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SSD 2017

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13th International Multi-Conference on Systems, Signals and Devices (SSD'17)

March 28–31, 2017, Marrakech, Morocco

Organized by:

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Preface

Following the success of SSD'01 held in Hammamet-Tunisia, the fourteenth International Multi-Conference on Systems, Signals and Devices - SSD'17 to be held at Marrakech, Morocco, from 28^{th} to the 31^{st} of March 2017. The conference program consists of 5 plenary sessions, 12 Keynote Lectures and 28 oral sessions. SSD'17 multi-conference is organized to include 4 conferences covering different fundamental and applied aspects:

1 "Int. Conf. on Systems, Automation & Control" (SAC)

2 "Int. Conf. on Conference on Power Systems & Smart Energies" (PSE)

3 "Int. Conf. on Communication, Signal Processing & Information Technology" (CSP)

4 "Int. Conf. on Sensors, Circuits and Instrumentation Systems" (SCI)

SSD'17 secretariat has received 225 submissions from 21 countries: Algeria, Australia, Benin, Burkina Faso, Canada, Egypt, France, Germany, Iraq, Jordan, Korea, Libya, Malaysia, Morocco, Oman, Saudi Arabia, Spain, Tunisia, Turkey, United Kingdom and USA.

Each paper has been reviewed by at least two reviewers of the program committee which consisted of more than 100 scientists from more than 30 countries. Only 158 papers have been accepted.

We would like to express our deep gratitude to all chairs and members of the program committee for their substantial reviews. Special thanks are due to all members of the organizing committees for their determination to make this event a promising success.

Finally, we would like to extend our deep gratitude to all those who have contributed to the financial support of SSD'17.

Professors Khalid Benjelloun, Maarouf Saad and Faouzi Derbel

Marrakech, Morocco

March, 2017

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r Advances in linear control theory
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Multivariable control
Large scale systems
Infinite dimension systems
Nonlinear control
Distributed control
Predictive control
Geometric control
Adaptive control
Optimal and stochastic control
Variable Structure Control
Robust control
Hierarchical and man-machine systems
Intelligent control systems
Robotics and mechatronics
System identification
Biological and economical models & control
Neural networks and neural control
Fuzzy systems and fuzzy control

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Electric machines modeling and control
Electric machine design
Special machines
Power electronic converters
Variable speed drives
Automotive electrical systems
Monitoring and diagnostics
Power systems
Renewable energy generation
Electromagnetic compatibility
Variable speed generating systems
Transformers

Conference on Communication, Signal Processing & Information Technology

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Signal processing
Communication systems
Digital signal processing
Image and video compression algorithms
Speech recognition
Person authentication
Biometry and medical imaging
Data fusion
Pattern recognition
Modulation and signal design
Communication theory and techniques
Communication protocols and standards
Telecommunication systems
Coding compression
Information theory
Communication networks
Wireless communication
Optical communication
Wireless sensor networks
MIMO communications
Artificial intelligence
Information retrieval
Adaptive antennas
Smart antennas

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& Instrumentation Systems

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Topics:

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Self test
Fault tolerance system & diagnosis
Simulation and design
Calibration and quality insurance
Sensors and actuators
Transducer design
Optical sensors and applications
Biomedical instrumentation systems
Circuits and systems
Full custom and semi-custom integrated circuits
Analog & digital signal processing
Neural networks implementation
Pulse mode neural networks
Genetic algorithm implementation
Sigma delta converters
Design for testability
Low-voltage design
Low-power VLSI design
RF circuit design
Smart home
Life sciences
Environmental applications
Opto-electronics
Micro-machines

SSD'16 : Multi–Conference Program

	08 h 30 – 9 h 00	**9 h 00 – 9 h 30**	**9 h 30 – 10 h 00**	**10 h 00 – 10 h 30**	**10 h 30 – 11 h 00**	**11 h 00 – 11 h 30**	**11 h 30 – 12 h 30**	**12 h 30 – 14 h 00**	**14 h 00 – 15 h 00**	**15 h 00 – 16 h 15**	**16 h 15 – 16 h 30**	**16h 30 – 18 h 00**	**18h 00 – 19 h 30**	**19 h 30**
Monday March, 27	**Registration at the Faculty of Sciences, Semlalia, Marrakech (Morocco)**													
Tuesday March, 28	**Official Opening**		Plenary Session 1		Coffee Break	Oral Sessions SAC 1 & PSE 1 CSP 1 & SCI 1		Lunch	Keynote Lectures L1	Oral Sessions SAC 2 & PSE 2 CSP 2	Coffee Break	Oral Sessions SAC 3 & SAC 4 CSP 3 & PSE 3	**SSD Meeting**	**Free Activities**
Wednesday March, 29		Plenary Session 2		Coffee Break	Oral Sessions SAC 5 & PSE 4 CSP 4 & SCI 2			Lunch	Keynote Lectures L2	Oral Sessions SAC 6 & PSE 5 CSP 5	Coffee Break	Oral Sessions SAC 7 & SAC 8 PSE 6 & CSP 6	**Free Activities**	
Thursday March, 30	Plenary Session 3		Plenary Session 4		Coffee Break	Oral Session SAC 9 & SAC 10 CSP 7 & SCI 3		Lunch	**Visit of the Energy Green Park**					**Conference Dinner at 19h30**
Friday March, 31		Plenary Session 5		Oral Session SAC 11 & PSE 7		**Closure**		Lunch	**Free Activities**					

Plenaries and Keynote Lectures

Reference: (PL-1)
Title: Why Communication Networks are the Next Big Thing!
Author(s): Frank Fitzek (Germany)

Abstract − The talk will be about the role of the communication networks for upcoming 5G systems. It will highlight the disruptiveness from existing networks and show new market potentials. New technologies for the networks are also discussed and put into perspective to the requirements of the Tactile Internet. Also the political role of communication networks is discussed.

Reference: (PL-2)
Title: The Role of English in the Production and Dissemination of Knowledge: Hegemony or Homogeny?
Author(s): Mohammed Amin Awwad (Jordan)

Abstract − This paper's thesis is that English will continue to rank first in the world language hierarchy as well in the European Union Language hierarchy as regards the production and dissemination of knowledge. Together with French and German it will play an important role in the internationalization and homogenization of higher education across time and space, and will, therefore, significantly and positively contribute to a more democratic and equitable world. The paper will also show that language, national identity, social, economic, scientific and political discourse and culture are inseparable and nation-specific traits even though this is mitigated by the homogenization processes and character of a universe with a shared international identity. It will provide evidence that inadequate language competence in English, French, and Arabic is responsible for the modest academic achievement in Jordan, Morocco, Tunisia, and the United Arab Emirates university gradates. As universities and other institution of higher education play a major role in the production and dissemination of knowledge, promote internationalization of education, support mobility of students and faculty members, they are best qualified to chart future trends and processes that will lead to the homogenization of Higher Education while still focusing on national, cultural and academic heritage. The paper will argue that the homogenization and the production and distribution of knowledge requires much more than English language competence courses in the basic skills, and in English for academic purposes. Joint on-line open courses, a joint Middle East- European Union area of higher education, and translation programmes can certainly help. However much more important steps and strategies would be needed: establishing joint-degree programmes, and large scale student and faculty mobility programmes, which proved to be most successful in India and China becoming important contributors to the advancement of science and technology. The paper will also provide evidence that translation cannot and does not produce material which correctly represents the thought processes and the full meaning intended in the original English text. Sometimes, the English (and other mother tongue) texts themselves are subject to an internal process of translation, mediation, and negotiation by their native speakers. Furthermore, the paper will show that complete congruence between any two language struc-

tures is untenable, which makes mobility of students and academic staff the best strategy for the production and dissemination of knowledge.

Reference: (PL-3)
Title: Impedance spectroscopy for measurement and sensor solutions
Author(s): Olfa Kanoun (Germany)

Abstract − Impedance Spectroscopy is an interesting measurement method in many fields of science and technology including medicine,chemistry and material science. The possibility to use information from complex impedance over a wide frequency range leads to interesting opportunities for separating effects, accurate measurements and measurements of non-accessible quantities. Especially in the field of sensors a multi-functional measurement can be realized. But for this measurement method, several aspects should be specifically addressed such as, impedance measurement procedures, investigations of physical and chemical phenomena taking place, development of suitable impedance models and extraction of target information by optimization techniques. Especially low cost realization in embedded systems leads to highly interesting scientific challenges and provides interesting improvements of quality of measurement.

Reference: (KL-SAC-PSE-1)
Title: Cooperative control of networked robotic systems
Author(s): Filippo Arrichiello (Italy)

Abstract − Networked robots, i.e. robotic devices connected to a communications network, have been object of widespread research in the latest years due to their broad application domain, flexibility, potential robustness to faults and capacity to accomplish complex tasks alternatively impossible for single units. Despite their clear advantages, networked robots pose challenging problems due to the interaction among control, communication and perception. This talk is about cooperative control strategies for networked multi-robot systems to achieve specific missions as connectivity maintenance and formation control with robustness to failures, with a focus on experimental validation with mobile robots. The talk will end with a focus on networked robots issues when operating in the marine environment, illustrating the main challenges that will be addressed in the ongoing H2020 research project WiMUST.

Reference: (KL-SAC-PSE-2)
Title: Analysis and control of chaotic behavior in an electromechanical drive
Author(s): Moez Feki (Tunisia)

Abstract − The hybrid two-phased stepper motor is a common electromechanical converter widely used in robotic field and small devices positioning systems such as disk drives ...etc. Originally, stepper motors were designed to provide precise discrete positioning in an open-loop control mode. However, it has been shown that using the stepper motor in an open loop configuration gives poor performance if it is driven using higher stepping rates than advised by the constructor. Indeed, we have shown that quasi-periodic as well as chaotic behaviors appear as the power supply frequency is increased

and this is due to incompatibility between the motor inertia and the driving speed. Therefore, controlling the chaotic behavior of the stepper motor becomes a worthwhile endeavor. We present in our keynote several strategies to stabilize the periodic behavior of the stepper motor with frequency input feedback loop, hence we extend the operating domain of the stepper motor to frequencies larger than advised by the constructor.

Reference: (KL-SCI-MiNE-1)
Title: Unobtrusive Smart Sensing and Pervasive Computing for Healthcare: Cardiorespiratory and Physical Rehabilitation Assessment
Author(s): Octavian Postolache (Portugal)

Abstract − The ageing phenomena requires the development in the near future of the new systems and services that will provide increasing of healthcare quality,with increased acceptance by the users reducing also the costs. In this context the distinguished lecture will presents a set of vital signals and daily activity monitoring unobtrusive solutions as so as the appropriate signal processing associated with the measurement channels. Will be highlighted:

- Vital signals acquisition and processing by embedded devices in clothes and/or accessories (e.g. smart wrist worn) or in walking aids and transportation equipment such as walker or manual wheelchair. The strength and drawbacks regarding cardiac and respiratory assessment capabilities, the studies on cardiac sensing accuracy estimation and artefacts influence on cardiac function sensing through capacitive coupled electrocardiography, electromechanical film sensor and microwave Doppler radar ballistocardiography, reflective photoplethismography will be discussed.
- Motor activity sensing through microwave motion sensor, MEMS inertial measurement as so as the appropiate signal processing will be discussed. Several methods for diagnosis and therapy monitoring, as time frequency analysis, principal component analysis and pattern recognition of motion signals with application to gait rehabilitation evaluation will described. Some developed works under the project Electronic Health Record for Physiotherapy promoted by Fundação para Ciência e Tecnologia, Portugal, related to Kinect natural interaction serious games for physiotherapywill be also presented.

Reference: (KL-CSP-1)
Title: The novel use of Darwin's 'Survival of the fittest' concept in sensory feature selection for the design of condition monitoring systems
Author(s): Amin Al-Habaibeh (United Kingdom)

Abstract − The concept of 'Survival of the fittest' is originated from Charles Darwin's book of 1859 "On the Origin of Species by Means of Natural Selection", in which his evolutionary theory was outlined describing the mechanism of natural selection. The survival of the fittest concept has been implemented in the engineering sector in condition monitoring systems by Professor Amin Al-Habaibeh and his team during the past 20 years for feature extraction for evolutionary selection of the most suitable sensors and signal/image processing

systems for enhanced system's performance. The term 'ASPS' which stands for Automated Sensor and Signal Processing Selection was used over the past years to articulate the concept which is related to the selection of the most suitable sensory characteristic features for the design of an improved condition monitoring system. A condition monitoring system of a machine, system or a process involves the selection of the most suitable sensor and signal/image processing method to extract the information related to the health conditions (or any other monitored characteristics) and the least dependent on noise and other operational conditions. Neural networks have been used to independently evaluate the performance of the theory and the suggested methodology. The theory has been tested in several projects and a wide range of applications including end milling, turning, drilling, fixturing systems, crowd monitoring and condition-based maintenance of gears. Ongoing work also includes water leakage detection in pipes and medical applications.

Reference: (KL-CSP-SCI-MiNE-2)
Title: Quantum Communication Simulator (QuCS) as an effective software for Quantum Experiment and Communication
Author(s): Zuriati Ahmad Zukarnain (Malaysia)

Abstract − Quantum communication promises for unconditional security with faster transmission. Current digital communication mechanism suffers serious drawbacks due to its inherent weakness. Unlike, digital communication, quantum communication based on complex quantum mechanism principles. Further, quantum based experiments are expensive and sophisticated due to its optical components and sensitive mode. Simulation plays a vital role in all fields of science and engineer. In order to achieve en effective simulation for quantum communication experiments required not only computer science but also mathematics, physics and engineering aspects. Currently, we developed a prototype simulator called quantum communication simulator(QuCS). Quantum experiments basically cover both continuous and discrete events. Further, few devices have its own dynamics action, i.e. avalanche photo detector (APD). Hence, a combination of discrete, continuous and system dynamic simulation techniques are involved to develop a quantum communication simulator. We called this method as hybrid simulation technique. Further, we classified the process of quantum experiments. The devices or components emulation comes under macro simulation. The action or changes in devices is defined as meso simulation. Finally, design of atomic level such as photon, electron called as micro simulation. The photon or electron is basically refers as quantum bit (qubit). Modeling a qubit is challenging task. Typically, qubits has various properties and careful attention is required in selecting and mapping with macro and meso simulations. Moreover, quantum itself is a stochastic nature. Hence in QuCS, well-defined random functions are implemented. We have developed simulation for a polarized based quantum secret key communication. In this scenario, sender transmits polarized encoded photons as qubits and receiver randomly choose the polarization. This scenario is called as quantum key distribution (QKD). In this experiment, we simulated the fiber optics as channel, photon source, passive photonic components as transmitter and detector, passive photonic components as receiver. The distance and noise factors are the performance metrics. In overall, QuCS simulates the life cycle

of qubit during the experiment. The proposed simulation designed as GUI based drag and drop solution with various internet features. Just a simple drag and drop method to develop a quantum experiments. This simulator abstract and encapsulate the quantum mechanics principle. This tool can serve for both teaching as well research. However, simulator lacks of various experiments components in order to build the higher lever experiments. Hence, our future goals are to enhance both quality of results and quantity of components.

Papers

Paper Reference: (SAC-1-1) 1570329477
Title: Path Planning for Unmanned Aerial Vehicle using Embedded GPU System
Author(s): Vincent Roberge, Mohammed Tarbouchi (Canada)

Abstract − Unlike commercial airlines that fly predetermined trajectories, military unmanned aerial vehicles (UAVs) operate in dynamic environments and must often adjust their itinerary based on the developing conditions during the mission. The path planner module is a key element of any autonomous UAV. It computes the optimal path from a start point to an end point. In this paper, we present a parallel genetic algorithm for UAV path planning using an embedded NVIDIA Jetson TX1 single-board computer. The path is built as a series of line segment connected by circular arcs to remove discontinuities and account for the dynamics of fixed wing UAVs. It is optimized to minimize the average altitude avoiding detection by enemy radars and to minimize fuel consumption improving range. The software developed is tested on four different 3D terrains. By exploiting the parallel architecture of the Jetson TX1 GPU, the proposed path planner provides a speedup of 33x compared to a sequential execution on ARM processor. It calculates quasi optimal solutions in complex 3D environments in less than 4 seconds and requires only 10 Watts, making it an excellent solution for onboard path planning.

Paper Reference: (SAC-1-2) 1570332691
Title: Communication Relay for Multi-ground Units using Unmanned Aircraft
Author(s): Abbas Chamseddine, Ouassima Akhrif, François Gagnon, Denis Couillard (Canada–Turkey)

Abstract − This paper investigates the problem of communication relay establishment for multi-ground units using anunmanned aircraft. It is required t odrive the aircraft to the optimal position for communication relay without knowledge of ground units' positions. As an alternative to positions information, two measurements a re-employed for each ground unit, the signal strength and its angle of arrival. Two navigation laws are proposed, the first employs all measured signals where as the second only employs the two smallest signals. Simulations are carried out to show the effectiveness of the proposed approaches.

Paper Reference: (SAC-1-3) 1570332831
Title: Modeling, Implementation and Control of An Autonomous Hovercraft
Author(s): Saber Abdrabbo, Yehia Hossamel-din, Tarek Anter (Egypt)

Abstract − This paper, introduces design, implementation, and experimental testing of an autonomous hovercraft vehicle. A mathematical model for the hovercraft is considered and simulated using MATLAB/Simulink environment. A navigation system with Global Positioning System (GPS) integrated with an Inertial Measurement Unit (IMU) sensors are used to monitor the speed, position, and the direction of the hovercraft for the autonomous operation. Two motors with propellers are used for the lifting and thrust systems, while a third one is used for the radar movement that controls the direction. The

results of the practical experiments of moving the hovercraft between two or three points are compared with that of the computer simulation. The distance error from the actual target has been found to be in range of 2 m. This is due to the usage of commercial GPS sensors. The land surface effect on hovercraft speed has been also studied experimentally and the results show that the proposed real model could move with the highest speed on sand, followed by ceramic, asphalt, flagstone, and the lowest is on a carpet.

Paper Reference: (SAC-1-4) 1570321582
Title: RC Helicopter Modeling using Re-Engineering and System Identification
Author(s): Tarek A. Tutunji, Yaser Aleed (Jordan)

Abstract − The construction and functionality of an RC toy helicopter was studied and analyzed using Reverse Engineering (RE). The electronic circuitry was modified by adding an inertial measurement (IMU) unit and Arduino processor in order to collect flight data. The multi-inputs and multi-outputs (MIMO) data set is composed of motor voltages (as the system inputs) and linear accelerations and angular velocities (as system outputs). The data is then processed and transferred to a computer where System Identification Toolbox in MATLAB is used to develop transfer functions for the MIMO helicopter system. The transfer function models are validated by comparing the identified model results with the actual measurements. Simulation results validate the methodology used..

Paper Reference: (SAC-1-5) 1570332413
Title: Stereo Visual-based Modified Super-Twisting Control in a Quadrotor used in Agricultural Application
Author(s): Walid Alqaisi, Brahim Brahmi, Maarouf Saad, Vahe Nerguizian, Jawhar Ghommam (Canada–Tunisia)

Abstract − In this paper, a stereo visual-based control is designed by using virtual image projection and actual depth calculation on a quadrotor system. Super twisting nonlinear control is supported with time delay disturbance estimation algorithm to estimate disturbance and to drive the system to track the desired trajectory. This proposed super twisting algorithm ensures the finite time convergence of the system states to the selected sliding surface. The stability analysis of the control is confirmed in the closed loop. The effectiveness of the proposed system is shown by carrying out simulation, using real quadrotor parameters.

Paper Reference: (SAC-1-6) 1570326371
Title: modeling of a vehicle vertical dynamic model using Bond graph
Author(s): Abderrahim Frih, Zakaria Chalh, Mostafa Mrabti (Morocco)

Abstract − The vehicle is a very complex system which contains basic organs: wheels, pneumatics, trains, chassis and suspensions... All these subsystems are designed to make the car work in the best conditions. In this paper, we propose to study the dynamic modeling of automobile vehicles by the bond graph methodology. Then we present in this study, modeling and analysis of a system of suspensions for a quarter, half and a whole model of the vehicle.

This approach is completely systematic and has enough flexibility to be able to introduce different sub-models in the full model.

Paper Reference: (SAC-2-1) 1570326204
Title: Unknown input observer design for fractional-order one-sided Lipschitz systems
Author(s): Assaad Jmal, Omar Naifar, Nabil Derbel (Tunisia)

Abstract − Designing unknown input observers for integer-order systems has been subject to numerous and various research works. However, dealing with the fractional-order calculus, the literature lacks of such results. Indeed, only very few attempts have been done to design unknown input observers for linear fractionalorder systems and Lipschitz nonlinear fractional-order systems. By this paper, a first solution is given to design unknown input observers for nonlinear fractional-order systems, under the so called one-sided Lipschitz condition, corresponding to a superset of the traditional Lipschitz class of systems.

Paper Reference: (SAC-2-2) 1570326406
Title: Observer-based Fault Tolerant Control for Vehicle Lateral Dynamics
Author(s): Naoufal Elyoussfi, Mohammed Oudghiri, Rachid El Bachtiri (Morocco)

Abstract − This paper describes a method of Sensor Fault Detection, Isolation (FDI) and fault-tolerant control (FTC) architecture for vehicle lateral dynamics represented by the Takagi Sugeno (TS) fuzzy model. Using the LMI formulation, the TS fuzzy model of the vehicle nonlinear dynamics is used to design an observer based controller, a method based on observer bank is then investigated for detection and isolation of sensor faults. Simulations show that the sensor faults are detected immediately after their occurrences and illustrate the proposed FTC strategy..

Paper Reference: (SAC-2-3) 1570330842
Title: Design of Unknown Input Observers for Linear Systems with State and Input Delays
Author(s): Seifeddine Ben Warrad, Olfa Boubaker (Tunisia)

Abstract − In this paper, an unknown input observer is proposed for linear systems with state and input delays. The robust observer designed is for a delay-dependant system. Necessary and sufficient conditions are provided for asymptotic stability and existence conditions. The efficiency of the proposed algorithm is validated using the quadruple-tank benchmark as a case study of the non-minimum phase systems.

Paper Reference: (SAC-2-4) 1570331386
Title: Flexible Manipulator State and Input Estimation Using Higher Order Sliding Mode Differentiator
Author(s): Mohammed Bakhti, Lahssen Ben tarla, Badr Bououlid Idrissi (Morocco)

Abstract − This paper proposes a higher-order sliding mode differentiator to give an estimate for a highly nonlinear one-link flexible manipulator state. An Euler-Bernoulli cantilever beam models the manipulator, and the elastic movement is approximated using the assumed modes method based only on the first elastic mode. The Hamilton's principle yields the system nonlinear equations that are rearranged in the Brunovsky canonical form in order to derive the differentiator equations. This article evaluates, via the included numerical simulation results, the efficiency of the differentiator scheme to lower the estimation error and to shorten its required time to converge. It also evaluates its ability to reconstruct the unknown input to the system.

Paper Reference: (SAC-2-5) 1570325716
Title: Generalized predictive controller performances in an anticipative context
Author(s): Asma Achnib, Tudor-Bogdan Airimitoaie, Sergey Abrashov, Patrick Lanusse (France)

Abstract − An existing method for tuning a generalized predictive control (GPC) law using desired closed-loop transfer functions is applied to preview systems. In the context of preview systems, it is supposed that future values of the reference signal are available a number of time steps ahead. This information can be used to reduce the error between the reference signal and the measured output by adding an anticipative action to the controller. This paper evaluates the performances of GPC in this context. Although the design method used provides good robust performances in an non-anticipative context, it is shown that unwanted behaviour can occur when anticipation is introduced. First the performances and robustness of the obtained GPC controller are validated in an non-anticipative context. Then, it is shown that an equivalent feedforward filter appears when anticipation is added, which can have bad effects on the system performances. An academic simulated example is used to validate our conclusions.

Paper Reference: (SAC-3-1) 1570326862
Title: Fault diagnosis in discrete event systems using RBF neural networks
Author(s): Mohammed Msaaf, Fouad Belmajdoub (Morocco)

Abstract − This paper deals with the diagnosis of discrete event systems described by sequences of events. A spatio-temporal representation (Temporal windows) is used to capture and analyse temporal data generated by the considered discrete event system. In the first phase, a theoretical approach is developed to perform diagnosis using temporal windows concept. The second phase uses the result of the first phase to train a neural network that preform on-line diagnosis and puts into practice the developed theoretical approach.

Paper Reference: (SAC-3-2) 1570326959
Title: Actuator Fault Estimation and Compensation For Hybrid Switched System
Author(s): Salwa Yahia, Saida Bedoui, Kamel Abderrahim (Tunisia)

Abstract − In this paper, a new approach which serves firstly the estimation of the actuator fault and secondly its compensation for hybrid switched system is presented. The compensation of this fault is based on the use of the additive fault tolerant control. So, this paper extends an estimation method (Data-based Projection Method) for switched system to estimate the actuator fault. Then, the additive control is synthesized by exploitation the fault estimation. So, the additive fault tolerant control is obtained by combining this additive control to the nominal control. The efficiency of this method has been demonstrated by an example.

Paper Reference: (SAC-3-3) 1570330357
Title: Diagnosability of Programmable Logic Controller
Author(s): Mohammed Bani Younis, Al-Mutaz Bellah Mesmar (Jordan)

Abstract − The diagnosis problem of Programmable Logic Controllers used to control an industrial process is an important research track. This paper introduces the use of the slicing methods on programmable logic controller's code. The used method enables the better navigation of the variables in the program. These vairables are mainely the inputs/ouputs field devices intstalled on the plant. The Instruction List programming language is chosen to determine the software feasibility and applicability of the slicing method. The sliced program is exploited for the debugging purposes. An evaluation about the methods and techniques used for the Diagnosability are also provided in the scope of this paper. A case study is provided to ease the understanding of the used slicing technique.

Paper Reference: (SAC-3-4) 1570331739
Title: Inputs estimator for actuator faults detection
Author(s): O.Dhaou, L.Sidhom, I. Chihi, A.Abdlekrim (Tunisia)

Abstract − This paper proposes a fault detection method for a particular class of nonlinear flat system using a dynamic higher order sliding mode. The key idea consists to design an inputs estimator based on analytical redundancy relations by solving a constraint satisfaction problem. Indeed, the analytical redundancy relations require knowledge of the successive derivatives of the measured system outputs. For this aim, a sliding mode differentiator with dynamic gains is applied in order to take account a measurement noise. The performances of the proposed approach are illustrated through some simulation tests on three-tank system to detect an actuator fault.

Paper Reference: (SAC-3-5) 1570331742
Title: Estimator parameters for process faults detection
Author(s): Dhaou Olfa, Lilia Sidhom, Afef Abdelkrim, Inès Chihi (Tunisia)

Abstract − This paper considers a process fault detection problem for a particular class of nonlinear flat system. In our work, a fault detection approach is proposed where an estimator parameters is defined. In fact, the computing of the system parameters is performed using measurements of inputs - outputs system and also with an estimation of the successive derivatives of the outputs. Then, the proposed approach involves a numerical differentiation

algorithm which is based on a dynamic higher order sliding mode. This last one can correctly detect a fault system even in the presence of a measurement noise. The defined approach is applied on the three-tank system in order to evaluate its performance.

Paper Reference: (SAC-3-6) 1570332313
Title: Rotorcraft Fault Detection and Isolation based on nonlinear analytical redundancy relations
Author(s): Noura Mouhssine, Nabil Kabbaj, Mohammed Benbrahim, Chakib El Bekkali (Morocco)

Abstract − This paper presents a fault detection and isolation scheme (FDI) applied on a quadrotor vehicle. Using nonlinear analytical redundancy relations NLAR technique, for a class of affine nonlinear systems, this technique is based on the elimination of the unknown variables of the system to detect and isolate sensor faults.

Paper Reference: (SAC-4-1) 1570331908
Title: Two-wheeled Self Balancing Unicycle Using a PSO Based LQR and A Fuzzy PD Controller
Author(s): Abdulwahid A. Al-Saif, Elmegdad Mekki (Saudi Arabia)

Abstract − This paper proposes the use Fuzzy logic controller and a PSO based LQR controller for the balance of an electric unicycle. It also examines dynamics of the electric unicycle's schematic design, which has a backing seat for the passenger and is analogous to the Segway device equipped with a handle shaft for direction. A proportional derivative controller incorporated with a Fuzzy logic controller was designed for the suggested model of the electric unicycle for speed and position control (Fuzzy controller), and a PD controller was utilized to control the angle rate and angle of the unicycle. Comparison of the Fuzzy logic controller with a PSO LQR controller was carried out based on error deviation and time response simulations. Command tracking or regulation of some initial state condition were examined and demonstrated by time based simulations of the modelled system. The results evidently indicate that the Fuzzy PD controller can effectively attain attitude equilibrium for the two wheeled unicycle and preventing it from falling down.

Paper Reference: (SAC-4-2) 1570331925
Title: L2 - L∞ Filtering for a class T-S fuzzy discrete systems under stochastic perturbation
Author(s): Taha Zoulagh, Bensalem Boukili, Abdelaziz Hmamed, Ahmed El Hajjaji (Morocco-France)

Abstract − This work tackles the L2 - L ∞ filter design problem for the discrete-time Takagi-Sugeno (TS) fuzzy stochastic systems. The approach based on the (T-S) fuzzy systems, and the objective is to provide a new design with sufficient condition via LMI procedure. Less conservative results are obtained through the use of the projection lemma to introduce additional free matrices. These tools allow to obtain a full-order filter design with extra degree

of freedom in order to optimize the L2 - L∞ performance. At the end, several examples are used to illustrate the efficiency of the proposed approach.

Paper Reference: (SAC-4-3) 1570332331
Title: Fuzzy Controller with neighborhood zone for obstacles avoidance applied to a differential robot
Author(s): Awatef Aouf (Tunisia)

Abstract − Obstacle avoidance and trajectory minimization are the main concerns in mobile robotics navigation. Motivated by these demands fuzzy logic controller using neighborhood zone is firstly investigated in this paper. In fact, the robot based on our approach has no knowledge of its environment but is able to perceive its neighborhood taken into account the assumption of all obstacles which are static and have different kinds of square form. In the face of a bloc of obstacle, seen as a surface, the controller make use of the solid angle, the direction and the distance measurements to compute the necessary signal that allows the robot to avoid it and continue his way to reach its final destination with optimal trajectory. Simulation result proves the effectiveness of our proposed technique in join obstacles avoidance and trajectory optimization compared to the used fuzzy in the literature.

Paper Reference: (SAC-4-4) 1570332359
Title: Interval type-2 TSK fuzzy approach for autonomous mobile robot control in presence of uncertainties
Author(s): Dorra Ayedi, Maïssa Boujelben, Chokri Rekik (Tunisia)

Abstract − The use of the type-2 fuzzy logic system (FLS) allows to a mobile robot to handle various uncertainties which can face it in an unknown environment. Actually, the type-2 FLS has become a popular approach applied for different control applications. In this paper, we will show the benefit of using the type-2 FLS on mobile robot navigation, comparing to the use of type-1 FLS. The procedure of this work is then described as follows: we apply the type-1 FLS on the mobile robot to reach a specific target and to avoid obstacles, adopting the hierarchical controller. Then we test the type-2 FLS to do the same tasks. The comparison between simulation results will prove the efficiency of this new type FLS, especially in the presence of perturbations.

Paper Reference: (SAC-4-5) 1570332215
Title: Adaptive Fuzzy Sliding Mode Control Based on Linear Matrix Inequalities for Nonlinear Systems
Author(s): Toufik Amieur, Abdelaziz Younsi (Algeria)

Abstract − In this paper, the performance improvement obtained from the Adaptive Fuzzy Sliding Mode Control (AFSMC) strategy for the Single Input Single Output (SISO) nonlinear system, in which its plant model is modeled by an unknown nonlinear dynamic and a bounded perturbation, is shown. The main contribution of this paper is to solve the chattering problem of the standard Sliding Mode Control (SMC) strategy by using the fuzzy logic mechanism where its parameters are well self- tuned. The proposed control strategy ensures overall an asymptotic stability when all the signals involved

are uniformly delimited. The inverted pendulum system, chosen as a realistic nonlinear case study, is controlled by the proposed control strategy and the performances obtained confirm the validity of the proposed idea.

Paper Reference: (SAC-4-6) 1570331930
Title: Fuzzy logic controller for mobile robot navigation to avoid dynamic and static obstacles
Author(s): Maïssa Boujelben, Dorra Ayedi, Chokri Rekik, Nabil Derbel (Tunisia)

Abstract − This paper addresses the problem of mobile robots navigation in static and dynamic environment. The proposed navigation method is inspired from the VFH (Vector Field Histogram) method: it adopts the principle of safe sectors, but simplifies the configuration space representation. It consists on directing the robot heading towards a desired direction allowing to reach the target or to avoid obstacles. The proposed control law uses a SI|SO fuzzy logic system. This method is characterized by its simplicity to implement and its low computation time. The validity of this approach is proved through simulation results.

Paper Reference: (SAC-5-1) 1570332303
Title: Stabilization and positivity of 2D fractional order uncertain discret time systems
Author(s): Laila Dami, Benhayoun Mohamed, Abdellah Benzaouia (Morocco)

Abstract − This paper considers the problem of robust stability and stabilization for a class of 2D fractional-order linear time-invariant system described by the Roesser model, with convex polytopic uncertainties. Necessary and sufficient conditions for the positivity and stabilization by state-feedback control are established. An illustrative example is provided to show the usefulness of the results.

Paper Reference: (SAC-5-2) 1570332259
Title: Design of Robust Fractional Order PID Controller Using Fractional Weights
Author(s): Toufik Amieur, Abdelaziz Younsi, Mohammed Aidoud, Sedraoui Moussa, Oualid Amieur (Algeria)

Abstract − In this paper, a Fractional Order Weighting Matrices FOWM are introduced in the mixed sensitivity problem in order to design the proposed Fractional Order PID controller FOPID. The aim of this proposition is to enhance the trade-off between the Nominal Performances NP and the robust stability RS of the closed-loop system where the neglected dynamic, the unstructured model uncertainty and the effect of the sensor noises are considered. The proposed fractional controller and fractional weighting matrices parameters are simultaneously determined through solving the H8 optimization problem using an adequate min-max optimization algorithm. The obtained performances are compared, in time and frequency domains, with those given

by the standard fractional order PID controller where its optimization problem is given by usual Integer Order Weighting Matrices.

Paper Reference: (SAC-5-3) 1570332008
Title: Stability of 2-D Continuous Systems in Roesser Model Based on KYP Lemma
Author(s): Ismail Er rachid, Abdelaziz Hmamed, Badreddine El Haiek (Morocco)

Abstract − This study is concerned with the problem of stability of 2-D continuous systems in Roesser model. Based on KYP lemma combined with frequency-partitioning approach. The objective is to propose a sufficient conditions of stability of the systems via LMI formulation. Finally, numerical example is given to illustrate the effectiveness of the proposed method.

Paper Reference: (SAC-5-4) 1570331594
Title: Modeling and Robust Closed Loop Position Controllers of Piezoelectric Actuator Drive (PAD)
Author(s): Mouhanned Brahim (France)

Abstract − This paper deals with the synthesis, design, and comparison of robust H-infinity (H∞) and RST position controllers of Piezoelectric Actuator Drive (PAD). The PAD is an accurate rotary piezoelectric motor that employs the elongation of stack actuators, the micro-toothed ring and the shaft to generate rotation motion. The motor position depends on precise adjustment between motor ring and shaft and therefore demand a closed loop control to overcome the maladjustment problems. In this paper Simulink model of the PAD is firstly proposed to evaluate the motor behavior. The transfer function between the control signal and motor shaft position is experimentally identified. H8 and RST position controllers are then synthesized. The precision and robustness of the proposed closed loop system are also validated.

Paper Reference: (SAC-5-5) 1570329788
Title: Design and Implementation of a Discrete Variable Gain Controller Based on a Numerical Approach
Author(s): Rami A. Maher, Karim M Aljebory (Jordan)

Abstract − this work presents a design and implementation of discrete variable gain controllers, which are used for regulating industrial systems. The design is derived from the classical discrete deadbeat response approach. The design is based simply on determining a variable gain for each discrete sample such to accomplish the regulation in finite steps equal the system order. The gain computation is performed numerically by solving a system of nonlinear coupled equations using one of the known evolutionary techniques, the genetic algorithm augmented with Newton-Raphson method. Two industrial control systems are considered to testify the designed controller for implementation. The efficacy of the proposed method for parameter variations is explored. Moreover, the results are compared with that based on a finite number of control steps.

Paper Reference: (SAC-5-6) 1570325962
Title: ILC-Tracking Control Design For repetitive Continuous-Time Linear
Author(s): Selma Ben Attia (Tunisia)

Abstract − This paper deals with the problem of the itera- tive learning tracking control (ILC) for continuous-time linear systems (LTI) operating in a repetitive manner. The design of iterative learning control law is developped by using the stability along the pass theory of 2D-repetitif systems. In this case, the convergence of the tracking error has been performed for a given learning controller gains. The main purpose of this control is to guarantee some desired specification of the system dynamic behavior result and the convergence of the output error between iterations. The various given conditions are formulated in terms of LMI (Linear Matrix Inequalities). Numerical results are given to illustrate the effectiveness of the proposed results.

Paper Reference: (SAC-5-7) 1570331644
Title: Finite Frequency H∞ Filtering for Discrete-Time Uncertain Systems
Author(s): Abderrahim El amrani, Youssef Berrada, Abdelaziz Hmamed, Ahmed El Hajjaji, Ismail Boumhidi (Morocco–France)

Abstract − This paper is concerned with the problem of finite frequency (FF) H∞ filter design for linear time-invariant discrete-time systems with polytopic uncertainties. The developed approach in the paper is to design a new filter guaranteeing an H8 performance when frequency ranges of noises are known beforehand. The H8 filter in designed to deal with noises in Low Frequency (LF) domain. By utilizing the Generalized Kalman-Yakubovich-Popov (GKYP) lemma, projection lemma, and we introduce many slack matrices, the conditions on the existence of H8 filters for LF range is unified in terms of solving a set of linear matrix inequalities (LMIs). Finally, a numerical example clearly demonstrates the merits and effectiveness of the proposed method.

Paper Reference: (SAC-6-1) 1570324916
Title: Non-Singular Terminal Sliding Mode with Time Delay Control for Uncertain 2nd Order Nonlinear Systems
Author(s): Yassine Kali, Maarouf Saad, Khalid Benjelloun, Mohammed Benbrahim (Morocco)

Abstract − This paper proposes a non-singular terminal sliding mode combined with time delay controller for fast tracking trajectory of uncertain second-order nonlinear systems in presence of external disturbances. The motivation for using Non-Singular Terminal Sliding Mode (NSTSM) mainly relies on its appreciable features, such as simplicity of design and implementation, high precision and fast convergence. However, the NSTSM problem is the well-known chattering, which degrades the controlled system. Then, using the time delay to estimate uncertainties and disturbances allows chattering reduction. The stability and the robustness of the proposed controller are verified by using the classical Lyapunov criterion. The proposed controller is implemented in real time on the seven-degrees-of-freedom (7-DOF) ANAT robot arm and compared with the Sliding Mode with Time Delay Control (SMTDC) with classical sliding surface to prove its superiority.

Paper Reference: (SAC-6-2) 1570329932
Title: Discrete Sliding Mode Control with Time-varying Switching Gain for Hammerstein Nonlinear Systems
Author(s): Aicha ZNIDI, Khadija Dehri, Ahmed Said Nouri (Tunisia)

Abstract –Designing a robust controller for nonlinear discrete-time systems, described by block-oriented models, becomes an active area for research in automatic theory. In this paper, two techniques are proposed: the first one is based on developing a discrete sliding mode control for a generalized Hammerstein mathematical model. The second one consists in replacing the constant switching gain of the discontinuous term in the proposed nonlinear sliding mode control by an adaptive one using an appropriate adaptation philosophy. Simulation example is reported at the end of the paper to prove the effectiveness of the proposed methods.

Paper Reference: (SAC-6-3) 1570331748
Title: New Sliding Mode Control for Non-minimum Phase Systems
Author(s): Laila Mokhtar, Houda Ben Mansour, Ahmed Said Nouri (Tunisia)

Abstract – Many of the modern industrial processes are non-minimum phase systems. Therefore, the synthesis of a robust control is a prerequisite for this type of systems. In this paper, a discrete sliding mode control for non-minimum phase systems is proposed via an input-output model. The proposed control is synthesized to overcome the problem of unstable zero. Simulation examples are presented to show the efficiency of the proposed control.

Paper Reference: (SAC-6-4) 1570332408
Title: Improvement of Vector Control of Dual Star Induction Drive using Synergetic Approach
Author(s): Hossine Guermit (Algeria)

Abstract – In order to have robust and high performance of vector control of Dual Star Induction Motor drive (DSIM), sliding mode control is applied. This control represent in attractive choice in terms of fast dynamic response, robustness against parameter variations and external disturbance. However the main drawback of this later is the chattering phenomenon due to the discontinuous components. To overcome this problem, we propose in this work, a novel control scheme based on synergetic control theory newly integrated in the control of DSIM. The developed control algorithm ensures, fast response, asymptotic stability of the closed-loop system in the all range of admissible operating condition, and robustness of the system to the deviation parameter. A comparison of simulation results between PI regulator, sliding mode regulator and synergetic control, shows clearly that synergetic regulator yield high dynamic and static performance in all operating conditions.

Paper Reference: (SAC-6-5) 1570335228
Title: FPGA Implementation of Super Twisting Sliding Mode Control of the Doubly Fed Induction Generator

Author(s): Marouane El Azzaoui, Karima Boudaraia, Hassan Mahmoudi (Morocco)

Abstract − This paper deals with FPGA implementation of First order and super twisting sliding mode control of the doubly fed induction generator. First order sliding mode is one of most robust control approach. However, it's had drawbacks which prevent it in practical implementation such as chattering phenomenon. Super twisting sliding mode seems a viable alternative solution to overcoming the chattering phenomenon. In this work, super twisting sliding mode control of the doubly fed induction generator is implemented in FPGA using Xilinx System Generator. Hardware co-simulation shows the performance of the proposed strategy.

Paper Reference: (SAC-7-1) 1570317457
Title: Identification of Third-order Volterra-PARAFAC models using Levenberg-Marquardt algorithm
Author(s): Zouhour Ben Ahmed, Nabil Derbel (Tunisia)

Abstract − Volterra models are very useful for representing nonlinear systems with vanishing memory. The main drawback is their parametric complexity.In this paper,we present a new class of Volterra models, called Volterra-Parafac models, with a reduced parametric complexity, by using a parallel factor (PARAFAC) decomposition of Volterra kernels of order (p¿2) viewed as tensors. This paper is concerned with the problem of identification of third-order Volterra-PARAFAC models. An iterative algorithm, called Levenberg-Marquardt algorithm is then proposed for estimating the parameters of these models. This algorithm is proposed when input-output signals and kernel coefficients are real valued. Some simulation results illustrate the proposed identification method.

Paper Reference: (SAC-7-2) 1570329939
Title: Numerical Modeling of Contaminant Transport with Aerobic Biodegradation in a Saturated Porous Medium
Author(s): Hind Loukili, Salaheddine Kam (Morocco)

Abstract − Through the present paper, we aspire to develop a computational code capable of numerically modeling the problem of transport and biodegradation in a saturated porous medium. The mathematical formulation of the problem leads to a system of nonlinear and coupled mathematical equations. The concept is based on the splitting method which consists in cutting this system of equations into subsystems and adapting appropriate numerical methods to solve each subsystem according to its properties..

Paper Reference: (SAC-7-3) 1570321582
Title: RC Helicopter Modeling using Re-Engineering and System Identification
Author(s): Tarek A. Tutunji, Yaser Aleed (Jordan)

Abstract − The construction and functionality of an RC toy helicopter was studied and analyzed using Reverse Engineering (RE). The electronic circuitry was modified by adding an inertial measurement (IMU) unit and Arduino processor in order to collect flight data. The multi-inputs and multi-outputs

(MIMO) data set is composed of motor voltages (as the system inputs) and linear accelerations and angular velocities (as system outputs). The data is then processed and transferred to a computer where System Identification Toolbox in MATLAB is used to develop transfer functions for the MIMO helicopter system. The transfer function models are validated by comparing the identified model results with the actual measurements. Simulation results validate the methodology used.

Paper Reference: (SAC-7-4) 1570332288
Title: Modeling and Performance Evaluation of a Public Transportation System
Author(s): Yassine Idel Mahjoub, Ahmed Nait-Sidi-Moh, El houcine Chakir El-Alaoui (Morocco–France)

Abstract − The purpose of this paper is to model, analyze and evaluate the performance of a public transportation network characterized by choice phenomena, synchronization and concurrency using two complementary formalism Petri Nets (PN) and Dioid algebra. Our contribution through this paper is to propose a (max, +) modeling approach for this type of system with conflicts by developing some functions called routing functions enabling to manage all encountered conflicts in the system. Afterwards, we evaluate the departure/arrival time of the transportation means from/to the different stations and also passengers waiting, boarding and disembarking times.

Paper Reference: (SAC-7-5) 1570332395
Title: Modeling and simulation of a Multimodal Transportation System based on Hybrid Petri Nets
Author(s): Karima Outafraout, El houcine Chakir El-Alaoui, Ahmed Nait-Sidi-Moh (Morocco– France)

Abstract − The object of this paper is to model and simulate the behavior of a multimodal transportation system (MTS). Firstly, we have described the operation of the system studied consisting of a bus shuttle between two stations belonging each to a line of train (System contains two transportation modes). Then, we have shown that the system can be considered as a Hybrid Dynamical System (HDS). In order to study the characteristics of the MT, we have constructed a Hybrid Petri Net-based model. This model has been analyzed to evaluate some properties of the system. Finally, the hybrid model has been simulated with Matlab, to analyze the system evolution. Owing to this analysis it is possible to make a performance evaluation and to indicate some functional limits of the studied system.

Paper Reference: (SAC-7-6) 1570331941
Title: Planning tripod gait of an hexapod robot
Author(s): Hasnaa El hansali (Morocco)

Abstract –Hexapod legged robot's missions, particularly in irregular and dangerous areas, require high stability and high precision. In this paper, we consider the rectangular architecture body of legged robots with six legs distributed symmetrically along two sides, each leg contains three degrees of

freedom for greater mobility. The aim of this work is planning tripod gait trajectory, based on the computing of the kinematic model to determine the joint variables in the lifting and the propelling phases. For this, an appropriate coordinate frames are attached to the body and legs in order to obtain clear representation and efficient generation of the system equations. A simulation in Matlab software platform is developed to confirm the kinematic model and various trajectories to the tripod gait adopted by the hexapod robot in its locomotion.

Paper Reference: (SAC-8-1) 1570326411
Title: Combined Backstepping-PID Control of Inverted Pendulum
Author(s): Chekib Ghorbel, Amira Tiga, Sana Rannen, Naceur Benhadjbrarik (Tunisia)

Abstract –The aim of this paper is to elaborate a control law based on the combination of PID and Backstepping controllers in order to stabilize the inverted pendulum initially unstable. Simulation and real time experimental results show that PID-PID and Backstepping-PID combination had achieved a satisfactory performance. Moreover, it had been concluded that the Backstepping controller is more efficient since it is able to sustain the desired response with rapidity.

Paper Reference: (SAC-8-2) 1570335223
Title: Backstepping and Adaptive control for Variable wind Speed Turbine Based on PM Synchronous Generator
Author(s): Chafik Eddahmani, Hassan Mahmoudi, Marouane El Azzaoui, Karima Boudaraia (Morocco)

Abstract –This paper presents a design and comparative study of backstepping and adaptive nonlinear control for the variable wind speed turbine based on a permanent magnets synchronous generator. The adaptive Backstepping control is applied in order to achieve the high tracking performance of speed control taking into account the parameter uncertainties such as the stator resistance and the rotor flux linkage and load torque. The convergence of variable states is assured by Lyapunov function. To verify the feasibility of the proposed controls, simulations are carried out in Simulink to compare the performances of each controller.

Paper Reference: (SAC-8-3) 1570333738
Title: Behavioral Control UAVs with Multi-threat Evasion Strategy Inspired by Biological Systems
Author(s): Sami El Ferik (Saudi Arabia)

Abstract –The problem of having a multi-agent nonholonomic systems achieve a desired mission in a multi-threat prone environment is addressed in this paper. In such hostile environment, the ability to reach a target, keep formation and evade a threat is crucial. This paper proposes a behavioral control algorithm that makes the multi-agent system operates by switching through different navigation algorithms. To ensure stability while switching, cohesive motion and formation maintenance, evasion if under threat, as well

as mission accomplishment a combination of path tracking and potential field strategies has been implemented. These algorithms are inspired from the behavior control of a school of fish in a foraging mission while under shark attack.

Paper Reference: (SAC-8-4) 1570333327
Title: Speed Tracking of Induction Motors with Backlash Inputs Using Adaptive Backstepping Control
Author(s): Salim Ibrir, Hassan Al-Abudib (Saudi Arabia)

Abstract − Induction motors have attracted the attention of the control community for more than three decades. However, the AC machine has many control challenges due to its complicated dynamics and the effect of model uncertainty of various types. In this paper, the problem of model-based tracking control in the presence of unknown backlash-input nonlinearities is considered. The controller design is based on the adaptive backstepping technique. This technique is proven to be a powerful tool to stabilize nonlinear systems and compensate against systems' uncertainties. The developed results are simulated numerically by the use of MATLAB/SIMULINK software. The obtained results prove the successfulness of the controller in handling input uncertainty while achieving the desired control objective.

Paper Reference: (SAC-8-5) 1570333330
Title: Speed Tracking of Induction Motors with Symmetric Dead-zone Inputs
Author(s): Salim Ibrir, Hassan Al-Abudib (Saudi Arabia)

Abstract − An adaptive nonlinear controller is proposed for speed regulation of induction machines subject to dead-zone voltage inputs. An adaptive backstepping control feedback is designed to cope with the hard input nonlinearity and ensure a bounded-error speed tracking. Numerical simulations have shown satisfactory tracking performances under a minimum knowledge of the dead-zone parameters.

Paper Reference: (SAC-9-1) 1570325995
Title: Swarm Learning in Discrete Time Mean-Field-Type Games
Author(s): Hamidou Tembine (USA)

Abstract − This article examines a swarm learning algorithm for approximating mean-field equilibria of mean-field-type games with continuous action spaces. The results support the argument that a swarm learning algorithm combined with a simple model-free payoff learning algorithm which consists to explore the continuous action set by means of multi-population of particles can provide a satisfactory solution in mean-field-type games. A collaborative learning between the particles of the same player takes place during the interactions of the game, in which the players and the particles have no direct knowledge of the payoff model. Each particle is allowed to observe her own payoff and has only one-step memory. The existing results linking the outcomes to satisfactory set do not apply to this situation because of continuous action space and non-convex local response. We provide a different approach using stochastic difference inclusion for arbitrary number of agents. As the number of iterations grows, there is an emergence of multi-swarm or consen-

sus for each player in many interesting classes of mean-field-type games. We provide a detailed analysis of the error which scales with the learning rates of the players.

Paper Reference: (SAC-9-2) 1570326339
Title: Design of Reduced Order Models for Multi-Time-Scale Systems Via Firefly Optimization
Author(s): Othman Alsmadi, Adnan M. Al-Smadi, Esraa Gharaibeh (Jordan)

Abstract − This paper presents a new model order reduction (MOR) technique of multi-input multi-output (MIMO) systems utilizing the firefly optimization method. The reduction operation is proposed with substructure preservation, as to maintain the exact dominant dynamics in the reduced order model. This is mainly possible for systems that are characterized as multi-time scale systems. Obtaining the reduced order model is achieved by minimizing the fitness function which is related to the error between the full and reduced order models' responses. Simulation results show the potential of the Firefly Algorithm (FA) as an artificial intelligence technique for the process of MOR. The new approach is compared with recently published work on firefly for model order reduction. The superiority of the proposed FA method over the other is clearly seen as illustrated in this paper.

Paper Reference: (SAC-9-3) 1570331921
Title: Optimal Posture Prediction of Human Lower Limb
Author(s): Faqihi Hachmia, Maarouf Saad, Khalid Benjelloun, Mohammed Benbrahim, Nabil Kabbaj (Tunisia)

Abstract − In this paper, a new posture prediction method is proposed and evaluated on human leg, as being a physiologically constrained three-link arm. The main posture prediction solution is focused on optimizing the manipulability and the human performance of the leg. The forward kinematic is used to define the feasible workspace of the human leg in sagittal plane. Using an effective optimization-based human performance measure that incorporates a new objective function of musculoskeletal discomfort, the optimal posture is obtained.

Paper Reference: (SAC-9-4) 1570331955
Title: A Wireless Multi-robot Network Approach for Industry 4.0 using RoBO2L
Author(s): Tim Wruetz, Jens Golz, Rolf Biesenbach (Germany)

Abstract –This research extends the Open-Source Toolbox RoBO2L with a network interface. The toolbox allows controlling of KUKA industrial robots with a remote PC running MATLAB, which provides the ability to connect external hardware to the robot more easily. For instance, 3D Cam Systems, like the Microsoft Kinect. With access to MATLAB toolboxes, the robot can be used for modern research projects combining industrial robotics with machine learning applications. Caused by the architecture of the robot system the connection between the robot controller and remote PC needs to be a

direct UDP/IP connection, the network interface bypasses this disadvantage and opens new possibilities, like controlling multiple robots at once, maneuver wireless or remotely control it via the internet. The idea of this contribution is to add a second remote PC, managing a network of parallel working computers running RoBO2L.

Paper Reference: (SAC-9-5) 1570332001
Title: Design of fractional PID controller using multi-objective optimization methods
Author(s): Marwa Houiji, Naziha Araari (Tunisia)

Abstract − This paper deals with a design of a fractional PID controller using the multi-objective optimization methods. Two new design approaches are proposed and based on frequency domain specifications. They achieve good robustness to gain variations by maintaining the open-loop phase quasi-constant in a crossover frequency.

Paper Reference: (SAC-9-6) 1570327597
Title: Control of Electric Unicycles
Author(s): Abdulwahid A. Al-Saif (Saudi Arabia)

Abstract − In this paper, several controllers were proposed and developed to control and maintain the balance of electric unicycle. The proposed controllers are Linear Quadratic Regulator (LQR), Linear Quadratic Regulator with Integral action (LQRI) and Feedback Linearization controller (FBL). Then a comparison is held based on disturbance rejection and tracking ability for desired unicycle speed. The performance and merit of FBL are well exemplified by conducting several simulations in Matlab/Simulink environment.

Paper Reference: (SAC-10-1) 1570332401
Title: Implementation of Fractional-Order PID Controller in an Industrial Distributed Control System
Author(s): Mohamed Abdelkarim, Mohamed El-Hawwary, Hassan Emara (Egypt)

Abstract − Fractional-Order Proportional-Integral-Derivative (FOPID) controllers presents a natural extension to PID controllers, which have been used profusely in industrial control systems, and are of great practical preference. This paper presents an implementation of FOPID control in an industrial distributed control system (DCS) that is used here for level process control. The setup is composed of ABB DCS AC 700F2 (the controller) connected to Lab-Volt Level Process Station (the plant). To implement an FOPID controller for this setup, a function block is built in the industrial controller using a certain discrete form of FOPID control. A comparison of the system response using FOPID and conventional PID controllers is performed via simulation (using a response optimization tool) and experimentally (using the setup). The results show a relative improvement in system response using FOPID control.

Paper Reference: (SAC-10-2) 1570333753
Title: Adapting Raspberry Pi to Miniaturized Safety Systems for Industry 4.0 Control Applications
Author(s): Ali Hayek, Sebastian Domes, Josef Boercsoek, Johannes Klos (Germany)

Abstract − The 4th industrial revolution enables through the networking of automated systems a realization of modular, flexible, economic and networking production processes. Control Machines and production plants are networked over various communication channels and they organize themselves in an intelligent way. Products are created in an automated way at the request of the customers and tailored to the customers specific needs. Highly networked system structures will evolve including the interference of humans as well as of machines. Apart from IT security functional safety plays an increasingly important role in the networking of humans and machines. In the future, safety functions shall not only control and monitor production processes but they shall be in a position to be maintained and configured in a flexible way by the user. In this paper, a possible implementation is introduced, which is able to connect the functional safety with a compact, cost-effective system that is widely used in industry.

Paper Reference: (SAC-10-3) 1570332011
Title: An Internet Platform for Open-Source Robot Offline Programming Interface RoBO2L
Author(s): Tim Wruetz, Jens Golz, Rolf Biesenbach (Germany)

Abstract − The main goal of the RoBO2L project is the development of a MATLAB interface for cross platform Model-Based Design for robot motion control. The open source interface allows the offline programming of an industrial robot with standard MATLAB software. The MATLAB interface enables the programming of an industrial robot with a widespread common engineering tool. Additionally RoBO2L opens the integration of manufacturer independent or not supported soft- and hardware components, e.g. webcams or game controller. This paper describes the features of the developed toolbox and introduces the new web platform for the open-source software.

Paper Reference: (SAC-10-4) 1570328648
Title: Performance Evaluation of Autonomous Deployment of WSAN in a Real Environment
Author(s): Gamal Sallam, Mohammed Al-Shaboti, Uthman Baroudi (Saudi Arabia)

Abstract − Robots deployment is becoming so popular due to its applications in different aspects, especially in areas where human intervention is not possible or poses a high risk. Multi-robots deployment in an unknown environment is a new challenging problem that needs to be investigated to understand the behavior of robotics applications under real parameters. For instance, in industrial place robots can be sent to a building to detect a source of gas leakage or help to discover bodies under rubbles in case of damaged buildings. Virtual force has been proposed to tackle such a problem; however, most of the existing studies did not consider the physical properties of the robots and

obstacles and their overall effect on the deployment purpose. In this paper, we will investigate two variants of the virtual force approach, full virtual force, and modified virtual force, taking into consideration all the physical aspects of Khepera III robot. The proportional-integral derivative (PID) controller has been utilized to control the robot movement towards the intended target when obstacles exist. The implementation has been carried out using a high fidelity simulator called Webots

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Paper Reference: (SAC-10-5) 1570326397
Title: Safe Navigation and Target Recognition for a Mobile Robot Using Neural Networks
Author(s): Mohammed Mehdi Ali (Jordan)

Abstract − Recently, there is a large demand on using mobile robots in different life applications. Thus, it is of importance to ensure mobile robot safe navigation towards its destination. In this research Robotino from Festo company is used to confirm safe navigation issue along with red color target recognition using its IR and camera sensors respectively. Real-time and simulation experiemental results have been obtained in labrotories of faculty of engineering / Philadelphia university / Jordan. Results were taken to train two multi-layers perceptron neural networks. One of them is used to force Robotino moving towards its target by controlling its linear velocity, while the other one is used to move Robotino avoiding any possible static or dynamic obstacle in its route. Matlab workspace is used for system analysis and design.

Paper Reference: (SAC-10-6) 1570325998
Title: Wireless Control of a Human Replacement Robot: Design and Implementation
Author(s): Kasim M. Al-Aubidy (Jordan)

Abstract − The objective of this paper is to design and implement a human replacement robot that consists of a mobile robot holding two 6-DOF manipulator arms and two wireless cameras mounted on moving plate attached on top of the robot. The human operator can control the robot wirelessly via wearable suit and virtual reality glasses. Moreover, the operator can control robot movement by special pedals placed under his legs. The experimental and simulated results confirm that the given prototype perform the same tasks and movement obtained by the operator with acceptable accuracy and speed. Such a robot is suitable for unreachable areas with minimum training needed for operator to start using the robot.

Paper Reference: (SAC-11-1) 1570336376
Title: Predictor-based stabilization for chained formsystems with input time delay
Author(s): Faiçal Mnif (Tunisia)

Abstract − This paper addresses the stabilization problem of nonlinear chained-form systems with input time delay. We first employ the so-called sigma-process transformation that render the feedback system under a linear form. We introduce a particular transformation to convert the original system

into a delay-free system. Finally, we apply a state feedback control, which guarantees a quasi-exponential stabilization to all the system states, which in turn converge exponentially to zero. Then we employ the so-called -type control to achieve a quasi-exponential stabilization of the subsequent system. A simulation example illustrated on the model of a wheeled mobile robot is provided to demonstrate the effectiveness of the proposed approach.

Paper Reference: (SAC-11-2) 1570331805
Title: Delay-Dependent Stability condition for linear 2-D state-delayed systems
Author(s): Hicham El Aiss, Nabil Echakroune,Hafsaa Rachid, Abdelaziz Hmamed, Ahmed El Hajjaji (Morocco–France)

Abstract − This paper deals with the problem of delay-dependent stability of 2D continuous delay systems with constant delay, described by the Roesser model. Based on the 2D version of the auxiliary function-based inequalities extended from 1D version and an appropriate 2D version of Lyapunov Krasovskii functional, without introducing any free weighting matrices, new stability condition are established in term of linear matrix inequality (LMI). Numerical example is given to compare with some previous results and demonstrate the effectiveness and the improvement of the method proposed.

Paper Reference: (SAC-11-3) 1570332087
Title: Stabilization of Discrete Singularly Perturbed Systems with Time-Delay
Author(s): Rakia Abdeljawad, Nesrine Bahri, Majda Ltaief (Tunisia)

Abstract − This paper treats the stabilization bound problem for discrete singularly perturbed systems with time delay. Based on Lyapunov-Krasovskii functional, a state feedback stabilization control design is proposed. A new sufficient condition given as a set of Linear Matrix Inequalities(LMIs), guarantees the existence of state feedback controller and the asymptotic stability of the closed loop system. Finally, an example is given to show the advantage and the effectiveness of the obtained result.

Paper Reference: (SAC-11-4) 1570332392
Title: Cartesian Sliding Mode Tracking Control of an Exoskeleton Robot Based on Time Delay Estimation
Author(s): Brahim Brahmi, Maarouf Saad, Cristobal Ochoa Luna, Mohammad habibur Rahman (Canada)

Abstract − This paper presents a Cartesian adaptive control based on a robust Sliding Mode and Time Delay Estimation (CSMTDE) for controlling a redundant exoskeleton robot called ETS-MARSE subject to uncertain nonlinear dynamics and external forces. The robustness and accuracy are achieved by selecting a sliding Cartesian surface and a sliding joint surface. The combination between them is done by the nonlinear Jacobian matrix. The stability of the closed loop system is solved systematically, ensuring asymptotic convergence of the output tracking errors. Simulation results manifest the efficiency of the suggested control to provide an excellent performance despite the presence of dynamic uncertainties and external disturbances.

Paper Reference: (SAC-11-5) 1570331907
Title: Control of Yaw Motion of Nonlinear Unmanned Underwater Vehicle over Wireless Network
Author(s): Abdulwahid A. Al-Saif (Saudi Arabia)

Abstract − The paper investigates the control performance of yaw motion of nonlinear semi autonomous Unmanned Underwater Vehicle (UUV) based on Model Reference Adaptive Control (MRAC). The mathematical model of a semi-autonomous UUV called LAURS, which is developed by Sensors and Actuators Laboratory at University of Sao Paolo. We designed the controller outside of UUV and used wireless network to transmit the data from and to UUV. The is applied to MRAC to compensate dynamic system and provide the stabilization. There is time delay to transmit and receive data over wireless network. We compared the proposed control performance to control the UUV with varying scenarios of different distance between UUV and controller. The proposed control design is able to control the system.

Paper Reference: (PSE-1-1) 1570326102
Title: Direct and Indirect Field Oriented Control of DFIG-Generators for Wind Turbines Variable-Speed
Author(s): Yasmine Ihedrane, Chakib El Bekkali, Bossoufi Badre (Morocco)

Abstract − In this paper, we present a study and modeling of a wind system based on Doubly-Fed Induction Generator (DFIG) , whose stator is directly connected to the grid in contrast to the rotor which is linked via power converters. The objective of this modeling is to improve the performance of the wind system by applying direct and indirect field oriented control to control the active and reactive power exchanged between the stator of the DFIG and the grid . The simulation results are tested and compared in order to evaluate the performance of the proposed system.

Paper Reference: (PSE-1-2) 1570331722
Title: Sensorless control with an Adaptive Sliding Mode Observer For Wind PMSG Systems
Author(s): Marwa Ayadi, Omar Naifar, Nabil Derbel (Tunisia)

Abstract − In this work, a robust sensorless control technique for a directly driven Permanent Magnet Synchronous Generator-wind Turbine (PMSG-WT) is proposed. This approach is based on Adaptive sliding interconnected observers witch estimate the rotor speed, the stator currents and the stator resistance. The vector control is the control strategy applied to the PMSG. The stability analysis of the applied observer is provided using the Lyapunov stability theory. The validity of the proposed control algorithm is shown by simulation studies.

Paper Reference: (PSE-1-3) 1570331792
Title: New MPPT Control for Wind conversion System based PMSG and a comparaison to Conventionals approachs
Author(s): Hassan Abouobaida, Said El Beid (Morocco)

Abstract − This study aims to apply the ripple correlation current (RCC) approach, which is an MPPT search algorithm used in photovoltaic systems. To extract the maximum power, a wind conversion structure based on a permanent magnet synchronous generator (PMSG), a three-phase rectifier and a boost converter is used. The choice of this structure is justified by the reliability, simplicity of implementation and control. This paper discusses the performance evaluation of new MPPT algorithms called RCC (ripple correlation current) in comparison with the conventional methods. To achieve this objective, four criteria are chosen: speed convergence, need of mechanical sensors, accuracy and dependence of the previous position. The main features presented in this paper are as follows: (a) modeling the power wind conversion systems, (b) presenting and detailing each MPPT algorithm (c) showing the proposed RCC MPPT and it implementation results, (d) conducting a discussion and give an evaluation of the proposed approach according to the criteria cited in comparison with the conventional methods.

Paper Reference: (PSE-1-4) 1570332104
Title: Development of a useful Wind Turbine Emulator Based on Permanent Magnet DC Motor
Author(s): Loubna Benaaouinate, Mohamed Khafallah, Abdelouahed Mesbahi (Morocco)

Abstract − In order to provide a testing for Wind Energy Conversion Systems (WECS) control strategies, a Wind Turbine Emulator (WTE) was designed and realized. The experimental implementation of the WTE for WECS consists of permanent magnet DC motor controlled by Pulse-Width Modulated (PWM). A DC motor is used to generate speed and torque required by the aero generator (PMSG) for producing electrical power. The model of wind turbine and the control of DC motor, which emulate the wind turbine, are implemented in MATLAB/Simulink platform. Results confirm that the WTE can provide all necessary parameters of the wind turbine system such as wind speed, output torque, power coefficient and tip speed ratio. Simulation results show good performances of the proposed control law.

Paper Reference: (PSE-1-5) 1570332166
Title: Intelligent control of wind pump based on PMSG using pitch control
Author(s): Aroua Slimen (Tunisia)

Abstract − This paper presents the design of an intelligent wind turbine pitch control of a permanent magnet synchronous generator (PMSG), used to regulate the DC bus voltage controller, output of the converter for a 150V pumping load, Where a fuzzy inference mechanism is used to estimate the upper limit of uncertainties. In addition, fuzzy inference makes it possible to adjust the output voltage, obtain greater efficiency in the use of wind energy and provide protection for the turbine blades. In the first part, we have presented the modeling system with a pitch control. In the second part a presentation of the results of the simulation system analyzed and validated by Matlab simulation.

Paper Reference: (PSE-1-6) 1570333609
Title: Comparative study between PI and the sliding mode control for the DFIG of a wind turbine
Author(s): Nadia Machkour (Morocco)

Abstract – This article presents a comparative study between the indirect field-oriented control (IFOC) with ProportionalIntegral controller (PI) and the sliding mode control of a doubly fed induction machine (DFIG), dedicated to the production of the electrical energy in a wind system. Both types of control are presented in this paper to compare their performances in terms of follow-up of deposits and robustness towards parametric variations of the DFIG.

Paper Reference: (PSE-2-1) 1570329825
Title: Diagnoses and Mitigation of the Corrosion due to the Coupling Between the HVPTL and Buried Pipelines
Author(s): Mohamed Ouadah (Algeria)

Abstract –In this paper, the corrosive effects of the electromagnetic induction caused by double circuit high voltage power transmission lines (HVPTL) on the buried X70 steel pipelines were diagnoses and mitigate. To achieve this objective, firstly the electromagnetic interference between the double circuit HVPTL and the X70 steel pipeline were studied. Then, electrochemical measurements were used to characterize the corrosion polarization properties of X70 steel in simulated soil at various AC current densities. The results show that the electromagnetic induction caused by the double circuit high voltage power lines affects the electrochemical characteristic of the X70 steel pipeline and accelerates the corrosion of the pipeline. However, some technical solutions were proposed to prevent the pipelines from AC corrosion.

Paper Reference: (PSE-2-2) 1570331975
Title: A Review of Techniques for Overcoming Challenges to Microgrid Protection
Author(s): Marwan Alluhaidan, Ibrahim Almutairy (USA)

Abstract – Microgrids are becoming increasingly popular with consumers. In the near future, many microgrids will be installed for consumers with widely varying energy needs. The most challenging of the requirements for these microgrids is finding a suitable protection scheme that is able to protect the microgrid in both grid-connected and islanded modes of operation. The purpose of this paper will be to provide a review of existing protection schemes for the protection of microgrids. Protection schemes should be capable of detecting short circuits and which faults are cleared by the devices that protect the microgrid system and isolate the faulted equipment. A combination of protective algorithms ensures the successful operation of protective devices and helps to develop different ways to deal with issues related to the protection of microgrid distribution systems. Outlined in this paper are the protection issues as well as existing techniques of microgrid protection.

Paper Reference: (PSE-2-3) 1570332335
Title: Augmented and Virtual Reality Approaches to Help with Peripheral

Vision Loss
Author(s): Ola Younis, Waleed Al-Nuaimy, Majid A. Al-Taee, Ali Al-Ataby (United Kingdom)

Abstract − Peripheral vision loss (also called tunnel vision) is one of the main visual field disorders that can be very frustrating, and affect confidence and main activities of the patient. In this paper, two promising solutions for the peripheral vision loss are presented and discussed. The first one uses optical see-through glasses that are augmented by computer-generated images to notify the user about any moving parts the peripheral vision area. The second solution is to create a complete artificial reality scene and display it in the healthy area of the eye. In this case, the lost part of the vision is provided by: (i) augmenting the captured scenes (via built-in cameras) and (ii) generating an artificial image for the peripheral vision. For both scenarios, a unit of ubiquitous computing is proposed to process and present the captured images in a way tailored to individual needs of the patients. Technical requirements and psychological aspects of the proposed solutions are also presented and discussed in this paper.

Paper Reference: (PSE-2-4) 1570340522
Title: State of charge estimation of lead acid battery using a Kalman filter
Author(s): Jihen Loukil, Ferdaous Masmoudi Loukil, Nabil Derbel (Tunisia)

Abstract − As an energy saving unit, lead acid battery plays an important role in photovoltaic system. Battery state of charge estimation is a key function of battery management system due to the requirement of ensuring optimum operation and safety. So, in order to achieve a reliable operation, it is necessary to develop an accurate model for the estimation of the state of charge (SOC) of battery. In this paper, a RC equivalent circuit model has been presented. A state representation of battery has been developed. A kalman filter has been proposed to determine the SOC. The model of battery and the recursive algorithm have been implemented on Matlab-Simulink and Simpower softwares. Recovered simulation results have been compared by an experimental works applied to a lead acid battery 12V, 7Ah. Obtained results show an acceptable correspondence with the experimental test. The kalman filter approach can be an useful tool for researchers to imitate the real behaviour of the battery and to ensure the accurate estimation of SOC.

Paper Reference: (PSE-3-1) 1570325949
Title: Solar Cell and Module Parameters Identification Using Analytical Appraoch and Numerical Method
Author(s): KrNoureddine Maouhoub (Morocco)

Abstract −in this paper a method based on analytical approach and numerical method is proposed to extract the five physical parameters of illuminated solar cells and modules from their experimental current-voltage characteristic using the single diode equivalent circuit model. The proposed procedure is based on analytical calculation of series resistance Rs and calculate the other parameters (shunt resistance Rp, saturation current I0 and photo-current Iph) by solving a linear system of three equations using least squares method for different

values of ideality factor between 1 and 2. The optimal values are given at lowest normalized root mean squared error (NRMSE). The method is applied on experimental characteristics of RTC commercial solar cell and KC200GT PV module. The extracted parameters have shown good agreement compare to other methods and the simulated I-V characteristic have shown best fit with experimental data.

Paper Reference: (PSE-3-2) 1570326469
Title: A Detailed Analysis of Photovoltaic Panel Hot Spot Phenomena based on the Bishop Model
Author(s): Chokri Belhadj, Ibrahim Banat, Mohamed Deriche (Saudi Arabia)

Abstract − In this paper, we introduce a detailed photovoltaic panel (PV) model that includes Bishop circuit representation for the hot spot phenomena. The hot spot phenomenon is considered as preliminary damage occurring in solar panels. The main reasons are shading and possibly dust accumulation. The hot spot reduces the output power of the panel and it life time. The developed model was based on Matlab /Simulink tool. The model simulation results confirm the shading rate control on the amount output power. The hot spot, current distribution detailed picture was reached under several testing conditions. The presented detailed has shown its capability to follow the switching action of the by pass diode during the event of shading in a panel string. The details about shunt current, string current along with the corresponding power dissipation in a panel string are newly introduced in this work.

Paper Reference: (PSE-3-3) 1570331618
Title: Electrical design of a photovoltaic-grid system for electric vehicles charging station
Author(s): Abdelilah Hassoune Mohamed Khafallah Abdelouahed Mesbahi Dominique Breuil (Morocco)

Abstract − This work presents a smart method for a photovoltaic-grid system for electric vehicles charging station, however, it describes the flow power through a smooth algorithm using MATLAB/Simulink environment. The consumption of electric vehicle battery is considered as a daily load for the charging station, indeed, it is highly recommended to predict the periodic power use in the charging station. However, the storage system is ensured through a lithium ion battery, which provides a wider operating temperature and others convenient characteristics. Additionally, the contribution of the electrical grid is also combined in this architecture as a back-up plan for mutual benefits when the photovoltaic power is unable to secure the station needs, on the one hand and on the other hand, when the battery of the charging station is fully charged and the photovoltaic system is able to inject an extra energy in the grid.

Paper Reference: (PSE-3-4) 1570331674
Title: Modeling and performance analysis of a solar PV power system under

irradiation and load variations
Author(s): Fatima-Ezzahra Tahiri, Khalid Chikh, Mohamed Khafallah (Morocco)

Abstract – This paper presents a modeling and simulation, in Matlab/Simulink environment, of a stand-alone solar PV system in order to analyse its performance under irradiation and load variations. Indeed, to supply an alternative load with a sinusoidal line without harmonic distortion under weather conditions, a MPPT (Maximum Power Point Tracking) algorithm has used to control a DC-DC boost converter to generate the MPP (Maximum Power Point) of the photovoltaic generator to alternative load via a PWM (Pulse Width Modulation) three phase inverter. The computer simulation results, in Matlab/Simulink environment, presented in this paper validate the full PV system components.

Paper Reference: (PSE-3-5) 1570332121
Title: Improvement Photovoltaic system provided Buck converter assuring optimum functioning independently
Author(s): Mostafa El ouariachi (Morocco)

Abstract – In this paper, we analyze the conception, the realization, and the optimization of a photovoltaic system (PV) adapted by a converter DC / DC of Buck type and an analogical MPPT command provided with a detection circuit of the dysfunction and convergence of the system (CDCS). The CDCS circuit allows assuring an optimal functioning of the PV panels independently in the variations of the conditions meteorological (illumination, the temperature) and of the load. From the modeling of the optimal functioning of PV panels and the complete system in the simulator Pspice, we showed the good functioning of the system PV conceived and realized during this work. During whole days of functioning, we showed that the efficiency on the converter is very satisfactory (of the order of 80 %) and the electric losses of power supplied by the PV panel are lower than 8 %.

Paper Reference: (PSE-3-6) 1570338114
Title: Design and Comparison of Quadratic Boost and Double Cascade Boost Converters with Boost Converter
Author(s): Nesrine Boujelben, Ferdaous Masmoudi, Nabil Derbel, Mohamed Djemel (Tunisia)

Abstract – Basically, the output voltage in renewable energy sources is improved using the boost converter, which is the key part in a photovoltaic chain. In this converter, the switching frequency is limited; hence the output voltage is reduced. To overcome this problem, two topologies are proposed; the quadratic boost converter results by combining the components of two boost converters by using single switch and the double cascade boost results from the association of two identical elementary boost converters connected in tandem. In this proposed paper a comparison of the efficiency of the two proposed converters topologies with boost converter is discussed.

Paper Reference: (PSE-3-7) 1570338118
Title: Comparative Study of Fundamental Variable Input Converters used for PV Conversion Systems
Author(s): Rabeb Abid, Ferdaous Masmoudi Loukil, Nabil Derbel (Tunisia)

Abstract –This paper studies the design, the sizing and the simulations of power conversion stages devoted to photovoltaic applications. A linearization method of the nonlinear characteristics of the load and the source around the maximum power point is presented. The sizing and modeling of six topologies of fundamental and developed DC/DC converters operating in continues conduction mode was detailed and implemented taking into consideration of the parasitic effects of the used components. There six structures DC/DC converters have been compared through a connection between a 50W PV panel and a resistive load with battery. This comparison is developed in terms of efficiency and voltage transfer gain using different output voltage batteries (6, 12, 24 and 48V).

Paper Reference: (PSE-4-1) 1570325997
Title: Quantile-based Mean-Field Games
Author(s): Hamidou Tembine (USA)

Abstract –In this paper we introduce a new class of mean-field games with common noise based on conditional quantiles. Each decision-maker revises her strategy based on the quantiles. This generates a new conditional distribution which is a random measure. Based the best-response of the decision-makers, the conditional quantile process satisfies a stochastic partial differential equation (SPDE) in the non-degenerate case. The methodology is illustrated in an auction mechanism in prosumer (consumer-producer) markets in which the prosumers can submit their bids and the respective bids that are below the market price may be selected depending on the quantity needed by the operator to compensate the mismatch between supply and demand in peak hours.

Paper Reference: (PSE-4-2) 1570329374
Title: A Speed Measurement Method for Fast Assessment of Power System Transient Stability
Author(s): Ahmed AlTaee, Majid A. Al-Taee, Waleed Al-Nuaimy (Australia–United Kingdom)

Abstract – The demand for fast measurement of angular speed has been increased in recent years for many online applications. In particular, early fault detection and transient stability assessment and control. This paper presents a new fast-speed measurement method for computing the rate of change of kinetic energy (RACKE) in real-time. RACKE is an effective criterion for assessment of transient stability in power systems, which was thoroughly investigated using computer simulation. Design and implementation of the proposed speed measurement method is based on a 16-bit microprocessor system and associated hardware circuitry for interfacing an electromagnetic speed sensor to a power system simulator. Operation principle of the proposed method is mathematically formulated and implemented using an efficient software algorithm. Performance of the proposed speed measurement method is assessed

experimentally using a single machine infinite bus power system. The obtained results and observations have demonstrated high accuracy and efficient time complexity. This allows for further investigation of RACKE criterion using practical implementations rather than computer simulations.

Paper Reference: (PSE-4-3) 1570331617
Title: Implementation of AMI in City Energy Management Systems
Author(s): Hyeong-Jin Choi, Sisam Park, Wonsuk Ko, Essam A. Al-Ammar (Korea–Saudi Arabia)

Abstract − AMI (Advanced Metering Infrastructure) system is constructed for the development of energy management system in this paper. To show a various type of energy saving simulation execution result, renewable systems such as wind, PV, and thermal systems operating site have been selected and the monitoring system of AMI system is built for the measured data. First, the energy demand profile of the reference site is analyzed to calculate reductions after applied the use of renewable sources. Then the operating scenario is determined through RTP (Real Time Pricing). Finally, the outcome of Load Shifting operation is simulated. The result shows that electricity cost can be reduced about 11,600 KRW/day and it is equivalent to 9.65 USD/day, 3.8% saving of electricity cost.

Paper Reference: (PSE-4-4) 1570332063
Title: Dynamic Under Frequency Load Shedding in Power Systems
Author(s): Khadija Ben Kilani, Mohamed Elleuch, Adnene El Haj Hamida (Tunisia)

Abstract − This paper proposes a dynamic under-frequency load shedding scheme allowing faster frequency re-establishment and system restoration. The proposed scheme is based on a combination of two criteria: frequency predefined minimum thresholds and the rate of change of frequency (ROCOF). The scheme comprises a fault detection stage, an initial shedding stage, and an accelerated shedding stage. The amount of load to be shed and its critical acting time are anticipated from the first stage frequency gradient. The proposed load shedding method was tested on the IEEE 9 bus 3 generators power system for loss of generation contingency, under different loading conditions. The simulation results demonstrate the advantages of the proposed technique in terms of avoiding unnecessary load shedding, and faster re-establishment of stable operation.

Paper Reference: (PSE-4-5) 1570332155
Title: Some Aspects of the Tunisian Power System Transient Stability
Author(s): Adnene El Haj Hamida, Khadija Ben Kilani, Mohamed Elleuch (Tunisia)

Abstract − This paper exposes some aspects of the Tunisian power system transient stability, drawn from the operational experience of the network. Different types and criteria of stability are considered: angular stability is studied by determining the fault critical clearing time after short circuit faults. Frequency stability is assessed function of allocated primary reserves and under-

frequency load shedding at different loading conditions: peak load and off-peak load. Various contingent scenarios are considered: the trip of the largest generating unit and loss of load, combined with inadequate operation of power system stabilizers (PSS). The results are discussed in terms of stability of northern and southern regions of the Tunisian electric network

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Paper Reference: (PSE-4-6) 1570332191
Title: Comparative study to reduce and control radiated EMI in planar power devices
Author(s): Nassima Tidjani, Fatima Djerfaf, Jean-Charles Le Bunetel (Algeria–France)

Abstract – In this work, we propose a comparative study to reduce, and control radiated electromagnetic interference (EMI) as crosstalk in planar power devices, such as a PCB board of boost converter DC-DC. The PCB board contains two coupled microstrip: power, and control lines that induce a strong crosstalk. A comparative study between several methods against crosstalk is proposed. The serpentine guard trace and the guard trace with via holes are explored in this work. But the serpentine guard trace can be transformed, into an additional source of electromagnetic interference by a crosstalk peak. To control this crosstalk peak, we added a microstrip steps in the width, between the coupled lines. This method allows to reduce more than 84% of the NEXT, and more than 68% of the FEXT.

Paper Reference: (PSE-5-1) 1570322664
Title: Simplified Approach for the Analysis and Design of DC Drive System
Author(s): Audih Al faoury, Mohammed Lazim (Jordan)

Abstract –A simplified frequency method for the parameters design of a thyristor speed regulator of a d.c motor is presented. The approximation of dynamics of the thyristor controller by Pades expansion simplifies the design and gives more accurate results than that when using the approximation by means of Hurwitz polynomial approximation or other conventional approximation techniques. The proposed method gives a simple approach for analysis and design of d.c. drive system parameters without going to the more complicated methods suggested recently for solving the d.c. drives problem.

Paper Reference: (PSE-5-2) 1570326667
Title: Impact of NPC multilevel inverter on circulating harmonic currents of double star induction machine
Author(s): Hajer Kouki (Tunisia)

Abstract – The fed of multiphase induction machines by a two level voltage source inverter is subject to vary extra harmonic currents of stator windings that causes losses and require larger semiconductor device ratings. In this paper, in order to eliminate these extra harmonic currents, the double star induction machine is supplied by a neutral-point-clamped (NPC) voltage inverter using the vector space decomposition concept while taking into account the stator mutual leakage between two stars. A generalized mathematical model of "N" levels inverters feeding the double star induction machine is

presented. The simulation results illustrate the validity and efficiency of the proposed strategy.

Paper Reference: (PSE-5-3) 1570331448
Title: Particle Swarm-Based Optimization of an In Wheel Permanent Magnet Motor
Author(s): Lassaad Zaaraoui, Ali Mansouri, Trabelsi Hafedh (Tunisia)

Abstract − As part of the optimization of electric machines, we are interested in this work to optimize the geometrical parameters of an in-wheel permanent magnet motor with an external rotor and concentrated windings. In the magnetic circuit optimization, three based Particle Swarm Optimization (PSO) multi-objective optimization algorithms were applied: Multi-Objective Particle Swarm Optimizer (OMOPSO), Speed-constrained Multi-Objective PSO (SMPSO) and Dual Multi-Objective PSO (DMOPSO). To achieve an optimized design, two objective functions are implemented while respecting certain constraints: (i) the first relates to increasing the machine efficiency and, (ii) the second concerns the machine weight minimization because it is directly coupled into the wheel. We have also presented the behavior of DMOPSO which can include a preference of the weight objective compared to the efficiency objective during the machine optimization.

Paper Reference: (PSE-5-4) 1570331653
Title: Finite frequency T-S fuzzy control for a variable speed wind turbine
Author(s): Youssef Berrada, Abderrahim El amrani, Ismail Boumhidi (Morocco)

Abstract − This paper investigates a finite frequency Takagi-Sugeno (T-S) fuzzy controller synthesis for a variable speed wind turbine. The proposed control design is based on both the T-S fuzzy modeling and the finite frequency approach. The T-S fuzzy model is proposed to deal with a nonlinear behavior of wind turbine, and the finite frequency approach allows the command in a specific domain of frequency. Using generalized Kalman-Yakubovich-Popov (GKYP) lemma the design controller conditions are presented in linear matrix inequalities (LMIs) terms which can be solved easily using existing numerical tools. In order to illustrate the performance of the proposed control algorithm, numerical simulations are performed using Matlab 7.6.0 software.

Paper Reference: (PSE-6-1) 1570331427
Title: Experimental Energy Management of Hybrid Fuel Cell/Battery System
Author(s): Moussa Boukhnifer (France)

Abstract − This paper treats the sizing and Energy Management (EM) of Fuel Cell/battery source for automotive application. The fuel cell system is used as the main source and batteries pack is the auxiliary one. A bidirectional DC/DC converter is used to connect the batteries to the DC bus and a DC/DC boost converter associates the fuel cell stack with DC link. A sizing algorithm is developed to determine the Energy Storage System (ESS) sizes. The proposed sizing approach and simulations results leads to show satisfied results regards weight, volume and cost. An online EM strategy is used to

manage the power between the main and the auxiliary source by determining the power profile of each one. This strategy is based on frequency splitting, it takes into account the slow dynamics of FC and the batteries constrains. Experimental energy management for developed hybrid FC/Battery system of ESTACA is presented. Experimental results lead to confirm the efficiency, robustness and stability of the proposed approach regrading dynamic performances during power demand, and regenerative braking.

Paper Reference: (PSE-6-2) 1570331581
Title: Battery Performance and Low Power Challenges for Standalone Mechatronic Devices
Author(s): Samir Mekid, Rifaqat Hussain (Saudi Arabia)

Abstract − This paper investigates low power consumption in standalone devices and sensors using known batteries based on their chemical composition and discusses alternative power source e.g. Ambient Radio Frequency (RF) harvested power than can be stored in batteries or used directly. Several types of batteries technologies were tested to estimate lifetime and related power thresholds needed by sensor boards to ensure proper operation. Difficult to reach standalone sensors could have very challenging scheduled power maintenance. The work has also carried out investigations for power consumption versus a lifetime of battery depending on their type and performance. An example of power consumption budget is discussed. Alternative ways to reduce or optimise power consumption are also discussed.

Paper Reference: (PSE-6-3) 1570332356
Title: Photovoltaic power forecasting using recurrent neural networks
Author(s): Rim Ben Ammar, Abdelmajid Oualha (Tunisia)

Abstract − The variability of the Photovoltaic power, due to the ever-changing weather conditions, induces many difficulties in grid management. Thus, the PV power prediction becomes highly recommended to ensure grid stability and service continuity. This paper presented daily, monthly, weekly and yearly power output forecasting of a PV system using recurrent neural networks namely the modified Elman, Jordan and the hybrid model combining the latest techniques. They were trained based on past data from the National Institute of Meteorology adopting a standard back propagation algorithm. After training,the test of the different networks and the comparison between the predicted and the measured powers showed that the average error between them doesn't exceed 8%. The lowest percentages of the Root Mean Squared Error, the Mean Absolute Error and the highest percentages of the Correlation Factor proved that the modified Elman neural network performed better than the Jordan and the hybrid networks.

Paper Reference: (PSE-6-4) 1570332991
Title: A Control Strategy Applied to Hybrid Renewable Energy System Operated in MPPT Strategy
Author(s): Nadia Machkour, Zakaria Sabiri (Morocco)

Abstract –The topic work's the modeling and control of a hybrid system composed on a photovoltaic field and a wind turbine based on the Doubly Field Induction Generator DFIG. The objective is to control the two sources separately in order to extract the maximum of power from the energy of the sun and the wind. For this purpose, a Backstepping controller based on the Lyapunov functions is used, ensuring the stability of the system, to control the various converters constituting the system. A simulation of the control laws using the Matlab / Simulink software was done to check their validities.

Paper Reference: (PSE-6-5) 1570335191
Title: Simulation, Design and Test of an Efficient Power Optimizer Using DC-DC Interleaved Isolated Boost
Author(s): Khadija Elkamouny, Hassan Mahmoudi, Brahim Lakksir, Abdelilah Benyoussef, Mohammed Hamedoun (Morocco)

Abstract – As the photovoltaic solar energy is as well promising as other renewable energies, much research and development are underway, to improve the performance of an installation. These improvements are made at the same level of PV modules manufacturing but the PV systems are less efficient because of the climatic conditions that alter their performance. For this reasons, the 'MLPEs' (Module-Level Power Electronic) include as a solution, not only to make a good harvest of the maximum power delivered by the PV, but also to adapt the DC output of the PV to the load or the grid voltage. The modules have generally a power up to 500W. Each PV module integrates its power optimizer or micro inverter that makes it more effective. The use of the multiple modules allows having a greater power if it is needed. This paper presents the simulation, design and test of an efficient power optimizer using a DC-DC interleaved isolated boost. It focuses on the optimization of DC/DC converter performances and its physical dimensions, and presents an efficient method to track the maximum power point and the load regulation. For this purpose, a specific architecture and design of a high-reliable, robust, stable and miniaturized system are proposed.

Paper Reference: (PSE-6-6) 1570343420
Title: Implementation of MPPT Algorithm For Photovoltaic System based On Pertub and Observe Method
Author(s): Houda Brahmi (Tunisia)

Abstract – This study presents an efficient control for photovoltaic (PV) generator computing the Maximum Power Point (MPP). The mathematical model of photovoltaic generator is presented. The variation of series and shunt resistor are taken into account in the PV model and are dynamically identified using Newton Raphson algorithm. The proposed control strategy is based on the perturb and observe method. Simulation results and experimental realization are presented to validate the advantages of the proposed control study.

Paper Reference: (PSE-7-1) 1570332225
Title: Design and realization of a single-phase inverter with numerical control

based on an Atmega32
Author(s): Mostafa El ouariachi (Morocco)

Abstract − This article aims to develop the control circuit of a single-phase inverter following our previous studies on the MPPT control and photovoltaic systems, this inverter produces a pure sine wave with an output voltage that has the same amplitude and frequency as Network voltage. A microcontroller, based on advanced technology to generate a sinusoid with fewer harmonics, less cost and a simpler design. The technique used is the sinusoidal pulse width modulation generated by the ATmega32 microcontroller. The designed inverter is tested on various AC loads and is primarily focused on applications such as an AC lamp. Proposed model of the inverter can improve the waveform of the inverter and control the dead time. The finished design is simulated in Proteus to ensure output results that is virtually verified.

Paper Reference: (PSE-7-2) 1570332380
Title: Sliding Bifurcations in Resonant Inverters
Author(s): Abdelali El Aroudi, Enrique Ponce, Luis Benadero, Luis Martinez-Salamero (Spain)

Abstract − In this paper, the switching dynamics of an dc-ac resonant self-oscillating inverter is considered. Using bifurcation analysis coexisting steady-state solutions are predicted, which are increasingly relevant for low values of the quality factor of the resonant circuit. A repelling sliding region is found to be connected with the two unstable limit cycles that split the phase plane in three basins of attraction. Simulation results obtained from circuit-level switched model confirm the theoretical derivations.

Paper Reference: (PSE-7-3) 1570332383
Title: Sensorless Control Strategy on Three-Phase Grid Side Converter
Author(s): Fatma Ben youssef (Tunisia)

Abstract − This paper develops a grid voltage sensor-less control strategy of Voltage Source Inverter (VSI) used for photovoltaic application. Virtual-Flux (VF) estimator is investigated to estimate the three-phase grid voltages. A second order generalized integrator-quadrature signal generation SOGI-QSG and Frequency Locked Loop FLL is achieved to ensure the grid synchronisation and to estimate the grid voltages quantities which is added to the control strategy. Analytical and simulation results prove the efficiency of the proposed sensor-less control strategy.

Paper Reference: (PSE-7-4) 1570332415
Title: Geometric optimization of the heat sink for cooling high power IGBTs modules
Author(s): Fadwa Haraka (Morocco)

Abstract − The aim of this article is to optimize the geometry of micro channel heat sink for cooling high power IGBTs modules used in the arm solar converter. The thermal model is developed by finding a relationship between the heat sink resistance and its geometry; wish is implemented in SIMULINK/M with algorithm that optimizes the dimensions of the heat sink.

The results of the model are compared with 3D finite element simulation by COMSOL in order to prove right the proposed model.

Paper Reference: (PSE-7-5) 1570340018
Title: Numerical Simulation of Wireless Power Transfer System to Feed Loads
Author(s): Yosra Ben Fadhel, Salem Rahmani, Kamal Al-Haddad (Canada)

Abstract − The aim of this work is to realize a system that ensures the Wireless Power Transfer (WPT) to supply a load situated at a distance from the source. This system consists mainly of two circuits: one primary and other secondary. In its design one have used the resonant inductive coupling to ensure the transfer. According to don research this technique is classified as the most effective for these type of applications. Initially the system is powered by a 5v/ DC voltage. Finally, our system can feed one load or many loads located at a distance from the source. Nevertheless, the efficiency decrease with the distance and the number of loads. The numerical simulations of the WPT, are also have presented in this work

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Paper Reference: (CSP-1-1) 1570326012
Title: Energy detection versus Maximum Eigenvalue based detection: A comparative study
Author(s): Asmaa Maali, Hayat Semlali, Najib Boumaaz, Abdallah Soulmani (Morocco)

Abstract − Cognitive radio (CR) is a form of wireless communication in which a transceiver can wisely detect communication channels that are in use and those which are not, and immediately move into vacant channels while avoiding occupied ones. In such systems, spectrum sensing (SS) is a crucial operation. It consists to detect the available frequency bands. Many spectrum sensing techniques are presented in the literature. In this paper, we present a comparative study between two Spectrum Sensing techniques: the Maximum Eigenvalue Detection (MED) and the Energy Detection (ED). The performance of these two methods is evaluated in terms of their Receiver Operating Characteristics (ROC curves) and their detection probability for different values of Signal to Noise Ratio (SNR) and of smoothing factor L. The results of this comparative study are given and discussed.

Paper Reference: (CSP-1-2) 1570331425
Title: Wavelet transform based facial feature points detection
Author(s): Choubeila Maaoui (France)

Abstract − In this paper, we present a detection and tracking feature points algorithm for video sequence environment. To trace and extract a face image, we use a modified face detector based on Haar-like features. For feature points detection, we develop a new method based on the wavelet decomposition. For more accuracy, good features to track of Shi and Thomasi is used around the points founds with wavelet method. In order to track the detected points, Pyramidal Lucas-Kanade Feature Tracker algorithm is used. Results for a video's sequence indicate that the proposed algorithm can accurately extract facial features points.

Paper Reference: (CSP-1-3) 1570329702
Title: Automatic cancerous cells detecting, classification and counting based on the biomarker Ki-67
Author(s): Rezgui Ines, Seddik Hassene (Tunisia)

Abstract – In this paper, we present an automatic method for detecting bladder cancerous cells of biopsy images stained with the biomarker Ki-67. The main aim is to help the doctors when diagnostic of the disease by reducing the analysis time of biopsy images. Usually, pathologists have manually performed to count the cancerous cells present in image. It is the current method based only on the vision and a microscope slide that is especially designed to enable cell counting. This method makes them take much time to complete its mission. In fact, it requires attention, concentration and validation. But the patient who is suffering from bladder cancer, needs to know the state of his health as soon as possible to resist disease. Bladder cancer is one of the leading causes of death from cancer in the world. So, early detection of bladder cancer is very important for successful treatment. Two applications will be discussed in this work; the first one on the computer and the other is a mobile application. We have implemented a solution that can detect automatically cancer and provide information to help pathologists in identifying the stage of the disease. The practical results showed a precise and accurate count, which indicates the superiority of our technique for a universal count of tumor foci as a diagnostic aid for ANAPATH services.

Paper Reference: (CSP-1-4) 1570331750
Title: Comparative Study of Blind Equalizers based on Optimal Bounding
Author(s): Ali Moussa, Mathieu Pouliquen, Miloud Frikel, Saïda Bedoui, Kamel Abderrahim, Mohammed Msaad (Tunisia–France)

Abstract –In this paper, we provide two algorithms for blind equalization in a bounded noise environment of a Single Input Single Output (SISO) channel. These approaches are based an Optimal Bounding Ellipsoid (OBE) algorithms. This class is among the set Membership identification methods. The aim of these algorithms is to force the equalizer output constellation to match the input constellation by estimating the parameters of the equalizer. They can be applied under different channels. Constellation and the symbol error rate (SER) for different value of SNR from 4-QAM modulation are presented. These simulations address the comparison between the two proposed algorithms performances under different type of channel: AWGN, Rayleigh and Rician channels.

Paper Reference: (CSP-1-5) 1570331616
Title: Conical and Cylindrical DRAs with Reconfigurable Band Rejection for UWB Applications
Author(s): Chafika Aissaoui, Idris Messaoudene, Abdelmadjid Benghalia (Algeria)

Abstract – Cylindrical and conical ultra-wideband (UWB) dielectric resonator antennas are presented in this paper. The first part of this work is a parametric study of cylindrical and conical dielectric resonator antennas for

Ultra-Large Band applications ranging from 3.1GHz to 10.6GHz. The second part of the work consists of creating a reconfigurable rejection band inside this UWB in order to minimize interference between UWB system and some narrowband systems operating in this frequency range (3.1GHz to 10.6GHz), Such as WiMAX and WLAN. The rejection band is obtained by a rectangular split-ring slot etched on the microstrip-line-fed patch, and is responsible for the creation of a band notch. The control of the band notch is made by displacing the cylindrical or the conical resonator. The results obtained showed that the band notch ranges from 3.2GHz to 4.7GHz for the cylindrical resonator and from 3.2GHz to 5.2GHz for the conical resonator. The proposed structures are simulated with the commercial electromagnetic simulation software "Ansoft HFSS." The numerical results from different simulations are presented in terms of reflection coefficient and radiation pattern.

Paper Reference: (CSP-1-6) 1570332737
Title: A Novel ant colonies approach to medical image segmentation
Author(s): Anissa Selmani, Seddik Hassene, Ezzedine Ben Braiek (Tunisia)

Abstract − Prostate cancer is becoming a threat to humanity. Today, the diagnosis of diseases is still be realized mostly by manual methods. Nevertheless, this traditional process is inefficient and not accurate. Its precision depends on the operator's expertise. Thus, applying machine learning algorithms for malignant cells detection and counting remains a significant purpose in medical image analysis research. In this paper, we apply a modified ACO algorithm to measure the rate of cell growth of cancer's patient automatically due to segmentation and counting process. The proposed method was applied on several medical images obtained from MRI-guided prostate biopsies. The robustness of this idea was showed by comparison with hand-labeled obtained segmentation results.

Paper Reference: (CSP-2-1) 1570326291
Title: Design and FPGA Implementation of a Viterbi Decoder for an OFDM Transmission system
Author(s): Slami Saadi, Ghibeche Youcef, Atef Benhaoues (Algeria)

Abstract − The convolution coding with decoding by the Viterbi algorithm is commonly used in actual digital OFDM communication systems (Orthogonal Frequency Division Multiplexing) in the purpose to improve their performances. The aim of this work is to design and implement a hardware model using VHDL (Hardware Description Language) of the Viterbi decoder on Virtex 5 FPGA (Field-Programmable Gate Array) platform. The availability of a synthesizable model gives more flexibility in systems implementation. The design was described by VHDL using Xilinx ISE (Integrated Software Environment). Reports given by ISE showed low consumption of the BMC (Branch Metric Calculation) unit and ACS (Add Compare Select) in the FPGA. The maximum operating frequency is 250 MHz, which is sufficient for our application.

Paper Reference: (CSP-2-2) 1570331695
Title: UWB Cyclic Prefix-based OFDM Synthetic Aperture Radar for Foliage Penetration
Author(s): Ghazal Ba Khadher, Abdelmalek Zidouri, Ali H Muqaibel (Saudi Arabia)

Abstract − This paper investigates the performance of sufficient Cyclic Prefix OFDM Synthetic Aperture Radar for Foliage Penetration (FOPEN) for single point target and extended target. The effect of the foliage on the sidelobes has been investigated through the range profiles of the spread function and the azimuth profiles of the spread function. Furthermore, the image quality metrics, the integrated sidelobe ratio and the peak sidelobe ratio have been used to investigate the fluctuation of this signal with application to FOPEN.

Paper Reference: (CSP-2-3) 1570332238
Title: Performance Analysis of DWT based OFDM with Index Modulation under Channel Estimation Error
Author(s): Asma Bouhlel, Sakly Anis, Salama Said Ikki (Tunisia–Canada)

Abstract − Inspired by the high spectral efficiency improvement of the Spatial Modulation (SM), Orthogonal Frequency Division Multiplexing with Index Modulation (OFDM-IM) was recently proposed and expected to be one of the key technologies of 5G systems. This novel transmission technique incorporates the index of active subcarriers to convey additional information. Similar to conventional OFDM, channel estimation error is considered as a dominant performance degrading cause of OFDM-IM system. This paper deals with robust OFDM-QIM system implementation under practical conditions. For this purpose, Discrete Wavelet Transform (DWT) based OFDM-IM is announced to improve the performance of the conventional OFDM-IM affected by nonideal channel estimation. To this purpose, DWT based OFDM-IM performance in terms of Bit Error Rate (BER) is compared to the original OFDM-IM based on Fast Fourier Transform (FFT) in the presence of channel estimation error. Simulation results are provided to prove the performance enhancement of our proposed system over Rayleigh fading channel.

Paper Reference: (CSP-2-4) 1570300277
Title: Enhancing the Performance of Speaker Verifications-Based DVB-T Systems
Author(s): Omar Daoud, Qadri Hamarsheh, Ahlam Damati (Jordan)

Abstract − Handheld Digital Video Broadcasting (DVB-T) is considered as one of the main two popular broadcasting standards, which facilitates the transmission of digital television in handheld receivers. In this work, a comparison will be held to enhance the mobile communications performance. It is based on tackling the Peak-to-Average Power Ratio (PAPR) problem; one of the main drawbacks of Orthogonal Frequency Division Multiplexing (OFDM) technique. Two main factors will be the main factor of this comparison; BER curves and CCDF curves. This work combined three different stages together; wavelet transformation in order to remove the noise from the signal; a globally statistical adaptive detecting algorithm; and replacing the affected peaks with a moving average filter process. At the same bandwidth occupancy of

the speaker verification-based systems, the simulation has been run and shows additional enhancement in both of CCDF and BER curves; an extra 15% reduction is achieved in the essence of PAPR and around 25% extra noise immunity.

Paper Reference: (CSP-3-1) 1570331804
Title: Ultra-wide Stopband Microstrip Lowpass Filter Design for Communication Systems
Author(s): Mouloud Challal, Ferhat Hachour, Ayoub Badaoui (Algeria)

Abstract − In this contribution, microstrip lowpass filter (LPF) with a wide and deep stopband using open stubs, rectangular shaped resonators and hourglass shaped resonators is introduced. The proposed LPF has a -3 dB cutoff frequency of 3.07 GHz and an insertion loss less than 1.5 dB. The stopband bandwidth for the attenuation level of -20 dB is from 3.07 GHz up to 20 GHz, and the structure occupies 35x14 mm2. The filter is simulated, fabricated and measured. A good agreement is achieved between experimental and simulation results indicating that the proposed LPF is well suited for various communication systems.

Paper Reference: (CSP-3-2) 1570326290
Title: Optimal Design of IIR filters using Least lp-norm: Application to ECG Signal Filtering
Author(s): Slami Saadi, Ghibeche Youcef (Algeria)

Abstract –In this work, we try to design an optimal IIR filter for filtering electro-cardiogram (ECG) signals reflecting the cardiovascular health. The optimality of the design is based on minimizing the error in the sense of weighted least Lp-norm. An unconstrained quasi-Newton algorithm is employed and any poles or zeros that lie outside of the unit circle are reflected back inside. These signals are contaminated by several types of noises such as drift of the base line and interferences with the power supply at 50 Hz. The results obtained show the effectiveness of this design approach, and thus improves the quality of the electro-cardiogram in comparison with a conventional IIR.

Paper Reference: (CSP-3-3) 1570326502
Title: Kalman Filter-Based Estimation of a Signal Buried in an Unknown Disturbance and Measurement Noise
Author(s): Rajamani Doraiswami, Lahouari Cheded, Sreeraman Rajan (Canada–Saudi Arabia)

Abstract − A Kalman filter-based scheme for estimating a class of random and deterministic signals from the output measurement corrupted by disturbance and measurement noise is proposed. Neither the model of the disturbance, nor the statistics of the random noise and disturbance are known except that they are Gaussian. The proposed identification scheme is derived from the Kalman filter residual model instead of the measurement model. It is shown that the colored equation error is whitened if and only if a Kalman filter rather than some arbitrary filter is employed. A novel two-stage identification scheme is employed. First, a high order signal model is obtained using the least-squares

method. In the second stage a reduced order model is derived from the high order signal model obtained from the first stage using a frequency domain approach so that it is an optimal least squares fit to the high order model in the spectral region where the signal to noise ratio is high. The order of the reduced order model is obtained using the popular Akaike Information Criterion. The proposed scheme is evaluated on a number of simulated and real data.

Paper Reference: (CSP-3-4) 1570332223
Title: Organic voice pathology classification
Author(s): Salma Chekili, Asma Belhaj, Aïcha Bouzid (Tunisia)

Abstract – In this paper, we propose to achieve the classification of pathologic voices and essentially the classification between organic pathologies: it's about polyp, edema and nodule pathologies using new features. These features are computed using the mel frequency cepstral coefficients calculated on the speech multiscale product. Besides, we propose to compare our new parameters to the known MFCC calculated directly on the speech signal. In this study, we adopt a three-class SVM classifier and we use the MEEI database. The results show that the classification rates obtained using feature extracted from the multiscale product give better results.

Paper Reference: (CSP-3-5) 1570332147
Title: Automated Glaucoma Diagnosis using Deep Learning Approach
Author(s): Baidaa Al-Bander, Waleed Al-Nuaimy, Majid A. Al-Taee, Yalin Zheng (United Kingdom)

Abstract – Glaucoma is one of the common causes of blindness worldwide. It leads to deterioration in vision and quality of life if it is not cured early. This paper addresses the feasibility of developing an automatic feature learning technique for detecting glaucoma in colored retinal fundus images using a deep learning method. A fully automated system based on convolutional neural network (CNN) is developed to distinguish between normal and glaucomatous patterns for diagnostic decisions. Unlike traditional methods where the optic disc features are handcrafted, the features are extracted automatically from the raw images by CNN and fed to the SVM classifier to classify the images into normal or abnormal. We demonstrate an accuracy, specificity and sensitivity of 88.2%, 90.8%, and 85%, respectively which compared favorably to the-state-of-the-art but at considerably lower computational cost. The obtained preliminary results clearly demonstrate that the proposed deep learning method is promising in automatic diagnosis of glaucoma.

Paper Reference: (CSP-3-6) 1570332251
Title: comparison and fusion of classifiers applied to a medical diagnosis
Author(s): Mohamed Ksantini, Ben Hassena Anouar, François Delmotte (Tunisia–France)

Abstract – This paper aims to compare classification methods in order to learn the strengths of each method. We will introduce the fusion of classifiers technique by using the theory of belief functions, particularly the transferable

belief model. We will propose different ways of fusion in medical diagnosis of diabetes analysis problem as an application of this work.

Paper Reference: (CSP-3-7) 1570332325
Title: Enhanced Operator Fatigue Detection Method Based on Computer-Keyboard Typing Style
Author(s): Hilal Al-Libawy, Ali Al-Ataby, Waleed Al-Nuaimy, Majid A. Al-Taee (United Kingdom)

Abstract − Many operators are working in jobs that require stressful mental tasks such as transportation supervision, vehicle driving, banking and others. Prevention of fatigued-based human error, that has been a standing challenge in such work areas, can be detected and quantified using human performance level. This paper proposes an enhanced method for operator fatigue detection based on computer-keyboard typing style. This is achieved by using an existing dataset for psychomotor impairment detection using natural typing style on computer keyboard. Several fatigue-related features are extracted and fed to two parallel classifiers based on artificial neural network (ANN) and support vector machine (SVM) algorithms. Outputs of those classifiers are then combined to enhance the classification performance, using Bayesian combiner. Performance of the developed fatigue detection system is assessed experimentally in terms of the classification accuracy as compared to a ground-truth dataset. The obtained results demonstrated that utilization of the Bayesian combiner has significantly improved the fatigue detection accuracy (94%) as compared to that of the ANN (87.5%) and SVM (91%) classifiers. These findings are favorably compared to the state of the art but with easily identified fatigue-related features.

Paper Reference: (CSP-4-1) 1570326306
Title: Indexing in High-Dimensional Multimedia Databases
Author(s): Mohamed Assane, Noureddine Ennahnahi, M. Meknassi, Said Ouatik (Morocco)

Abstract − In this paper we propose two methods for addressing similarity-based search problem of high-dimensional data. The first one belongs to exact search approaches. Its main feature consists of its self-adaptation with the query and any eventual storage limitation. The second method is an approximate search using a graph partitioning approach. It aims to cluster small world graph in order to speed up and improve the k-NN similarity search. It is based on the idea of partitioning the graph and starting the search from any vertex in the most appropriate group of vertices for the given vertex query. We provide a comparison with recently published approaches. The empirical analysis on several datasets shows that our two proposed methods outperform the other concurrent methods.

Paper Reference: (CSP-4-2) 1570329602
Title: Image denoising using wave atom transform
Author(s): Khelil Seif Eddine, Seddik Hassene (Tunisia)

Abstract − The image usually has different kinds of noises which are not easily removed in process of receiving [17], coding and transmission. Wave atoms is one of the new geometric multiscale-multidirectional transform[6], after 1999 that is based on wavelet transform, whose structural elements involve the parameters of dimension and location, and orientation parameter more, which let wave atom transform has good orientation characteristic. For that reason, wave atom transform is better than wavelet and even curvelet transform. In the expression of image edge, such as geometry characteristic of curve and beeline, which has previously obtained excellent research results in image denoising.This paper introduced a new method for image denoising by coefficient thresholding based on wave atom transform. Wave atom proposes a new representation have a higher performance than the other transform [22]. Experiments results indicate that the improved wave atom transform has abroad future for eliminating the noise of images. It remains edges efficiently, and offers a better visual effect.

Paper Reference: (CSP-4-3) 1570331823
Title: Medical image Enhancement based on New anisotropic Diffusion Function
Author(s): Sondes Tebini, Hassene Seddik, Ezzedine Ben Braiek (Tunisia)

Abstract − Medical images are often corrupted by noise. This noise presents many problems because it can mask and blur the important details and the information in the analysis phase of the image. In this article, we propose a new anisotropic denoising technique for medical images based on a new diffusion function. We show that the new scheme offers an efficient noise removal while protecting edges without any blur of the image details.

Paper Reference: (CSP-4-4) 1570326374
Title: Features Selection for Arrhythmia Diagnosis using Relief-F Algorithm and Support Vector Machine
Author(s): Mujahed Al-Dhaifallah, Alaa Elsayyad, Ahmed Nassef (Saudi Arabia–Egypt)

Abstract − Electrocardiography (ECG) is a standard clinical process to record the electrical activity of the heart. It is the most available effective method for diagnosing cardiac arrhythmias. The ECG signals can be classified into either normal or abnormal based on the timing and potential information of electrical waves propagating through the heart's muscles. Many advanced signal processing techniques have been used to extract different numerical and logical features from these signals. Usually, the number of the extracted features is very huge and some of them are redundant, irrelevant and/or noisy. In this work, a thorough experimental study was conducted to reduce the number of ECG features finding a new more compact representation of samples selecting the most informative features and removing the others. We empirically investigated the efficiency of two different filter-based feature-selection algorithms for the diagnosis of cardiac arrhythmia. We used support vector machine and logistic regression as classifiers and compare the performance of Relief-F with the well-known information-gain feature-selection criterion. Relief-F is a promising filter-based feature selection algorithm. It is a simple

and effective algorithm capable of evaluating the feature's importance considering dependence from other features. Classification performance is evaluated using three different statistical measures; classification accuracy, sensitivity and specificity. Experimental results showed that the performance of Relief-F with SVM is promising for the diagnosis of cardiac arrhythmia.

Paper Reference: (CSP-4-5) 1570329600
Title: Towards Automated Length-Estimation of Free-Swimming Fish Using Machine Vision
Author(s): Qussay Al-Jubouri, Waleed Al-Nuaimy, Majid A. Al-Taee, Iain Young (United Kingdom)

Abstract − Machine vision has been widely and efficiently used for various industrial applications. However, in marine applications, this technology is still facing big challenges due to the free-swimming nature and behavior of the objects as well as uncontrollable detection conditions such as visibility, lighting, and sensors stability. This paper presents new models for length estimation of small-size free-swimming fish objects using low-cost machine vision system. These models include two setups; orthogonal and stereo camera setups. In the orthogonal setup, a single camera (side view) is used for object's distance for measurement. This camera is synchronized with another orthogonally oriented one for object's length measurement. The measured distance and length are then used to estimate the actual length of the object. In the stereo setup, however, both cameras are simultaneously used to measure the object's distance and length. Those setups are found to be cost-effective and accurate in estimating the length of the objects under study in various short-range laboratory setups. Automatic calibration based on fixed object with known diameter is also considered in this study to measure the real value of object's length. In particular, for short range application, the effect of light refraction is assumed to be negligible, therefore; a linear relationship is adopted to estimate actual object's length for both orthogonal and stereo setups. This approximation is assessed experimentally and the measurement error in the object's length is found to be within the range of ± 1%.

Paper Reference: (CSP-4-6) 1570331991
Title: Watermarking for integrity, authentication and security of Medical Imaging
Author(s): Amine Mestiri (Tunisia)

Abstract − Image watermarking has been generally acknowledged as a pertinent technique for improving authenticity, integrity and data security where medical images are transmitted, stored, retrieved across networks. An improved the quality of remote medical services strictly depends on the ability of the techniques used to ensure ethics and protect the transmitted medical secrets. On the one hand, medical image watermarking must ensure the confidentiality of information. Indeed, private medical data inserted into the image should be imperceptible and can only be retrieved by authorized persons; which prevents any possibility of access, alteration or destruction. On the other hand, several tips must be present in the watermarking scheme in order to implement integrity and to remove any possibility of alteration, using

tools that foster the recovery of the initial medical information. Note also that the watermarking scheme used must guarantee the availability of patient data that must be accessible by people adroit at any moment. Finally, we can not forget to mention authentication. Indeed, every information extracted from watermarked image must be identifiable and especially conform with that inserted initially. In this paper, we propose a hybrid system of reversible Digital Watermarking H-GAWM for medical images. The experimental results show that H-GAWM offers a significant improvement in terms of imperceptibility for a desired capacity of the mark by comparing with existing approaches.

Paper Reference: (CSP-4-7) 1570331943
Title: Different Feature Parameters in Speaker Recognition
Author(s): Imen Daly, Zied Hajaiej (Tunisia)

Abstract − Feature parameters extraction is critical for speaker recognition research. The paper presents the function Mel frequency central coefficient (MFCC) with the method of sub band and The measurement of the formant(F1,F2,F3,F4) for speaker recognition Using the data base TIMIT

Paper Reference: (CSP-4-8) 1570332414
Title: Remote Person Authentication in Different Scenarios Based on Gait and Face in Front View
Author(s): Asma El Kissi Ghalleb, Najoua Essoukri Ben Amara (Tunisia)

Abstract − To predict criminal acts and to assure more security, the biometric remote recognition of people has lately been getting much interest among researchers. We propose in this paper to use biometric modalities that may be acquired remotely, which are the gait and the face. The gait is explored at 11 different angles of view with different styles of clothes using the CASIA Gait Datasets A and B. For the front view, we fuse the gait with hard and soft facial biometrics. Tested on both public databases, the gait-based recognition has yielded interesting results in different cases compared to the existing results in the literature. The system based on the fusion of the gait with the face has led to better results.

Paper Reference: (CSP-5-1) 1570331824
Title: Merging operator selection in possibility theory
Author(s): Sonda Ammar Bouhamed, Imene Khanfir Kallel (Tunisia)

Abstract − In data processing, merging of data requires definition of conflict degree between source information in order to select the appropriate merging operator. The diversity of merging operators and the variability of information precision and source reliability generate great difficulty in the selection of the appropriate merging operator. Possibility theory and Dempster Shafer (DS) theory are two main formalisms in modeling with uncertain information. The common aspect of these two theories is how to measure the degree of conflict. In this paper, we propose an original strategy to select a merging operator according an appropriate conflict degree investigation. We deploy different operator modalities proposed in possibility theory. We discuss how to select the operator modality based on the uncertainty degree developed in possibility

theory and the distance between betting commitments developed in DS theory. The proposed strategy allows a traitor made merging of several information sources and to provide an informative possibility distribution.

Paper Reference: (CSP-5-2) 1570329888
Title: The Price of Simplicity of Mean-Field-Type Optimization is Unbounded
Author(s): Hamidou Tembine (USA)

Abstract − With the increase of data in size, heterogeneity, volume and variability, the resulting optimization problems involve large number of parameters. It is crucial to develop tractable large-scale optimization tools to find and identify the significant quantity-of-interests. A Mean-Field-Type Optimization is an optimization framework that involves not only the parameters but the distributions of these parameters. It allow us to investigate and quantify the risk, quantile and outage probabilities. A mean-field-type optimization procedure is an aggregation method that uses a mean-field approximation and an optimization component. In this paper we investigate the efficiency of the mean-field-type optimization procedure when applied to static and dynamic optimization problems. We show that the optimization of the approximated system may lead to poor performance compared to the original optimization problem. Our result is based on the fact that the indistinguishability/symmetrization techniques used in mean-field approaches fail when the original optimization problem has only asymmetric global optima. The price of simplicity, which is the ratio between the global optimum of the original problem and the solution achieved by the mean-fielded optimization problem is unbounded. This suggests a careful design of the decomposition of the original problem instead of symmetrizing all the parameters.

Paper Reference: (CSP-5-3) 1570326881
Title: A new approach for the complete unfolding of Petri nets
Author(s): Medesu Sogbohossou (Benin)

Abstract − The technique of unfolding of Petri nets (PN) allows to contain state-space explosion in case of strong concurrency. To cover all the state-space, the classical approach for computing the complete prefix bases itself on the concept of adequate order, which excludes the category of the unsafe PN. In this paper, a new algorithm independent of the concept of adequate order is defined. Its specificity consists in creating the events of the unfolding in the context of a unique process at the same time. It gives satisfactory results for the safe nets. The algorithm also takes into account the unfolding of the bounded unsafe PN, with the objective to preserve the concurrency with the partial order semantics.

Paper Reference: (CSP-6-1) 1570332339
Title: An Enhancement of MOD-LEACH protocol for Wireless Sensor Network
Author(s): Hasna Dhehibi, Ahmed Zouinkhi, Olfa Kanoun, Nabil Derbel (Tunisia)

Abstract − Since sensor nodes are energy constrained as they have limited power resources, they turn off their energy earlier. So, it will be so hard and so expensive to change or recharge their batteries from one time to another especially for a large scale networks. Therefore, prolonging their lifetime is a key issue that should be highly considered. As a solution for this problem is to manage intelligently the remain power in the node in order to increase as much as possible not only the lifetime of that node but also the lifetime of the whole network. The major source of energy dissipation is during the transmission of data packets. After studying the major sources of energy wasting and after providing the existent energy management methods, efficient routing protocol was proposed as an important challenge in a network area to reduce energy consumption. Hierarchical routing protocols are considered as the most suitable protocol implemented for wireless sensor networks. In this paper, a proposed protocol is developed to avoid some problems related to the routing of wireless sensors network. A clustering algorithm that aims to balance the energy consumption among all sensor nodes and to achieve an improvement on the network lifetime.

Paper Reference: (CSP-6-2) 1570332300
Title: History Trust Routing Algorithm to improve efficiency and security in Wireless Sensor Network
Author(s): Ahmed Jedidi (Saudi Arabia)

Abstract −Wireless sensor network (WSN) considered as one of the important technology in our days. Low-cost, low-power and multifunction based on these characteristics WSN become more and more apply in many areas. However, one of the major challenges in WSN is the security. Indeed, the usual method of security cannot be applied in WSN because the technological limit of the different components. In this context, we propose a new method to establish a secure route between the source node and the Sink node. Particularly, our method based on routing trust history table (RTH) and trust path routing algorithm (TPR). Therefore, our method offers a high level of security for the routing path with efficiency and stability in the network.

Paper Reference: (CSP-6-3) 1570332237
Title: Sensor Node Data Validation Techniques for Realtime IoT Sensor Board
Author(s): Jiwa Abdullah, Nayef Abdulwahab Mohammed Alduais, Ansar Jamil, Lukman Audah, Rozlan Alias (Malaysia)

Abstract − Wireless sensor networks (WSNs) with the incorporation with the Internet of things (IoT) are vital platforms for collecting environmental data and monitoring multiple phenomenons. The validity of data sensor that described the change of events plays a significant role in the accuracy and reliability of the system to ensure data quality for perfect decision making. The common statistical methods to observe the outliers in the data set, typically has low complexity. Unfortunately the most of statistical approaches are not useful for online application because most of them are based on historic data and fixed threshold. In this paper, we proposed an algorithm to detect different types of errors based on adaptive threshold, as well as addressing the various techniques to classify between error and event. The proposed algorithm is

successfully implemented in the sensor board. From the results, the proposed algorithm appears to be more adaptive, and easy to implement in real-time applications. In addition, the proposed algorithm has been compared with a recent work and showed a better performance, in terms of false detection, delay and energy consumption.

Paper Reference: (CSP-6-4) 1570332224
Title: Impact of ZRP zone radius value on wireless network performance
Author(s): Tiguiane Yélémou, Boureima Zerbo, Mesmin Toundé Dandjinou, Oumarou Sié (Burkina Faso)

Abstract − In this paper, we highlight the impact of the routing load on the performance of ad hoc wireless networks. Specificaly, we analyze Zone Routing Protocol (ZRP) routing load and the impact of zone radius value on this protocol performance. First, we show that performance parameters curves such as routing overhead, Packet Delivery Ratio and End-to-End Delay don't evoluate monotonously according to zone radius value. In our test context, we note optimal values for routing overhead and Packet Delivery Ratio (PDR) when R=3. For delay, minimal values are observed when R=1 and R=4. Second, we study this hybrid protocol routing overhead according to network density and compare it to pure on-demand and table-driven routing approaches. Contrary to that is largely presented, in realistic wave propagation model context, taking into account obstacles and their effects such as multi-path one, proactive routing approach performs better than reactive one. In fact, in lossy link context, route request and route error packets broadcasted are significant. In dense network, ZRP, due to its multitude control packets, performs the worst for routing overhead and packet delivery ratio (PDR) parameters.

Paper Reference: (CSP-6-5) 1570325644
Title: An Efficient Data Collection Algorithms for IoT Sensor Board
Author(s): Nayef Abdulwahab Mohammed Alduais, Jiwa Abdullah, Ansar Jamil, Lukman Audah, Rozlan Alias (Malaysia)

Abstract − Wireless sensor network (WSN) has come to be an enabler equipment for the IOT applications, which extend the physical reach of the monitoring capability. The IOT sensor board's support multiple sensors, possesses several constraints such as limited energy availability, low memory size, and low processing speed that are the principal obstacles to designing efficient data collection methods, including the WSN-IOT integration. In IOT based WSN, the basic issues are concerned with the mechanism to reduce the energy consumption of sensor boards. Therefore, decrease the number of transmissions and reducing the number of bits for payload packet, will result in prolonging the lifetime of the WSN. We proposed an efficient data collection approach for IOT Sensor Boards. The proposed method aims to reduce the number of transmitted messages as well as, reducing the number of bits for payload packet size by using a coding sachem. In addition, we applied with modifying a univariate sensor data type based Cluster -head level approach to be a benefit for multivariate sensor boards level. The performance matrices in terms of energy consumption and accuracy of predictions of sensed data at the Gateway (Sink). The simulation results showed that the proposed ap-

proach a better performance in term of energy dissipation with saving to 98% and 90% from the overall of the sensor board's energy for a smart and green building application and environment monitoring application respectively. In addition, the proposed approach presented more accurate than the current work to predictions of sensed data at the sink.

Paper Reference: (CSP-6-6) 1570332410
Title: A novel method to design chaotic S-box for wireless sensor network
Author(s): Tarek Farah, Rhouma Rhouma, Safya Belghith (Tunisia)

Abstract − A chaotic strong S-Box (substitution box), for wireless sensor network (WSN), based on Ikeda map and permutations of the input values of the S-Box is presented in this paper. The different criteria such as objectivity, strict avalanche criteria (SAC), non-linearity criteria, output bits independence and equiprobable input/output XOR distribution of our S-box are analyzed. Also, we evaluated the proposed method of S-box generation in terms of algorithmic complexity and independency measure ratio. The results of tests show that our proposed Sbox strong, have a good cryptographic proprieties and useful for WSN. Comparisons and discussions with other proposed S-box are presented in this paper.

Paper Reference: (CSP-6-7) 1570332342
Title: Sparse Channel Estimation with Gradient-Based Algorithms: A comparative Study
Author(s): Ahmed Abdelmoaty, Azzedine Zerguine (Saudi Arabia)

Abstract − Channel state information (CSI) is very crucial for any wireless communication systems. Typically, CSI can be characterized at the receiver side using channel impulse response (CIR). Many observations have shown that the CIR of broadband multi path wireless channels are often sparse. To this point, the family of least mean square (LMS)-based algorithms have been widely used to estimate the CIR, unfortunately the performance of LMS family is not much accurate in terms of sparse channel estimation. The Least Mean Mixed Norm (LMMN) algorithm combines the advantages of both the Least Mean square (LMS) and the Least Mean Fourth (LMF)algorithm, which makes this algorithm stands in a very special position among the family members in terms of convergence and steady state error. In this paper, we held a fair comparative study between the LMMN and a number of the LMS-based algorithms, such as the LMS algorithm, the zero-attracting (ZA-LMS) algorithm, and the normalized (NLMS) algorithm. Simulation results are carried out to compare the performance of all these algorithms with the LMMN algorithm. The results show that the LMMN algorithm outperforms the rest of these algorithms in the identification of sparse systems in terms of both fast convergence and the steady state error.

Paper Reference: (CSP-7-1) 1570333064
Title: 3D-Mapping-Aided GNSS Localization For Integrity Monitoring In Urban Environments
Author(s): Nabil Kbayer, Mohamed Sahmoudi (France)

Abstract − In order to foster the development of Global Navigation Satellite Systems (GNSS) for land navigation services, there is a pressing need for providing a trust level of the localization solution, especially for liability critical applications. In view of such need, integrity monitoring aims to compute protection levels that successfully bounds positioning errors in nominal conditions. Conventional Receiver Autonomous Integrity Monitoring (RAIM) algorithms have been widely used for integrity monitoring especially for aircraft navigation. Conventional RAIM starts out by supposing a Gaussian measurement errors model with known means and variances. However, this assumption does not hold in dense urban environment. Therefore, we propose novel algorithms that dispenses with this classical assumption. We use external information provided by a 3D GNSS simulation to characterize GNSS errors in urban areas. We propose two approaches for protection levels computation based on comparison between predicted 3D pseudo-ranges bias and computed thresholds. These approaches give a new vision on integrity control based on indicators on the pseudo-ranges bias. Experimental results show that proposed algorithms give an acceptable success rate on integrity monitoring in a harsh areas.

Paper Reference: (CSP-7-2) 1570332377
Title: Saliency Detection Based Object Proposal
Author(s): Aymen Azaza, Ali Douik (Tunisia)

Abstract − Recently, the use of object proposals has been much introduced in the field of salient object segmentation methods. Object proposal methods provide a limited set of proposals per image which can successively be analyzed on their saliency. In this context, We regard saliency map computation as a regression problem. We used object proposals (selective search) to compute the saliency map. Our method based on low-level features combined with a random forest classifier a saliency classifier is trained. Our method obtains state of the art results salient object segmentation algorithms on 2 dataset in term of F-score.

Paper Reference: (CSP-7-3) 1570332409
Title: Study on Speech Reconstruction Stability using Tight Framelet Packet Transform
Author(s): Souhir Bousselmi, Kaïs Ouni (Tunisia)

Abstract − The major contribution of frames theory, in particular wavelet frames, is to ensure a perfect and stable signals reconstruction. This paper focuses on the speech reconstruction stability, in distortion sense, of the tight framelet packet transform which is new time-frequency decomposition derived from wavelet frame theory. A comparison with classical wavelet transform has been conducted. The experimental results show that the tight framelet packet transform provides better reconstruction stability than wavelet packet transform.

Paper Reference: (CSP-7-4) 1570332348
Title: Scale Selection Technique for Heartbeat Detection Algorithm
Author(s): Ghassen Smaoui (Tunisia)

Abstract − This paper presents an empirical study that aims to determine the frequency band best suited for ECG heartbeat detection operation for portable monitoring electronic device. This study was accomplished using the Continuous Wavelet Transform technique and in particular the Mexican-hat wavelet. This study was performed to minimize the effect of motion artifacts type of noise as it is prevalent and difficult to remove. It consists of gradually tuning the scale of the wavelet and observing its effect on the output signal and more precisely its effect on both real beats and peaks that correspond to motion artifacts noise. The result concluded was that the best wavelet to be used for such a task was this having a frequency response centered in the value 32 Hz.

Paper Reference: (CSP-7-5) 1570332666
Title: Dual LMCs Fusion for Recognition of Isolated Arabic Sign Language Words
Author(s): Salihu Aliyu, Mohamed Mohandes, Mohamed Deriche (KSA– Saudi Arabia)

Abstract − In this paper, we propose a Dual-Leap Motion Controllers (DLMC) based Arabic Sign Language recognition system. More particularly, we propose to use both front and side controllers to cater for the challenges of finger occlusions and missing data. For feature extraction, we select an optimum set of geometric features extracted from both controllers, while for classification, we used both a Bayesian approach with a Gaussian Mixture Model (GMM) and a simple Linear Discriminant Analysis (LDA) approach. Though this paper focused only on the GMM approach. Data was collected from a native adult signer, for 100 isolated Arabic words. Ten observations were collected for each of the signs. The proposed framework uses an intelligent strategy to handle the case of missing data from one or both controllers. A recognition accuracy of 94.63% was achieved, with the proposed system. The proposed system outperforms glove-based systems and a single-LMC based techniques.

Paper Reference: (CSP-7-6) 1570332346
Title: A combined Harris-SIFT approach for indexing the Arabic document
Author(s): Youssef Elfakir, Ghizlane Khaissidi, Mostafa Mrabti (Morocco)

Abstract − This paper present a query-by-example word spotting in handwritten Arabic documents, based on Harris detector and Scale Invariant Feature Transform (SIFT), without using any text word or line segmentation approach , because any errors affect to the subsequent word representations. First, the interest points that are automatically extracted from the images using Harris detector, then, we use SIFT descriptor to represent each interest point in the images, in the end, we represent the image's regions as histogram by using bag of visual words method. The validate study is conducted under a series of controlled experiments on handwritten Arabic documents images.

Paper Reference: (SCI-1-1) 1570329535
Title: Testing Electrostatic Energy Harvesters:A New Topology for Accurate Characterization
Author(s): Bjoern Bieske, Gerrit Kropp, Alexander Rolapp (Germany)

Abstract − Small autonomous devices using low power techniques can be supplied by energy harvesters. In this paper we focus on electrostatic energy harvesters using a variable capacitor as transducer. The capacitance, charge and voltage vary in a loop process. Many different setups are known. The aim of this paper is to show a method to characterize the harvested energy of the intrinsic harvester. Due to the very low currents in the range of nA, it is difficult to do exact measurements without influencing the harvesting process. A new improved topology is used to ensure the autonomous operation of the harvester circuit. This topology makes it possible to measure the converted energy more accurately, even if there are resistive losses in the variable capacitor. Thus we can obtain comparable results on the efficiency of the harvester itself. The amount of harvested energy can be determined easily by processing the measured values.

Paper Reference: (SCI-1-2) 1570331383
Title: MEMS Based Soft Nervous Materials with Ambient RF Power Supply: Feasibility Study
Author(s): Samir Mekid, Khurram Qureshi (Saudi Arabia)

Abstract − The purpose of this study is to investigate ways to supply low power to MEMS sensors and actuators that can be embedded inside host materials and membranes without adding more physical devices inside the material. These host materials can be low cost polymers, nylon and any other type of plastic composite laminates. Such type of materials that can be used in various engineering applications especially in bioengineering where the device is embedded inside human body. With battery less devices, wireless RF power harvesting seems to be the unique ideal source for low power. The study shows feasibility and identify practices.

Paper Reference: (SCI-1-3) 1570326743
Title: Implantable wireless ultra-low power data logger for temperature measurements in animal brains
Author(s): Simon Heller, Kim Allinger, Uwe Pelz, Michael Kroener, Peter Woias (Germany)

Abstract − This paper reports on the development of an implantable, micro controller based, ultra-low power data logger for temperature gradient measurements in animal brains. In contrast to commercially available systems the device uses a wireless interface allowing the readout and reprogramming of the data logger after the implantation. To ensure low power consumption, a wake-up receiver is integrated in the system, aside a dedicated power management system, reducing the power consumption to 43 μW at one temperature sample/min/channel.

Paper Reference: (SCI-1-4) 1570332357
Title: A Self-Biased Active Precision Rectifier for Energy Harvesting Systems
Author(s): Umais Tayyab, Hamza Shahid, Hussain Al-Zaher (Saudi Arabia)

Abstract – A high efficiency precision rectifier for Energy harvesting systems is presented. The precision rectifier utilizes single supply op-amp for AC-DC conversion process. The op-amp enables low forward diode voltage drop and less reverse leakage current in order to achieve large power conversion efficiency (PCE). The op-amp utilized in the precision rectifier is self-biased meaning no external supply needed to bias the op-amp instead it uses part of the harvested energy for its biasing. The proposed precision rectifier is designed and simulated in 0.15μm CMOS process technology using Cadence virtuoso tool. The proposed rectifier achieves power conversion efficiency (PCE) of 69% for a 1 KHz sinusoidal input of 0.8V for a 40 kΩ load resistor. This efficiency is 2.5 times better than its counterpart of the passive rectifier with large rectified output DC voltage. The relation between PCE and the load is presented.

Paper Reference: (SCI-1-5) 1570339980
Title: Energy Harvesting and Management of Continuously Powered WSNs
Author(s): Eric Schneider, Faouzi Derbel, Florian Strakosch (Germany)

Abstract – Numerous methods to harvest and store energy from e.g. vibration of technical systems that is otherwise wasted have been developed by countless engineers around the world. All of them have some benefits as well as drawbacks that need to be overcome or at least to be reduced to a minimum especially when it comes to efficiently power a wireless sensor network (WSN). In this paper, it is shown what those drawbacks are and some techniques to minimize them are proposed. Furthermore, a possible way to manage the harvested energy in case of the source is not available permanently while the WSN needs to be powered constantly is presented. The given results are based on simulation as well as hardware prototypes.

Paper Reference: (SCI-1-6) 1570332405
Title: Dynamic loads, source of errors of High Speed Weigh in Motion Systems
Author(s): Lhoussaine Oubrich, Mohammed Ouassaid, Mohammed Maaroufi (Morocco)

Abstract – High Speed Weigh in Motion Systems (HS-WIM) devices are specifically designed for detecting axle load of moving vehicles with normal speed. At present, they are used only as preselecting instruments for overloaded vehicles, installed upstream of the accurate measurement using static scales. The accuracy errors of the HS-WIM are 10% more than static loads. This is due to the dynamic interactions between the wheels and the road surface.

The aim of the present study is to analyze the dynamic loads with a view to designing a HS-WIM system for direct enforcement.

The results show that the amplitude of the dynamic loads is the range of 0-30% modulus in relation to the static loads. This depends on the quality of the road surface, the axle load, the speed and the suspension system. Their

frequency spectrum consists of two main frequencies varying respectively between 1-3Hz and 6-15H corresponding to the sprung and unsprung masses vibrations.

Paper Reference: (SCI-2-1) 1570331729
Title: Q-Compensation of a CMOS Two-Stage Miller OTA: Application to a Non-Inverting Amplifier
Author(s): Herve Barthelemy, Remy Vauche, Jean Gaubert, Sylvain Bourdel (France)

Abstract − This paper presents a theoretical analysis of the classical non-inverting amplifier based on a two-stage Miller OTA. The analysis consists in computing the closed-loop gain voltage transfer of the amplifier and obtaining by calculation the equivalent resonance factor Q versus the value of the Miller compensation capacitance C_M. Theoretical expression of the closed-loop gain was computed from the proposed small-signal macro-model and compared to transistor-level simulations. The classical two-stage Miller OTA used for the comparison has been designed in a 0.35μm CMOS technology and simulated with a DC bias current of 45μA. In a non-inverting configuration, loaded by 10pF using a DC voltage gain equals to 6 and a Q factor equals to 1, the corresponding phase margin is about $\Phi_M = 50^\circ$ and the corresponding Miller compensation capacitance is $C_M = 372$ fF. The corresponding Gain-BandWidth product (GBW) product is equal to 98.2MHz (5.99×16.4 MHz) and the total power consumption is 930μW. For $C_M = 70$ fF, the Unit-Gain Bandwidth product (UGBW) is about 102MHz (1×102 MHz) with an overshoot lower than 0.1%. The transistor-level (BSIM3V3) and macro-model simulations have been performed using PSPICE and give very close results.

Paper Reference: (SCI-2-2) 1570332358
Title: A CMOS Timer Circuit with Pulse Width Modulation for Sub-hertz Monitoring Applications
Author(s): Hamza Shahid, Umais Tayyab, Hussain Al-Zaher (Saudi Arabia)

Abstract − A single supply, ultra-low power sub hertz timer is proposed using the transistor operation in sub threshold region. The circuit is designed in a standard CMOS 0.15μm and simulated in Cadence. Pulse width modulation is achieved by the sizing the transistors in charging and discharging control blocks for the capacitor. The circuit is working from a low supply voltage of 0.4V and can work for the higher voltages as per application requirement. The circuit can produce as low as 0.0217 Hz (a period of 46 seconds) while using integrable capacitor (100pF). The circuit average power consumption for one period is 13.91 pW.

Paper Reference: (SCI-2-3) 1570332163
Title: Hypoglossal nerve stimulation in the treatment of obstructive sleep apnea
Author(s): Ghada Ben salah, Karim Abbes, Chokri Abdelmoula, Mohamed Masmoudi (Tunisia)

Abstract − This paper deals with Sleep Apnea Syndrome (SAS) or, more specifically, Sleep Apnea-Hypopnea Syndrome (SAHS) which affects the population, mainly in the age range of 40–65 years. This syndrome not only has a very negative impact on the sleep of patients, but it can lead to death if not properly treated. Continuous Positive Airway Pressure (CPAP) is an efficient treatment for SAS, but it is uncomfortable for patients. Consequently, there is a significant need for additional therapeutic alternatives for patients suffering of SAS. Hypoglossal nerve (HGN) stimulation is under investigation by several research groups as a possible therapeutic alternative. After dealing with studies, we have compared all devices that show the decrease of the intrathoracic pressure values in the phase of the detection of apnea event. However, the increased negative measurement of esophageal pressure (Pes) was an accurate solution for the detection of SAS (>13.5 cmH_2O). According to the stimulation of HGN, it requires values range between 33–38 Hz for decrease pharyngeal collapsibility.

Paper Reference: (SCI-2-4) 1570326114
Title: Auto-Transformer-Based Power Amplifier with Totem-Pole Driver
Author(s): Elena Sobotta, Robert Wolf, Frank Ellinger (Germany)

Abstract − We present a fully integrated auto-transformer-based power amplifier with totem-pole driver exhibiting a very high bandwidth. In order to simplify the design process a structural analysis and optimization method for the transformer are presented as well as an analytical method to ensure the optimum load line at the transistor. The circuit was implemented in a 0.25 μm SiGe BiCMOS technology and was characterized on-waver and chip-on-board mounted. The measurement results prove a bandwidth of 800 MHz around 650 MHz. The output power at 1 dB compression point is 24.4 dBm with a power added efficiency of 38%. The circuit was also tested with DVB-T signals showing that not more than 5 dB back-off are required in order to fulfill the error vector magnitude requirements. In this case, the efficiency is more than 19%

Paper Reference: (SCI-2-5) 1570313467
Title: Investigation of optoelectronic properties of amorphous silicon germanium photodetectors
Author(s): Wagah Mohammed (Jordan)

Abstract − Cost consideration of the development of electronic devices is one of prime importance. One simple approach to lower the cost of production of photovoltaic and detectors is by using low cost materials such as amorphous silicon and germanium. These two semiconductors have different optoelectronic properties, such as energy gap, photoconductivity and absorption coefficient. The use of an alloy from the mixing of silicon with certain percentages of germanium would produce photodetectors with improved electronic characteristics and photoconductivity. A number of a-SiGe alloy thin films with different quantities of germanium have been fabricated using thermal vacuum evaporation technique. Conduction mechanism and activation energy of the prepared samples had been calculated and analyzed. The I-V characteristics, the photogenerated current and detectivity of these samples are subjected to

measurement and discussion. Hall measurements are also conducted so to calculate the Hall I-V characteristics, Hall mobility, carrier concentration and type identification of the samples.

Paper Reference: (SCI-2-6) 1570342112
Title: Hardware Emulation of Memristor Based Ternary Content Addressable Memory
Author(s): Mohamed Bahloul, Rawan Naous, Mohamed Masmoudi (Saudi Arabia–Tunisia)

Abstract − MTCAM (Memristor Ternary Content Addressable Memory) is a special purpose storage medium in which data could be retrieved based on the stored content. Using Memristors as the main storage element provides the potential of achieving higher density and more efficient solutions than conventional methods. A key missing item in the validation of such approaches is the wide spread availability of hardware emulation platforms that can provide reliable and repeatable performance statistics. In this paper, we present a hardware MTCAM emulation based on 2-Transistors-2Memristors (2T2M) bit-cell. It builds on a bipolar memristor model with storing and fetching capabilities based on the actual current-voltage behavior. The proposed design offers a flexible verification environment with quick design revisions, high execution speeds and powerful debugging techniques. The proposed design is modeled using VHDL and prototyped on Xilinx VirtexR FPGA.

Paper Reference: (SCI-3-1) 1570331318
Title: Improved VNA Hardware for Applications in Civil Engineering
Author(s): Mario Radschun, Tino Morgenstern, René Schäfer, Olfa Kanoun, Joerg Himmel (Germany)

Abstract − The detection of soil erosion processes in dams, hydraulic heave failure or corrosion processes of reinforcing steel in concrete are a small selection of measuring applications in civil engineering where the impedance analysis can be used to determine the measurand. Those measuring applications are having high requirements for the measuring hardware. For example a common interface for fast data exchange, high resolution, independent functionality and easy customizability to suit the measuring application. For that reason, a well-known application for steel-mill process monitoring can be used as a development platform. This hardware platform is based on a vector network analyzer and is meeting the requirements mainly. However, a couple of modifications has to be made, like replacing the ADC for a higher sample rate, Ethernet for easy and fast data exchange and the microcontroller for more calculation power.

Paper Reference: (SCI-3-2) 1570331495
Title: Experimental Interference Liability Studies on Electrode Geometry of Aqueous Solution Sensors
Author(s): Roman Gruden, Olfa Kanoun (Germany)

Abstract –Low-cost sensors to determine aqueous solutions are mostly constructed as an electrochemical cell with a two-electrode-system. Such a two-

electrode-system can be realized with multiple geometric arrangements and shapes of the electrodes. The decision which arrangement and shape is best for the current application depends primarily on interference liability. In real applications criteria like producibility, probability of pollution and strain of the surface are also important. This paper shows the test results of six different two-electrode-systems regarding the mentioned criteria with focus on interference liability. The tests were executed under laboratory conditions by a frequency range between 40 Hz and 110 MHz.

Paper Reference: (SCI-3-3) 1570340986
Title: Investigation of Interdigital Sensor Geometry for Oil Quality Measurement
Author(s): Ahmed Fendri, Rajarajan Ramalingame, Hamadi Ghariani, Olfa Kanoun (Tunisia–Germany)

Abstract − The paper aims to optimize the interdigital electrode (IDE) geometry of a capacitive sensor for quality evaluation of frying oils. The dielectric constant of typical edible oils is in the range between 2.9 and 3.1. It slightly increases with the increase of the frying time. Since the change is very small it's very important to use a measurement setup which guarantees the detection of this small change. The results show that the choice geometry of the sensor is very important to improve the sensitivity and the accuracy of the measurement. The width and the length of the electrodes as well as the distance between them should be well selected depending on the measurement range and the desired sensitivity.

Paper Reference: (SCI-3-4) 1570340973
Title: Dielectric Spectroscopy for Assessment of Water Content in Edible Oils
Author(s): Ahmed Fendri, Hamadi Ghariani, Olfa Kanoun (Tunisia–Germany)

Abstract − Water content in vegetable oils is one of the important parameters to be controlled during the extraction of oils. In this work, we investigate the efficiency of the dielectric spectroscopy for the detection of the water content in different vegetable oils. A capacitive sensor with a high effective surface and small distance between the electrodes is used in order to measure the dielectric constant of the oil. First the water content of edible oil was characterized by measurements corresponding to ISO 620. The dielectric constants of the oil samples change linearly with changes of water content for all oil samples. The measurement should be carried out at frequencies lower than 2 MHz.
