

Editorial

Selected Papers From 2019 IEEE Eurasia Conference on Biomedical Engineering, Healthcare and Sustainability (IEEE ECBIOS 2019)

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Abstract: The 2019 IEEE Eurasia Conference on Biomedical Engineering, Healthcare, and Sustainability (IEEE ECBIOS 2019) was held in Okinawa, Japan on 31 May–3 June 2019, and provided a unified communication platform for researchers in the fields of biomedical engineering, healthcare, and sustainability. Recently, healthcare has undergone a sector-wide transformation thanks to advances in computing, networking technologies, big data, and artificial intelligence. Healthcare is not only changing from being reactive and hospital-centered to preventive and personalized, but it is also changing from being disease focused to well-being centered. Healthcare systems, as well as fundamental medicine research, are becoming smarter and enabled in biomedical engineering. Furthermore, with cutting edge sensors and computer technologies, healthcare delivery could also yield better efficiency, higher quality, and lower cost. This Special Issue on “Selected Papers from the 2019 IEEE Eurasia Conference on Biomedical Engineering, Healthcare, and Sustainability (IEEE ECBIOS 2019)” is expected to select excellent papers that were presented in IEEE ECBIOS 2019 on the topic of sustainability. It will link several disciplines, including the environmental, cultural, economic, and social sustainability of human beings, which provide an advanced forum for studies related to sustainability and sustainable development. Our aim is to encourage scientists to publish their experimental and theoretical research relating to natural sciences, social sciences, and humanities in as much detail as possible in order to promote scientific predictions and impact assessments of global change and development.

Keywords: biomedical engineering; healthcare; sustainability

1. Introduction

The 2019 IEEE Eurasia Conference on Biomedical Engineering, Healthcare, and Sustainability (IEEE ECBIOS 2019) was held in Okinawa, Japan on 31 May–3 June 2019, and provided a unified communication platform for researchers in the fields of biomedical engineering, healthcare, and sustainability. Recently, healthcare has undergone a sector-wide transformation thanks to advances in computing, networking technologies, big data, and artificial intelligence. Healthcare is not only changing from being reactive and hospital-centered to preventive and personalized, but it is also changing from being disease focused to well-being centered. Healthcare systems, as well as fundamental medicine research, are becoming smarter and enabled in biomedical engineering. Furthermore, with cutting edge sensors and computer technologies, healthcare delivery could also yield better efficiency, higher quality, and lower cost. This Special Issue on “Selected Papers from the 2019 IEEE Eurasia

Conference on Biomedical Engineering, Healthcare, and Sustainability (IEEE ECBIOS 2019)" is expected to select excellent papers presented in IEEE ECBIOS 2019 on the topic of sustainability. It links several disciplines, including the environmental, cultural, economic, and social sustainability of human beings, which provide an advanced forum for studies related to sustainability and sustainable development. Our aim is to encourage scientists to publish their experimental and theoretical research relating to natural sciences, social sciences, and humanities in as much detail as possible in order to promote scientific predictions and impact assessments of global change and development.

2. The Topics of Biomedical Engineering, Healthcare on Sustainability

This special issue selected 12 excellent papers related to the topics of sustainability from 160 papers presented in IEEE ECBIOS 2019. The published papers are introduced as follows:

Wang et al. reported "Investigation and Analysis of Medication Disposal in Hospitals and Community Pharmacies in Taiwan" [1]. This research aimed to: (1) understand methods of disposal of unused medications, and public awareness of related issues, (2) understand the sources and types of unused medications and reasons for their disposal, and (3) propose improvements to current disposal practices. Data on practices and perspectives on the disposal of medications were collected from members of the public using a questionnaire, and subjected to chi-square analysis of demographic variables. The survey found that many respondents disposed of medications inappropriately, but most believed that the government should establish a return system. The majority of discarded medications came from hospitals, and were most frequently discarded because patients had forgotten to take them.

Liu et al. reported "The Application of Passive Radiative Cooling in Greenhouses" [2]. In this study, polyethylene (PE)-based formulations with a UV stabilizer and nonmetal oxide particles (NOP) were first granulated and then formed a monolayer film by co-injection molding. The experimental results showed that due to passive radiative cooling, under the environmental conditions of 35 °C, and only considering the natural convection heat transfer, the net cooling power of the greenhouse film developed was 28 W·m⁻² higher than that of the conventional PE film. The temperature inside the simulated greenhouse clad with the new greenhouse covering was on average 2.2 °C less than that of the greenhouse with the conventional PE film.

Hsueh et al. reported "Conceptualization and Development of a DFuzzy Model for Low-Carbon Ecocities" [3]. This paper proposed a Delphi and Fuzzy (DFuzzy) model in order to institute low-carbon ecocities. DFuzzy is a scientific decision-making model with multiple quantitative attributes and artificial intelligence. Twelve specialists from the Delphi experts were interviewed, including chief executive officers (CEOs) of industries, management committee members, and senior academics, all of whom had 15 years of experience in urban planning practice. After a three-round Delphi process with 17 criteria that were taken from the literature, four criteria of the DFuzzy model were recognized by experts: policy norms, resident cooperation, pollution prevention and control, and ecological reserves. The practical application of the DFuzzy model took three areas as examples: the Baiyun District and Conghua District of Guangzhou City, and the Dahu Community of Kaohsiung City. Through the experts' consensus in the two-round Delphi process, four criteria, as the input basis, demonstrated the objective quantitative calculation function of the DFuzzy model and also indicated that the model established in this study provided a reference for evaluating low-carbon ecocities.

Lee et al. reported "Extension of TAM by Perceived Interactivity to Understand Usage Behaviors on ACG Social Media Sites" [4]. This study formulated a concept model to investigate the prerequisite factors of users' "continuance use intention" on ACG social media sites. The snowballing method was used to recruit 367 participants who had experience in creating ACG works and using more than two ACG social media sites from the Japanese sub-cultural communities at a university in Northern Taiwan. The results of this study provided empirical evidence supporting perceived interactivity as a prerequisite factor for extending the technology acceptance model (TAM), perceiving interactivity, and supporting indicators such as continuance use intentions and the willingness to exchange information on ACG social media sites.

Gu et al. reported “Empirical Examination of Intention to Continue to Use Smart Home Services” [5]. This study aimed first to explore the relevant factors that affect the sustainable use of smart homes, and second, empirically analyze the hypothetical model by using structural equation modeling. The empirical analysis results were based on the sample data of 488 Chinese respondents with experience in smart home use. The results showed that the service quality and perceived usefulness of smart home services positively impacted users’ degree of satisfaction, and a higher degree of satisfaction, in turn, contributed to users’ formation of habits. Users’ desire to continuously use smart home services was influenced by perceived usefulness, degree of satisfaction, and habit; among them, habit was the key factor affecting users’ willingness. These findings have expanded our understanding of users’ desire to continuously use smart homes and provide theoretical support for the sustainable development of the smart home industry.

Tsao et al. reported “Development of a Reminiscence Therapy System for the Elderly Using the Integration of Virtual Reality and Augmented Reality” [6]. This study integrated virtual reality (VR) and augmented reality (AR) to construct a visualized reminiscence therapy system, which provides not only reminiscence entertainment but may also aid in dementia prevention for healthy and sub-healthy (a therapeutic working concept which defines an intermediate stage between health and disease) elderly people. Images taken by an LG 360 CAM were primarily introduced into Power Director 360 as the guide interface. The special effects were joined using After Effects. With the model constructed under 3ds Max, the reminiscence therapy system integrated by virtual reality and augmented reality was then established by the Unity engine. It was shown that the developed 3D ancient building model could be used by Samsung Note 5 smartphones as well as VR CASE glasses to increase the immersive experience for the elderly. The visualized reality system developed in this study can further promote the social interactional satisfaction of elderly people.

Lee et al. reported “Employees’ Perceptions of Training and Sustainability of Human Resource” [7]. This study explores employees’ perceptions of training and tries to identify what factors influence their perceptions. The results show that employees do not attach enough value to vocational training. Urban registration, higher education, and management positions correspond with higher valuation of training, but length of service has a negative effect on their valuation. The differences between urban households and rural households, the social distinction between basic education and vocational education paths, and the increase in frequency, time, and importance of the interactions between personal and work places may play an important role in these phenomena and have impacts on the sustainable development of human resources in China.

Lim et al. reported “Promoting the Sustainability of City Communities through ‘Voluntary Arts Activities’ at Regenerated Cultural Arts Spaces: A Focus on the Combination of the ‘Democratization of Culture’ and ‘Cultural Democracy’ Perspectives” [8]. This paper sought effective ways to create a ‘Third Place’ by drawing out the boundaries of arts activities, which could differ by conflicting perspectives of ‘Democratization of Culture’ and ‘Cultural Democracy’. In the case studies of France and Korea, case analysis was conducted using websites and official documents issued by each arts facility, and also visiting cultural arts facilities at first hand and interviewing the staff in charge. Especially in the case of ‘Le Centquatre-Paris’, this paper focused on the statistics of the annual reports published from 2008 to 2018 in order to examine if they had one-way communication in giving visitors cultural and artistic information—on the perspective of ‘Democratization of Culture’—or if they also promoted the sustainability of the local arts space by making visitors voluntarily create and participate in arts activities—which meant the upward perspective of ‘Cultural Democracy’.

Chen et al. reported “Sustainable Management of Coastal Wetlands in Taiwan: A Review for Invasion, Conservation, and Removal of Mangroves” [9]. This study explored the current implemented strategies pertaining to the invasion, conservation, and removal of mangroves for wetland sustainability. A total of 19 mangrove sites were sorted out to develop the main patterns and factors for the destruction or protection in estuaries on the western coast of Taiwan. For traditional wetland management, when faced with development pressure, having protected areas under certain laws is a good direction to

go in for mangrove sustainability. Furthermore, due to the invasion of mangroves in the mudflats, the Siangshan Wetland indicated mangrove removal could be a positive conservation case as an appropriate habitat rehabilitation strategy for benthic organisms. Under special conditions, mangrove removal provides useful insights into the sustainability of wetlands. These insights contribute to facilitating the worldwide move towards sustainable management on mangrove wetlands. The study also presents the following strategies to further reduce or remove mangroves in the coastal wetlands that contain no mangrove forests: (1) Conducting studies to evaluate the effectiveness of mangrove removal; (2) implementing policies to ensure positive influences on coastal wetlands, and (3) providing mangrove conservation education for sustainable development.

Harrison et al. reported “Sustainable Management of a Mountain Community Vulnerable to Geohazards: A Case Study of Maolin District, Taiwan” [10]. This study investigated community-based landslide mitigation planning. The combination of a landslide susceptibility index (LSI) model, landslide inventory datasets, and field work was used to identify hazard-prone areas in the Maolin District of Taiwan. Furthermore, to identify the challenges and opportunities affecting the sustainable development of mountain communities, a pilot survey was conducted in three such communities (Dona Village, Wanshan Village, and Maolin Village). The results revealed that there were two types of significant mass movement in such areas: debris avalanche and debris flow. The results also showed that the LSI map and multi-temporal landslide inventory datasets correlated with landslide locations. A meander was identified as an important factor in landslide activity. The questionnaire results showed that the residents of the study area lacked awareness of and access to information related to landslide activity. Similarly, the local residents favored increased environmental protection, working within their community, and additional government spending with regard to managing geohazards. To increase the resilience of the community, an improved landslide susceptibility map was proposed based on the output of the results. Thus, this research improved upon the process of identifying, supporting, and bettering the management of communities prone to landslides.

Hwang et al. reported “Spectral Deconvolution for Dimension Reduction and Differentiation of Seagrasses: Case Study of Gulf St. Vincent, South Australia” [11]. The objectives of this study were: (1) To determine distinct characteristics of spectral profiles for sand versus three temperate seagrasses (*Posidonia*, *Amphibolis*, and *Heterozostera*); (2) to evaluate the most efficient derivative analysis method of spectral reflectance profiles for determining benthic types; and to assess the influences of (3) site location and (4) the water column on spectral responses. The results showed that 566:689 and 566:600 bandwidth ratios were useful in separating seagrasses from sand and from detritus and algae, respectively; first-derivative reflectance spectra was generally the most efficient method, especially with deconvolution analyses further helping to reveal and isolate 11 key wavelength dimensions; and differences between sites and water column composition, which could include suspended particulate matter, both had no effect on endmembers. These findings helped develop a spectral reflectance library that could be used as an endmember reference for remote sensing, thereby providing continued monitoring, assessment, and management of seagrasses.

Lin reported “Improvement of Human Thermal Comfort by Optimizing the Airflow Induced by a Ceiling Fan” [12]. The purpose of this study was to investigate the relationship between the greenhouse effect and the overuse of electricity and energy under a sustainable environment. The goal was to investigate the airflow that was induced by ceiling fans, by measuring human body temperature. In the simulation model, the thermal plume phenomenon was observed in the indoor environment. By changing the ceiling fan parameters, the influence of the airflow was investigated by practical measurement of human body temperature. The indoor convective heat transfer was enhanced by installing a ceiling fan, which affected the whole body thermal sensation (WBTS). Different scenarios were reviewed by adjusting the fan speed in the simulation model, so that the distribution of human body temperature could be determined. By modeling the blade plane of the ceiling fan, the airflow characteristics could be determined by making the simulation model rotate in order to assess the thermal comfort characteristics. As the ceiling fan generated circulation within the domain, the thermal

comfort was significantly enhanced. By keeping a reasonable thermal comfort level, a higher room temperature or a higher heat load was allowed so that a sustainable environment could be maintained without affecting the indoor thermal comfort or the efficiency of energy usage.

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