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From the Editor's Desk

I have the privilege to introduce the second issue of the Amity Journal of Engineering and Technology (AJET), a peer-reviewed multidisciplinary scientific journal that focuses on emerging trends in various domains of engineering and technology. AJET aims to provide a platform to researchers to share their ideas and emerging trends, across varied themes related to the disciplines of engineering, technology, and allied areas.

The current issue of the journal is a compilation of seven papers, wherein authors have discussed ideas ranging from contemporary technologies like in-memory data systems and mobile cloud computing to discussion of traditional issues. This particular issue also includes a study that focuses on identifying and suggesting appropriate solar shading devices for houses in the North East India considering the climatic dynamics and existing housing patterns. Another interesting study aims the development of an osteoconductive bio composite scaffold incorporated with anti-resorptive drug as nanoparticles for prolonged and sustained drug release for enhanced osteogenesis in osteoporotic bone fracture conditions.

We would like to extend our sincere gratitude to the authors of the papers, from different countries, without whose dedication to research, this journal would not have been possible. We would also like to thank the reviewers for their valuable comments to the authors and the editorial committee, for extending support in bringing out this journal in its present form. The first two issues of AJET bear testimony to the zeal and commitment of the founding editors of the journal in providing a common forum to researchers to share their ideas and build upon them, adding to the process of knowledge creation.

We hope that academics, researchers, and industry experts will find AJET useful, as they set out to explore the fascinating world of advanced engineering, emerging technologies, and inspiring architectures.

Prof. Dr. Piyush Maheshwari
Editor in Chief

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A Practitioners View: Compare In-memory Data Systems against Relational DBMS

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Abstract: There is a continuous growth of In-memory computations within the present generation of application systems. This is primarily attributed to the astronomical increase of data volumes, real-time need for processing and quick decision making, and even the diverse types of data assets, an enterprise possess to derive the knowledge and insights. While Relational Data systems have inherent limitations, NoSQL and NewSQL Data Systems have shown some promises to overcome these limitations.

In-Memory Data Systems seem to address the complexity, robustness and scalability in distributed computations, combining with newer approaches to data architectures evolving from polyglot persistence such as Lambda and Kappa architectures with more on the rise. From an Enterprise perspective this leads to a lot of confusion around deciding upon the right data store and the data architecture for business information processing. While the problem statement around the right data systems is much broader to address and most cases specific to the business use cases, the paper is an attempt to take a use case and compare the traditional leading RDBMS against an In-memory data systems. While doing the comparison, I also left out the discussions around machine models –parallel systems or BSP and left it to the discretion of the systems vendor as they have implemented.

Keywords - *In-memory systems, polyglot persistence, data architecture, NewSQL*

1.0 Introduction

In the last few decades, RDBMS had been the mainstay for data storage and processing in an OLTP environment. Most database systems implement ACID compliance to meet the guarantee of data state while being processed (on flight) or when in rest. As the volume, velocity and variety of data grew for an enterprise, RDBMS started to slow down. This had been observed both for read and write performances. With the advent of NoSQL data systems, the development community tried addressing the read performance over writes. The NoSQL systems were based on CAP theorem and people even coined BASE properties as opposed to ACID that an RDBMS is known to support. In this paper, I try to take some long running read queries and compare the performance between different data systems. Though the extensive exercise was done using multiple leading data systems solutions –

- 1) RDBMS that organized in row/ column format.
- 2) Column oriented data system.
- 3) Key-value pair systems and
- 4) Multiple NewSQL data systems.

However, limit my discussions to only compare the results between RDBMS and NewSQL systems. When it comes to In-memory systems, they are typically of two types – In-memory distributed processing and In-memory data grid. I delve into the latter in this paper as the former has negligible to no support for data persistence.

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Analysis of Different Channel Coding Techniques for Mobile Cloud Computing

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Abstract: Digital Disruption is all around us. Mobile devices especially the smart phones are fueling the culture of “Anytime, Anywhere, And Anything”. Smartphone growth has also triggered the explosive growth of mobile applications and cloud computing. Together, Mobile cloud computing is now a potential technology for mobile service. In wireless communication whenever data is transmitted or received error is produced that can render the data unreliable or inconsistent. For efficient data communication, it is necessary to receive errorless data. Channel encoding increases the performance of communication system by reducing the effect of noise and there by increases the reliability. This paper compares BER (Bit Error Ratio) analysis of 4 different channel coding techniques; Bose- Chaudhuri-Hocquenghem (BCH) code, Hamming code, Reed-Solomon (R-S) code and convolutional codes through an Additive White Gaussian Noise (AWGN) channel. The simulations are carried out in MATLAB R2015b and same is verified mathematically.

Keywords- AWGN, BER, Cloud computing, Channel Coding Techniques, matlab, mobile, MCC

1.0 Introduction

Mobile devices and apps are becoming an essential part of human life. Mobile devices are most convenient way of communication which are not bound by time and place. Mobile users enjoy various services from mobile applications, which run on the device or/and on remote servers via wireless networks. However this requires a high data rate and minimum bit error rate. But in a digital communication system, the inevitable presence of noise in the channel causes errors in the received data. Radio waves, electrical signals, atmospheric disturbance, internal components will have some amount of noise on the medium as well as signal degrades over a distance. Error correcting codes adds redundancy to the original message in such a manner that at the receiver we could detect & correct the received message and there by increases the reliability [1].

Two basic approaches of channel encoding are Automatic Repeat Request (ARQ) and Forward Error Correction (FEC). In ARQ whenever the receiver detects an error in the transmitted block of data, it requests the transmitter to send the block again to overcome the error and the request continue until the block is received correctly [2]. FEC relies on the controlled use of redundancy in the transmitted code word for both detection and correction of errors. No sender retransmission required. FEC is the most common technique used in the digital communication [2]. There are 2 major categories of FEC codes. Block coding—in which a block of k bits is mapped into a block of n bits by adding $(n-k)$ redundant bits. Examples are Hamming code, Reed–Solomon codes and Bose-Chadhuri-Hocquenghem (BCH) codes. Convolutional coding-- are also known as codes with memory, in this type of codes the encoder operates on the incoming message sequence continuously in a serial manner.

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Compression Performance and Thermal Analysis of Hollow Low Carbon Mild Steel Cylinders with Circumferential Butt-Welded Joints

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Abstract: In the present study, a set of circumferentially butt-welded hollow cylindrical specimens of varying thickness are subjected to compressive loading. The load Vs deflection graphs are plotted for all the specimens to study the pattern of load variation for different cylinder thickness in the presence of butt-welded joint in the specimens. The effect of thickness along with the presence of weld joint on the compressive performance of the specimen is studied. A thermal analysis is also carried out to identify the point concentration of temperature and to understand the distribution of temperature along the specimen over a certain time period by considering steady state and transient conditions. Nodal Temperature over Time period graphs are plotted to get a better understanding of the temperature distribution. The high temperature zones around the weld bead are predicted.

Keywords-Compression, Butt Welded, Thermal Analysis, Steady State, Transient

1.0 Introduction

Welding is a form of permanent fusion process of similar or dissimilar metals with the application of heat or pressure or both together. Welding processes are not specific to a particular component, and can therefore be extended to the fusion of various types of components by altering certain welding parameters [9]. Welding is one of the most efficient and economical methods for the permanent joining of metals. This method has marked a tremendous improvement the large number of industries by raising their efficiency, productivity and service life. Mild steel is one of the most commonly used materials for a variety of purposes [9, 10]. In this study, the type of weld considered a butt- welded joint. A butt welded joint is a type of joint, where two members aligned in the same plane are joined together by welding. A double V-Butt weld joint is used to weld the two hollow cylindrical pieces (pipe) together for this study due its superior mechanical properties [9]. This joint is frequently used in plates, sheet metal, and pipe work where high strength is required. They are reliable and can withstand stress better than any other type of weld joint [9]. Due to the application of extremely high temperatures, there will be a significant change in the micro-structure of the weld and the base materials, thus altering the mechanical properties of the materials: Hardness, compressive strength and other chemical properties [9]. The difference between the mechanical properties of the base metal and the weld metal increases, the weld metal, contrary to the parent metal, is still a cast alloy whose strength mainly depends on its chemistry [11].

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Enhanced Network Security by Botnet Detection Approach

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Abstract: Network Security has become very important in today's world, as a result of which various methods are adopted to bypass it. The increased network computers makes botnet detection as a challenging one and it makes easier for intruders and attackers to generate mitigation attacks. The centralized propagation nature of botnet floods warms through different botnet clients and questions the network security. To overcome the challenges in identifying the botnet, I try to propose a new approach for botnet detection and filtration. The proposed approach is a learning one, which keeps track of signature of identified warm and the list of hop it traversed. For each warm signature identified, it maintains bot matrix, in which set of hop addresses traversed by the data packet is stored. Whenever a warm packet is identified, its traversal path is tracked and compared with the list of hops present in the bot matrix for the occurrence of hop address present in the traversal path.

Keywords: *Botnet, Type of attacks, Firewalls, Network Security, Bot Matrix.*

1.0 Introduction

Botnets is term used for collection of software robots, or bots, that run autonomously and automatically .A Botnet (also called as zombie network) is a network of computer infected with malicious program that allow cybercriminals to control the infected machine remotely without the user's knowledge.

Botnets have become a significant threat to network communications and applications, as they increases the efficiency of network attacks such as denial-of-service (DoS) attacks, scanning, phishing, Email spam, identity theft, click fraud, and espionage [1]. This capability of a botnet is attributed to the large number of hosts that it controls, which ranges from hundreds to thousands that work together in carrying out an attack, as opposed to when only a few number of hosts carry out attack .Bots in the botnet connect directly to some special hosts (called "command-and-control servers, or "C&C"servers).C&C servers receive commands from their bot master and forward them to the other bots in the network. From now on we will call a botnet with such control communication architecture a "C&C botnet".

A peer-to-Peer network is a network of computers connected in no topology and could be used to transfer data packets. The data packets travel through different networks and computers towards destination. There are hops which act as a bot master which induces other peers to spread spams, the other peers which supports bot master is called as bot client or propagators. The peers participating in botnet changes its addresses dynamically, so that identifying the peer address is more difficult.

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Thermal Comfort in Built Environment through Shading: The Case of Guwahati City

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Abstract: Use of shading devices as a strategy to reduce or optimize solar gain as per the contextual and climatic requirement has become one of the most preferred and tested strategy for designing new or refurbished building envelop. Use of mechanical shading devices have also gained importance along with layered glass paneled windows with innovative designs and improved aesthetics, especially to suite the vertical constructions in the mega cities all over the world. The present day application for bio climatic and passive architectural design has accelerated with the concept of energy conservation and sustainability, backed by various software, computer modeling and Life cycle assessment tools. Studies and research done extensively on the use of solar shading devices indicate reduction of heat gain/loss for thermal comfort in the built environment. This study was focused to identify and suggest appropriate solar shading devices for houses in the North East India considering the climatic dynamics and existing housing patterns (low and medium rise). Guwahati city, the business hub of North East India and capital of Assam state was taken up for case study. The results suggest that simple devices along with the existing natural buffer can act against the use of mechanical and energy intensive processes, eventually reducing energy consumption and better thermal comfort.

Keywords - Thermal Comfort, Shading Devices, Guwahati City

1.0 Introduction

Mankind built spaces to get comfort and keep them away from the nature's fury. But global warming and anthropogenic unsustainable practices has changed the whole climatic scenario of the world; welcoming the nature's fury. Mankind is moving away from their traditional knowledge, which was evolved through centuries in sync with their immediate nature and climate. Furthermore the practice of adapting the current engineering without examining its versatility for climatic context, making the mankind to spend on energy intense means to achieve their comfort.

With the growing ideas of sustainable future and conservation of energy for future has forced the world to think of taking a U-turn to the history and explore the traditional systems which were climate responsive and not energy intense, with modern approach to attain the desired comfort. Building design with passive strategies is one such system which can help in minimizing the energy usage to build a sustainable future.

1.2 Energy and Building

Various organizations like UNEP, has claimed that building industry worldwide consume 40% of the global resource use (UNEP, 2009). The use of this resources produce 30% of world Green House Gas emissions, which is majorly responsible for the world climate change due to its heat trapping capability (Kamal, 2012).

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Strontium Ranelate Trailblazed Osteoconductive Biocomposite Scaffold for Osteoporotic Defects

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Abstract: A suitable biodegradable scaffold implant with sufficient physio-chemical properties and drug release pattern that can replenish the bone volumes in fragility fracture conditions associated with osteoporosis is still under investigation. In this study we aimed at development of an osteoconductive bio composite scaffold incorporated with anti-resorptive drug as nanoparticles for prolonged and sustained drug release for enhanced osteogenesis in osteoporotic bone fracture conditions. The bio composite scaffold was fabricated using freeze drying method and further nanoparticles by coacervation-crosslinking method. Sodium alginate-Guar gum polymers were taken as the matrix components integrated with ceramic wollastonite and strontium ranelate was taken as the model drug for drug release application studies. The study highlights were focused on development and characterization of the polymer-ceramic scaffold, the drug release pattern from the composite matrix for monitoring optimum drug delivery to osteoporotic bones. The drug release studies conducted clearly demonstrated the potential of the scaffold matrix for a prolonged and sustained release of strontium ranelate favourable for drug delivery applications. The In vitro Degradation, Swelling and Porosity studies indicated the integrity and physico-chemical properties of scaffold. The various cell studies, ALP activity studies and In vitro biomineralization studies demonstrated the clear aspect of the system to favour the growth of bone cells thus increasing bone volumes and finally healing of osteoporotic bones.

Keywords- *APP activity, Osteoconductive, Biocomposite*

1.0 Introduction

The orthopedic surgeons face difficult surgical fixation procedures involved in repairing fragility fracture conditions that are more prone to occur in patients suffering from osteoporosis. The healing process involved in fracture of osteoporotic bone passes through normal stages but is prolonged due to poor bone quality, loss of bone mass and micro architectural deterioration of bone tissue.[1,2,3] Currently these procedures are handled clinically by using autologous bone grafting synthetic bone grafts such as metals, ceramics and polymers. However these applications are bound by several constraints including requirement of secondary surgery, increased rate of infection or recurrent pain and lack of biodegradability for most metals and for certain ceramics. Also supply of tissue platform and minerals with respect to time to make up the loss of integrity of bone due to osteoporosis condition by the constructs are limited.[4-7]

The field of tissue engineering seeks to overcome these setbacks by design of 3 dimensional structure supports called scaffolds that support the ability of the cells in the body to regenerate as bone thus stimulating the end state, the native bone tissue with no trace of the scaffold.

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A Review on Recent Trends on Parametric Optimization in WEDM

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Abstract: The WEDM process is the most popular and an inevitable non-conventional machining process used for the machining of hard and difficult-to-cut material such as tungsten carbide and its composites. The most important goals of WEDM are to achieve a higher productivity, accuracy and reliability. Due to a large number of variables and improper combination of process parameters, the optimal performance of WEDM processes is very difficult to achieve. This goal can be achieved by determining the relationship between the process parameters and response variables of the WEDM process and selecting the optimum process parameters. Researchers have used different analytical and statistical design of experiment (DOE) methods to select best combination of process parameters for determining the most significant/optimum process parameter. In view of above, this paper presents a review of current research work on parametric optimization in Wire cut EDM.

Keywords - WEDM, Process Parameters, Response Variables, Optimization, DOE, difficult-to-cut material

1.0 Introduction

Research in advanced materials has opened new opportunities for the manufacturing sector. The materials such as tungsten carbide and its composites, titanium based alloys and other superalloys – have been developed to meet the demands of industries such as aerospace, turbine, automobile, tool and die industries which demands extreme applications.

The traditional metal cutting processes utilizes shearing action on the work piece for material removal during machining. The properties such as high hardness, toughness, corrosion resistant have made these materials difficult-to-cut using traditional metal cutting processes. Since these difficult-to-cut materials possess excellent mechanical properties which can be useful in many important applications, machining of them can open up opportunities of utilizing them widely. Therefore, the machining of difficult-to-cut materials is an important issue of research to the industries in the field of manufacturing [1-5].

Nowadays innovative research and developments in the area of non-traditional machining processes such as Wire Electro-Discharge Machining (WEDM) process are considered as alternative replacements for conventional machining methods of metal working. WEDM has the capability of machining the intricate features of hard and difficult-to-cut materials such as tungsten carbide with high dimensional accuracy which has made WEDM process the most popular and an inevitable non-conventional machining process [1,2]. Both EDM and micro-EDM processes in recent years have been extensively used in the field of mould making, production of dies and cavities etc. for aerospace, nuclear, missile, turbine, automobile and die making industries where accuracy in the range of $\pm 2.54 \mu\text{m}$ is maintained.

WEDM was first introduced in the late 1960's to manufacturing sector. WEDM as shown in Fig-1 [15] is a thermal-based process in which the spark is generated between workpiece and tool i.e., conductive wire (usually brass wire).

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All submitted articles should report original, previously unpublished research results, experimental or theoretical. All submissions should be made as per the guidelines and manuscript requirements available with Coordinator of AJET. Authors are requested to follow standard IEEE format in all their submissions.

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