

Welcome to the Journal of Electrical and Computer Engineering Innovations (JECEI)

JECEI is devoted to the research in different disciplines of Electrical Engineering such as Communications, Control, Electronics, and Electrical (Power), Computer Engineering and Computer Science. The editors would like to welcome you to the Eleventh issue (Vol. 6, No. 1), that contains twelve papers focusing on research works in Field Calibration of Triaxial Gyroscope, CIGS Thin Film Solar Cell, Text Coherence Evaluation, Compact Low Pass Filter, Cost of Software, Switched Reluctance Motor, Double Junction InGaN/CIGS Solar Cell, Software Quality Models, Linear Induction Motor, Discrete-time Sliding Mode Controller, FACTS-POD Design, and Cryptanalysis of R2AP for RFID.

The first article entitled "A Simple and Fast Method for Field Calibration of Triaxial Gyroscope by Using Accelerometer," by S. Ranjbaran et al., deals with a simple and fast method called improved least squares to find calibration coefficients of an accelerometer including bias, scale factor, and non-orthogonality. As a principal, the magnitude of acceleration measured by the accelerometer in the static condition is equal to the magnitude of the gravity vector. In gyroscope field calibration, the sensor is rotated manually around all three axes separately and then it is put in the static mode. Calibration coefficients including bias and scale factor are obtained using the least squares method. Simulation results show about a 40% increase on the accuracy of the gyroscope.

The article "Improvement the Efficiency of CIGS Thin Film Solar Cells by Changing the Doping of the Absorbent Layer and Adding the InAsP Layer," by H. Firoozi and M. Imaniedh, investigates the functionality of solar cells structure based on $\text{CuIn}_{1-x}\text{Ga}_x\text{Se}_2$. The CIGS thin film solar cell is simulated using SILVACO software. The absorbent layer doping was originally changed and later doping was kept constant and also P-type layer of InAsP was added. Their effect on the cell function was observed and examined. It is shown that after doping, some parameters of the solar cell are improved whilst some others are decreased. Also, it is concluded that examined an increase or decrease in the amount of dopant would reduce the efficiencies of the solar cell. Adding the InAsP layer leads to jointly increase the open circuit voltage, short circuit current and the solar cell power which gives about 33.2% efficiency.

In the third article, entitled "A New Model for Text Coherence Evaluation Using Statistical Characteristics," M. Abdollahi and M. Zahedi propose a method that focuses on both local and global coherence, which can assess the local topic integrity of text at the paragraph level regardless of word meaning and handcrafted rules. The global coherence in the proposed method is evaluated by sequence paragraph dependency. According to the derived results in word embeddings by applying statistical approaches, the presented method incorporates the external word correlation knowledge into short and long stories to assess both local and global coherence, simultaneously. Using the effect of combined word2vec vectors and most likely n-grams, it is shown that the proposed method is independent of the language and its semantic concepts.

The fourth article "Compact Low Pass Filter Using Sharp Roll-off Ultra-Wide Stopband T-shaped Resonator," by F. Yousefi et al., focuses on the design and fabrication of an ultra-wide stopband microstrip low pass filter with sharp roll-off and compact size, which its -3dB cut off frequency is 3.1GHz, the insertion loss is lower than 0.12dB and the return loss is greater than 15dB. In order to achieve a -20dB attenuation level in the stopband, a modified L-shaped structure is utilized. This filter has an ultra-wide stopband that is expanded from 3.37GHz to

37.5GHz and the suppression level is greater than -20dB. The fabricated filter has a size of about $16.6 \times 13.5 \text{ mm}^2$.

In the fifth article, entitled "A Method for Estimating the Cost of Software Using Principle Components Analysis and Data Mining," A. Saberi and R. Tavoli present classifying techniques of learning algorithm of machine and COCOMO model for software costs and the analysis method of principal component approach. In addition, this investigation presents a method to improve the performance of software cost estimation and decrease the basic data set. Finally, it is shown that the algorithms of several classifications can be assessed by applying this method.

The sixth article, "A Switched Reluctance Motor with Lower Temperature Rise and Acoustic Noise," by P. Vahedi and B. Ganji, introduces a shape design method for switched reluctance motors by which both heat transfer and acoustic noise are improved. For evaluation of the proposed shape design method, a simulation model based on the finite element method is also developed to predict both the temperature rise within the machine and the produced noise. The simulation model is created using ANSYS finite element package. The convection heat transfer coefficients are determined in the developed thermal model based on an iterative algorithm. The proposed shape design method is applied to a typical 8/6 motor and simulation results including temperature distribution in various sections of the machine, displacement of stator and sound pressure level are presented.

In the seventh article entitled "A Numerical Optimization of an Efficient Double Junction InGaN/CIGS Solar Cell," M. Feli and F. Parandin use a thin CdS top cover layer as the anti-reflector layer. To reach the current matching condition and changing the thickness of this CdS layer, the short-circuit currents of both the top and bottom cells are enhanced. To gain the desired efficiency, different design parameters, such as the doping concentrations and the thicknesses of the various layers of the cell are optimized. Considering the proposed structure and the simulation results, efficiency of 41.87% is achieved whereas the obtained fill factor is equal to 75.16%.

Eighth paper, "Software Quality Models: A Comprehensive Review and Analysis," by H. Rashidi and M. Sadeghzadeh Hemayati, reviews nineteen quality models and classifies them from three different perspectives, including structural, behavioral, and basic and derived aspects. The main aim of the investigation is to specify and extract the more comprehensive set of quality factors to evaluate software quality. Moreover, this paper compares the different quality models and analyzes the factors to draw the necessary aspects in comprehensive quality models. These factors are in different aspects such as the measurement time in different development phases, product as well as process-related quality factors, a set of quality metrics measurable on the different type of artifacts such as document, model and source code, and finally a specific mechanism to apply dynamic weights to quality factors to determine their impacts on final quality of a product based on its application domain.

In the next article, entitled "Analysis of a Linear Induction Motor with Solid Iron Secondary," by S. E. Abdollahi and M. Mirzaei, a new two-dimensional analytical method is presented in order to predict developed thrust force of a single-sided linear induction motor with a solid iron secondary. In the proposed method, the skin and saturation effects of the induced eddy currents in the solid iron of the secondary are considered. Results confirm the accuracy of the proposed analytical and finite element methods for the analysis and design of linear induction motors with solid iron secondary.

The tenth research work, entitled "Design of a Discrete-time Sliding Mode Controller for Nonlinear Affine Systems based on Disturbance Estimation," by N. Azam Baleghi and M. H. Shafiei, deals with the design of a sliding mode controller based on the disturbance estimation for a class of discrete-time nonlinear affine systems. Based on two disturbance compensator schemes, static and dynamic, procedures of sliding mode controller design are proposed for the discrete-time system. In two proposed control laws, there is no switching expression to induce the problem of chattering. Moreover, based on the necessary and sufficient quasi-sliding mode condition proposed by Sarpturk, boundedness and robustness of the proposed controllers are evaluated. In the case of constant or slowly time-varying disturbances, the quasi-sliding mode band converges asymptotically to zero and in this case, the proposed method is converted to the ideal sliding mode. Finally, two examples are provided to verify the proposed control laws.

In the eleventh paper, entitled "A Novel Method of FACTS-POD Design to More Enhancement of Inter-Area Mode Damping in a Multi-machine Power System," by B. Ehsan Maleki and H. Beiranvand, a non-typical design method of flexible AC transmission systems power oscillation damping (FACTS-POD) controller is proposed, which increase the efficiency of these devices. In this investigation, the graduated modal decomposition control is utilized as a specific strategy for POD controller design. Moreover, the nonlinear dynamic model of the multi-machine power system is developed and it is linearized around the operating point to design the controllers. As a verification, the time-domain simulations on a 10-machine power system emphasize the analysis of dynamic results and their information under the considered conditions.

Finally, the twelfth paper entitled "Cryptanalysis of R²AP, an Ultralightweight Authentication Protocol for RFID," by M. Safkhani, proposes a desynchronization attack against R²AP protocol that succeeds with the probability almost 1 and requires an adversary to initiate 1829 sessions of the protocol. It is shown that a passive adversary who eavesdrops only two sessions of the protocol can trace the tag with the probability of 0.921. In addition, a passive attack for which the adversary can extract the secret ID of the tag is presented. In this case, assuming that the adversary eavesdropped 128 sessions of the protocol, the success probability is about 0.387.

The editors and editor in chief of JECEI wish to take this opportunity to thank the scientists and reviewers around the world who have contributed their time and expertise in the preparation of the Eleventh issue of the journal.

The author is solely responsible for the validity of scientific material is written.