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Machine Invention Systems: A Fundamental Paradigm Shift in the Field of Innovation and its Societal Implications

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ABSTRACT

Based on current developments from a number of industries, a new trend in the field of innovation that challenges the well established invention paradigm is emerging. What we call machine invention systems holds the promise of being able to automate the invention process by removing the human component. This article creates a working definition of machine invention systems based on current operational examples in various industries. Furthermore, the article discusses existing challenges, usage scenarios as well as broader implications like intellectual property and ethical and moral concerns regarding the impact of such technology on the society.

KEYWORDS: machine invention system, automated invention, automation, invention process, innovation

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Power distribution transformers operating under nonlinear and balanced load conditions

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ABSTRACT

In this paper we propose a simple and efficient procedure dedicated for evaluating the reduction of apparent power rating of a power transformer that operates under non-sinusoidal and balanced load condition. The non-invasive procedure bases on international standards and requires only the power quality parameters of the current waveform through the transformer along with the machine rated data.An accurate losses separation within the power transformers is also performed, which manages to evaluate the MPC (maximum permissible current) of the machine that operates under distorted state.The whole procedure is illustrated on a 160 kVArated power distribution transformer that supplies industrial non-linear loads.

KEYWORDS: non-linear loads, transformer, harmonics, derating

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Real-time FPGA monitoring hardware module using on-chip sensors

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ABSTRACT

The increasing demands for high density and high performance electronic devices such as microprocessors and FPGA in the latest years imposes real-time monitoring techniques. Many passive and active sensors can be used to measure system voltage and temperature: thermocouples, resistive temperature detectors, thermistors, silicon temperature sensors and on-chip sensors. In this paper, design and experimental results of a hardware module using FPGA on-chip sensors will be presented. These sensors permanently monitor the chip internal temperature and voltage. The innovative design enables   monitoring many parameters. If they over pass user defined thresholds an interrupt signal will be generated and the main system will immediate action in order to prevent system failure.

KEYWORDS: microprocessor, FPGA, on-chip sensor

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On the predictive maintenance of the major energy converters used in low voltage electric installations –case studies

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ABSTRACT

In order to reach a high level of safety and reliability, both predictive and proactive maintenance are major operations periodically required by any electric installation. Particularly, for the major electric energy converters commonly found in low voltage installations (e. g. transformers and induction motors), this paper critically analysis their main non-invasive inspection procedures: IR thermographic investigation and power quality measurement. Aspects regarding other maintenances procedure such vibration analysis or ultrasonic detection is also covered.

KEYWORDS: Thermography, predictive maintenance, thermal camera, power distribution transformer

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Novel Metal Oxide Resistive Switches for Tunable Radio Frequency Circuits

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ABSTRACT

In this paper, we propose metal oxide resistive switch (or ReRAM) with good reliability and performance for radio frequency (RF) circuits working in the X-band (i.e. 8–12 GHz). This novel switch has a simple two-terminal design, its resistance can be tuned by low voltage ($<$1V) with good endurance and the programmed resistance is stored in a non-volatile fashion. The device is based on a thin film ($\sim$30nm) of sub-stoichiometric TiO_{2-x} material deposited using e-beam evaporation. The device area was approximately 2µm x 2µm. The device showed -32 dB isolation at 10 GHz due to its relatively low OFF capacitance, but it was harder to tune to very low ON resistance values needed for very low insertion loss. The proposed low voltage non-volatile switch could replace other volatile RF switches based on MEMS, PIN diodes and transistors in applications requiring low power consumption.

KEYWORDS: ReRAM, radio frequency, non-volatile, RF switch

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Fitting Dependence using Copulas

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ABSTRACT

The present paper describes the bivariate process using cumulative distribution function for the chosen characteristics and the relationship between them, in association with the copula theory. The paper models the response variable -joint cumulative distribution function (CDF) - of two controlled variables, Brinell Hardness and Tensile Strength to explain and predict an output variable, the copula function. The paper proposes a method based on the bivariate density and cumulative distribution function with the Clayton copula, using Gamma distribution models. The methodology is applied to literature data assessing the dependence between two important mechanical properties.

KEYWORDS: copula, dependence, Gamma distribution

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Operational Risk Modelling

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ABSTRACT

This paper provides a quantitative approach on the risk management field, namely operational risk management. Operational risk can be defined as a consequence of critical contingencies which can be quantified with mathematical models with purpose of calculating the capital requirement against unexpected operational losses.

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Copula and Risk

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ABSTRACT

The paper presents a few ideas about risk by copula and reliability. Copula is a device that fully quantifies marginal distributions into a joint one and the dependence among random variables too. Decision and risk analysis can benefit from the use of correlations and copulas in the construction of probabilistic models. An example was introduced to link reliability with risk and copula.

KEYWORDS: risk, copula, reliability, multivariate distributions

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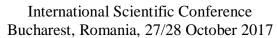
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Lean Manufacturing in the Production Industry

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ABSTRACT

Lean is a method which was implemented in many companies. The results appear over time, that means that patience, perseverance and everyone's involvement is needed to apply this concept. The fundamental purpose of Lean Manufacturing is to offer products with high quality and considerable lower price and also to contribute to the prosperity of society. This concept is known also as a philosophy, on the basis of which it is very important to build a company's production system with the aim of eliminating waste completely and increasing the quality of the system. Reducing costs, meaning improvements of the productivity, developing a unique manner against the corporate management and at the same time creating and developing integrated techniques that will contribute to corporate operation, all these aspects outline the Lean Manufacturing Concept (Web 1).

The paper concludes with some possible improvements that can be made in a Romanian company by implementing Lean techniques.

KEYWORDS: Lean principles, Toyota, flexibility, reducing losses, customer value

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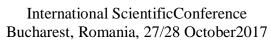Web-2: https://www.lean.org/WhatsLean/History.cfm , accessed 10 October 2017.

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Digital Business

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ABSTRACT

Once a business starts using technology and different tools inside and outside itself, this business can be called a digital business.

There are obviously differences between a traditional company and a digitalised company. Even so, the trends are in the favour of digitalization of companies, making the internal and external tasks a lot easier to handle and solve for both employees and customers.

KEYWORDS: digital, business, technology

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Film – a mixture of art and technology
A century of innovation in Sound Design

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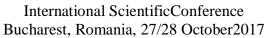laury_lazarescu@yahoo.de

ABSTRACT

Film is the only form of art that is dependent on technology. Since the invention of cinema, film enjoyed technological advancements both on the visual and the acoustical level. This article focuses on the evolution of film sound, starting with the silent movies and the coming of talkies, going from multichannel to Sound Design. The materialization of new ideas was possible thanks to the development of groundbreaking technologies, like the synchronous sound, the Dolby standards, the surround sound and the concept of "Sound Design" that eventually changed the entire perception and style of the soundtrack. During a century, film sound evolved from a piano accompaniment to today's multichannel, immersive soundscapes and augmented realities.

KEYWORDS: Film sound, sound design, computer graphics, immersive soundscape, Dolby

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Innovative ways of teaching German

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ABSTRACT

The teaching of foreign languages is a challenge for every teacher in this field. While classical ways are very good at offering knowledge, the other components of the competence regarding a foreign language like the ability to write and to speak and the motivation to do so are not so easy to tackle. In this paper, the authors present elements of their own innovative teaching methods that support the development of communication competencies related to the German language.

KEYWORDS: innovative learning, German language competencies, serious games

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