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Ambient intelligence and ergonomics in Asia

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This special issue is based on selected papers from the 2nd international conference on ambient intelligence and Ergonomics in Asia held on January 21–23, 2015, in Taoyuan, Taiwan. The conference attracted a large number of scientific papers that contributed to the state-of-the-art in the fields of ambient intelligence and ergonomics. All of the papers selected for this special issue were extended from their original versions and underwent two or three rounds of rigorous peer-reviewed process. The accepted papers cover interesting works on the interaction between ambient intelligence and ergonomics.

Virtual environment (VE) technology for online shopping can provide a 3D perspective to customers for a more realistic sense of the goods and the shopping environment. Cheng-Li Liu and Shiaw-Tsyr Uang found that the elderly who browsed in a 3D virtual store with high-quality depth perception cues benefitted from binocular disparity within a 3D display and were able to experience a good sense of presence. Although the 3D displays provided a stereopsis environment, the cyber sickness side-effect from exposure in a VE can be serious when the depth perception cues are poor, especially within a stereoscopic display.

Rung-Ching Chen, Chia-Fen Hsieh and Wei-Lun Chang established an intrusion detection system, the patrol intrusion detection system (PIDS), to protect the confidentiality and integrity of sensor data. In the proposed methodology a fraction of the sensor nodes were used as roaming patrol nodes to detect malicious sensor nodes. A revised artificial bee colony (ABC) algorithm was designed to find a path with lower power consumption to transmit attack feature packets in the PIDS.

Estimating the cycle time for each job is a critical concern in managing a factory. To address this concern, classification approaches in which jobs are classified before or after forecasting their cycle times have recently been proposed. However, none of these approaches can guarantee the compatibility of the job classifier with the forecasting mechanism. To overcome this difficulty Toly Chen proposed a new classification approach, in which the forecasting mechanism training was embedded into the job classifier iterations. Consequently, the classification and forecasting stages interweaved with each other, improving their compatibility.

A. AL-Refaie, Toly Chen, R. Al-Athamneh and Hsin-Chieh Wu proposed a fuzzy neural network approach to optimize the performance of a process with multiple responses. In their method each quality characteristic was transformed into a signal-to-noise ratio, and all ratios were then provided as inputs to a fuzzy model to obtain a single comprehensive output measure (COM). The radial basis function neural networks were used to generate a full factorial design. The average COM values were then calculated for different factor levels, where for each factor, the level that maximizes the COM value was identified as the optimal level.

Mobile advertising researchers have suggested that the advertising effect is caused by the advertising features. Kuo-Wei Su, Po-Hsin Huang, Po-Hung Chen and Ya-Ting Li tried to identify what mobile application advertising formats users really liked and accepted. They found that

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rich media showed higher advertising effectiveness than the dynamic banner. Further, the playfulness interactive mode was better than user control and connectedness for advertising effectiveness.

Hsin-Chieh Wu, Min-Chi Chiu and Chia-Wei Peng used an ergonomic perspective to measure eyestrain occurrence time while watching different display types and stimulation scenarios. Notably, both display type and stimulation scenario have significant effects on the eyestrain occurrence time. They suggested that hand-held intelligent devices should intelligently remind users to rest according to the time spent viewing from the AMOLED (active matrix organic light emitting diode) or TFT-LCD (thin film transistor-liquid crystal display) screen, as well as while watching static text or dynamic images. Their findings can be applied to developing an ambient intelligent system that can intelligently remind the user to take a rest before visual fatigue occurs.

The growth of LED (light-emitting diodes) lighting applications has accelerated along with LED lighting efficiency and characteristics enhancements. Energy issue and policy formulation considerations are concerns among governments all over the world. Chien-Chun Lu, Chinmei Chou, Akira Yasukouchi, Tomoaki Kozaki and Cheng-Yi Liu compared the nighttime LED and current fluorescent light effects on human melatonin. They found that LED lighting will lead to lower melatonin and DLMO (delay of melatonin onset) interference than fluorescent lights.

Computer and video games have become the most popular leisure time activities for people in recent years. Si-Jing Chen, Yen-Yu Kang, Chih-Long Lin investigated the display type, play-rest schedule and game type effects on visual fatigue, heart rate and mental workload for both genders during 1 h Wii game playing. Their study results showed that better display quality (plasma display) and a more intensive game (boxing) increased players' motivation and visual sensitivity (CFF threshold increased). However, it also caused an increase in eye fatigue and physical as well as mental workload. Thus, it is necessary to adopt a frequent-break schedule while playing more intensive games such as boxing.

Chu Chai Henry Chan, Ying-Rown Hwang and Hsin-Chieh Wu proposed the PSO algorithm to cluster customers. They used a RFM model to find profitable, valuable customers and compute their lifetime values. Based on these lifetime values they applied the PSO algorithm to cluster customers. Further, they presented an empirical case study involving a retail automobile marketing campaign and found that the hybrid S-K-Means-PSO (SOM, K-Means and PSO) algorithms reached the best performance. Their study proposes effective marketing strategies for two segmented profitable and valuable customers.

The increasing development of intelligent lighting designs for better life quality calls for studies on thermal lighting environments. Chin-Mei Chou, Chien-Chun Lu, Ruyu Huang investigated the effects of five color indoor lighting temperatures and two office temperatures on workers' physiological, psychological response and work performance. They found that comfortable physiological responses in work and non-work conditions were observed with CCT5000 °K and CCT6500 °K at 30 °C and CCT4000 °K at 28 °C. This study contributes to well-planned ambient intelligent design settings for humans to improve work performance in ambient environments.

Hui-Cun Shen and Kun-Chieh Wang proposed a new Kansei manipulation procedure that combined an associative creativity thinking process with the fuzzy Kansei engineering to explore a new product form matching future customers' requirements. They also evaluated the procedure by designing a table horn. Their methodology can be used to design a new product prototype that matches customers' preference.