

Editorial

I. From the Editor

Capstone project is a significant component in Engineering/Technology programme curricula, and provides opportunities to both undergraduate and postgraduate students at universities to develop professional skills like problem solving, analysis, synthesis and evaluation. These projects provide a unique opportunity for students to work on own or with in groups on a chosen topic and to investigate, find, contribute to the engineering society. Even engineering professional accreditation bodies (like, IChemE, JBM, IET, IMechE, ABET, and ENAEE) of the UK, the USA, and in the Europe, scrutinize the student capstone projects with great emphasis on the development or demonstration of professional maturity; mastery of engineering knowledge/tools; and effective presentation and communication skills.

This Volume 40 Number 2 contributes to a Special Issue on “Capstone Projects of Engineering and Associated Disciplines in the Caribbean”. The prime objective of this issue is to publish original research, works and empirical results arising from student capstone projects and experiences from the extended areas. In total, eight (8) research/technical articles are edited for this issue.

This issue also includes an announcement and a Call for Papers for the Fourth Industrial Engineering and Management Conference 2018 (IEM4-2018) that is to be hosted at the Faculty of Engineering, The University of the West Indies on 7th-8th December 2018. With the theme on “Striving for business/engineering performance excellence with quality management and IEM practices” the Conference IEM4-2018 invites papers for presentation, and suggested topics of interests fall into two groups of 1) Traditional Industrial Engineering areas and 2) with Quality Management (QM) focus. For Enquiries and Registration, contact Prof. Kit Fai Pun and Dr. Cilla T. Benjamin, c/o Faculty of Engineering, UWI, St Augustine Campus, Trinidad and Tobago, e-mails: KitFai.Pun@sta.uwi.edu; Cilla.Benjamin@sta.uwi.edu

II. About This Issue

The relevance and usefulness of the eight (8) research/technical articles are summarised below.

B.V. Chowdary, M-A. Richards, and T. Gokool, “Virtual Conceptual Design of a Multi-Purpose Fixture for a CNC Milling Machine Using Controlled Convergence Technique”, present an integrated approach to designing a multi-purpose, cost-effective fixture to perform several milling operations in the computer numerical control (CNC) environment. Pugh’s Controlled Convergence (CC) technique was used to generate

alternative designs. The authors claimed that the most feasible alternative was modelled using Virtual Engineering (VE) principles which can allow it to be further analysed for downstream operations. The results indicate that the proposed CC and VE principles were applied effectively to design a multipurpose milling machine fixture.

In their article, “A Controlled Environment Agriculture Greenhouse for the Caribbean Region”, **M. Suraj, E.I. Ekwue, and R.A. Birch** examine the effect of temperature and humidity variations on a prototype Controlled Environment Agriculture (CEA) greenhouse that was designed to suit the climatic conditions of Trinidad and Tobago. It was found that the CEA greenhouse had significantly higher growth rates in all plant growth parameters (about two and a half times on the average) than the non-controlled greenhouse. The combination of blue LED light, evaporative cooling, and air circulation fans coupled with natural ventilation resulted in a significant increase in plant growth rates in the CEA greenhouse compared to the greenhouse with only natural ventilation as the weather control measure.

K. Narinesingh, S. Bahadoorsingh, and C. Sharma, “The Development of a Portable Electrical Engineering Educational Outreach Toolkit”, explore the use of a portable educational toolkit incorporating electrical engineering theory and principles as required by the primary and secondary school curricula in Trinidad and Tobago. The toolkit contains 1) a Van De Graff Generator, 2) Tesla Coil, 3) Joule Thief and 4) a Combinatorial Logic Designer Board. Results from live demonstrations to selected schools showed that majority of students (90%) indicated that the use of the toolkit could increase their interests in studying science. Some 95% of students indicated that the toolkit made learning science more fun and motivational.

In the fourth article, “The Role of Engineering in the Design of Kings of Carnival Costumes in Trinidad and Tobago”, **U. Persad et al.**, share findings from an interview study with costume designers on 1) identifying the design process used, 2) determining the factors that influence the design of the costumes, 3) examining the extent to which Engineering principles be utilised, and 4) recommending strategies for improving the design process. Results indicated that engineering input was not utilised in the costume design process and material selection was based on tradition, availability and cost.

R. Latchmepersad and T. Ragoobar-Prescod, “Performance Measurement of Broadband Connections: An Enhanced Tool”, discuss the development of enhanced algorithms and, correspondingly, a software application for the performance measurement of broadband Internet connections. The enhanced tool, TINQA (Totally

Integrated Network Quality Application), is a native Windows® application, developed using the C# programming language and the .NET framework, and measures speed, latency, jitter and packet loss. TINQA produced results similar to those obtained from some of the most popular existent performance testing tools, including speedtest.net, testmy.net and pingtest.net. It was claimed that the algorithms were robust and that the added flexibility in testing did not compromise the accuracy of the tests in the application.

In their article, “Customising a Project Management Framework at a Trinidad-based Paper Manufacturer: A Case Study”, **V. Ragbir and K. F. Pun** review a strategic realignment exercise which was done to determine the root causes of project failures, and to tailor-make a project management (PM) framework to govern process improvement projects at Paper Products Limited (PPL). In order to quantify historical project performance and determine the reasons for historical project failure at PPL, a four-phase study was initiated. Phase-1 involved the analysis of projects undertaken from 2012 to 2015 on the cost, schedule and scope variances. Phase-2 determined the root cause of project failures, Phase-3 comprised the development of a PM framework and the final phase involved testing the efficacy of the framework using selected projects at PPL. This case study demonstrated an initiative in fostering PM practices and performance in business.

D. Mohammed et al., “A Lighting Audit of The University of The West Indies St Augustine Campus”, document the methodologies and the results of an audit conducted on the St. Augustine campus of The University of The West Indies at night. Inadequate lighting can make the school environment unsafe. The audit was performed to determine the adequacy of the campus lighting. Areas audited were identified via a survey distributed to students of the campus. The illuminance levels were measured at these locations and compared to applicable standards of the Illuminating Engineering Society. The results confirmed that none of the areas evaluated satisfied the lighting levels detailed in the standards. Recommendations and implementation plans accompanied by cost-benefit analyses were developed for each area ensuring the standards are satisfied.

Z. Blackwood and G.S. King, “Vertical Take-off Unmanned Aerial Vehicle with Forward Flight Transition”, present the findings from a capstone project that was to design a drone capable of functioning as vertical take-off Unmanned Aerial Vehicle (UAV) with a conversion to horizontal flight. It could serve as a stable controlled flight using a simulator based iterative design process. The vehicle was intended to work in an

environment where tedious or boring jobs could be automated. The vehicle design concepts were created through research, benchmarking, design metrics, and virtual flight testing. Both the simulation model and demonstration vehicle adhered to the aim and goals of the project.

On behalf of the Editorial Office, we gratefully acknowledge all authors who have made this special issue possible with their research work. We greatly appreciate the voluntary contributions and unfailing support that our reviewers give to the Journal.

Our reviewer panel is composed of academia, scientists, and practising engineers and professionals from industry and other organisations as listed below:

- **Professor Adel Al Taweel**, Dalhousie University, Nova Scotia
- **Dr. Brian Aufderheide**, Hampton University, USA
- **Dr. Cilla T. Benjamin**, University of the West Indies (UWI), Trinidad & Tobago (T&T)
- **Professor Edwin I. Ekwue**, UWI, T&T
- **Dr. John Schormans**, Queen Mary University of London, UK
- **Professor Joseph K. Ssegawa**; University of Botswana, Gaborone
- **Professor Kit Fai Pun**, UWI, T&T
- **Ms. Man Yin Rebecca Yiu**, UWI, T&T
- **Ms. Marcia Nathai-Balkissoon**, UWI, T&T
- **Professor Nathalie Drouin**; Université du Québec à Montréal, Canada
- **Professor Peter Hogarth**, Bournemouth University, UK
- **Dr. Ruel Ellis**, UWI, T&T
- **Professor Sreekala G. Bajwa**, North Dakota State University, Fargo, USA
- **Dr. Sulaiman Abdulkareem**, University of Ilorin, Nigeria

The views expressed in articles are those of the authors to whom they are credited. This does not necessarily reflect the opinions or policy of the Journal.

KIT FAI PUN, *Editor-in-Chief*
Faculty of Engineering,
The University of the West Indies,
St Augustine, Trinidad and Tobago
West Indies
February 2018