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Special Issue in System Design & Instrumentation

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Abstract: This special issue Special Issue in System Design & Instrumentation publishes eight articles. A study of the first article aims to develop sensors for the detection of chemical solvents. The second article discusses that carbon steel components can be used to predict the lifespan of the material. The third article is about aquaponics method of combining aquaculture and hydroponics that have been used in the production of catfish and water spinach. The fourth discusses the concept of support domains on the analysis of the Radial Point Interpolation Method that is presented in a step-by-step manner. The fifth article reported a DC-DC power converter for high gain may be used to link low voltage components like solar panels, fuel cells and batteries to the 400 V voltage bus. The sixth article has been carried out to develop a baseline energy model for the measurement and verification of the performance of the International Performance of Measurement & Verification Protocol (IPMVP). The seventh article highlighted radiators are cooling devices that keep engines from overheating in automobiles. The last article reported that IR LED transmitter can produce radiant energy which consists of peak wavelength λp = 940 nm and the IR LED receiver received the wavelength produced by the IR LED transmitter with the same amount of energy.

Editorial

The first article was written by Izyani Mat Rusni and Sasichandran a/l Rabichandran entitled Development of Interdigitated Electrodes for Cooking Oil Detection using AD5933 Impedance Analyzer. The operation of Interdigitated Electrode is based on the dielectric sensing method, where these sensors is used to measure the changes of impedance due to changes in the dielectric value of the material. Interdigitated Electrode works based on the capacitive sensing method. All the results are recorded in.csv file on a laptop based on data collected through AD5933 impedance analyzer. The frequency ranges from 1 KHz to 100 Khz is considered suitable to measure the presence of oil. The detection mechanism for these IDEs was based on measuring the changes in capacitance or impedance when biomolecular binding occurs. The determination of food authenticity and detection of adulteration between halal and haram ingredients are major concerns to consumers.

The second article is an article that looks at the capacity of the Magnetic Memory to detect the stress concentration zone during crack site identification in SAE1045 carbon steel specimens was established in this investigation by Hanita Hashim, Hafizan Hashim, Yati Ashikin Abd Wahab, Siti Hawa Mohd Yusoff, and Krudharshaini Nagapan. The article entitled Statistical Identification of Fatigue Life using Metal Magnetic Memory Technique. Fatigue damage is a mechanical failure when mechanical structures are subjected to constant stresses over long periods. The MMM signals were collected from the damaged materials subjected to the bending test. The state of the material can be determined by using the kurtosis model to predict the specimen lifespan. The capacity of the Magnetic Memory to detect the stress concentration zone during crack site identification in SAE1045 carbon steel specimens was established in this investigation.

The third article entitled In-Situ Nutrient Removal from Clarias Gariepinus Hatchery by Vegetable on Floating Bed Coupled With Attached Growth Media was written by Hazmin M. and Erin Marissa Ramlan. They summarized that it is worth noting that the values obtained for the nitrite standard proposed by the Ornamental Aquatic Trade Association. Aquaponic systems are recirculating aquaculture systems that include plant production without soil. Aquaponic fish require good water quality conditions, which means that parameters such as dissolved oxygen, carbon dioxide, ammonia, nitrate, nitrite, and pH must be within acceptable limits. The levels of dissolved oxygen and nitrogen waste in the system may have an impact on fish performance.

The fourth article discusses the concept of support domains on the analysis of the Radial Point Interpolation Method that is presented in a step-by-step manner. The article entitled Effect of Support Domain on Radial Point Interpolation Method (RPIM) for Displacement Analysis in 2D Problem was written by Mokhtazul Haizad Mokhtaram and Mohamed Elmi Abdi. RPIM method is constructed based on a Galerkin formulation with the adoption of Radial Basis Function to produce the shape functions. The use of the support domain has reduced differences in the location of the nodes and in turn, has managed to provide good results. We show the procedure in a step-by-step manner on the formulations of RPIM with support domain for two-dimensional plane stress problems. The choice of size for support domain depends on the number of nodes.

The fifth article entitled An Analysis of Interleaved High Gain DC-DC Converter with Voltage Multiplier. A DC-DC power converter for high gain may be used to link low voltage components like solar panels, fuel cells and batteries to the 400 V voltage bus. Mohamed Ibrahim and Rohaizah Ghazali reported that high voltage gain DC-DC converter based on the modified Dickson charge pump voltage multiplier circuit. This converter is capable of stepping up voltages as low as 20 V to 400 V. It can draw power from a single source as well as from two independent sources while offering continuous input current. Distribution systems at 400 V DC offer better efficiency, higher reliability at an improved power quality, and low cost compared to AC distribution systems. Telecommunication centres, data centres, commercial buildings, residential buildings, and microgrids are among the emerging examples.

The sixth article entitled Baseline Energy Model Development Using Artificial Neural Network: Small Dataset Approach. Farah Amira Zulfikri and Wan Nazirah Wan Md Adnan reported in this special issue that Malaysia is one of the developing countries in Southeast Asia. It is found that the baseline energy model using Artificial Neural Network with resampling technique with combination of 7 neurons in hidden layer is the best energy model. The number of populations in Malaysia grew from 31,633,500 to 32,022,600 from year 2016 to 2017. This study emphases on development of baseline energy model for IPMVP Option C whole facility energy use.

The seventh article reported that IR LED transmits the radiant energy to the infrared receiver until a specific time for each distance. The voltage efficiency is getting lower as the distance and degree angle are higher. We can conclude that the wireless power transmission is higher when the distance is nearer at 0 angle. Each IR LED transmitter light that has been chosen is in the same size which was 5 mm. Ibtisam Ismail, Sasni Ismail, Juwairiyyah Abdul Rahman1 Taufik Ridzuan reported that the IR LED transmitter can produce radiant energy which consists of peak wavelength $\lambda p = 940$ nm and the IR LED receiver received the wavelength produced by the IR LED transmitter with the same amount of energy.

The eigth article or last article entitled Structural Analysis on Several Modified Radiator Fin Designs using Computer Aided Engineering (CAE) studied CATIA V5R18 software by Muhamad Amir Bukhari Bin Bakhtiar and Siti Marhamah Binti Rosman. They reported radiators are cooling devices that keep engines from overheating in automobiles. Radiators are commonly place at the frontal part of the engine in automobile. They are subjected to various types of loads while the car moves. The loads are lifting, braking, and bumping. Design 1 has the lowest maximum Von Mises stress which is 4.06 Max Principal Stress during lifting load and 4.58 MPa during bumping load. This is because the design of fin for Design 1 has increased thickness of fin as compared to other designs.