International Journal of Technology (2014) 2: 98-99
ISSN 2086-9614

SUSTAINABLE TECHNOLOGY DEVELOPMENT IN PRODUCT AND SERVICE DESIGNS

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In 1987, the United Nations released the Brundtland Report, which included what is now one of the most widely recognized definitions: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". However, the needs of the present are vast and often conflicting. Today, technology plays a significant role in sustainable development in all of its aspects: social, environmental, and economic. By maintaining our way of life in a way that does not deplete our resources, we are ensuring that future generations will also be able to sustain themselves.

In accordance with the above, sustainable technology development is urgently needed in order to fulfill the increasing demand of product and service due to population and market growth. New methods and approaches to search for sustainable technological solutions in product and service designs are required to fulfill this demand. Delivering sustainability means finding ways to meet our needs by stimulating innovation processes, as a pivotal role, in sustainable technology development. Many papers published in IJTech strongly represent the use of sustainable technology in product and service designs. They show lessons learned on how technology application and development have been utilized to comply with the principles of social, economic, and ecology.

Sustainable Technology = Innovation and Added Value

During the process of developing innovative products or projects, the use of a method-based principle on an integrated product/project development is highly important. A holistic perspective to optimize system performance can lead to innovative, efficient and robust solutions. Beside tackling the technological challenges, development in policies and markets towards sustainable future of civilization are also required. This has implications for our decisions on how technologies might be designed, developed and utilized for increasing the quality of life. By considering natural resources scarcity and constraints into new technology development, the decisions will lead to more robust and better technology processes that produce more attractive products and services. A strong demand for value for money in products and services will thus create new markets that require technology development to meet the ecological criteria.

This season, we are pleased to present ten selected papers dedicated to sustainable technology development in product and service designs. With this theme, the issue discusses technology improvement and ways to find creative technology as a solution to tackle many problems faced by human beings and our mother nature. The papers containing of evaluation of problems and propose alternative solutions to define and drive our technology development by considering environmental, economic and social engineering that add values to technology breakthrough.

The first paper, written by A.W. Salami, A. A. Mohammed, Z. H. Abdulmalik, and O. K. Olanlokun highlights an analysis of hydro-meteorological variables to the Niger River and the Benue sub-basins in Nigeria. The authors argue that the significant outcome of the analysis in relation to Kainji sub-basin, where the major hydropower dams in Nigeria are situated, is that there is a tendency for a reduction in the stream flow to the reservoirs. These could be the result of an increase in temperature in the area, which could lead to an increase in evaporation and cause a reduction in runoff.

The next paper, written by G. Murali, A. S. Santhi, and G. M. Ganesh, presents an experimental investigation on impact-failure energy and strength reliability of fiber reinforced concrete (FRC) by using a simple drop weight test. Two different steel fibers were used as the reinforcing materials in various volume fractions with a water cement ratio of 0.42. The results indicated that the impact resistance was increased against the first visible crack and final failure; which means that the energy absorption capacity in the fibers containing concrete is increased.

Furthermore, the third paper, written by M. A. Kamaruddin, M. S. Yusoff, and H. A. Aziz, examines a method for preparing macro alginate beads through drop weight.

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Permalink/DOI: http://dx.doi.org/10.14716/ijtech.v5i2.407

The macro beads were prepared via different concentrations of alginate, dripping tip sizes and the beads were then immersed into a predetermined concentration of calcium chloride ($CaCl_2$) bath. The authors argued that the prediction model developed for the shape and size of macro alginate beads produced through the drop weight method could be employed for process optimization and to evaluate process limitations in the field of macro encapsulation.

The fourth paper, written by I. Kustiningsih, Slamet, and W. W. Purwanto, examines the synthesis of Titania nanotubes (TiO_2 NT) and Titania nanowires (TiO_2 NW) by combining sonication-hydrothermal treatment and their photocatalytic activity for hydrogen production. The photocatalytic activity of the prepared catalysts was evaluated for photocatalytic H_2 evolution from an aqueous methanol solution. The authors argued that the activity of the catalyst not only depended on the morphology of the catalysts, but also on the crystalinity and surface area.

The fifth paper, written by I. Hawachi, H. Sammouda, and R. Bennacer, investigates numerically the problem of melting of a phase-change material (PCM) containing paraffin and the effect of integration of the material to increase the thermal inertia. As a result, the numerical model to overcome the problem of meltingina rectangular enclosure fitted with heat sources in the presence of natural convection is proposed and the thermal transfer mode that manages the process of fusion is evaluated.

The sixth paper, written by A. Udhiarto, M. A. Tamam, R. Nuryadi, and D. Hartanto, proposes a design and simulation of two bits single-electron logic using Double Quantum Dot (DQD) single electron transistor. Electrons in a single electron transistor (SET) are transported one by one from source to drain based on the coulomb blockade mechanism. The design of a DQD SET to manipulate the presence of an electron in Quantum Dot (QD) as an implementation of a single-electron logic concept is offered.

The next paper, written by M. I. Shehzad, M. Awais, M. Amin, and Y. A. Shah, proposes an algorithm for face recognition using average half face template to reduce computational time and storage requirements. The proper detection and registration is performed before splitting the face into two halves and Principal Component Analysis (PCA) is used to compress the multi-dimensional data space and recognition. The authors argued that the half face recognition produced much better result and took less than 3 seconds to recognize a person's face.

The eighth paper, written by M. Silalahi, A. Dimyati, S. Harjanto, P. Untoro, and B. Suharno, presents the synthesis of Fe-Cr microalloy by ultrasonic irradiation at a frequency of 20 kHz. The ultrasonic irradiation resulted in the formation of both partial- (incomplete) and complete Fe-Cr microalloy. The authors claimed that ultrasonic treatment could further be endorsed and disseminated as a novel method for microalloying Fe-Cr powders.

The next paper, written by H. D. S. Budiono, G. Kiswanto, and T. P. Soemardi, proposes a manufacturing cost estimation model during early design phase related to the complexity of a machining process. The model was developed by correlating cost calculation with the complexity of a machining process based on product features. The authors argued that the model could be used to manage design changes quickly rather than modifying it at the manufacturing stage.

The last paper, written by P. Chatterjee, S. Mondal, and S. Chakraborty, proposes a comprehensive solution to automated inspection device selection problem using ELimination and Et Choice Translating REality (ELECTRE) methods. The authors concluded that by using different ELECTRE methods, a list of all the possible choices of suitable devices, from the best to the worst, is obtained while taking into account different selection attributes.

I hope that this new edition of IJTech conveys some new insights in the way we conduct our research. I am pleased to accept and respond to any comment and enquiry you may have on the direction and content of IJTech and I invite you to join us in this venture by sending your work for consideration.

With warmest regards from editorial desk,

Dr. Mohammed Ali Berawi
Editor-in-Chief