Through Products and Services	AHFE 7	DI
134	Advanced Production Management and Process Control III	AHFE 8	APMPC
135	Perception, Cognition and Emotion	AHFE 9	APD
136	UX in Healthcare and Aging I	AHFE 10	UUE
137	UX in Healthcare and Aging II	AHFE 11	UUE
138	Public Transport Systems	AHFE 12	RR
139	Ergonomics in Building and Architecture IV	AHFE 13	SUPI

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143	User Research: Education and Games	AHFE 3	ED
144	Road Safety I	AHFE 4	RR
145	Ergonomics in Building and Architecture V	AHFE 5	SUPI
146	Human Factors in Software and Systems Engineering III	AHFE 6	HFSSE
147	Advances in Medical Devices and Techniques: Diagnostics and Usability	AHFE 7	EHMD
148	Multimodal Measurements, Artificial Intelligence and Mental Structure	AHFE 8	CCIoT
149	Smart Manufacturing, Affordance and Technology	AHFE 9	SYSI
150	Human Factors, Business Management and Society IV	AHFE 10	HFBMS
151	Visualizing Team Trust and Cohesion	AHFE 11	HFSIM
152	Human Factors in Global Issues and Disease Control	AHFE 12	DCPP
153	Human Factors in Artificial Intelligence and Social Computing V	AHFE 13	AISC
154	Engineering Design and Strategy	AHFE 14	IPID
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156	Digital Human Modeling by Women in Human Factors	AHFE 2	DHMAO
157	User Research	AHFE 3	ED
158	Maritime	AHFE 4	MAR
159	Usability and User Experience Application III	AHFE 5	UUE
160	Drones, Robots and Humanized Behaviors	AHFE 6	HFRDUS
161	Design for Inclusion in Everyday Life and Behaviors II	AHFE 7	DI
162	Health Care Innovation	AHFE 8	EHMD
163	Holistic Approach in Safety Management and Influencing Factors During a Pandemic	AHFE 9	PEHF
164	Human Factors, Business Management and Society V	AHFE 10	HFBMS
165	Usability, Applied Virtual Reality and Game Design	AHFE 11	HFGD
166	Human Dynamics for Social Cohesion	AHFE 12	HDCS
167	Interaction and xR Technology: Health and Well Being	AHFE 13	CIE
168	Aging and Wellbeing	AHFE 14	HFAS
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169	Enhancing Interdisciplinarity in Service Innovation	AHFE 1	HSSE
170	Human Factors in the Design of Products for Health	AHFE 2	IPID
171	Ergonomics, Design and Ergonomics Interceptions I	AHFE 3	ED
172	UX in Wearables, Virtual and Augmented Reality Environments I	AHFE 4	UUE
173	Usability and User Experience Application IV	AHFE 5	UUE
174	Distance Learning and COVID-19	AHFE 6	TELS
175	Human Factors in Software and Systems Engineering IV	AHFE 7	HFSSE

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#	Session Title	Room	Track
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177	Aviation	AHFE 9	AVI
178	Cognitive Ergonomics in Virtual and Augmented Reality Applications	AHFE 10	CCIoT
179	Safety Perception & Safety Culture	AHFE 11	SMHF
180	Innovation and Entrepreneurship	AHFE 12	CIE
181	Pandemic Prevention and Management	AHFE 13	DCPP
182	Textile Design and Engineering	AHFE 14	HFATE
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184	Ergonomics, Design and Ergonomics Interceptions II	AHFE 2	ED
185	UX in Wearables, Virtual and Augmented Reality Environments II	AHFE 3	UUE
186	Driver Behavior and Vulnerable Road Users	AHFE 4	RR
187	Pedagogy and Competency Management in Education	AHFE 5	TELS
188	Robotic Systems and Users for Social Interactions	AHFE 6	HFRDUS
189	Design for Inclusion in Healthcare and Therapies	AHFE 7	DI
190	Human Sensing and Data Essential for HF Simulation Modeling	AHFE 8	HFSIM
191	Human Factors and Wearable Technologies II	AHFE 9	HFWT
192	Advanced Technologies and Manufacturing Processes for 3D Printing	AHFE 10	AMMSP
193	Human Factors and Assistive Technology II	AHFE 11	HFAT
194	Advanced Production Management and Process Control IV	AHFE 12	APMPC
195	Innovation and Creativity in Business	AHFE 13	CIE
196	Human Factors for Textile and Society	AHFE 14	HFATE
	Session Time: 17:00 – 18:30 (pages 80 - 85)		
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198	Human Factors and Behavior in Organizational Context and Work Environments	AHFE 2	HFML
199	Safety and Prevention Management	AHFE 3	SMHF
200	Communication of Design IV	AHFE 4	HFCD
201	Road Safety II	AHFE 5	RR
202	New Research and Design Applications for 3D Printing	AHFE 6	AMMSP
203	Teaching/Learning Interaction	AHFE 7	TELS
204	Aviation and Space	AHFE 8	AVI
205	Lean and Agility and Enterprise	AHFE 9	MFG
206	Modeling and Simulation for Human-Human and Human-Agent Teaming	AHFE 10	HFSIM
207	Emotional Design II	AHFE 11	APD
208	Ergonomics in Urban Design III	AHFE 12	SUPI
209	Human Factors in Cybersecurity II	AHFE 13	CYBER
210	Human Factors in Energy: Oil, Gas, Nuclear and Electric Power Industries	AHFE 14	ENERGY

Conference at a Glance

Acronym	Track
AISC	Human Factors in Artificial Intelligence and Social Computing
AMMSP	Additive Manufacturing, Modeling Systems and 3D Prototyping
APD	Affective and Pleasurable Design
APMPC	Advanced Production Management and Process Control
AVI	Transportation: Aviation
CCDM	Cross-Cultural Decision Making
CCIoT	Cognitive Computing and Internet of Things (IoT)
CIE	Creativity, Innovation and Entrepreneurship
CN	Neuroergonomics and Cognitive Engineering
CYBER	Human Factors in Cybersecurity
DCPP	Global Issues: Human Factors in Disease Control and Pandemic Prevention
DHMAO	Digital Human Modeling and Applied Optimization
DI	Design for Inclusion
ED	Ergonomics in Design
EHMD	Human Factors and Ergonomics in Healthcare and Medical Devices
ENERGY	Human Factors in Energy: Oil, Gas, Nuclear and Electric Power Industries
HDCS	Human Dynamics for the Development of Contemporary Societies
HERRP	Human Error, Reliability, Resilience, and Performance
HFAS	Human Factors in Aging and Special Needs
HFAT	Human Factors and Assistive Technology
HFATE	Human Factors for Apparel and Textile Engineering
HFBMS	Human Factors, Business Management and Society
HFCD	Human Factors in Communication of Design
HFGD	Human Factors in Virtual Environments and Game Design
HFML	Human Factors in Management and Leadership
HFRDUS	Human Factors in Robots, Drones and Unmanned Systems
HFSIM	Human Factors and Simulation
HFSSE	Human Factors, Software and Systems Engineering
HFWT	Human Factors and Wearable Technologies
HSSE	The Human Side of Service Engineering
ICEEP	Industrial Cognitive Ergonomics and Engineering Psychology
IPID	Interdisciplinary Practice in Industrial Design
KE	Kansei Engineering
MAR	Transportation: Maritime
MFG	The Human Aspects of Advanced Manufacturing: Manufacturing Enterprises in a Digital World
PEHF	Physical Ergonomics and Human Factors
RR	Transportation: Road & Rail
SIPOR	Human Factors in Sports, Injury Prevention and Outdoor Recreation
SMHF	Safety Management and Human Factors
SOE	Social & Occupational Ergonomics
SPACE	Transportation: Space
SUPI	Human Factors, Architecture, Sustainable Urban Planning and Infrastructure
SYSI	Human Factors and Systems Interaction
TELS	Human Factors in Training, Education, and Learning Sciences
UUE	Usability and User Experience

1	**Plenary: Neuroergonomics and Cognitive Engineering** Chair: Hasan Ayaz, USA	CN
9:00-10:30 AHFE 1	Preserving human performance under fatigue using advances in neuroergonomics Ranjana Mehta, USA	
2	**How to Address Complexity in the Emerging Platform Society** Co-Chairs: James C. Spohrer and Clara Bassano, USA/Italy	HSSE
9:00-10:30 - AHFE 2	Exploring new digital age challenges Sergio Barile, Clara Bassano, Paolo Piciocchi, Marialuisa Saviano, Jim Spohrer, Italy Ecosystems transformation for social change: How to challenge emergency through emergence Francesco Polese, Orlando Troisi, Mara Grimaldi, Italy The role of technological platforms in co-creating symbiotic relationships between firms and society Pierpaolo Testa, Luigi Cantone, Giuseppe Fabio Cantone, Jay Kandampully, Italy Reducing industry complexity with international standards: Current efforts for services, e-Commerce, artificial intelligence Stephen Kwan, Jim Spohrer, USA Digital transformation in the era of Covid-19 Marco Tregua, Cristina Mele, Tiziana Russo-Spena, Marialuisa Marzullo, Adriana Carotenuto, Italy Management of smart city in lens of viable system approach Leonard Walletzký, Luca Carrubbo, Frantiska Romanovska, Czech Republic	
3	**HMI, ADAS and Electric Vehicles I** Co-Chairs: Ralf Philipsen and Stewart Birrell, Germany/UK	RR
9:00-10:30 - AHFE 3	Behavioral indicators affecting driving performance in human machine interface assessments with simulation Yukun Xie, Tianyang Yue, Preben Hansen, Fang You, China An expert informed approach to assess challenges in automotive HMI-development and their implications on development processes Jan Bavendiek, Teresa Koch, Christopher Brockmeier, Lutz Eckstein, Germany Developing transferable route choice models using driving simulator experiments Chaojie Wang, Zhu Qing, Einat Tenenboim, Srinivas Peeta, USA Simulation models for electric mopeds: a study of the impact on traffic flow Evangelia Portouli, Niki Georgiou, Angelos Amditis, Greece The way you do things you do - fueling or charging cars as dealing with refillable resources Ralf Philipsen, Hannah Biermann, Martina Ziefle, Germany Look, no cables! An interview study into guiding the practical implementation of wireless chargers for electric taxis Arun Ulahannan, Matthew Knight, Robert Doel, Stewart Birrell, UK	
4	**Applications and Implications of Automated Technologies for Performance Assessment in Aircrew Training** Co-Chairs: Beth Atkinson and Joseph Mercado, USA	TELS
9:00-10:30 - AHFE 4	A heuristic-based approach to prototyping workbench Mitchell Tindall, Emily Rickel, USA Benefits and challenges of automated instructorless feedback for tactical radio communications training Emily Anania, Bill Schmermund, USA Advancing after action reviewing capabilities in next generation hypoxia training Beth Atkinson, Christopher Gilg, USA Increasing student proficiency through adaptive training: A systems integration challenge Brent Fegley, Michael Tolland, USA	

5	**Cognitive Assessment and Physical Strain of First Responders and Action Forces** Co-Chairs: Miloš Kostić and Lucas Paletta, Serbia/Austria	CCIoT
9:00-10:30- AHFE 5	Physiological responses during simulated chemical-biological-radiological-nuclear scenarios with chemical protective clothing Thomas Hölzl, Gerald Bauer, Robert Enne, Oliver Kühr, Peter Wittels, Austria Electrotactile stimulation, a new feedback channel for first responders Matija Štrbac, Milica Isaković, Jovana Malešević, Gorana Marković, Strahinja Dosen, Nikola Jorgovanović, Goran Bijelić, Miloš Kostić, Serbia/Denmark Virtual reality-based human factors analysis for first responder training and flexible real-time support Lucas Paletta, Michael Schneeberger, Martin Pszeida, Amir Dini, Austria Multisensory wearable vital monitoring system for military training, exercise and deployment Alexander Almer, Anna Weber, Lucas Paletta, Michael Schneeberger, Stefan Ladstätter, Dietmar Wallner, Günther Grabher, Peter Süss, Philipp Klöckl, Patrick Fuchshofer, Thomas Hölzl, Austria	
6	**User Research and Product Design I** Co-Chairs: Xiang Liu and Francisco Rebelo, China/Portugal	ED
9:00-10:30- AHFE 6	The stability of headphones Ruyang Yu, Cao Yuan, Li Xinyi, Wang Haining, Renke He, China Green sustainable design of Chinese agricultural products Xiang Liu, Renke He, Tie Ji, China Visual analysis of sustainable product service system design based on bibliometrics Yongkang Chen, JieXuan Wang, Meng Gao, Renke He, China Application status and prospects of implicit interaction in the field of smart care for the elderly Yali Ling, Mengfei Liu, Ren-ke He China Experience of positive emotion caused by smell in driverless automobile technology Yunshuang Zheng, Yanan Chang, Huiyuan Han, China Design of jewelry deriving from Luodian lantern with topological property constrained: Example of Rabbit Lamp of Chinese Zodiac Junxuan Li, RongRong Fu, China	
7	**Complex Human-System Interactions** Co-Chairs: Filipa Carvalho and Jorge Gil Tejeda, Portugal/Mexico	SYSI
9:00-10:30- AHFE 7	Client's quality assessment of digital transaction platforms interactivenesses in a Covid-19 e-commerce business environment Mohammed Aminu Sanda, Ghana Women's operational vulnerability and risk in Ghanaian business systems: A case study of kayayei in Accra, Ghana Majoreen Osafroadu Amankwah, Rosemond Asor Obeng, Eziaku Rasheed, Ghana/Sweden A post-mortem analysis of a merger and a rightsizing: The case of Ecobank Ghana Limited and The Trust Bank Limited Majoreen Osafroadu Amankwah, Joyleen Fayorsey Mante, Ghana The hierarchy in the temporary interaction micro-processes that precede the breaking points of focal attention in an object of the new media Lorena Olmos Pineda, Jorge Gil, Mexico Comparative studies of the variations in the spatial location processes generated by a weak-visual person in two work systems Jorge Gil Tejeda, Lorena Olmos Pineda, Mexico Physical exertion and prevalence assessment of musculoskeletal disorders among brush cutter operators Filipa Carvalho, Teresa Cotrim, Rui B. Melo, Portugal Technology and growth: An agent based model of micro behaviors and meso technology networks for macroeconomic growth Mark Abdollahian, Yi Ling Chang, Yuan Yuan Lee, USA Automated trust modeling for increasingly autonomous aerial systems Sarkis Mikaelian, Li Liu, Nhut Ho, USA	

8	**Safety, Integration and interaction for Aging Population** Co-Chairs: Oksana Kravchenko and Peter Schmid, Ukraine/Germany	HFAS
9:00-10:30- AHFE 8	Electrotactile feedback to provide assistance to touchscreen interaction of the elderly Peter Schmid, Thomas Maier, Germany Elderly people's living space and well-being design based on ergonomic applications Xing Ji, China Virtual reality based system with a stationary bike to enhance lower limb training for elderly Yi Xiang Su, Chien-Hsu Chen, Taiwan Psychological and pedagogical support of students with special educational needs in a higher education institution Oksana Kravchenko, Natalia Koliada, Oleksandr Safin, Halyna Bondarenko, Katherine Chupina, Victoriia Boyar, Ukraine Rehabilitation for people with disabilities by means of art: Example of the international art symposium-plenary of people with disabilities Oksana Kravchenko, Inna Molochenko, Maksym Skochko, Ukraine Community landscape for the elderly based on health preservation Xinru Feng, Wuzhong Zhou, China Digitalization of later life: What prevents the care sector from meeting the rapid digitalization of older populations? Britt Östlund, Sweden	
9	**Health Care Strategies and Design during COVID-19 Era** Co-Chairs: Doris Janssen and Jorge Guadalupe-Lanas, Germany/Ecuador	DCPP
9:00-10:30- AHFE 9	Factors related to walking behavior of the elderly residents in urban residential green space during COVID-19 Yidan Cao, Chunrong Liu, Xiaomin Tang, China The impact of COVID-19 impact on students' economic life Jorge Guadalupe-Lanas, Jorge Cruz-Cárdenas, Hugo Arias-Flores, Ecuador An experiment of mobile application design course based on crises experiences in COVID-19 pandemic Zhen Qin, Jing Cui, China WIBCE – A Web application helping people to reflect their infection risk and psychological well-being and act accordingly during the COVID-19 pandemic Doris Janssen, Katharina Lingelbach, Sabrina Gado, Philipp Maurer, Daniela Piechnik, Martin Eichler, Dennis Knopf, Leopold Hentschel, Markus Schuler, Daniel Sernatinger, Matthias Peissner, Germany Green design of community public space in the context of the COVID-19 epidemic Hanyu Xu, China Application of aromatherapy in public space in the context of the COVID-19 pandemic Shixin Ni, Wuzhong Zhou, China Analysis of influencing factors of online performance's consumption experience during the epidemic of Corona Virus disease 2019 Seina Tasaki, Japan	

10	**Usability and User Experience Applications I** Co-Chairs: Junghyun Ahn and Michelle Burger, South Korea/South Africa	UUE
9:00-10:30- AHFE 10	Acceptance of occupational exoskeletons: Social and psychological factors Emese Papp, Jens Krzywinski, Christian Woelfel, Germany Inner city development for kids in South Africa: A Jewell City mixed use precinct case study approach Charles Pfungwa Malaila, Michelle Burger, Andries (Hennie) van Heerden, Gregory Chawynski, South Africa Interactive automatic refrigerator door for emotional satisfaction Dokshin Lim, Junghyun Ahn, South Korea Personalized video recommendation integrating user portrait and collaborative filtering Shuangni Cheng, Miao Liu, Wan Jing Cao, China Development and evaluation of a technical information sharing system for international remote medical education Shunta Tomimatsu, Kuriko Kudo, Shuji Shimizu, Shintaro Ueda, Tomohiko Moriyama, Yasuyuki Hirai, Japan Touch screen application in flight deck for civil aircraft Jiangping Chu, Lei Wu, Jian Xu, China A co-design approach for a smart cooking appliance. The application of a domain specific language Matteo Zallio, Paula Kelly, Barry Cryan, Damon Berry, UK	
11	**Communication Between Human and Machine** Co-Chairs: Shuichi Fukuda and Kazutaka Ueda, Japan	APD
9:00-10:30- AHFE 11	Movement-mediated communication between human and machine Shuichi Fukuda, Japan Neural dynamics involved in creative thinking in engineering design Fukashi Mikami, Kazutaka Ueda, Koji Koizumi, Masayuki Nakao, Japan Examinations of color emotions for average faces Keiichi Muramatsu, Yoshimasa Tawatsuji, Kazunori Kaede, Keiichi Watanuki, Japan Research on trust oriented interface design method of logistics robots in the post epidemic era Yutian Lei, Zhengyu Tan, Weihong Su, China Effect of aesthetic appeal on large scale brain networks Kazutaka Ueda, Japan	
12	**Cross-Cultural Decision Making I** Co-Chairs: Noriko Okabe and Toshihisa Doi, Japan	CCDM
9:00-10:30- AHFE 12	Understanding the value ranking of Chinese middle class Wenhua Li, Jiaying Huang, China Mechanism of improving performance by expressing human service employees' positive emotion Noriko Okabe, Japan The concept, development, evolution and practice of poverty alleviation design Jie Zhou, Wei Ding, Yuyao He, Yiran Zhang, Yisha Wang, Xinyi Yu, China Towards better working conditions for visually impaired: A pilot study on occupational risk assessment for visually impaired massage workers in China Linghong Li, China Examining the cultural differences of users' characteristics between the United States and Japan related to user interface design Toshihisa Doi, Atsuo Murata, Japan A comparison on the development mode of traditional and emerging cultural innovation: A case study of electronic sports-league of legends Huang Xinyao, Wei Ding, China Weakness of real estate collateral valuation policy in changed financial world Jukka Rantala, Atte Rantanen, Maria Yllikäinen, Timo Holopainen, Finland Micro loans to over-indebtedness, causes and consequences, perspective on youth spending Jukka Rantala, Maria Yllikäinen, Henri Untinen, Timo Holopainen, Finland	

13	**Digital Human Modelling and Applied Optimization I** Co-Chairs: Lorenzo Vianello and Sofia Scataglini, France/Belgium	DHMAO
9:00-10:30- AHFE 13	Data-driven personas: Expanding DHM for a holistic approach Ari Kolbeinsson, Jessica Lindblom, Erik Brolin, Sweden The relationship between the position of bicycle saddle and human comfort based on Jack Yu Yalan, Liu Litao, China Improving ergonomics at work with personalized multi-objective optimization of human movements Waldez Azevedo Gomes, Junior, Pauline Maurice, Eloïse Dalin, Jean-Baptiste Mouret, Serena Ivaldi, France Probabilistic estimation of postures during human-robot collaboration: An ergonomics perspective Lorenzo Vianello, Serena Ivaldi, Alexis Aubry, Jean-Baptiste Mouret, France	
14	**Ergonomics in Building and Architecture I** Co-Chairs: Jerzy Charytonowicz and Alicja Maciejko, Poland	SUPI
9:00-10:30- AHFE 14	The synthesis of the arts and its influence on modern theatre architecture Pawel Amalowicz, Poland The multitude of adaptive reuse solutions in sustainable revitalization of historic post-military complexes Marta Rudnicka-Bogusz, Poland Meaning of senses in the perception and shaping of architecture Katarzyna Słuchocka, Poland Interior design and decorations of a house No 83 in Kemer in Turkey Alicja Maciejko, Jerzy Charytonowicz, Poland Possibilities for utilizing wooden structures for creating contemporary architectural forms in the context of sustainable development Alicja Maciejko, Poland	
15	**Systemic-Structural Activity Theory Session** Co-Chairs: Inna Bedny and Alexander Yemelyanov, USA	CN
11:00-12:30 - AHFE 1	Neurocognitive indicators of insight according to P300 and later visual ERP components Sergey Lytaev, Russia Systemic-structural activity theory and artificial intelligence Inna Bedny, Waldemar Karwowski, USA Applying web-based application ExpressDecision2 in patient-centered care Alexander M. Yemelyanov, Rahul Sukumaran, Alina Yemelyanov, USA Worker engagement in routinized structured activity circumvention: Using SSAT to understand the significance of involuntary cognitive intentionality Mohammed Aminu Sanda, Ghana Self-regulation approach for setting goals in problem solving Alexander M. Yemelyanov, Inna Bedny, USA	

16	**Re-Balancing Benefits in the Digital Age: Public and Private Sector Resilience and Citizens Fundamental Rights** Co-Chairs: Christine Leitner and Wojciech Cellary, UK/Poland	HSSE
11:00-12:30 - AHFE 2	The human-side of service engineering: Advancing technology's impact on service innovation Wojciech Cellary, Louis Freund, Stephen Kwan, Christine Leitner, Jim Spohrer, Poland/USA/UK New ecosystem based on big data for more digital impact Loris Schmid, Christoph Glauser, Switzerland New frontiers in cyberspace – recent European initiatives to regulate digital finance Christian Stiefmueller, UK emyConnect: Building a smart public service for young mobile Europeans Andreas Martin, Yuri Misnikov, Mohammad Allagha, Austria The engagement catalyst initiative: How one global organization activates and energizes employee engagement Laura C. Anderson, Michal Jacovi, Jonathan Lenchner, Jade Strattner, USA Lessons learned from EMY – A post-COVID perspective on student mobility and democratic participation in the EU Christine Leitner, Kristina Reinsalu, Britta Breser, Mohammad Allagha, Christian Stiefmueller, Radu Serrano, UK Fairness and justice: designing and developing human-first AI technologies Lauren Thomas Quigley, Stacy Hobson, Rachel Bellamy, USA A service design for rural India, helping alleviate dual grand challenges of unemployment & a lack of access to healthcare Shrikant Parikh, India	
17	**User Research and Product Design II** Co-Chairs: Meng Gao and Francisco Rebelo, China/Portugal	ED
11:00-12:30 - AHFE 3	Graphic perception design of social fear release for college students Yuan Lingling, He Guoqiang, China Perception of soundscape for the elderly in urban communities: Field study based on three communities in Changsha, China Liqun Wang, Feihu Chen, Jiaqi Li, Jie Wang, China Framework for teacher-student interaction in the design classroom to enhance student creativity Tingting Gao, China Describing and visualizing sustainable product-service system (S. PSS) applied to distributed water-energy-food nexus Meng Gao, Renke He, Ke Ma, China Naturalistic data collection of head movements during headphone use Xinyi Li, Wang Haining, Cao Yuan, Ruyang Yu, Ren-ke He, China Are you watching me? A study on privacy notice design of social robot Su Peng, Yuan Xiang, China China household ceramics design in the experience economy Hu Yu, Yu Zhou, China	
18	**Usability and User Experience Applications II** Co-Chairs: Rhyse Bendell and Yufeng Wu, USA/China	UUE
11:00-12:30 - AHFE 4	Analysis of level of accessibility of online scientific conferences for blind participants Hugo Arias-Flores, Sandra Sanchez-Gordon, Tania Calle-Jimenez, Ecuador Design of electric bicycle for delivery from the perspective of perceptual engineering Miao Liu, Yufeng Wu, Yujia Hu, Xuqi Yao, Zhiwen Li, China Profiling of E-learning users with accessibility needs Tania Calle-Jimenez, Sandra Sanchez-Gordon, Hugo Arias-Flores, Ecuador Application of background color in banner design Yitong Jiang, Zhonghua Ni, China Modeling dynamic visual attention resource allocation in cockpit with discrete event simulation Chaoran Liang, Shuang Liu, Xiaoru Wanyan, Hao Chen, Yuchen Min, China How pedestrian-AV interaction is affected by the eHMI: A virtual reality experiment Zhifan He, Zhengyu Tan, Ruifo Zhang, Yanyan Li, Bin Liu, China Human-computer interface design of intelligent spinning factory monitoring system based on eye tracking technology Lan Zhang, Guorui Ma, Zhou Jian, Fang Jia, China	

19	**HMI, ADAS and Electric Vehicles II** Co-Chairs: Andrew Krum and Sarah El-Dabaja, USA	RR
11:00-12:30 - AHFE 5	Design sprints integrating agile and design thinking: A case study conducted in the automotive industry. Emilie Henreaux, Michel Noutcha, Tina Phan-Ngoc, Kieffer Suzanne, Belgium Subjective evaluation of road situation alerts using visual, speech and auditory modalities with elderly drivers Luka Rukonic, Marie-Anne Pungu Mwange, Belgium How to share control with ADAS? The impact and investigation of human-system interaction by joystick for driver intervention Cho Kiu Leung, Toshihisa Sato, Japan Cars are talking and their drivers are listening Sarah El-Dabaja, Bhaven Naik, Deborah McAvoy, Jacob Campbell, USA Implications of configurable displays for universal driver-vehicle interfaces Andrew Krum, Zachary Doerzaph, USA Supporting event prediction for level 2 ADAS users to prevent automation surprises Akihiko Takahashi, Japan Explaining the public acceptance of electrified L-category vehicles towards sustainable urban mobility planning Anna Antonakopoulou, Anastasios Rigos, Evangelia Portouli, Angelos Amditis, Evangelia Latsa, Greece	
20	**Ergonomics in Building and Architecture II** Chair: Wojciech Bonenberg, Poland	SUPI
11:00-12:30 - AHFE 6	Humanistic architecture - the human factor in the perception and creation of educational spaces Barbara Świt-Jankowska, Poland The pro-user revolution in design of military complexes in the interwar period Marta Rudnicka-Bogusz, Poland Architectural design after the information revolution Tomasz Konior, Agata Bonenberg, Poland Digital design tools in Polish architectural practice against the backdrop of developed European states Wojciech Bonenberg, Shoufang Liu, Agata Bonenberg, Xia Wei, Poland Digital diagrams in contemporary architectural design: A creative interface between human imagination and form Ana Vasconcelos, Portugal	
21	**Cognitive Living Spaces by Using IoT Devices** Co-Chairs: Herwig Zeiner and Zoheir Sabeur, Austria/UK	CCIoT
11:00-12:30 - AHFE 7	Cognitive living spaces by using IoT devices and ambient biosensor technologies Herwig Zeiner, Lucas Paletta, Roland Unterberger, Julian Aldrian, Austria Human-centric emergent configurations: Supporting the user through self-configuring IoT systems Fahed Alkhabbas, Romina Spalazzese, Paul Davidsson, Sweden Design of an IoT architecture in livestock environments for the treatment of information for the benefit of cattle Miguel Angel Quiroz Martinez, David Manuel Rodriguez Zapata, Monica Daniela Gomez Rios, Maikel Leyva, Ecuador Advanced cyber and physical situation awareness in urban smart spaces Zoheir Sabeur, Marios Angelopoulos, Liam Collick, Natalia Chechina, Deniz Cetinkaya, Alessandro Bruno, UK	

22	**Brain-Machine Interface (BMI) and Neuroinformatics** Co-Chairs: Umer Asgher and Hasan Ayaz, Pakistan/USA	ICEEP
11:00-12:30 - AHFE 8	**Cognitive interventions based on technology: A systematic literature review** Carlos Ramos-Galarza, Omar Cóndor-Herrera, Hugo Arias-Flores, Janio Jadán-Guerrero, Mónica Bolaños-Pasquel, Priscila Cedillo, Ecuador **Design for AI-enhanced operator information ergonomics in a time-critical environment** Jussi Okkonen, Jaakko Hakulinen, Matti Jalava, Heikki Mansikka, Tuuli Keskinen, Markku Turunen, Finland **Feature comparison of emotion estimation by EEG and heart rate variability indices and accuracy evaluation by machine learning** Kei Suzuki, Midori Sugaya, Ryouta Matubara, Tipporn Laohakangvalvit, Japan **Control room operators' cognitive strategies in complex troubleshooting** Jari Laarni, Marja Liinasuo, Satu Pakarinen, Kristian Lukander, Tomi Passi, Finland **An analysis of the cognitive process and similarities of Complex Problem Solving (CPS) discussions** Yingting Chen, Taro Kanno, Kazuo Furuta, Japan **Exploring relationships between distractibility and eye tracking during online learning** Shanshan Chen, Yiqian Zhao, Tianyu Wu, Yajun Li, China	
23	**Risk Assessment and Safety Training I** Co-Chairs: Rui Melo and Jouke Verlinden, Portugal/Belgium	SMHF
11:00-12:30 - AHFE 9	**Risk assessment knowledge relating to occupational health and safety risks: A case study of five Finnish companies** Minna Rantala, Maria Lindholm, Sari Tappura, Noora Nenonen, Finland **Experimental comparison of CWA 17553:2020 community face coverings to surgical masks and filtering facepiece respirators** Nhât Nguyen, Joren Van Loon, Jochen Vleugels, Sam Smets, Els Du Bois, Jouke Verlinden, Stijn Verwulgen, Regan Watts, Belgium **Workplace hazards difficult to identify and manage** Noora Nenonen, Sari Tappura, Minna Rantala, Maria Lindholm, Finland **COVID-19 prevention in construction sites: A case study in a railway project** Christiane N. Gomes, Rui B. Melo, Portugal **Occupational exposure reporting for fire investigators** Barbara Millet, Erin Kobetz, USA **Short circuiting the controller – Missteps in maintenance and inspection of process and wiring in STS-93** Kristy Yun, Tanya Andrews, USA **Machine learning for occupational slip-trip-fall incidents classification within commercial grain elevators** Fatemeh Davoudi Kakhki, Steven A. Freeman, Gretchen A. Mosher, USA	

24	**Wearable Sensing in Physical Ergonomics Assessment and Safety** Co-Chairs: Sol Lim and Chi-Wen Lung, USA/Taiwan	PEHF
11:00-12:30 - AHFE 10	**Machine learning-based pre-impact fall detection and injury prevention for the elderly with wearable inertial sensors** Xiaoqun Yu, Jaehyuk Jang, Shuping Xiong, South Korea **The effectiveness of wearable sensor-based vibrotactile feedback in yoga training for users with visual impairment** Melanie Grudinschi, Md Shafiqul Islam, Kyle Norland, Sang Won Lee, Sol Lim, USA **Functional data representation of inertial sensor-based torso-thigh, knee, and ankle movements during lifting** Sol Lim, Clive D'souza, USA **Using deep learning methods to predict walking intensity from plantar pressure images** Hsing-Chung Chen, S. T. Sunardi, Yih-Kuen Jan, Ben-Yi Liau, Chih-Yang Lin, Jen-Yung Tsai, Cheng-Tsung Li, Chi-Wen Lung, Taiwan **BIONIC: Custom sensors for risk assessment and training of older workers** Alberto Ferreras Remesal, Juan Fernando Giménez Pla, Purificación Castelló Mercé, Salvador Pitarch Corresa, Raquel Marzo Roselló, Mercedes Sanchís Almenara, Spain **Diagnostics of the stress state by the method of pupillography** Marina Boronenko, Oksana Isaeva, Russia **A pilot study on the use of changes in facial features to assess physical workload in real-time** Qian Zhang, Lora Cavuoto, USA	
25	**Production Management in Industry** Co-Chairs: Markus Kohl and Edmund Pawlowski, Germany/Poland	MFG
11:00-12:30 - AHFE 11	**Segmentation and sequencing in CAx instructional videos** Lorena Niebuhr, Nina Rußkamp, Eva-Maria Jakobs, Germany **Data-driven determination and plausibility check of requirement profiles in logistics** Markus Kohl, Sandra Häring, Jens Lopitzsch, Johannes Fottner, Germany **Robot process automation in industrial engineering – challenges and future perspectives** Sebastian Schlund, Mathias Schmidt, Austria **Process improvement for the reduction of rework applying TPM and Kaizen in a company in the metalworking sector** Percy Castro, Angel Murga, Jennyfer Valenzuela, Peru **Improvement of the global efficiency of mining equipment through Total Productive Maintenance - TPM** Cesar Nunura, Orlando Lama, Josue Alayo, Victor Aparicio, Peru **Management system of intelligent autonomous environment (IAEMS): The reference model** Edmund Pawlowski, Poland **Application of Porter's Value Chain Model for construing potential prospects and lacunas in industry 4.0 adoption by 21st century manufacturers** Makinde Oluwafemi Ajayi, Timothy Laseinde, South Africa	

26	**Communication of Design I** Co-Chairs: Daniel Raposo and Amic Ho, Portugal/China	HFCD
11:00-12:30 - AHFE 12	Brand marks analysis - criteria and evaluation components for an analysis tool Daniel Raposo, Fernando Moreira Da Silva, João Neves, Jose Silva, Rogério Ribeiro, Ricardo Correia, Portugal Guidance and public information systems: Diagnosis and harmonization of tourist signage João Neves, Fernando Moreira da Silva, Daniel Raposo, Jose Silva, Rogério Ribeiro, Ricardo Correia, Portugal Organizational design towards the configuration of a media communication model Jorge Brandão Pereira, Vítor Quelhas, Portugal Investigation of city environment with the help of typographic communication design perspectives Ruth Chau, Amic Ho, China Investigation of the application of humanized design concept in the evolution process of Chinese bed Xu Li, Wang Xueting, Lu Yeqing, Zhang Xiuhua, China Visual analytics of urban informality and infrastructure planning with tableau for sustainable urban design research strategies in Lagos metropolis Oluwole Soyinka, Alain Chiaradia, China Quantitative method of regional color planning -- Field investigation on renewal design of Jiangchuan Street Lingling Chen, Kong Fan Qiang, China	
27	**Education** Co-Chairs: Paulo Maldonado and Qingchuan Li, Portugal/China	CIE
11:00-12:30 - AHFE 13	Creative class of micro culture creative industry Xiaobao Yu, Han qing Lin, China Innovation and entrepreneurship practice: Interdisciplinary teaching and learning in an applied psychology context Jinge Huang, Lin Gan, Yuchen Jing, Longxin Ma, Qi Zhang, Liuyi Zhao, Mingyu Zheng, Antong Zhang, Wei Liu, China How shared online whiteboard supports online collaborative design activities: A social interaction perspective Qingchuan Li, Jiaxin Zhang, Xin Xie, Yan Luximon, China Perceived conflict and resolution strategy in collaborative design of complex product from the perspective of cognitive semantics Yufan Zhou, Zhengtang Tan, Danhua Zhao, Zhen Wang, China Understanding the interrelation between prototype cognition and creativity in interdisciplinary design course Lisha Ren, Zhe Sun, Yue Li, China The application of teachers' encouragement in design classroom Xiaoyu Li, China Exploring and reflecting on Generation Z interaction qualities and selfie scenario designs Di Zhu, Ruilin Wang, Ziwei Zhang, Dawei Wang, Xiaohan Meng, Wei Liu, China	

28	**Pandemic Impacts and Coping** Co-Chairs: Maria João Pereira Neto and Lilia Raycheva, Portugal/Bulgaria	DCPP
11:00-12:30 - AHFE 14	Job satisfaction and expectations of pharmacy employees During the COVID-19 pandemic: An application of DEMATEL method Xin Li, Chunrong Liu, Ting Han, China Identifying key factors influencing customers' acceptance of serving chopsticks and spoons in restaurants by FA-DEMATEL approach Zhaohui Nian, Chunrong Liu, China Interactive design of public health safety smart supervision platform under the background of normalization of epidemic prevention Tingwei Cai, Ying Cao, China Green design of prefabricated community control measures in response to public health emergencies Enjia Zhang, China Surviving in pandemic times – Can good design help us to change our lives? Raffaella Maddaluno, Maria João Pereira Neto, Jorge Firmino Nunes, Portugal Communicating challenges of COVID-19 to the ageing population Lilia Raycheva, Bulgaria Addictive cell phone usage: Impacts on family interaction during COVID-19 pandemic Bankole Fasanya, Karen T. Abad Navarrete, Temilade Adeyeye, USA	
29	**Real-World Human State Assessment: Victories and Remaining Challenges** Co-Chairs: Bethany Bracken and Tamsyn Edwards, USA	CN
13:00-14:30 - AHFE 1	Can situation awareness be measured physiologically? Bethany Bracken, Sean Tobyne, Aaron Winder, Nina Shamsi, Mica Endsley, USA Towards a measure of situation awareness for space mission schedulers Tamsyn Edwards, Summer Brandt, Jessica Marquez, USA Monitoring human performance on future deep space missions Kritina Holden, Brandin Munson, Jerri Stephenson, USA Real-time estimation of cognitive states via fNIRS-based time series classification Nina Shamsi, Sean Tobyne, Aaron Winder, Bethany Bracken, Mica Endsley, USA What did our model just learn? Hard lessons in applying deep learning to human factors data Brian Weigel, Kaleb Loar, Andres Colon, Robert Wright, USA Addressing two central issues of team interaction dynamics: The whole is greater than the sum of its parts Mustafa Canan, Mustafa Demir, USA	
30	**Emerging Research Innovations in AI, User Experience, New Technology, and Design: Industry, Business, and Education** Co-Chairs: Debra Satterfield and Kimberly Melhus Mitchell, USA	HSSE
13:00-14:30 - AHFE 2	UI design for medical devices: An interdisciplinary research program to enhance the usability and UX of environmental control units at VA-hospitals Sam Anvari, Gabriella Hancock, Nicole Mok, Aram Ayvazyan, Matthew Nare, Camen Machado, Becka Chompff, Yoshiko Mizushima, Yuji Shiraiwa, Natalia Morales, Loulya Alcharbaji, USA Value co-creation through collaborative world-building and cosplay: QwörkSpace Joshua Ian, Debra Satterfield, USA Evaluating innovation strategies in online education in higher education Debra Satterfield, Jose Rivera-Chang, David Teubner, Tom Tredway, Wesley Woelfel, USA Color and flavor perception Sunghyun Kang, Carol Faber, Nora Ladjahasan, Andrea Quam, USA Disruptive innovation: Designing a shifting pedagogy for creative disciplines in higher education learning Kimberly Mitchell, USA Virtual exhibit design: The UX of student BFA design shows in social VR Laura Huisinga, USA	

31	**User Research and Product Design III** Co-Chairs: Ming Zhong and Francisco Rebelo, China/Portugal	ED
13:00-14:30 - AHFE 3	Green intelligent production design strategy based on service design Wandong Cheng, Jun Zhang, Wanzhi Gao, China Using vibrotactile device in music therapy to support wellbeing for people with Alzheimer's disease Yingjie Fang, Jing Ou, Nick Bryan-Kinns, Qingchun Kang, Junshuai Zhang, Bing Guo, China Information superiority effect of multi-channel interaction of smart mobile robot Ming Zhong, Ren-ke He, China The effects of auditory parameters on the meaning of sound for multifunctional beds Jiehao Ling, Yonghong Liu, Yiming Song, China Emergency protection of urban commercial complex based on VR technology Wenyu Qi, Yun Liu, Zhong Zheng, China	
32	**Usability and User-Centered Design I** Co-Chairs: Saad Almesalm and Yu-Pin Lin, Saudi Arabia/Taiwan	UUE
13:00-14:30 - AHFE 4	Improving usability of a gaze-based surveillance support tool through user-centered design Alexandre Marois, Laura Salvan, Daniel Lafond, Alexandre Williot, Noémie Lemaire, Sébastien Tremblay, Canada Enhancing blood donation intentions using mobile responsive web design Yu-Pin Lin, Meng-Cong Zheng, Taiwan Applying iterative design approach to Kafu games in order to enhance the user experience of gamers in Saudi Arabia Saad Almesalm, Nadeem Bakhsh, Saad Ali Khan, Saudi Arabia Insight into the needs of mobile performance speakers based on multimodal sensory user experience Huai Cao, Juanjuan Feng, Jihao Xu, Zining Liu, China Advanced interactive style guide for design consistency Bryan Croft, Mike Nithaworn, Seana Rothman, Odalis Felix, Jeff Clarkson, Eric Voncollin, Lisa Guo, USA Improved Kano Model based on stakeholder-centered design Yuqi Wang, Danhua Zhao, China GVUI: Graphic-assisted voice user interface based on multi-modal human-machine conversation Bo Zhou, Long Li, China	
33	**Educational Design** Co-Chairs: Zhiyi Wen and Qianqian Lin, China	ED
13:00-14:30 - AHFE 5	Experience in teaching design of human-computer interaction through evaluation and research YuanBo Sun, Zhiyi Wen, Shaohuan Zhang, China A teaching experience of service design course supported by design thinking Qianqian Lin, Yuanbo Sun, China The application of scenario-based design thinking in the teaching practice of product design Cailian Wang, KangHu, Li Zeng, Chunmeng Weng, China Visual analysis of the development trend of design discipline in American basic education Haiwei Yan, Tianyi Sun, Ying Chuai, Yuanbo Sun, Ruolin Gao, China Design thinking application in K-12 education utilizing service design methodology Qiongying Ge, YuanBo Sun, Zhiyi Wen, Shaohuan Zhang, China A review: Implementation of design thinking education in K-12 Shaohuan Zhang, YuanBo Sun, Zhiyi Wen, Qiongying Ge, China Teaching practice of product design driven by supportive employment project for mentally challenged youth Meng Li, China	

34	**Advanced Learning Technologies** Co-Chairs: Martin Kröll and Eric Peterson, Germany/USA	TELS
13:00-14:30 - AHFE 6	Structure of a socio-technical learning and innovation factory Barbara Tropschuh, Fabian Dillinger, Quirin Gärtner, Svenja Korder, Harald Bauer, Moritz Kagerer, Germany Teaching robotics with virtual reality: Developing curriculum for the 21st century workforce Eric Peterson, Biayna Bogosian, Shahin Vassigh, Jorge Tubella, USA I feel the need for speed - empirical evidence of the effectiveness of VR training technology on knowledge and skill acquisition Victoria Trabysh, Theodore Feldhacker, Cait Rizzardo, Kent Halverson, Jake Johnson, Lisa Tripp, Antonio Gonzalez, III, USA Digital creative abilities for achieving digital maturity Marita Canina, Carmen Bruno, Italy AI and learning in the context of digital transformation Martin Kröll, Kristina Burova-Keßler, Germany Impacts on cognitive decay and memory recall during long duration spaceflight Terry Rector, James Casler, Curtis Cripe, USA	
35	**Human Technology Approach to Governance** Co-Chairs: Batia Ben-Hador and Benita Zulch, Israel/South Africa	HFML
13:00-14:30 - AHFE 7	Leadership in media industry: Theoretical approach Cristian Londoño, Ecuador How much immersive is virtual reality? Evidence from VR-based managerial competency assessment tool testing Asta Savanevičienė, Lina Girdauskiene, Lithuania He just didn't listen -Coaches' and coachees' different perceptions about the practice of Managers as Coach (MAC) Batia Ben-Hador, Israel The construction professional's Kanohi kē: The road to purpose-fit selection for New Zealand Andries (Hennie) Van Heerden, Gregory Chawynski, Janette Doblas, Michelle Burger, New Zealand The role of the project manager in delivering design-build projects Jp Kitshoff, Benita Zulch, South Africa An improved method to determine the weight of evaluation index based on group decision-making theory and analytic hierarchy process Jingqi Gao, Qing Xue, Minxia Liu, China	
36	**Human Error, Reliability, Resilience, and Performance in Aviation** Co-Chairs: Barry Kirwan and Casey Kovesdi, France/USA	HERRP
13:00-14:30 - AHFE 8	Is our human factors capability in aviation and maritime domains up to the task? Barry Kirwan, Kasia Cichomska, Beatrice Thiebaux, Andrew Kilner, France Introducing human factors into fault tree modelling for aviation Andrew Kilner, Marta Llobet-Lopez, France Design of a human factors database for learning from safety occurrences in the aviation and maritime domains Sybert Stroeve, Barry Kirwan, Luca Save, Simone Pozzi, Rafet Kurt, Osman Turan, Netherlands Flying high. Voice stress analysis to detect pre-symptomatic acute hypobaric hypoxia at 25000 ft. Martine Van Puyvelde, Emma Debecker, Xavier Neyt, Frederic Detaille, Vanderlinden Wim, Nathalie Pattyn, Belgium Human factors analysis for a new wake vortex air traffic alert Frédéric Rooseleer, Barry Kirwan, Adriana Dana Schmitz, Belgium	

37	**Kansei Engineering I** Co-Chairs: Jiahao Wang and Xinran Chen, China	KE
13:00-14:30 - AHFE 9	Analysis of keyboard layout elements based on aesthetic and subjective evaluation Xinran Chen, Jianrun Zhang, China Evaluation of the layout of home game console interface elements based on aesthetic calculation Ziyi Xie, Chengqi Xue, Wenyu Wu, China The effect of optical weight on optical balance in user interface Kai Ma, Wenyu Wu, Chengqi Xue, China Evaluation of the layout of the interface elements of the posters designed by the Luban AI system and the designer based on Meidu calculation Peng Cheng, Xingsong Wang, China Aesthetics evaluation and usability of multifunctional printer interface Zhou Shen, Mengqian Tian, Xingsong Wang, China Enterprise product morphology based on Kansei Engineering - Taking AGV as an example Xinxiong Liu, Zining Liu, Juanjuan Feng, Jihao Xu, China Form design of household knee-joint products based on Kansei Engineering Wei Ding, Wenqin Fan, Junnan Ye, China	
38	**Health Care Issues and Risk Assessment** Co-Chairs: Helen Fuller and Serena Ivaldi, USA/France	EHMD
13:00-14:30 - AHFE 10	Machine learning approaches to predict scoliosis Joanne Yip, Ruixin Liang, Michael To, Yunli Fan, China Using exoskeletons to assist medical staff during prone positioning of mechanically ventilated COVID-19 patients: A pilot study Serena Ivaldi, Pauline Maurice, Waldez Azevedo Gomes Junior, Jean Theurel, Lien Wioland, Jean-Jacques Atain-Kouadio, Laurent Claudon, Hind Hani, Antoine Kimmoun, Jean-Marc Sellal, Bruno Levy, Jean Paysant, Serguei Malikov, Bruno Chenuel, Nicla Settembre, France A case study of initial in-brace spinal correction of Anisotropic Textile Brace and Boston Brace Charlotte Sze-Ham Wong, Joanne Yip, Kit Lun Yick, Sun Pui Ng, China Preliminary wear trial of posture training bracewear for older adults with degenerative scoliosis (ADS) Linda Yin Ling Sit, Joanne Yip, Kenny Yat Hon Kwan, China The benefits of standardization in healthcare systems Nancy Lightner, Tandi Bagian, USA The flip side of the coin: Potential hazards associated with standardization in healthcare Helen Fuller, Timothy Arnold, USA How might we think about safety? Inviting deeper reasoning through elaborative inquiry Timothy Arnold, Helen J. A. Fuller, Stuart C. Gilman, William P. Gunnar, USA	
39	**Communication of Design II** Chair: Amic Ho, China	HFCD
13:00-14:30 - AHFE 11	Relationship between Chinese painting strokes and Qi on inspiration of art education - A study on Jian Bi stroke Xue Hu, Eakachat Joneurairatana, Sone Simatrang, Thailand Application of emotion-based design in brand communication: Taking KFC as an example Xiaoning Jiang, Fan Zhan, China Pupil dilation, emotion valence and recall of visual images Mritunjay Kumar, Braj Bhushan, Ahmed Sameer, Satyaki Roy, Rajesh Ranjan, India Advertising and lifestyle: A brief history of contemporary Chinese advertising and lifestyle transition Wenhua Li, Jia Xin Xiao, Jiaying Huang, China An impression evaluation of robot facial expressions considering individual differences by using biological information Kai Yu, Peeraya Sripian, Muhammad Nur Adilin Mohd Anuardi, Midori Sugaya, Japan Mascot endorsement provoke the audiences' engagement Tsz Chun Kevin Kwok, Amic Ho, China A modular structure to explore the interface design and interaction testing process of teams Bahar Memarian, Brian Fisher, Christos Koulas, Canada	

40	**Virtual Reality and Game Design in Education** Co-Chairs: Pirita Ihamäki and Zheng Chen, Finland/China	HFGD

13:00-14:30 - AHFE 12

Efficacy of romantic poetry: Chinese classical poetry education project based on augmented reality technology for elementary school students
Zheng Chen, Zhong Wang, China

Developing interactive company presentations in the 3D glue virtual reality environment: a collaborative educational approach
Pirita Ihamäki, Katriina Heljakka, Finland

A theoretical model of video game design in the educational context
Sergio Martinez, Enrique Chiroque, Vanessa Vega, Maria José Espinosa, Eudes Axel Muñoz Delmás, Peru

User experience design of online education based on flow theory
Jiadong Han, Yan Wang, China

Behind the chain coffee shop: Design of utilizing virtual reality for coffee-making training
Yi Ciao Lin, Chien-Hsu Chen, Taiwan

MindJourney: Employing gamification to support mindfulness practice
Yang Ge, Ting Han, China

41	**Human Factors in Artificial Intelligence and Social Computing I** Co-Chairs: Veton Matoshi and Nathanael Brown, Germany/USA	AISC

13:00-14:30 - AHFE 13

Human-AI-collaboration in the context of information asymmetry: A behavioral analysis of Demand Forecasting
Tim Lauer, Sophia Wieland, Germany

A minimally supervised event detection method
Matthew Hoffman, Sam Bussell, Nathanael Brown, USA

LDAvis, BERT: Comparison of method application under Corona conditions
Heike Walterscheid, Veton Matoshi, Katarzyna Wisniewiecka-Brückner, Klaus Rothenhaeusler, Frank Eckardt, Germany

Artificial Intelligence (AI) coupled with Internet of Things (IoT) for the enhancement of occupational health and safety in the construction industry
Kavitha Palaniappan, Chiang Liang Kok, Kenichi Kato, Singapore

Computational intelligence applied to business and services: A sustainable future for the marketplace with a service intelligence model
Mariana Alfaro Cendejas, Mexico

Promoting economic development and solving societal issues within connected industries ecosystems in Society 5.0
Elizabeth Koumpan, Anna Topol, USA

Knowledge discovery about cancer based on fuzzy predicates
Miguel Angel Quiroz Martinez, Christian Rene Vargas Alava, Monica Daniela Gomez Rios, Maikel Leyva, Ecuador

42	**Fashion and Apparel Design** Co-Chairs: Carla Morais and Theresa Lobo, Portugal/USA	HFATE

13:00-14:30 - AHFE 14

Fiber leading designs. How the typical features of woollen yarn can drive a collection of knitwear product in a real industry application
Giovanni Maria Conti, Martina Motta, Chiara Bianchi Maiocchi, Italy

The personal wardrobe during COVID-19
Carla Morais, Gianni Montagna, Portugal

A cultural mediation of meanings between consumer-goods, trends and the culturally constituted world
Theresa Lobo, William Afonso Cantu, Nelson P. Gomes, Portugal

Individual motivation to create can boost the apparel and textile company's culture and climate for innovation: A case study
João Barata, Rui Miguel, Portugal

Constructed images and the inner self: Reading identities in "The Queen's Gambit"
Carlos Manuel Figueiredo, Ana Rafaela Diogo, Portugal

Design of fashionable and functional tri-laminated wool fabrics for leisurewear considering comfort
Benilde Reis, Rui Miguel, Madalena Pereira, José Lucas, Claudia Sousa, Gilda Santos, João Carvalho, Fernando Moreira da Silva, Manuel Santos Silva, Portugal

Comfort of the 3D layered materials for self-grown fashion creation
Wen Wang, China

43	**Modeling and Monitoring Humans for Operational Task Performance** Co-Chairs: Angela Harrivel and Adrian Curtin, USA	CN
15:00–16:30 - AHFE 1	Investigating the modulation of spatio-temporal and oscillatory power dynamics by perceptible and non-perceptible rhythmic light stimulation Katharina Lingelbach, Isabel Schöllhorn, Alexander Dreyer, Frederik Diederichs, Michael Bui, Michael Weng, Jochem Rieger, Ina Petermann-Stock, Mathias Vukelić, Germany Autocomplete fNIRS: Bi-directional RNN approach for time-series signal recovery Adrian Curtin, Marjan Saadati, Lei Wang, Hasan Ayaz, USA Human monitoring as a migration path mechanism to support public confidence and operational resilience with urban air mobility reduced-crew operations Saeideh Samani, Richard Jessop, Angela Harrivel, USA Planned investigations to address acute central nervous system effects of space radiation exposure with human performance data Angela Harrivel, Steve Blattnig, Ryan Norman, Lisa Simonsen, USA Towards artificial social intelligence: Inherent features, individual differences, mental models, Theory of Mind Rhyse Bendell, Jessica Williams, Stephen Fiore, Florian Jentsch, USA Modeling crew performance degradation due to radiation exposure in space M. C. Dorbecker, USA	
44	**Augmenting Service Capabilities in the With/Post-Pandemic Era** Co-Chairs: Kazuyoshi Hidaka and Kentaro Watanabe, Japan	HSSE
15:00–16:30 - AHFE 2	Toward a model for improving service literacy via digital assistants Md Abul Kalam Siddike, Kazuyoshi Hidaka, Japan Differences in effect of endorsement of professional vs. Non-professional YouTuber through credibility and parasocial relationship Hisashi Masuda, Spring H. Han, Jungwoo Lee, Japan Digital transformation strategy of service systems for enhancing human experiences Takeshi Takenaka, Watanabe Kentaro, Miwa Hiroyasu, Sashima Akio, Japan Restaurant reservation system: Allocating customers with space management under the impact of Covid-19 Bingxin Du, Nariaki Nishino, Koji Kimita, Kohei Sasaki, Japan Empathy-based CE strategy to tackle complex challenges Hiromi Iida, Kensaku Ishibashi, Akino Inoue, Yuriko Sawatani, Japan	
45	**Design and Evaluation Research for Enhanced Product Usability and User Experience** Chair: Yuting Tong, China	ED
15:00–16:30 - AHFE 3	Effect of natural sounds masking on perception of noise in the kitchen environment Yuting Tong, Ruifo Zhang, Zheng Liu, Zhengyu Tan, China Neck muscles fatigue evaluation of VR glasses based on sEMG signals Xin Wang, Yumiao Chen, China Ergonomic design of dining robot for older adults Yuanjie Chen, Yumiao Chen, China Design of cognitive ability assessment method for the elderly when using intelligent kitchen products Yi Jin, Juanfang Xu, Zheng Liu, China Choice of behavior model in new retail: usability testing of intelligent shopping terminals functional framework Yuanfeng Li, Qun Wu, Yilin Zhang, China Function layout of adaptive aging population kitchen design based on trace observation Meilin Chen, Canqun He, Mengyao Wang, Yun Wang, China	

46	**Design Issues in Research** Co-Chairs: João Neves, José Silva and Daniel Raposo, Portugal	ED
15:00–16:30 - AHFE 4	A puzzling confrontation: Overall quality and usefulness of PhD design research vs master design research Rita Almendra, Portugal Mitigating the ephemeral character of design exhibitions Helena Barbosa, Vasco Branco, Portugal Design, meaning and intention: Communication in times of a pandemic Maria Luísa Costa, Joana Saes, Silvia Rala, Portugal Brand argument driven through art and schematics: Designing new perspectives to transform and empower the neighborhood Daniel Raposo, José Silva, Noemy Berbel, Maravillas Diaz, João Neves, Nuno Martins, Daniel Brandão, Portugal Design and communication for the territory: Promotion and enhancement of heritage based on tourist routes João Neves, Ricardo Jorge Nunes da Silva, Jose Silva, Daniel Raposo, Nuno Martins, Daniel Brandão, Portugal The book's relevance in the contemporary editorial practice João Brandão, Sofia Rodrigues, Portugal Research through co-design (RTC) and ergonomics Sofia Scataglini, Daniele Busciantella-Ricci, Belgium	
47	**Usability and User-Centered Design II** Co-Chairs: Yaru Li and Zhenzhen Ma, China	UUE
15:00–16:30 - AHFE 5	Interface color design of intelligent vehicle central console Fang You, Yaru Li, Preben Hansen, Liping Li, Mengting Fu, Yifan Yang, Xin Jin, Jianmin Wang, China Design of drinking water facilities in Shanghai Botanical Garden based on service design Zhenzhen Ma, Li Xu, China Product identity design of Yiwu general merchandise based on user experience Shanwei Zhang, Ye Junnan, Jingping Li, Lixia Hua, China Online shopping web sites' perceived usability: A case study with Turkish shopping related web sites Merve Demirci, Turkey Measurement of the attentional bias in children using eye tracking during a psychological test Andrea Argudo-Vásconez, Omar Alvarado, Cristian Calderon, Franklin Buele, Patricia Margarita Ortega Chasi, Martha Cobos, Ecuador The color semantics of compact car: A case study on Ford Focus Jiahao Wang, Yafeng Niu, Lang Xiao, Jin Liu, Guorui Ma, Hongrui Zuo, China How expert and novices perceive the photographic images composition: An eye-tracking study on composition Farbod Torabi, Sakol Teeravarunyou, Thailand Color matching method for foreground based on complex background image processing: Example of mobile phone interface Lanjing Li, Dongke Sun, China	

48	**Design for Inclusion in the Living Environment** Co-Chairs: Michela Benente and Elke Ielegems, Italy/Belgium	DI
15:00–16:30 - AHFE 6	Ergonomic considerations for the design of tactile guide paths for new urban changes and needs Kin Wai Michael Siu, Hong Kong Inclusive design for open spaces in dense older districts: A comparative study of Hong Kong and Guangzhou Jia Xin Xiao, Kin Wai Michael Siu, Ming Jun Luo, China The UDI³-framework: Unravelling a design context in which knowledge on Universal Design can be built Elke Ielegems, Jasmien Herssens, Jan Vanrie, Belgium Accessibility and usability standards of built environment design: Struggle toward agreement in the global context Satoshi Kose, Japan The Museum listens: A collaborative project on Torino archaeology collections Michela Benente, Valeria Minucciani, Filippo Masino, Italy Cultural perception of accessibility and the role of heritage: The Havelis in Shahjahanabad (Old Delhi) Valeria Minucciani, Michela Benente, Gianluca D'Agostino, Anuradha Chaturvedi, Italy	
49	**Human Factors on Security and Crises Management** Co-Chairs: Mário Simões-Marques and Justine Caylor, Portugal/USA	SYSI
15:00–16:30 - AHFE 7	Mental traps behind maritime disasters Pedro Água, Armindo Frias, Mario Simões-Marques, Portugal Preliminary evaluation of multi-criteria decision-making methodology for emergency management Justine Caylor, Robert Hammell, Adrienne Raglin, USA Linked open data supporting semantic integration and collaboration in disaster management cycle Anacleto Correia, Pedro Água, Mario Simões-Marques, Portugal Human factors impact in the security and safety of the maritime domain Mario Simões-Marques, Armindo Frias, Pedro Água, Portugal Virtual sensor robust to faults in the nuclear power plant accidents Jeonghun Choi, Seung jun Lee, South Korea	
50	**Computational Modeling Approaches in Politics and Economics** Chair: Zining Yang, USA	HFSIM
15:00–16:30 - AHFE 8	Assess electric vehicle adoption through an agent based approach Yi Ling Chang, Yuan Yuan Lee, Zining Yang, USA The impact of housing programs on unsheltered homeless population: An agent-based approach Dandan Kowarsch, Zining Yang, USA Opening borders: Peru's expected utility on Venezuelan's immigration; A social network analysis Jorge Guerra, USA Optimal strategy in international relations Dandan Kowarsch, Kelly Fang, USA Modeling and simulation of disaster medicine processes for resilience assessment of hospital BCPs Shunsuke Kadono, Taro Kanno, Chia-Hsin Cheng, Sheuwen Chuang, Japan PEV market dynamics: An ABM approach to model the relationship between demand for PEVs and charging station supply in Southern California Zining Yang, Ruiqian Li, USA	

51	**Human Factors and Assistive Technology I** Co-Chairs: Shoichiro Fujisawa and Yang Cai, Japan/USA	HFAT
15:00–16:30 - AHFE 9	**Visual guidance by blinking light of LED block for individuals affected with low vision** Shoichiro Fujisawa, Kenji Sakami, Tomoya Sakaguchi, Takatoshi Aoki, Masaki Okegawa, Jiro Morimoto, Jyunji Kawata, Yoshio Kaji, Mineo Higuchi, Shin-ichi Ito, Japan **Gait recognition from drone videos** Yang Cai, USA **Pedagogical interface agent for Kenyan sign language** Casam Njagi Nyaga, Ruth Diko Wario, Lizette De Wet, South Africa **Collision prediction and prevention in contact sports using RFID tags and haptic feedback** Moeen Mostafavi, Fateme Nikseresht, Jacob E. Resch, Laura Barnes, Mehdi Boukhechba, USA **Estimation of probe angles based on inertial measurement and human skill assessment** Kazuki Matsuo, Hiroyuki Nakamoto, Daigo Kosaka, Futoshi Kobayashi, Japan **Promoting social skills in technology-mediated communication contexts: First results on adopting the social compass curriculum** Miguel Carvalho, António Teixeira, Samuel Silva, Portugal **Developing quality assistive technology and better supports for breasts with the help of low-cost sensors** Lucia Regina, Jose Aguiomar Foggiatto, Brazil **A methodology to determine the efficacy of design variations in a wearable airbag using finite element analysis** Byung Cheol (Bruce) Lee, Krystal Garza, USA	
52	**Advanced Production Management and Process Control I** Co-Chairs: Salvador Avila and Magdalena K. Wyrwicka, Brazil/Poland	APMPC
15:00–16:30 - AHFE 10	**Improved sulfuric acid discharge through combined task and risk analysis** Jefferson dos Santos Mascarenhas, Igor Santos Araujo, Salvador Ávila Filho, Danillo Ramos Camargo, Leila Maria Aguilera Campos, Luiz Antônio Magalhães Pontes, Brazil **Operational reliability investigation of turbo-generator based on technological aspects and human factors** Igor Santos Araujo, Salvador Ávila Filho, Jefferson dos Santos Mascarenhas, Danillo Ramos Camargo, Brazil **Organizational risk in custom manufacturing of complex products** Anna Stasiuk-Piekarska, Magdalena K. Wyrwicka, Poland **Expanded polystyrene wall and conventional concrete wall sustainability issues in housing** Adegboyega Lateef Adewole, Rita Yi Man Li, Nigeria **Applying packing problems to optimize throughput time and human ergonomics in project shops** Thomas Henke, Jochen Deuse, Germany **Stability method for pit dimensioning obtained using the gradient boosting machine algorithm in underground mining** Hernan Camacho, Humberto Pehovaz, Carlos Raymundo, Peru **Impact of globalization on current practices in the supply chain management of SMEs** Ayodeji Dennis Adeitan, Clinton Aigbavboa, Oyindamola Cynthia Olubiyo, South Africa	

53	**Sustainability and Ecodesign** Chair: Daniel Raposo, Portugal	HDCS
15:00–16:30 - AHFE 11	Dryas as a model for lighting products design Liliana Soares, Ermanno Aparo, Rita Almendra, Fernando Moreira Da Silva, João Teixeira, Jorge Passos, Portugal Design, plastics and sustainability – methodological reflections Dilia Nunes, Joana Lessa, Portugal Fostering sustainability on campus: Design of an IoT-enabled smartbottle for plastic reduction in the academic environment João Mendes, Ana F. Curralo, Antonio Curado, Sergio I. Lopes, Portugal Fashion design education towards transition - circularity and biobased materials Gabriela Forman, Portugal Design and science for the valorisation of residues and by-products of the wine industry Elena Cioffi, Assunta Capece, Severina Pacifico, Mario Buono, Italy	
54	**Human Factors in Artificial Intelligence and Social Computing II** Co-Chairs: Alexander Streicher and David Coar, Germany/USA	AISC
15:00–16:30 - AHFE 12	Graph-based modeling for adaptive control in assistance systems Alexander Streicher, Rainer Schönbein, Stefan W. Pickl, Germany Is artificial intelligence digital? Vaclav Jirovsky, Vaclav Jirovsky, Czech Republic Interpreting pilot behavior using long short-term memory (LSTM) models Ben Barone, David Coar, James Allen, Jinhong Guo, Brad Galego, Ashley Shafer, USA The old moral dilemma of me or you Maria Colurcio, Ambra Altimari, Italy Teaching Brooks Law based on Fuzzy Cognitive Maps and Chatbots Miguel Angel Quiroz Martinez, Andres Fabian Arteaga Ramírez, Santiago Teodoro Castro Arias, Maikel Leyva, Ecuador Algorithm for the signal validation in the emergency situation using unsupervised learning methods Younhee Choi, Gyeongmin Yoon, Jonghyun Kim, South Korea	
55	**Explorations in Industrial Design Education** Co-Chairs: George Chow and Adam Feld, USA	IPID
15:00–16:30 - AHFE 13	Validation in a distance learning environment Adam Feld, USA Rapid idea development: Translating face-to-face interactions to virtual platforms Verena Paepcke-Hjeltness, USA Expressive design: An intersection of design and meaning. Paul Skaggs, USA Trash to treasure: An upcycling project case study George Chow, USA What if...? Strategies to teaching communication, empathy and teamworking for design students by design students Ana Paula Nazaré de Freitas, Rita Assoreira Almendra, Brazil Predicting inclusive futures: Wearables, automation, and design speculation Raja Schaar, Clint Zeagler, USA Investigation of scarcity: The cause and effect of homogeny in the industrial design workforce Betsy Barnhart, USA	

56	**Human Performance and Variability** Co-Chairs: Kin Wai Michael Siu and Patrick Seitzinger, China/Canada	HFAS
15:00–16:30 - AHFE 14	Promoting the social connectedness of the lost-only-child elderly in China Yunhe Du, Yu Hin Brian Lee, Kin Wai Michael Siu, China Factors affecting mobile game genre preference for chinese older adults in Hong Kong Wing Lam Yu, Tsun Hang Ho, Alan Chan, China The guardian slippers: Designing an IoT device to enhance safety for the elderly in the nursing home I-Hsin Chen, Chien-Hsu Chen, Taiwan Emotional design of dining processes for older adults Chenqi Zhang, Ting Han, Can Huang, Tasaki Seina, Xinran Chen, Xi Han, China Chatty Bot: An alternative to implement a memory training option for the upcoming older adults in Indonesia Elizabeth Wianto, Chien-Hsu Chen, Chia-Chen Chen, Chih-Lung Lin, Indonesia Service and design strategy of smart care products in pension agency under the background of active aging Wen Qing, Li Fangyu, China	
57	**Design Strategy, Design Method - Interdisciplinary Methods of Research and Design for Experience Design** Co-Chairs: Liang Fuxi and Tiantian Li, China	ED
17:00-18:30 - AHFE 1	What kind of quality do users prefer? A study of automobile interior quality based on loudness theory Liang Fuxi, Danhua Zhao, Fangzhou Gu, China Mood board tool on high-level semantics visual representation to favor creative design Tiantian Li, Danhua Zhao, China The trend of artificial intelligence aided industrial design Hao Xin, Danhua Zhao, China Design of kitchen appliances for aging population based on healthy diet Mengyao Wang, Canqun He, Meilin Chen, Yun Wang, China A conceptual framework of future home smart kitchen system with multiple experience modes Zhongliang Yang, Xinyu Zhang, Xingyu Liu, Jialu Tang, Hui Cao, China From present to future: Developing personas combining scenario thinking and LDA model Jingshu Jiang, Zhengyu Tan, China	
58	**Human Factors and Unmanned Aerial Vehicles** Co-Chairs: Oscar Bjurling and Serge Chaumette, Sweden/France	HFRDUS
17:00-18:30 - AHFE 2	Swarms, teams, or choirs? Metaphors in multi-UAV systems design Oscar Bjurling, Mattias Arvola, Tom Ziemke, Sweden Visual communication with UAS: Estimating parameters for gestural transmission of task descriptions Alexander Schelle, Peter Stütz, Germany Concept for cross-platform delegation of heterogeneous UAVs in a MUM-T environment Siegfried Maier, Axel Schulte, Germany A distributed mission-planning framework for shared UAV use in multi-operator MUM-T applications Gunar Roth, Axel Schulte, Germany Zsouav: The social open UAV to support information collection and collaboration in risky situations Serge Chaumette, David Auber, France	