

Editorial

About This Issue

This Volume 42 Number 2 includes ten (10) research/technical articles. The relevance and usefulness of respective articles are summarised below.

S. Wilson, C.S. Maharaj, and R. Maharaj, “Formalising the National Innovation System in a Developing Country”, employed system dynamics to examine the policy initiative and contributed to the formalising a NIS for small developing countries that operate largely in low-technology sectors. A case study approach was adopted, detailing the steps for formalising a NIS in a developing country, the Republic of Trinidad and Tobago (T&T). It was advocated that the design of the system must account for three key elements: namely, the actors, the interactions among the actors and the intended innovation output.

In the article, “A Case Study for Improving Maintenance Planning of Centrifugal Pumps Using CBM”, **C.S. Syan et al.**, investigated the adoption of CBM approach for CP maintenance as compared to the current practices of a leading offshore company in Trinidad and Tobago (T&T). A test programme was simulated, and vibration data for the CPs was utilised to develop the P-F curve for pump failure as a result of faulty bearings. The tests demonstrated the possibility for improved fault classification and data driven maintenance planning with a CBM best practice approach. Future work will investigate the ability of enhanced Artificial Intelligent (AI) techniques to improve the classification accuracies in the face of more complex operational conditions.

S. Al-Zubaidy, A. Ordys, and E.D. Coyle, “Analysis and Development of Innovative Engineering Programmes”, focused on the level of interaction between engineering disciplines, meeting requirements for professional accreditation and meeting requirements for the skilled work-force in the place of implementation. In line with the standards of the UK Engineering Council, the design of curricula had to encompass a number of elements, and demonstrate that they are safeguarding the quality requirements of the professional engineering institutions. In this paper, some metrics are proposed, based on fuzzy logic approach to establish membership functions for measuring interaction between the programmes, and the emphasis of the programmes on particular aspects of engineering learning outcomes.

R. Koon Koon et al., “A Review of Caribbean Geothermal Energy Resource Potential”, presented quantitative findings as to the potential power production, economic and environmental savings through which geothermal energy development can bring to each respective nation in the Caribbean. An estimated 184.49 MW of geothermal capacity can be absorbed into the national energy mix, displacing 855,600 barrels of oil (bbls) importation, resulting in approximately 1.1 million

tonnes of carbon dioxide (tCO₂) emissions being avoided per year. In this paper, an inter-island grid connection approach is presented to tackle large-scale energy projects to attract financial investors in an effort to combat the upfront challenges associated with geothermal energy development.

In the fifth article, “An Analysis of the Use of Hydraulic Jet Pumps, Progressive Cavity Pumps and Gas Lift as Suitable Artificial Lift Methods for Heavy Oil Production in East Soldado Reservoirs, Offshore the Southwest Coast of Trinidad”, **R. Hosein and A.S. Balgobin**, developed models for the currently installed gas lift and PCP configurations and then optimised to determine the best oil lifting capabilities for these two systems. A lift score analysis between PCP pumps and hydraulic jet pumps was also conducted by comparing lifting potential, installation cost and time, rig vs. non-rig intervention for the installation; and ease of operation and optimisation. The results from this analysis indicate that using hydraulic jet pumps would be a more cost-effective oil lift system compared to PCP pumps. This lift score can also be used as a guide to effectively optimise artificial lift systems for other oil wells from the field.

O. Falloon, S. Mujaffar, and D. Minott, “Physicochemical and Functional Properties of Starch from Ackee (*Blighia sapida*) Seeds”, investigated the physicochemical and functional properties of isolated ackee seed starch. Solubility, swelling power, water absorption, oil absorption and extent of syneresis of the starch were measured and hypoglycin content was determined by reversed phase HPLC. Pasting, thermal properties, crystalline pattern, granule morphology and gel texture were determined, and the gelatinised starch used to prepare retrograded resistant starch. Ackee starch had a high setback, high syneresis, produced opaque pastes and formed a hard gel texture. Based on the properties, the starch may be suitable in manufacturing of noodles and to produce retrograded resistant starch and may have applications in fat replacers, dusting/face powders and bioplastics.

J. Persad and S. Rocke, “Investigating the Impact of Deformation on a 3D-printed Antenna in Biomedical Systems”, investigated the Radio frequency (RF) characteristics of a flexible Planar Inverted-F Antenna (PIFA) antenna intended for biomedical applications. Using a traditional PIFA antenna structure on a Nylon substrate, simulations facilitated investigation of the impact of the mechanical deformations on antenna performance, through consideration of the impact of flexibility on the reflection coefficient, transmission frequency and radiation patterns between 700MHz and 4GHz. Results demonstrated good stability on the antennas resonant frequency and physical resilience. This provides valuable insights for those interested in deploying flexible antenna structures for wearable antenna

and RF sensor applications

In the eighth article, “Driver Gap Acceptance Behaviour at Roundabouts in Trinidad and Tobago”, **K.L. Campbell** and **T.A. Townsend**, investigated the gap acceptance behaviour of motorists to determine the critical gap in Trinidad and Tobago (T&T). The estimated critical gaps were compared with values commonly used in the Highway Capacity Manual (HCM), so as to determine the effect on estimated intersection capacity. The results indicated that the critical gap values would differ significantly from the United States (US) default values (as one of the standards adopted by T&T), which therefore would affect the estimated capacity of the roundabouts. It was argued that the published values from the HCM were significantly higher than the values obtained, indicating that the estimated capacities using the default US values would underestimate the existing capacities in T&T.

S. Mujaffar and **S. Bynoe**, “Microwave Drying of West Indian Bay Leaf (*Pimenta racemosa*)”, investigated the effect of microwave power (200, 500, 700 and 1000W) on the drying behaviour of West Indian Bay leaf. The results show the clear potential for microwave drying as a rapid drying method of drying bay leaves. Microwave power level had a significant impact on the drying rates and quality of dried samples. An increase in power level resulted in increased drying rates, with browning and the risk of scorching increasing at 1000W power. Drying at 200W power level was unfavourable in terms of low drying rates and leaf quality. The drying data was successfully analysed through the determination of drying rate constants (k) and moisture diffusivity values (D_{eff}), and the Verma and Jena and Das models best fit the data for leaves dried at 500W and 700W, respectively.

F. Muddeen, “Electrical Engineering and the New SI Definitions”, reviewed the new definitions of Systeme International des Unites or SI system. These new definitions marked a substantial change from the previous ones and would have a considerable impact on the realisation of the various units and in particular the kilogram. Seven of these units directly relate to the units of measure used in Electrical Engineering. In this paper, the author examined how the fundamental units of electrical engineering be realised from the definitions, and also looked into the impact of these changes on the uncertainty of measurement of electrical units and discussed the role of the new Volt, Ohm and Ampere in the realisation of the new kilogram.

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:

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