



99<sup>th</sup>  
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**99<sup>th</sup> Session of the  
Indian Science Congress**

SECTION OF

**ENGINEERING SCIENCES**



**The Indian Science Congress Association**

**PROCEEDINGS**  
**OF THE**  
**NINETY NINTH SESSION OF THE**  
**INDIAN SCIENCE CONGRESS**  
**BHUBANESWAR, 2012**

**PART II**  
**SECTION OF**  
**ENGINEERING SCIENCES**

*President : Prof. H. R. Vishwakarma*

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# **99<sup>th</sup> Indian Science Congress**

**January 3-7, 2012, Bhubaneswar**

## **I**

# **PRESIDENTIAL ADDRESS**

*President* : **Prof. H.R. Vishwakarma**

***PRESIDENTIAL ADDRESS***

**PREPARING NEXT-GEN ENGINEERS FOR FACING  
THE CHALLENGES OF 21ST CENTURY**

**H.R. Vishwakarma\***

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Society of India (2010-12).

Both the Indian IT and Education are now trillion dollars sectors. In deed, it is a matter of pride. However, the potential of our Nation is much more than the above – given its demographics.

The Indian Education System has seen a phenomenal growth in terms of quantity and quality - making it the third largest education system in the world after with US and China. It is also having the potential to become the best education system with strong relationships among education, research and industry sectors. The engineering sciences account for a major share in the Indian Education System in terms of the number of students and variety of academic programmes.

In the above backdrop and aiming at promoting education and research activities, especially in the advanced technological domains and emerging research fields, the impact is on three aspects volume, value and velocity. For the universities, esp in science and technology domain, the critical issues have been of the productivity, quality and reach of their academic programmes.

Taking forward from the Engineering Sectional Theme “Ethics in Education and Research” of the 98<sup>th</sup> Indian Science Congress, the sectional theme for this year was chosen.

The engineering sciences programmes continue to be the most sought after academic programmes in India, even though several other lucrative career options being available. The engineering

profession supposedly offers an intellectually enriching and financially rewarding career- apart from the high social status. The role of engineering professional and engineering workforce in the nations building can not be overemphasized.

With a large number of private engineering institutions, quality of students in take and graduates passing out poses a big challenge to entire engineering profession. In the absence of Body of Knowledge for Engineering Sciences, even the accreditation and assessment systems are becoming ineffective.

As is well known, the fundamental discoveries in basic sciences are essential ingredient of engineering and technology- in way these could be considered as product outcomes. Such discoveries and applications began to evident in the late nineteenth and in the twentieth centuries and in greater variety than in all the previous 50 centuries of civilized life.

In simplest words, the engineering is a discipline of delivering the right products which necessitates the engineers to consider a wide range of trade-offs, including many that are only weakly defined. A deep appreciation of this fundamental situation is at the core of all engineering and needs to be conveyed to the budding engineers. All engineering lives in the intersection of people, technology, domain, and opportunity aspects.

The 21<sup>st</sup> century unlike the previous centuries poses the problems and challenges of different kind than the previous centuries. These relate to scarcity of resources Disparities and divides, shrinking lead time- with almost simultaneous development and deployment, globalization, and fast changing customer/user along with the co-evolving technological and business models. Further, the stringent delivery requirement necessitates simultaneous development and deployment.

In the above back ground, I would like to mention the following:

- The Millennium Development Goals
- Distinguishing aspects of engineering education
- Key stakeholders and their roles and responsibilities
- Educational planning and administration
- Productivity, Quality and Reach
- Employability and Categories of Employment
- Faculty early induction and development
- Accreditation and Assessment
- Role of S&T societies and industry associations
- Role of ICT in engineering education
- Role of problem-solving environments

As we live in the knowledge-driven world, the next-generation engineers have to be prepared for “Engineering the knowledge society” and not alone for engineering the products in the physical sense. The disciplinary approach of teaching-learning is inadequate for solving the large and complex problems posed in this century.

The twin facts – the role of research and innovation in the development of new products and processes, and its contribution to productivity enhancement have not gone unnoticed but have triggered a renewed interest in technological research and innovation through out the world. The research like teaching has not been an attractive career option in India- with the most talented engineers choosing to work in the industry while the residual take up the teaching and research. However, the scenario is changing for better.

The foremost is the change of our mind-set and to start accepting failures and learning from them-“Learning as an engineer” means “rising from the ashes of failed projects”. The Indian engineering students and faculty members are deprived of real-life scenarios and case studies as the industry is even prepared to share the details of closed projects with the academia.

On the other hand, the academia is not prepared to ask for the reasons from the industry – why a particular group of students could

not make it through the placement interviews? As a society, we need to open ourselves to share, discuss and analyze the failures of engineering projects.

Another dangerous trend is to expect every student and faculty member to publish the technical papers only in the international journal. India with its unique diversity and complex problems offers umpteen opportunities for undertaking research projects.

The outcomes of such research projects could be shared with state and national research laboratories and universities for further development and it can finally go the industry for building products and solutions. The above requires a free flow of human resources and ideas on both side- academia and industry.

The faculty members with technological excellence, research orientation, process innovation and trans-disciplinary enrichment are the first and foremost requirement to prepare our engineering graduates as Global Indian Engineers. The budgetary provisions must be made at all levels for joint faculty-student research.

The following important aspects have emerged for discussion and deliberation:

- Trans-disciplinary engineering design and development
- Systems engineering as a tool for enhancing productivity and quality
- Knowledge Management as the key enabler in engineering profession
- Ecosystem for Industry Industry Institute Interaction
- Synergetic Evolution of Technology and Society
- Nature Inspired Engineering and Green Engineering

The 21<sup>st</sup> century demands systems to deliver knowledge to a very large number of student population (*Volume*) spread over large geographical area and placed in different economic & social strata. Secondly, the quality (*Value*) of education is affected due to poor content, delivery and its currency. Its utility as a support to career

development and meeting the qualifying needs of job opportunities is very weak. Third, the speed of delivery which it demands now because of sheer quantum of education content & its learning is not at all enough to satisfy the current requirement of the community.

Due to this situation, large number of young student population is deprived of opportunities to learn. The problem gets more complex due to Digital divide, Gender divide, and Social divide in this target population. On the top of this requirement, a large number of working professionals in the age group of 30-40 years need to revisit the campuses for relearning, learning the current knowledge for better performance in their respective organizations.

On the other side education delivery system suffers from cost pressure and pressure of resource management. It suffers from quality of faculty, a key component in the delivery system. At many places faculty is not available and if available it is not supported by soft infra structure such as laboratories, library, ICT and internet access.

The project-based learning (PBL) is an important process enabling student improve the quality of their project work and build their core competence. PBL can be thought of as active learning stimulated by, and focused round a scientific or engineering or any other crucial problem thus opportunities where solving problems is the focus or starting point for students' learning.

There is a strong need to bring in a change in institutes' policies and/or mindsets as the first step to wholeheartedly accept the following aim and objectives of student project:

- To prepare students for working life by enabling them to practice what has been learnt in the institutes.
- To familiarize students with the workplace characterized by a blend of problem-solving, analysis, design, resources and risk management perspectives
- To examine students' potential for higher studies e.g. Masters/Research programmes



- To inculcate creativity, professionalism and team spirit and how to present and/or defend their ideas and hypothesis in a collaborative and consultative spirit
- To provide students with an insight and a flavour of research methodology
- To support a connection between research and undergraduate teaching-learning
- To serve as a quality control mechanism for academic programmes and curricula
- To stimulate industry-interaction through student and faculty involvement in technology commercialization;
- To enhance scientific and technological learning, by combining skills with a broader vision of new developments and its relationship with economy and society;
- To promote entrepreneurship and diffusion of new technologies and applications;

If the student projects are taken seriously by the stakeholders, the same could result into a wide range of products and solutions for the segments and sectors which are generally over looked by large companies. Even, the education and research sector would greatly benefit from the untapped talent.

I wish to briefly mention the critical success factors for an engineering education institution. These include- Robust faculty recruitment processes, Quality of curriculum, Institutional support mechanisms, Regular revision of curriculum, Industry-institute interaction, Academic freedom, a strong governance system with proper checks.

The universities, esp in Science, Engineering and Technology, could serve as an eco-system for inclusive growth as well as resource centres for organizations and citizens engaged in education and research. Certainly, the universities could undertake research studies involving local resources and addressing issues/challenges of a given segment and social sector. At this juncture, I would to enumerate some of important suggestions for discussion:

1. In the developed nations, it is the academia which leads the industry in taking research and innovation initiatives whereas the existing education system in India makes things more algorithmic and systematic, without laying stress on the creativity of the students. There is an urgent need for a change to bring in a system that gives importance to students' capabilities. By creating such an environment, innovations and breakthroughs happen. The open labs concept be introduced and "tolerance for failure" culture be inculcated to promote experimental learning in students and young faculty; else innovation will be just a dream.
2. Students and faculty must prepare to benefit from research and innovation opportunities. However, research and innovation will not happen automatically. There is a need to foster these, to create an environment that is conducive to research and innovation. New ideas, new knowledge and new findings should be used to anticipate and innovate. Younger faculty should be given opportunities for research, while senior professors given undergraduate classes to improve the quality of teaching. India has a meager share in the technical papers published world-wide. Prime reason for the decline in research could be taking away of research from universities and entrusting it to R&D organizations after the 1960s.
3. It is very evident shows that India has bright students who need an affordable blend of credible, durable, effective, flexible, global, high-value and innovative (ABCDEFGHI) academic programmes. Indian government and industry are now pushing the innovation agenda in a big way from the current dismissal figure of R&D spending. However, there is urgent need to make teaching and research a lucrative career option to address an acute shortage of faculty.
4. The effective ICT usage has improved efficiency of businesses, now it is high time that ICT be used to improve education system as well as to facilitate creativity and enhance productivity. What the students need is an ICT facilitated

Personalized System of Instruction (PSI) with Cooperative Learning.

5. In the given scenarios, a maturity model of industry-academia association revolves around five levels viz., Supplier-Buyer, Donor-Receiver, User-Consultant, Sponsor-Institute, and Long-term. Unfortunately, in a majority of cases, the association is at the lowest level. The ASSOCHAM, CII, MAIT, NASSCOM, TiE and others should take path-breaking initiatives to support academia and to network with community of practice.
6. Project semesters are usually not utilized effectively by students and not taken seriously by academia-industry project sponsors. There is a need to formulate long-term collaborative project guidelines and best practices for exploiting this untapped national human resource (think of about a million young minds – available annually almost ready to work). Early identification of entrepreneurs and establishment of industry supported project development and innovation centres could be the first steps in the right direction.
7. To reduce the learning curve and improve employment potential of the students, the industry-oriented extension programmes can be offered jointly by academia-industry-professional societies. Also, there is need to facilitate continuous learning environments with ample opportunities to continually expand the capacities for achieving desired results. The systems engineering and trans-disciplinary engineering design methodologies should find place in the curricula. Service Science, Management and Engineering (SSME), a growing multi-disciplinary research and academic effort of IBM and the world's leading universities, should be considered for implementation that integrates fields like computer science, operations research, engineering, management, business, social and cognitive sciences, and legal sciences.
8. The acute shortage of faculty can be partially addressed by inviting experienced professionals from Govt./R&D and industry

(not withstanding with their academic qualifications) to become an extended arm of academia. The above will also lead towards a collaborative environment for scholarship, innovation and building intellectual capital. Academic pressure should be increased so that students excel and innovate.

9. Faculty development institutes or centres should be established by universities or autonomous institutes for training new faculty. Also, summer schools/FDPs and liberal sabbaticals for faculty to facilitate exposure to the latest technologies, products and industry practices thus inculcating problem-based learning and 'learning by doing' attitude.
10. The recommendation of Knowledge Commission for establishing 1,500 universities should be acted upon to provide education opportunities to all strata of society. However, universities must be bench-marked/assessed regularly. Regulatory agencies and professional societies should co-evolve quality standards.

Thank You !

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*Acknowledgement: A large number of websites, books have been used in preparing this speech. All such sites and books are thankfully acknowledged.*



**99<sup>th</sup> Indian Science Congress**

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**II**

**ABSTRACT OF  
YOUNG SCIENTIST  
AWARD  
PROGRAMME**



**YOUNG SCIENTIST AWARD PROGRAMME**

**POLYANILINE AND FUNCTIONALIZED CARBON  
NANOTUBE FOR NOVEL ORGANIC PHOTOVOLTAIC  
CELLS**

**S. Paul**<sup>#</sup> and S. K. Samdarshi<sup>\*</sup>  
Solar & Energy Materials Lab,  
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The paper reports incorporation of functionalized multiwalled carbon nanotubes (f-MWNTs) in Poly (3- octylthiophene) and (6,6)-phenyl-C<sub>61</sub>-butyric acid methyl ester heterojunction solar cells. Al/LiF/P3OT+PCBM+f-MWNTs/PANI+MWNT/ITO fabricated cell shows short circuit current (I<sub>sc</sub>), open circuit voltage (V<sub>oc</sub>), fill factor and conversion efficiency of 2.4 mA, 0.537 V, 28.9% and 0.089% for a device area 4.16 cm<sup>2</sup>.

Solar cell fabricated with incorporation of functionalized-multiwalled carbon nanotube (f-MWNT) and Polyaniline (PANI) shows much better device performance, then that of the device with MWNTs. f-MWNTs act as an active exciton dissociation site and provide efficient hole transportation. The MWNTs were synthesized from renewable green precursor *Sesamum indicum* oil.





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**III**

**ABSTRACTS OF  
SYMPOSIUM/INVITED  
LECTURES**



**PROCEEDINGS  
OF THE  
NINETY NINTH SESSION OF THE  
INDIAN SCIENCE CONGRESS  
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**PART II : ABSTRACTS OF SYMPOSIUM / INVITED  
LECTURES**

**SECTION OF  
ENGINEERING SCIENCES**

*President : Prof. H.R. Vishwakarma*

**1. CLIMATE CHANGE–INDICATOR FOR DESTRUCTION  
OF PLANET EARTH**

**Ramadhar Jha**

Hindustan Steelworks Construction Ltd,  
Bokaro Steel City

Time is running short. Environment is getting affected at rapid speed. Delay in decision making and implementation will raise the cost of arresting climate change & will lead to failure. To arrest climate change there is urgent need to focus on the following issues:-

- Halting forest loss, reversing deforestation & degradation of forest land
- Focus on rapid growth of cleaner technologies options like solar, wind, hydro, sustainable bio energy, geothermal & solar thermal energy mix
- Developing new fuel options by giving emphasis on research & development
- More & more use of natural gas & less utilization of coal
- Essential to minimize green house emissions

- Technologies to be developed & deployed for carbon capture & storage (CCS )
- Global warming resulting in climate change is the biggest challenge for the mankind today
- Although serious efforts are being made at the international level through KYOTO PROTOCOL (under UNO) on Climate Change where 191 countries have signed the protocol but desired results are not there.
- Protect environment, save planet earth & maintain ecological balance should be our mission.

## **2. SAFETY CULTURE IN INDUSTRY AND ENVIRONMENT**

**G.S. Mukherjee,**

Defence Research & Development Organization, New Delhi-110  
054

In the last month of every year it appears to most of our mind about the tragic accident of Bhopal tragedy which occurred on 3<sup>rd</sup> December 1984 due to toxic release of killer methyl isocyanate.

There are accidents occurring in chemical industries including in one of our prestigious chemical laboratories in Mumbai. There is many more news of accidents almost on regular basis, for example, contamination of water as a result of radiation leakage at nuclear power plant, leakages of toxic gas from the cylinders or for that matter incident of fire hazards here and there. There are also reports of accidents of fire hazard in the low-floor DTC buses in the region of nation capital, Delhi.

In recent past, the casualty in the national capital as a result of radiation from cobalt-60 is really awesome because of lapse in managing safe disposal of radio active item. In this backdrop, Year 2011 is declared as International Year of Chemistry and is currently being celebrated worldwide.

The necessity of safety management is so essential yet it is not given due importance. Even though science and engineering have progressed enormously but still many of the earthy problems like for example, the fire hazard in the coal mines is a big challenge.

All these events call for proper attention to evolve and encourage safety culture in the industry, institute and in their interface.

Lessons learned from all process safety steps in the past are vitally important for creation and implementation of effective and sustainable process safety programs for the future to avert accidents altogether.

### **3. THE 3D ARCHITECTURES IN CHIP DESIGNING – CHALLENGES AHEAD**

**Dr. Debesh Das**

Jadavpur University, Kolkata

As the number of transistors per chip is still increasing day by day following Moore's law, it is also bringing up some inherent problems which must be addressed. Increasing interconnect costs between the several modules on the chip is an important issue.

One alternative promising option to avoid such problem is the building integrated circuits in 3D architectures. In 3D architectures, a stack of multiple device layers, with direct vertical tunneling through them, are put together on the same chip. Introduction of 3D architectures are also offering us several advantages, such as

- (i) higher packing density
- (ii) higher performance
- (iii) lower interconnect power consumption
- (iv) support for realization of mixed-technology chips.

However, for 3D ICs, the thermal issues are more pronounced than the traditional 2D designs, which also need the attention of the researchers.

There is no doubt that 3D architectures in chip designing are going to be the technology of the next generation. The paper discusses the design challenges and issues.

#### **4. A FRAMEWORK FOR SYSTEMATICALLY EVOLVING SYSTEM-OF-SYSTEMS THROUGH ANALYSIS OF MEASURES OF EFFECTIVENESS (MOES)**

**Ramakrishnan Raman,**

*Honeywell Technology Solutions Lab, Bangalore*

The System-of-Systems (SoS) are systems of interest whose system elements are also systems which are independent with their own objective and purpose.

Engineering complex SoSs has evinced keen interest in the recent past, specifically towards factoring in the operational & managerial independence of the individual systems in the SoS, and the evolutionary and adaptive nature of SoS development.

This paper proposes a framework towards systematically evolving complex System of Systems. The framework is based on analyzing the Measures Of Effectiveness (MOEs) for the SoS in relation to the MOEs of the constituent systems.

The challenge faced in SoS is that due to the operational and managerial independence of the constituent systems, the inter-relationships of the MOEs of the SoS and the constituent systems need to be systematically analyzed so as to optimally evolve the SoS under the provided constraints.

## **5. REGULATION OF ENGINEERING PROFESSION**

**Dr. Uddesh Kohli,**

Chairman, Engineering Council of India, New Delhi

In today's global and knowledge-driven economic world, the engineers form a major part of the workforce.

The ever changing and co-evolving technological and business scenarios put a tremendous pressure on the engineers across the Globe and especially in India- one of the largest S&T pools in the world. The need for the regulation of the engineering profession has been felt due to following national and international considerations:

(i) **National Considerations:** The role of Engineers and Engineering profession is very important for a country as they are responsible for design and implementation of development projects in all sectors of economy. They play a very important role in the creation of wealth and enormous employment opportunities. It is necessary that the profession is regulated properly within the country since it is directly concerned with public welfare and safety.

The experience at the time of the earthquake in Gujarat, where many building structures were found inadequate and fell down, also highlighted the need for the regulation of the engineering profession. Such a regulation is necessary internally within the country to ensure that:

- a. Engineering is legally recognized as a profession
- b. Requisite standards are maintained in the professional practice
- c. Welfare and safety issues are adequately addressed
- d. The level of professional ethics maintained is the best.
- e. There is adequate professional growth and they update their knowledge and skills



While there are legislations and regulatory bodies for other similar professions such as medical practitioners, dentists, architects, legal practitioners, chartered accountants, company secretaries, etc., there is no legislation or regulatory body for the engineering profession which has perhaps the largest numbers and is vital for the economy and the society.

Also, foreign companies entering India or bidding in Indian contracts generally are not subject to regulation in India to accredit or certify the quality of such their engineering personnel, while Indian engineers require such accreditation for working in many foreign countries which have regulatory bodies.

(ii) **International Considerations:** From an international point of view it is necessary to:

- Set up a statutory body of the country for the recognition of professional competence of engineers, which could enter into mutual recognition agreements with other countries.
- Assure the world that strict quality standards are maintained and engineers are certified consistent with those in other countries, to ensure of their mobility across the world for rendering engineering services wherever required.

There is thus an urgent need for enacting law governing the engineering profession, similar to other professions and setting up of a statutory regulatory body for the engineering profession in India which can help in ensuring accountability of engineers.

It will also help in ensuring proper professional conduct of engineers and enhance their image in the society.

## **6. MATERIALS ENGINEERING: CERTAIN ASPECTS**

**Professor Ravi Prakash**

Jaypee University of Information Technology, Solan, H.P.

Materials engineering is a fascinating branch of engineering and has glorious past to its credit as well as a bright future ahead. Historical eras have been named after various materials which were being used in that era. Stone Age, Bronze Age, Iron Age, Plastics Age and Composites Age are to name a few. Presently we are in the era of smart materials. The comforts of life would not have been possible but for the development of new materials. Light materials made it possible to have satellites without which there would not be any of the modern communication and transportation services. Newer electronic materials have made faster and smaller computers possible. Fighters, bombers, rockets, missiles etc. are all possible because of the development of newer and lighter materials. We still do need even more lighter materials to go for hypersonic planes from present supersonic planes.

Materials have made tremendous inroads in biomedical applications too. A number of bio metals, bio-polymers and bio ceramics are being used for making various prostheses. Hip prosthesis, knee prosthesis, elbow prosthesis, ankle prosthesis, wrist prosthesis etc. are being commonly used employing all these engineering materials. They are also being used for implant applications such as dental implants, orthopaedic implants and implants for bridging large osteoperiosteal gaps. Biomaterials are also being used for making fracture fixation plates, intra medullary nails and interlocking screws besides being used for ophthalmic applications, cardiovascular applications, as suture materials, for drug delivery systems and tissue connectivity etc.

Materials research is also very interesting indeed and one seeks answers to certain basic questions. For example, we all know that due to fatigue, materials fail at much lower loads than they should and the question arises as to why fatigue should occur at all. After

thoroughly investigating the phenomenon, one realizes that due to push pull loading or flexural loading, stresses keep changing from tensile to compressive and back to tensile. Hence if during tensile loading, plastic deformation takes place near micro defects due to stress concentration, the deformation is permanent elongation and this permanent elongation cannot be undone during compressive cycle where the loading cycle tries to permanently compress the body. Due to this mismatch, fatigue crack nucleates and starts propagating in subsequent cycles. Similarly, when you tear a paper or break a twig, you hear some sound. Where does this sound come from? Do the materials speak? Sound is a form of energy and it cannot be produced.

We can only change one form of energy to the other form. Hence some energy form must be getting converted into sound energy. On thorough investigation, one finds that every material has stored elastic energy within the volume of material which gets released on plastic deformation, phase transformation or fracture.

There are several such questions and which would always be investigated by materials scientists to keep the material research going and resulting in development of newer materials and newer technologies. The future of materials engineering is very bright indeed.

## **7. COMPUTATIONAL STUDY OF NANOFUIDS IN A HEAT EXCHANGER PROVING THEIR THERMAL ENERGY EFFICIENCY**

**Dr. Debendra K. Das**

University of Alaska Fairbanks, USA.

A three-dimensional turbulent flow and heat transfer with two different nanofluids,  $\text{Al}_2\text{O}_3$  and  $\text{CuO}$ , in an ethylene glycol and water mixture circulating through the flat tubes of a heat exchanger have been numerically studied to evaluate their superiority over the base fluid. New correlations for viscosity and thermal conductivity of

nanofluids as a function of particle volumetric concentration and temperature developed from the experiments have been used in this study.

Numerical results from the simulation were first validated for the flow of water by comparing the friction factor and the Nusselt number in flat tubes of an exchanger, for which accurate results are available in the literature. Next, the model has been applied to study the peripheral variations of shear stress and convective heat transfer coefficient, both showing higher magnitudes in the flat regions of the tube. Convective heat transfer coefficient in the developing and developed regions along the flat tubes with the nanofluid flow showed marked improvement over the base fluid. Results for the local and the average friction factor and convective heat transfer coefficient show an increase with increasing particle volumetric concentration of the nanofluids. Quantitative results of the increase of the heat transfer coefficient and the friction factor with increasing volumetric concentrations of nanofluids at various Reynolds numbers are presented. The pressure loss increases with increasing particle volumetric concentration of nanofluids; however, due to the reduced volumetric flow needed for the same amount of heat transfer, the required pumping power is found to diminish. Nanofluids reduce the size of heat exchangers on the basis of equal heat transfer.

## **8. A MODEL CURRICULUM FOR POSTGRADUATE PROGRAMME IN COMPUTATIONAL SCIENCE AND ENGINEERING**

**Prof. A.K. Nayak,**  
Indian Institute of Business Management, Patna

Most of the challenges faced in this millennium require different focus and strategy. In the fast changing global scenario, there is a tremendous pressure on the scientific and engineering community to do more in less time with lesser resources. The Indian IT and Education both these sectors are revered globally and hence in great demand in the development and under-developed though for

different reasons. As result, the core research in the science and engineering takes the back seat.

The M.Tech. scholars with specializations in Computer Science & Engineering and allied ICT domains do get attracted to more lucrative jobs in the enterprise software development and software service. On the other hand, even the basic ICT-based tools are unavailable to the scientific and engineering community. This is owing to the fact, the M.Tech. (CSE) programmes focus on computing technologies and not on the computational aspects with direct applications for solving complex problems.

The paper also briefly introduces a model curriculum for a postgraduate programme on Computational Science & Engineering – a relatively new discipline of higher education, as opposed to Computer Science & Engineering (related to science/engineering of building computers).

## **9. OPEN SOURCE SOFTWARE AND SOFTWARE ENGINEERING EDUCATION**

**Prof. D. Janaki Ram,**  
IIT- Madras

Open source software provides a wealth of real software repositories which can be a great source for teaching software engineering concepts. In this talk, we explore the possibility of using Linux kernel for teaching software engineering design concepts. The two important concepts of software design are coupling and cohesion. We look various kinds of coupling and cohesion present in linux kernel and their impact on software maintenance.

We propose some mechanisms for improving the coupling and cohesion and their effect on the kernel performance using various bench marks. We also present the redesign of the kernel using object oriented wrappers and the use of OO Wrapper kernel for developing

device drivers in C++. We present the redesign of a network driver using OO Wrappers and the performance issues in the redesign.

## **10. INDIAN SPACE PROGRAMME: ‘REACHING OUT – TOUCHING LIVES’**

**P K Pandey**

Vikram Sarabhai Space Centre, Thiruvananthapuram, India

The Indian Space Research Organisation (ISRO) with a modest beginning in early 1960s took upon itself the objective of developing the space technology and its applications for various societal tasks of national development. Emphasis has been to achieve self reliance in space technology development for the socio-economic uplift of the society.

ISRO concentrated on achieving capability to build and launch communication satellites (INSAT-Indian National Satellite System) and remote sensing satellites (IRS-Indian Remote Sensing Satellite System). While the INSAT system is for television broadcast, telecommunications and meteorological applications, the IRS system is for management of natural resources.

ISRO also undertook the development of Polar Satellite Launch Vehicle (PSLV) and Geo-stationary Satellite Launch Vehicle (GSLV) for launching IRS class of satellites and INSAT class of satellites respectively. Hall mark of the Indian Space Programme has been the application oriented efforts and the benefits that have accrued to the nation.

## **11. FUSION OF WEB USAGES MINING WITH WEB SEMANTICS AND TIME SPENT BY USER**

**Brijendra Singh,**

University of Lucknow,  
Hemant Kumar Singh,  
Azad Institute of Engineering & Technology Lucknow,

Today, the delicate job of the web master of Companies and institutions is to go with the wants of user and maintain their interest in their web site. A Web Usages Mining (WUM) system may be used to operate on Weblog i.e. stored at Web servers, clients, proxy servers or server databases. Web Semantics can be utilized for Web Mining for different purpose, for e.g. predicting the popular pages of a website. Web semantic mining aims at mining the content of web pages and finding similarity between web pages based on the content. The proposed approach is to capture the perception of the customer and provide them the pages of their interest by using the information from web usage mining, web semantics and time spent on web pages to improve the recommendations

## **12. IMPORTANCE OF SENSITIVITY AND UNCERTAINTY MODELING IN ENGINEERING RISK ANALYSIS**

**Dr. D. Datta**

Health Physics Division  
Bhabha Atomic Research Centre, Mumbai

Uncertainties are part of any assessment, model or estimation. In engineering calculations, we ignore the estimation of uncertainties associated with failure models and parameters, either because uncertainties are very small, or, more often, the analyses are done conservatively (e.g., by using high safety factors or design matrix). Risk analysis has three elements: (a) risk assessment, (b) risk management and (c) risk communication. There are many interactions and overlaps between these three main elements of risk analysis. Risk assessment is the process through which the chance or

frequency of a loss and the magnitude of the loss (consequence), by or to a system is measured.

Risk management is the process through which the potential magnitude and contributors to risk are evaluated, minimized and controlled. Risk communication is the process through which information about the nature of risk and consequences, the risk assessment approach, and the risk management options are exchanged and discussed between the decision makers and other stakeholders. Risk analysis measures the potential and magnitude of any loss from or to a system.

Formal risk analysis consists of answers to these questions: (1) what can go wrong that could lead to an outcome of hazard exposure? (2) How likely is this to happen? (3) If it happens what consequences are expected? Answer to these questions is the definition of risk as  $R = \langle S_k, P_k, C_k \rangle$ ,  $k = 1, 2, \dots, n$ , where  $S_k$  is a scenario of events that lead to hazard exposure,  $P_k$  is the likelihood or frequency of scenario  $k$ , and  $C_k$  is the consequence of scenario,  $k$ . Engineering risk analysis is traditionally carried out using probability theory and we address risk analysis as Probabilistic Risk Assessment (PRA). Since PRAs are primarily used for decision making and management of risk, it is critical to incorporate uncertainties in all factors of the PRA. In PRAs, uncertainties are primarily shown in the form of probability distributions. For example, the probability of failure of a subsystem (e.g. hazard barrier) may be represented by a probability distribution showing the range and likelihood of risk values.

The process involves characterization of the uncertainties associated with the frequency of initiating events, the probability of failure of subsystems, the probability of all event tree headings, the strength of the barriers, the amount of hazard exposures, the consequences of exposure to hazards, and the sustained total amount of losses. Once uncertainties associated with hazard barriers have been estimated and assigned to models and parameters, they propagate through the PRA model to find the uncertainties associated with the results of PRA, primarily with the bottom-line risk calculations, and with the



list of risk of significant elements of the system. Propagation is done using traditional Monte Carlo simulation.

The paper deals with the challenges of a new mode of engineering risk analysis so called as possibilistic risk analysis in which the basic theme will be to address the uncertainties associated with imprecise parameters using fuzzy set theory and Dempster-Shafer theory.

### **13. DESIGN OF INDUSTRY READY PG PROGRAM ON “AUTOTRONICS”**

**Dr. K. Ganesan, Director and D. Valli**  
TIFAC-CORE in Automotive Infotronics, VIT Vellore

In a country like India, only about 15% of the population has access to private vehicles (2-wheeler and/or 4-wheeler). Thanks to the Governments initiative in laying quality infrastructure, in terms of wider roadways, generous sanctioning of loans by Banks and the insistence to lead a quality life (due to media and internet), more and more people are looking for buying vehicles for commuting. Unlike olden days when fuel economy was the deciding factor in buying vehicles, currently people demand safety, comfort and environment friendly vehicles. These factors lead to the introduction of electronics into the vehicular environment.

These electronic systems not only reduce the weight of the vehicle and also price. Moreover with a given electronic hardware system, it is possible to deploy a host of software services and hence more and more new models and innovations are possible. This has led to a number of Research and Development activities in this domain and hence it is a good choice for the design of a PG program.

A typical PG program on Automotive + Electronics, in short one can call it as “Autotronics” requires a number of interdisciplinary courses. The typical disciplines it needs to cover are Mechanical (in particular Automotive), Electrical, Electronics, Instrumentation and Information Technology. One needs subjects like Engine

Management systems, automotive technologies and hybrid vehicles in the area of Mechanical engineering.

The electrical subjects such as Control theory, Fuzzy Logic, Battery Management, Power Electronics and Drives are a must. The electronics related subjects such as Microcontrollers, in-vehicle networks, signal processing, embedded systems, electro-magnetic interference are essential for the good design of a hardware system. The instrumentation related subjects such as Data acquisition, sensors and signal conditioning are very essential. Apart from this, some of the IT related courses such as embedded C, Image processing algorithms, Real Time operating Systems and web and mobile technologies are needed to bring in new applications into the vehicles.

Once if these courses taught in a curriculum along with some industry needy tools such as Matlab, Labview, Simulink, OrCAD, pSpice, MultiSIM, etc, it is very likely that a student can easily carry out a real time project during the project period either in the industry or at academia.

Coupled with these, if any one learns some emerging wireless communication technologies such as GPS, GSM, GPRS, Bluetooth, WiFi, IrDA, etc it is possible to carry out a publishable work or patentable work. Thus, introducing “Autotronics” at PG level is a good choice for students, educational institutes and industries.

#### **14. ROLE OF WOMEN IN ENERGY CRISIS**

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SRM University, Chennai

M.Arun Bhaskar, Velammal Engg College, Chennai

India is in a severe energy crisis that will continue to increase in severity. Coal accounts for over 70% of India’s energy production, but it is a limited resource that also hurts the environment. Even if more coal was mined, people are still using more energy than can be

produced. The lack of energy resources is an even larger problem in rural areas.

Although India has emerged as a global leader in software and business services, the majority of Indians still live a rural agricultural life.

Nearly 75% of the rural population of India still depends on bio-fuels (firewood, agricultural residues, and dung). The available fuel is only about 1/3 of what is needed.

Women in Indian villagers are forced to spend from two to six hours per day gathering fuel for their household cooking fires. Such usage of traditional energy resources is inefficient and cause make life miserable for women.

In this paper, the role of women in energy crisis and the different roles taken by the women to solve the energy crisis in different parts of the world have been explained.

## **15. KNOWLEDGE MANAGEMENT IN HIGHER EDUCATION THROUGH DIGITAL LIBRARIES**

**Mini Ulanat,**

Cochin University of Science & Technology

Institutes of Higher Learning world wide are undergoing a remarkable transition from the conventional methodology to adopting of the technology tools. Institutional Repositories are gaining prominence due to the fact that it is critical to developing, managing and leveraging the organization wide digital content and bringing greater value of the organizational output.

Colleges and universities have significant opportunities to apply knowledge management practices to support every part of their mission—from education to research. The open source movement has adopted this idea and has been driving this revolution.

The success of this much depends on the institutional community voluntarily contributing and participating in this concept of creating a repository through Digital Library Software Systems.



**99<sup>th</sup> Indian Science Congress**  
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**V**

**ABSTRACTS OF  
ORAL /POSTER  
PRESENTATION**



**PROCEEDINGS  
OF THE  
NINETY NINTH SESSION OF THE  
INDIAN SCIENCE CONGRESS  
BHUBNESHWAR, 2012**

**PART II : ABSTRACTS OF ORAL/POSTER PRESENTATION**

**SECTION OF  
ENGINEERING SCIENCES**

*President : Prof. H.R. Vishwakarma*

**1. SENSOR GRID ARCHITECTURE FOR HEALTH  
CARE MONITORING USING SMART OBJECTS**

**M.A. Maluk Mohamed and T. Vigneswari**  
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Sensor networks can sense real time data but the sensor nodes have less processing power and low storage capacity. Grid computing has evolved as a paradigm for dynamic sharing of resources like processing, storage, communication devices etc. Integration of sensor network and grid computing leads to an emergence of new paradigm, namely the sensor grid, by which both of the paradigms can complement each other. Sensor grids can be widely used in applications like health care monitoring, pollution monitoring, forecast in agriculture etc. However the integration leads to various challenges like conversion of sensor data into a format which is acceptable by grid, communication paradigms that should identify the location of nodes without disturbing the user application, etc. The paper proposes a novel object based sensor grid that can be used in monitoring of health care system.



Sensors are attached to the patient's body. The vital parameters collected by the sensor are transmitted to the nearby mobile device which is part of the grid. In the grid, the relevant blood related parameters are sent to an appropriate node which contains Software as Service (SaS). The SaS receives the parameters and analyse whether the parameters go beyond the threshold level already given. In this case, the physician looking after the patient is sent an alert message. Much similar architecture can be found which uses proxy based approach, agent-oriented runtime approach and overlay network approach. Hence in this work we introduce an object based P2P approach which uses Distributed Pipe Communication.

This frame work has a two tiered P2P grid which uses Distributed Pipes (DP) for communication. The first layer is an unstructured layer, whose nodes have the application software (SaS). The second layer is an structured P2P layer where the data sent by sensors are stored permanently as data archive. This can be viewed by the patient or physician with proper acces right. Horse Power Factor (HPF) is used for selecting suitable nodes in both the layers. In unstructured P2P layer where processing is done, CPU capacity is used as HPF. The node which has lessrer work load is assigned with new task. Similarly in structured layer, storage capacity is used as HPF.

When the sensor registers itself with the grid, it is abstracted by an object. A mapping table is avaiable which maps the sensor with its corresponding object. The objects handle pipe creation, load balancing and migration of tasks. The objects initiates pipe communication with the sensor and collect the values from the sensor. Then it send the parameters to an appropriate Donor node which contain the SaS. The node is selected based on power factor which considers the processing power of nodes. The node with less load is given with this task. if the result of execution finds that the vital parameter go beyond threshold value, another pipe communication is initiated which sends alert message to the physician.

The purpose of using the DP is it can locate any remotenode without disturbing the user application and more over task can be moved to another node if the current node exceeds its load capability during execution.

## **2. INNOVATION PEDAGOGY IN ENGINEERING EDUCATION AND THEIR IMPLICATIONS**

**Dr P Jothimani,**

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As a part of capacity building/development initiatives, United Nations sponsored Global level education forum made a collective recommendation and commitment to achieve the goals and targets of Education for All by 2015. Almost in every country major share on Annual budget on Education goes to school and higher education, research and training etc., Government of India has taken various measures and thus giving priority in budget allocation. National leaders and Academic experts suggest private players should also take a lead in proving appropriate impetus to the growing segment of Engineering Education in India. There are about 600 Universities and more than 40, 000 colleges of various types in India which are either owned and/or operated by Government or Private. Each of these institutes operate with appropriate approval from UGC, AICTE, NBA, NACC etc., The market driven demand gives impetus to Institutions to chose the subject areas in Engineering and Technology, Medicine, Law, Arts and Sciences etc and the focus have evolved its own courses at Graduate and Masters Level in various domain expertise within Engineering stream viz., Aeronautical, Automobile, Bio-technology, Civil , Information and Communications Technology, Electronics, Geoinformatics / Geomatics, Instrumentation, Business Management, Medicine, Ocean Technology, Satellite Communications and Urban Planning etc.

This paper discusses various aspects on Pedagogical innovations being adopted in engineering institutions which includes Industry

participation through final year projects at the site of industries, rather than within educational campus. This is part of enabling initiative to create employable skilled manpower which is a need based industry driven efforts and partnership with Academia. Science & Technology based Geoinformatics Education, being the emerging geospatial technology driven Courses thus needs active players from the industry/ market forces to decide on curricula/ academic standards etc.,

The paper addresses the need for sandwich model of curricula wherein Industry experts are part of the visiting faculty to the Colleges / Institutions / Universities and equally owns the responsibility in bringing up the employable skills in the graduates. Extensive search has been carried out how various institutions adopt industry-academic interaction model and efforts are made to introduce the standardized consistent educational curricula, with acceptable norms and standards set by various Indian and international accreditation agencies like ABET Inc., USA.

### **3. FREQUENCY DEPENDENT BRIDGING OF CNT NETWORK DEPOSITED BY DIELECTROPHORESIS**

**Abhilasha Chouksey, Poornendu Chaturvedi, Pika Jha, Mohan Lal, Ashok Kapoor and P K Chaudhury**  
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Dielectrophoresis (DEP) is a promising and convenient technique for large scale production CNT based resistor and FET. Here we are reporting the fabrication of CNT based resistors for gas sensors using DEP. CNT network deposition between the electrode pair of gap of 10  $\mu$ m has done by the application of AC signal of 10 Vpp for varying frequency. DEP of CNT network has investigated by SEM micrographs and resistance variation.

Chain of clumped CNT bundles has been observed after DEP. We observed that for 0.1 Hz there was negligible CNT deposition and it can be increased by increasing signal frequency. Alignment and

bridging can also be enhanced using high frequency signal. Trace impurities were also observed.

We observed that CNT deposit and degree of bridging and alignment of CNT network between the desired electrodes can be improved by increasing the frequency. For 10 MHz signal frequency, bridging, alignment, density and purity of CNT network was better. Thus, we can utilize this study for further improvement over alignment of pure CNT.

#### **4. NEW HYBRID INTRUSION SYSTEM BASED ON OPERATION RESEARCH & BIOLOGICAL COMPUTATIONAL APPROACH**

**Brijendra Sigh,**

University of Lucknow, Lucknow

**Pooja Agarwal,**

Dr. Shakuntala Misra Rehabilitation University, Lucknow

A Hybrid Intrusion Detection System combines the advantages of low false-positive rate of signature-based intrusion detection system (IDS) and the ability of anomaly detection system (ADS) to detect novel unknown attacks.

In this paper we propose a new hybrid intrusion system approach which is based on the concept of the Operation research & biological computational approach because a prevention mechanism is used to counteract well-known attacks.

It establishes a corresponding prevention method, according to the characteristics of an attack. In this approach we will implement the multiple classifiers to improve the accuracy of finding rules.

Afterwards, it will use the combination of algorithms for optimization of search result and sequence matching. The final module will be tested by using real-world data-sets.

## **5. PLATFORM INDEPENDENT NETWORK BASED REMOTE CONTROL SECURE SYSTEM**

**Chiranji Lal Chowdhary**  
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With advent of the Internet and convergence of computing and communication, a huge amount of widely distributed data on the network systems is needed to access from a single system.

Also there are several problems like monitoring of remote devices and controlling its operation are arising.

In view of the above, a reliable, secure and platform independent remote control and monitoring system is required.

The paper deals the above issues and proposes a system of web service-based remote control and monitoring.

The concept is to use the web for the purpose of real-time remote monitoring and control of processing equipments.

A novel web Service-based remote control and monitoring system based on the idea of web services is proposed.

## **6. VALIDATION AND CREATION OF NEW ALGORITHM USING ADMISSION CONTROL FOR VIDEO TRANSMISSION OVER IP NETWORK**

**Naveen Hemrajani,**  
Suresh Gyan Vihar University, Jaipur, Rajasthan,  
**Dr. Dharm Singh**  
Maharana Pratap Univ. for Agriculture & Tech, Udaipur  
**Ekta Menghani**  
Mgias,Jecrc Foundation, Jaipur, Rajasthan

Admission Control (AC) is a mechanism for traffic management, which consists of admitting a new traffic source if and only if the

network can guarantee QoS to the new flow while still supporting existing QoS guarantees to sources already accepted. An AC procedure is employed to maintain a high utilization of network resources while preserving the QoS of existing flows. It does this by balancing higher network utilization through increased multiplexing against the satisfaction of QoS for existing clients. Such an AC scheme relies on being able to accurately establish the resource requirements of current flows, along with a prediction of the impact a new flow will have upon existing traffic sources. Commonly an AC scheme requires that a new flow declares parameters that can be used to calculate its resource requirements and, therefore, its impact on pre-existing flows.

In present scenario, there are lot of AC algorithms which are working effectively in the current world. In present research, attempts were made to review the various MBAC algorithms and generation of co-comparison in the present networking's for validation and creation of new algorithm with potent efficiency in networking. It is noteworthy that this comparison is execution based. The judgment is execution base, contribution reliability with real claim as well as approaching into characteristic such as algorithmic intricacy, expenses, and act in genuine AC system.

## **7. SIMULATION OF ION-IMPLANTED DOPING PROFILE FOR DETERMINATION OF JUNCTION DEPTH IN ATT DEVICES FOLLOWING MODIFIED THREE MOMENT APPROACH.**

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**Moumita Mukherjee**

University Of Calcutta. India.

Ion implantation is a well - matured technique to introduce ionized atoms in to targets with enough energy such that it could penetrate beyond surface region. The major advantage of this technology over more easy diffusion technique is the capability of precisely

controlling the number of implanted dopant atoms. Upon annealing the target precise dopant concentration between  $10^{23}/\text{m}^3$  to  $10^{26}/\text{m}^3$  in Si is obtained. In addition to this dopants depths distribution profile can be controlled and estimated.

The author in this paper has developed a generalized simulation technique to obtain ion-implanted doping profiles of Si IMPATT diode at W-band & D-band. From the doping profile the junction depth of the double drift MPATT diode is estimated. A three moment approach is adopted to obtain ion- implanted doping profile.

## **8. ON CERTIFICATE-BASED MUTUAL AUTHENTICATION PARADIGM FOR MOBILE GRID COMPUTING USING SURROGATE OBJECTS**

**M.A. Maluk Mohamed and H. Parveen Begam**

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Grid computing has arisen as an evolution of distributed systems mainly focused on the sharing of and remote access to resources in a uniform, transparent, secure, efficient and reliable manner.

It is possible to join Grid technology and mobile technology in order to create one of the most promising technologies and developments to appear in recent years, in that they enrich one another and provide new solutions that solve many of the limitations and problems found in different technologies.

Although the individual computing devices may be resource-limited in isolation, as an aggregated sum, they have the potential to play a vital role within grid computing. Security is a very important factor in Mobile Grid Computing and is also difficult to achieve owing to the open nature of wireless networks and heterogeneous and distributed environments.

In this paper, certificate based mutual authentication of mobile hosts using surrogate objects for the mobile grid environment is proposed.

In designing the security protocols proposed here, the low computational power of the mobile stations and the low bandwidth of the wireless networks are considered. Authentication and session key establishment can take place at two different levels: between a network and an MS, and between two distinct MSs. In the former instance, a secret communication over the traffic channel between a network and an MS is guaranteed. However, privacy of conversation between two MSs is not guaranteed since the encrypted message is always decrypted by the network before forwarding it to another mobile user. In the latter instance, two mobile users can exchange their messages secretly since the session key established between themselves is only known to them, not exposed to the network.

The surrogate object (SO) is a software entity and acts as a representative for a particular Mobile Host (MH) in the wired network that maintains application specific data structures and methods. SO is used to solve the issues like asymmetry in network connectivity and computing power, mobility. The major advantages of using a surrogate objects are: Maintains the location information about the mobile device, acts as a place-holder that can realize local caching for faster information access, handles message delivery for the MH, when it is out of reach from the MSS and acts as data sink that can collect data from diverse sources and delivers appropriate data to the MH depending upon the current location of the MH and its connectivity constraints. So adding security features to the SO will help the mobile devices to progress in a mobile grid environment in a secured manner.

The mobile devices can communicate with the grid environment through TLS (Transport Layer Security) protocol which is the extension of SSL (Secure Socket Layer) protocol. TLS is a protocol created to provide authentication, confidentiality and data integrity between two communicating applications.

The communication between the mobile hosts is done through X.509 certificate which is a direct authentication service based on public key cryptography and digital signatures. The service



certificates are stored in surrogate objects. All entry should be registered in MSS. Whenever the new entry comes, the MH contact the related MSS. The request will be forwarded to SO and entry will be checked in its location register. If the MH is authentic, then the requested services will be provided. If not the message will be sent to MH by asking the MH to register itself properly, instead of sending the error report in an usual manner. So the mutual authentication is the added feature which is implemented in the surrogate object.

Certificate based authentication mechanism in SO is implemented in which mutual authentication and secure communication path is generated between mobile hosts.

## **9. INTRUSION DETECTION FOR BETTER NETWORK SECURITY**

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An intrusion is the act of gaining the unauthorized access to a system so as to cause the loss or harm to the data or information and system. The research paper discuss in developing general and systematic methods for intrusion control by prevention and detection. The complete study of the network/computer security is not completed without the discussions of the detailed Vulnerabilities, Viruses; Worms, Intrusions, malware etc., .This speaks about the voluminous importance towards the security in the network community. The better society is generated by controlling all the above mentioned botnets either by prevention or detection.

The network security is in the most demand now-a-days due to the growing of importance of handling all the human related activities through the internet. Many methods where proven for the control of botnets malware's. But this paper attempts on focusing of the key ideas of using the data mining techniques to discover prevent and detect the intrusions malware's and prove the mining algorithm's are

best fit for identifying and providing the solutions for the better network security in comfortable and ease to the users.

**10. SOME STUDIES ON THE SETTLING  
CHARACTERISTICS OF AQUEOUS COAL-SLURRIES IN  
ACIDIC AND ALKALINE MEDIUM**

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The settling characteristics of aqueous coal slurries has been studied in both acidic and alkaline medium and presented in this paper.

The consistency has been kept constant at 3% (wt./vol.) and the particle sizes have been varied as 80 /100, 100/115, 115/160 and 160/200 mesh BSS, corresponding to particle diameters of 0.2858, 0.2374, 0.1898 and 0.1429 mm respectively.

The pH of the medium has been varied as 4, 5, 6 by adding HCL and as 8.5, 9.0 and 10.0 by adding NaOH solution to it.

The pH of neutral medium (7.0) has also been considered. A dimensional co – relation has been developed to predict the time (in sec), taken by a 3% (wt./vol.) slurry to reach a particular interfacial height at any pH ( $4.0 \leq \text{pH} \leq 10$ ) and at any particle size ( $0.1429 \text{ mm} \leq d_p \leq 0.2858 \text{ mm}$ ).

## **11. ROLE OF WOMEN IN HARNESSING TRADITIONAL KNOWLEDGE AND INNOVATION**

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Dr. Paul Raj Engineering College, Bhadrachallam  
Dr. Ujjwal Kumar Behera and P.Chandrakanth Sharma  
The Singareni Collieries Company Ltd., Khammam

The efforts of women in documenting traditional knowledge and harnessing innovation are not well recognized. Any encouragement to women in this regard can be appreciable as it will have a multiplier effect on other silent workers. Others in this area also will take initiative. This will lead to cost effective and environmental friendly approach in meeting millennium development goals (MDG) in India. Sustainable development also will be taken care. For this purpose the hard working women in rural areas need to be encouraged with rewards & reorganization.

It is suggested to constitute one hundred cash incentive of Rupees one lakh each, fifty on mahila gyansodh (documenting & harnessing the traditional knowledge ) and fifty on mahila gyandeeep (Innovation in rural areas). These can be decided by national innovation foundation (NIF). It is based on identification and harnessing the gyanshodh & gyandeeep. In this paper the role of women in rural areas are high lighted and the steps required to tap the traditional knowledge and to encourage them are discussed.

## **12. TRANSFORMING EDUCATION SYSTEM THRU ICT**

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In India, the ICT is yet to play a crucial role in delivering social advances and economic growth even though the country has built a reputation as a fast-learning, ICT-savvy trailblazer among emerging economies. India's story continues to be marred by poverty and inequality. Access to quality education, health and employment are still far out of reach for many millions in India.

Moreover, the country's increasing population, especially in deprived regions, creates ever greater pressure for rapid improvements in basic living standards and employment opportunities. ICT-based processes and tools must be deployed to address these critical issues across its vast and diverse population and geography.

The country clearly has much to offer and much to gain from the ICT revolution. Fortunately, the central government and several states have instigated a number of ICT programmes; and non-governmental organizations are taking numerous ICT-based initiatives.

There is a strong need to prepare our engineering graduates for pushing India's social engineering agenda as well as deploying ICT-based solutions in the socially relevant areas such as Education, Agriculture, Healthcare and Governance.

In the above backdrop, the universities esp in engineering institutions need to gear up for deploying ICT-based solutions to increase productivity, quality and reach of their academic programmes. This paper deals with such aspects and proposes a framework for empowering stakeholders through ICT.

### **13. EMBEDDED SMART CAR SECURITY SYSTEM**

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**L.Pratap Reddy**

Jawaharlal Nehru Technological University Hyderabad

The paper proposes an advance security system in automotives, consists of a face detection sub-system, a GPS module, a GSM module and a control platform. The face detection sub-system can detect faces in cars during the period in which nobody should be in the car. The other module transmits necessary information to users and help to keep eyes on cars all the time, even when the car is lost.

The system proto-type is built on the base of one embedded platform in which SoC named SEP4020 controls all the processes. Experimental results illuminate the validity of this car security system.

#### **14. WEB POWERED BUSINESS INTELLIGENCE FOR SMALL TO MEDIUM ENTERPRISES**

**Tapan kumar Das**

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Decision support systems success depends on the data warehouse. Nowadays it is used by all kind of enterprises in the entire world. Many studies have been conducted on the need of decision support systems(DSSs) for small businesses, most of them adopt existing solutions and approaches, which are appropriate for large-scaled enterprises, but are inadequate for small and middle-sized enterprises. Small enterprises require cheap, lightweight architectures and tools (hardware and software) providing online data analysis. In order to ensure these features, we review web-based business intelligence approaches. This paper discusses web interfaces (including freeware tools) relevant for SMEs in decision making.

#### **15. PROVISION OF URBAN AMENITIES IN RURAL AREA AT RMD (RMD-PURA)**

**Dr. R.M.Suresh**

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In order to conceive a well-balanced model of rural development, economically, socially and environmentally, the Government of India hopes to evolve an Action Plan for making the Tenth Plan, a People"s Plan and Development, a People"s Movement. The programme announced for attaining this objective is through the establishment of Knowledge Powered Village Complexes, known by the acronym "PURA"(Provision of Urban amenities in Rural

Areas). This is a key element of “Vision 2020” and is intended to give a new thrust to the all-round development of viable village complexes through the twin strategies of Effective Planning and Implementation of Rural Development Programmes with People’s Participation” and Effective Development Communication for People’s Participation”. The programme PURA is essentially a Habitat Design to achieve prosperous, peaceful and safe human habitat in rural areas, that would improve the quality of life in rural places and lead to “Inclusive Rural Development”. The paper deals with suggested frame for PURA and how ICT can be an enabler. A case study has also been discussed

## **16. ROLE OF NANOTECHNOLOGY IN ELECTRICAL ENERGY TRANSMISSION SYSTEMS**

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The application of nanotechnologies to energy transmission has the potential to significantly impact both the deployed transmission technologies and the need for additional development.

This paper introduces the field of nanotechnology, describes some of the ways in which processes and products developed with or incorporating nano-materials differ from traditional processes and products, and identifies some examples of how nanotechnology may be used to reduce potential ROW impacts. Potential environmental, safety, and health impacts are also discussed.

A solution to the global energy problem will require revolutionary new technology, as well as conservation and evolutionary improvements in existing technologies. Efficiencies in the use of energy will come from many advances, but particularly from revolutionary new materials like nano-materials.

Transmission and storage of energy, particularly electrical power is a major societal need, and holds the most promise in solutions with new nano technologies. It is in this area that we believe nano-science can bring the most immediate benefits, with nano-tubing and other nano-based materials creating new opportunities to transport electricity efficiently and at lower cost over very long distances.

Breakthroughs in nanotechnology open up the possibility of moving beyond our current alternatives for energy supply by introducing technologies that are more efficient, inexpensive, and environmentally sound.

### **17. STRUCTURAL AND ELECTRICAL STUDIES OF NANO CRYSTALLINE BLEND SYSTEMS BASED ON PANI WITH POLY VINYL ALCOHOL FOR AN ELECTROCHEMICAL CELL.**

**Vijay Kumar Kambila & Siddharth Marupeddi**

Dept. Of Electrical Engg, KL Univ., Guntur, AP

Development of new materials through polymer blending has become an important activity with increasing interest over a past one decade. This method allows tailoring of the product properties in a way that is more economical than the costly synthesis of new homo polymer. Because most polymers are thermodynamically immiscible, melt mixing of two polymers will often yield a two – phase system with coarse morphology leading to a high interfacial tension and poor interphase adhesion.

Interfacial tension between the blend components makes it difficult to generate polymer blend having a desired degree of dispersion of random polymer mixtures (4, 5). To avoid this difficulty just mentioned a polymer blend which is a suspension of polymer matrix of water soluble polymer like polyvinyl alcohol can be useful. The PANI-PVA blend thin films have been prepared successfully by chemical oxidative polymerization technique. The UV-visible, FTIR and SEM study gives idea about uniformity, porosity and surface

morphology of the films. Finally, the films were exposed to ammonia gas with different concentrations ranging from 50 - 800 ppm and higher using computer controlled gas sensing characterization system to study sensing characteristics of the films.

## **18. ADVANCES IN MANUFACTURING TECHNOLOGY OF METALLIC COMPONENTS**

**Jyotsna Dutta Majumdar**

Indian Institute of Technology Kharagpur

Besides alloy chemistry, manufacturing route plays an important role in determining the microstructures and properties of the fabricated component. Conventional routes of metallic materials processing include melting and casting, cold/hot forming and powder metallurgy.

However, properties achieved on the fabricated component developed by the conventional processing routes are predictable and well documented.

However, application of non-equilibrium processing routes like semisolid processing, spray-forming, melt spinning, severe plastic deformation, and laser materials processing is capable of manufacturing components with non-equilibrium microstructures and unique properties which are not well predictable and most cases are superior to the same developed by conventional processing routes.

The present contribution aims at presenting a detailed overview on the fabrication of component by emerging processing routes and the status of its industrial implementation.



## **19. A STUDY ON DIGITAL LIBRARY APPLICATIONS OF ONTOLOGY BASED WEB MINING**

**Dr. R.M. Suresh**

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It is a challenging task to develop digital libraries for organizing and managing digital content from the Web, due to the unstructured and semi-structured nature of Web pages and the design peculiarity of Web sites since, today the Internet provides users access to extremely large number of Web sites and search engines many of which contain information of entertainment, education and commercial values.

Web mining research, in its last 12 years, has on the other hand made significant progress in categorizing and extracting content from the Web.

In this paper, ontology is represented as a set of concepts and their inter-relationships relevant to some knowledge domain. The knowledge provided by ontology is extremely useful in defining the structure and scope for mining Web content.

A review on Web mining and the ontology approach to Web mining are also described. The application of these Web mining techniques to digital library systems is also discussed.

## **20. IMPACT OF ROUTING MISBEHAVIOR ON QOS IN MANETS**

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Mobile Ad hoc Network is a collection of mobile nodes without support of any infrastructure. Routing in mobile ad hoc networks is achieved through mobile nodes acting as intermediate nodes. These

nodes are responsible for receiving and forwarding data packets from one host to another in the network.

Routing protocol in present mobile ad hoc network could be of two types: One, is *Proactive routing* which maintain routes to all nodes, including nodes to which no packets are sent (i.e., based on either link-state or distance vector principles) and other, is *reactive* routes establishments i.e., routes between nodes, are determined only when explicitly needed to route packets.

*Reactive routing* algorithm is also known as *On-Demand Routing* algorithm. *Routing misbehavior* occurs when nodes agree to forward but some nodes agree and do not forward packets as node is misbehaving, selfish, overloaded, broken or the software fault is present. Misbehaving nodes are significant problem in MANETs which severely effect the QoS mechanism of network.

## **21. ROLE OF FOOD ENGINEERS TO MEET CHALLENGES IN FOOD INDUSTRY**

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Conventional thermal food processes are mostly used in the food industry to keep the product safe for more time. Recently, technologies have been developed to optimise the process i.e. reducing the severity of the thermal processes leading to better food quality retention.

Consumers prefer high quality food such as fresh, less processed and with less preservatives than the foods that have been processed with age old technology.

To respond to this situation, new and improved techniques have to be used such as High pressure processing, Ultrasound, High intensity light, microwave heating, Pulsed electric field and

Nanotechnology. All these technologies offer commercially feasible alternatives for conventional processing methods.

The food engineers rose to the challenges in Food industry and developed novel ways to retain the food quality, nutritive value and edibility of various foods.

## **22. TASK SPECIFIC KNOWLEDGE ACQUISITION AND MENTORING SYSTEM**

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This paper proposes a tool “Task specific knowledge acquisition and mentoring system” for acquiring the knowledge. Knowledge acquisition is realized through variety of mechanisms such as expert systems and KDD (Knowledge Discovery Data mining). The user interface of knowledge acquisition facilitates the interactive questions and answers as it is supposedly the best way to acquire information.

This paper discusses helping in situations such as enquiry offices, field service organizations, customer “hot lines” training and development centers, research organizations, display of procedures where there is a continuing stream of questions that is information needs many of which occur over and over, but some which the organization has never seen before.

The mentoring system includes a branching network of diagnostic questions that helps users find the answers they need. If the answer is not present, it automatically sends the question to the appropriate expert, and the answer is returned to the user as well inserted into the organization network. Experts can also modify this network in response to user’s problems. This system supports the knowledge sharing mechanism in the desktop level.

### **23. LONG-DISTANCE POWER TRANSMISSION SYSTEM WITH NANO-SATELLITE**

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Realization of external supplying power to satellite moving on its orbit can lead to weight reduction and miniaturization of power system. It can also reduce difficulties in launching satellite like launching cost. Standardization of wireless power transmission module has the effects of being on market faster and improvement of usability's effects. Thus, building of the Flexibility Power Supply Network which uses wireless power transmission technology expands potential of nano-satellites in space.

Among the many tasks that need to be carried out, we need to come up with accurate calculations of communication links, we need to evaluate propagation effects ( such as attenuation) at the operating range of frequencies, we need to come up with a better estimation of the noise levels and an accurate calculation of the power.

We need to build a model to understand variations due to distance and alignment errors, and to understand how the misalignment information can be used to correct position.

We also need to establish commercial components that can be used to implement the system and carry on short experiments and tests to demonstrate that the proposal can bring the promised benefits.

On the other hand, even if not explained in this project, we need to work on a detailed specification of the ground station communications base, which is crucial to achieve stable control feedback, and a significant bandwidth increase.

The work ahead is long and hard; however, we know that the technology for implementation is available, and the concepts summarized along this paper make us believe that the proposed system will contribute the satellite with: good energy savings, high capacity communications channel, and valuable position control feedback.

We have no doubt that the proposed system is viable, and that the work necessary is worth, as the prize at the end of the road is sweet and encouraging.

#### **24. A CORRELATIVE ANALYSIS OF METHODOLOGIES INVOLVED IN ONTOLOGY CONSTRUCTION FOR E-LEARNING**

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This paper is a correlative study of some of the existing techniques and approaches in ontology construction with respect to e-learning. The goal of this paper is to provide a comprehensive idea of the methodologies used in some of the approaches to build ontologies for an e-learning system. Presently many Manual, Semi-automatic and Automatic approaches are available to build ontologies; out of these certain methodologies that are very apt are chosen and analyzed and the results are compared and tabulated.

#### **25. SMS AS AN INTERACTIVE TOOL FOR ACADEMIC SERVICES**

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With large number of students enrolled in several private universities in India, it has become very difficult to manage operational and administrative task. This paper deals with how the mobile telephony services and convergence of computing and

communication technologies could help addressing some of the issues/challenges.

In a mobile network structure, internet and GSM network acts as a gateway which connects to the database server, where a client can send or receive information. The application software in the client acts as an interface to communicate with the server via SMS. When the user sends a short message to the server, it does the required task and sends back the results, which is a two way information delivery system. Academic services such as registration for events, faculty details, various subscription services (like results, notice of attendance shortage, and appointment with the faculties) can be retrieved by sending a short message using the client utility. This paper proposes a framework and illustrates how Short Messaging Service (SMS) can be put into use for an interactive academic purpose.

## **26. PARAMETRIC INFLUENCE ON DELAMINATION IN DRILLING OF GLASS FABRIC EPOXY/RANDOM ZYLON HYBRID COMPOSITE**

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This paper presents the experimental results in drilling 8mm diameter hole in Glass fabric Epoxy/Random Zylon Hybrid Composite using HSS and K20 Carbide drills. The effect of feed rates, cutting speeds and the type of drill on delamination and cutting forces are studied.

The experimental results show that delamination free drilling process may be obtained by the proper selections of drill material and the process parameters.

However, at low spindle speed and high feed rate the heat generation due to friction between cutting edges and the work material facilitate softening of the matrix which resulted in poor surface finish and lower delamination.

The results revealed that the proper selections of process variables are capable of producing quality holes for extended lifetime.

## **27. HEALTH EFFECTS OF RSPM – A CASE STUDY OF KAKINADA CITY**

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This study was undertaken to investigate the quality of air in Kakinada during 2010-2011 with reference to RSPM, NO<sub>x</sub> and SO<sub>2</sub> and to study the health effects of them.

The minimum and maximum concentration of RSPM in ambient air at different locations of Kakinada is recorded as 79.69 -190.11 µg/m<sup>3</sup> and in summer, 63.22-175.21 µg/ m<sup>3</sup> in monsoon and 83.36 – 205.21 µg/ m<sup>3</sup> in winter season.

The AQI of the study area was calculated and the industrial and commercial areas were found to be polluted.

About 100 families of Dummulupeta industrial area have been surveyed for prevalence of air pollution oriented diseases among the people.

Results indicated higher incidence of respiratory diseases among the affected people.

**28. BATCH AND CONTINUOUS REACTORS FOR  
INVESTIGATING PHARMACEUTICAL WASTEWATER  
BIODEGRADATION USING *PHANEROCHAETE  
CHRYSOSPORIUM* – A KINETIC STUDY**

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In the biodegradation of pharmaceutical wastewater using the immobilized cells of *Phanerochaete chrysosporium* batch experiments were carried out for five different initial concentrations such as 13000, 10000, 6000, 4000 and 2000 mg COD/l. The corresponding steady state values of COD removal efficiencies for the said five concentrations were 50.9, 54.25, 56.4, 59.15 and 71.4 % at the end of 10th day. The effects of various parameters like agitation and biomass dosage were also studied.

The Langmuir and Freundlich adsorption models fitted well with the equilibrium data of the process studied. It was also recorded that the experimental kinetic data followed the first order rate expression. For continuous studies, the experiment was carried out in a packed column at three different flow rates namely 6 cc/min, 8 cc/min and 12 cc/min, the maximum COD removal efficiencies obtained were 66.2, 62.2 and 58.4%, respectively, with the initial substrate concentration of 2000 mg COD/l of the wastewater.



## **29. SPINTRONICS: A NEW ERA IN FUTURE ELECTRONICS**

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In the information era, a new promising science has been strongly addressed producing a breakthrough in the technological products: The science is called ‘*Spintronics*’, the contracted form of ‘spin based electronics’.

The 2007 Nobel prize for Physics, with whom A. Fert and P. A. Grünberg have been awarded, is another clear signal that the importance of ‘*Spintronics*’ for society is worldwide understood. For more than thirty years physicists and engineers devoted their researches and efforts mostly to charge-transfer devices, developing the actual semiconductor industry and granting to it a tremendous growth rate [1]. In the far 1933 the physicist F. Mott published his innovative concept of spin dependent conduction and the possibility of considering within a ferromagnetic metal (FM) the two electron spin channels as separate non-interacting conduction ways [2].

Only forty years later experimental evidence of current spin-polarisation was reported by P. Tedrow and R. Meservey [3]. ‘*Spintronics*’, or Spin-Electronics, thus involves the study of active control and manipulation of spin degrees of freedom in solid-state systems. This paper will review the current status of this subject, including both recent advances and well-established results.

The primary focus is on the basic physical principles underlying the generation of carrier spin polarization, spin dynamics, and spin-polarized transport in semiconductors and metals. Spin transport differs from charge transport in that spin is a non-conserved quantity in solids due to spin-orbit and hyperfine coupling. The author discuss in detail spin decoherence mechanisms in semiconductors.

Various theories of spin injection and spin-polarized transport are applied to hybrid structures relevant to spin-based devices and fundamental studies of materials properties.

Experimental work is reviewed with the emphasis on projected applications, in which external electric and magnetic fields and illumination by light will be used to control spin and charge dynamics to create new functionalities not feasible or ineffective with conventional electronics.

### **30. GROUND EFFECT VEHICLES: MASS TRANSPORT SOLUTION FOR INDIAN COASTAL LOGISTICS AND COASTAL**

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On the ominous evening of 26th November 200, ten infantry level armed terrorists from a failed state violated the maritime borders of the Motherland and caused unprecedented carnage, exposing the underbelly of our maritime security. The statistics year after year of our Coastal shipping, may be due to flawed policies, presents a bleak present and uncertain future. This sick sector has been growing at a rate not exceeding 2.7% CAGR. On one hand we have a vast energy demand, an insatiable appetite of a growing nation of 1.2 billion; on the other hand the growing and ever increasing Gap between the energy demand vis-à-vis the planned and installed generation capacity threatens to stifle our growth. All this, notwithstanding the huge reserve of billions of tones of methane - clathrate or hydrated methane, lying unused waiting to exploited for India's energy security. Similarly, the Vast and increasing population of 17.31% of people in the world needs increasing source of food and nutrition to battle hunger and starvation while the EEZ of the country remains vastly underutilized even today, despite being one of the richest in terms of biodiversity and fishing potential.

Over the seas a shrewd and powerful giant adversary prepares to flex its maritime muscle in our backyard. The maritime security of our beloved nation is at a grave risk from the “string of pearls” strategy. Today, a majority of Indian fishermen venture out to the open seas in their antiquated wooden boats some of them powered with diesel engines. They are at the mercy of the forces of nature, at peril from the misadventurous Pakistan navy and coast guard, and vagabonds of the sea from the failed, imploding and dysfunctional regime of an African nation located at the dark continents “HORN”. One look at the IMB piracy map shows the growing reach of pirates/maritime terrorists like the fingers of an evil hand trying to fiddle with the respect of our holy motherland. In today’s world the country aspiring to be permanent member of the UN Security Council lacks the resolve and the might to protect its own seafarers who are being captured, tortured, killed and held for ransom in inhuman and insanitary conditions by the prodigies of A PIRATE NATION whose children are taught in the school of anarchy by the franchise of Al-Qaeda popularly called the Al-shabab. When our seafarers and fishermen get in distress, help is not at hand at short notice, which is CRITICAL in such life and death situations.

All the above situation highlight a weak coastal defense, a foundering Coastal trade and a lack of rapid response solutions to contingencies, inability to exploit one own natural resources in our own maritime territory and a collective failure to assert our presence in our own backyard against aggressive and oppressive neighbours. All these should be a severe source of worry for a nation trying to position itself as the superpower of the coming centuries. It may be well recognized that there is no quick-fix solutions to tackle all these problems and grave challenges. We have failed to pre-empt these situations for more than couple of decades. As time and tide has passed by; we have decided to blissfully ignore the tell-tale signs of the dark clouds approaching. The clock is ticking and we need some out of the box solutions and we need it FAST.

Development of warship fleet is understandably is extremely time and resource consuming affair, and the ship-building infrastructure to support such expansion plan and proactive policies to help private

shipyards to jump into the fray are not effectively present. It may not be wrong to say that we may have missed the boat by at least more than couple of decades. Various policies to augment coastal exploration and revive coastal shipping, even if made in the earnest and deployed, will have a definite minimum time lag to have a positive effect for a positive change.

The authors look towards the highly secret research carried out by a brilliant scientist and inventor Dr. Rostislav Alexiev, quietly in the town of Nizhny- Novgorod (popularly called Gorky) some 40 years ago.

Independently, another brilliant scientist from the WWII era Dr. Alexander Lippish was conducting similar experiments in West Germany. Can the results of these top secret projects of yesteryears, be the relatively a reasonable solutions to our “achilles heel”?

A look to wards today’s contemporary world reveals that great powers and maritime heavy weights like Russia, Germany, China, Australia, UK are carrying out significant research, detailed developmental work, construction standard codification for this solution we are going to explore. This probable solution is called “EKRANOPLAN: GROUND EFFECT VEHICLE”.

Can this be OUR solution to the serious problems plaguing of maritime state as discussed above? Have we gain missed the boat by neglecting the solution for too long while others have taken the lead? The author feels that all these question needs to be debated at the highest levels of the nation’s think-tanks of Indian policy makers.

### **31. AN IMPROVEMENT IN METHOD OF OIL SPILL RECOVERY**

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The paper deals with an efficient, time saving, costless, mechanism which can be used along with the Conical Shaped Apparatus (a mechanical instrument used for recovery the oil spilled in Mexico) to recover an oil spill. Our present study is based on how to get pure oil in minimum time from this Conical Apparatus. We have tried to get pure oil by achieving stream line flow with the help of helical shaped pipe along with this apparatus. This is done by analyzing the flow of oil in helical pipe considering always Reynolds's number (R) less than or equal to 2000. The study is carried out on different combinations of Reynolds's number and different sized helical pipes to get pure oil in minimum time.

The model study of this mechanism is performed with different densities of oil considering thickness of oil, working temperatures and working conditions- static & wavy water. Thus we have found out the efficiency of this mechanism with respect to time and purity of separated oil up to 90%.

### **32. ELECTROCHEMICAL OXIDATION OF TEXTILE DYE WASTEWATER USING TI ELECTRODE**

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The electrochemical oxidation of dye wastewater has opened up a new avenue in the field of Green Technology. The Textile industries require huge quantities of process water. It generates more or less an equal amount of wastewater containing a lot of hazardous materials like azo dyes, dissolved inorganic salts, dispersing agents, other harmful organics and metals like chromium etc.

Recently, an industrial complex in the suburb of Kolkata containing a cluster of dyeing units emerged a hazardous and potential threat because of lack of quality assurance in wastewater management.

This prompted the present research group to quest for an appropriate green technology to treat wastewater collected from industries.

A continuous module (electrochemical reactor) was developed with five sampling points and residence time of 25 minutes. Mathematical model was developed to ascertain COD as response variable. The extensive treatment for determination of rate constants for discoloration and COD reduction was done. The process run was capable for maximum 47% of COD reduction. The ranking of wastewater methodologies were also prescribed.

### **33. ERADICATION OF POWER THEFT**

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Power line communication (PLC) presents an interesting and economical solution for Automatic Meter Reading (AMR). If an AMR system via PLC is set in a power delivery system, a detection system for illegal electricity usage may be easily added in the existing PLC network. In the detection system, the second digitally energy meter chip is used and the value of energy is stored.

The recorded energy is compared with the value at the main kilo Watt-hour meter. In the case of the difference between two recorded energy data, an error signal is generated and transmitted via PLC network.

The detector and control system is proposed. The architecture of the system and their critical components are given. The measurement results are given.

### **34. MODELING AND SIMULATION OF DIELECTRIC POCKET SILICON ON NOTHING (DIPSON) MOSFET**

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Low-voltage, low-power VLSI circuit application using sub-45 nm channel lengths devices is very challenging due to severe VTH roll-off and leakage current.

In order to further suppress SCEs, Dielectric Pocket at source/drain junctions are incorporated in a Silicon on Nothing (Air) MOSFET which act as a diffusion stopper and reduces electrostatic coupling.

The aforementioned attributes of the DiPSON structure, thus, substantiate its emanation as a significant outcome of the lateral channel engineering technology to achieve excellent SCE suppression.

In the present work, a compact analytical subthreshold drain current model for DiPSON MOSFET is proposed and validated by device simulation Software.

### **35. AN ELEMENTAL APPROACH TO DETERMINE THE EFFECTS OF ARMATURE REACTION & SATURATION IN A PERMANENT MAGNET BLDC GENERATOR**

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Brushless DC generators are being extensively used in various applications due to their advantages such as high efficiency, better voltage control, high power density and high reliability. Hence its design is to be carefully studied. By taking field saturation and armature reaction into consideration while designing helps in building a better generator. Armature reaction refers to the magnetic field produced by currents in the stator slots and its interaction with the permanent magnet Field.

Ideally the magnetic field distribution within the motor is the linear superposition of the permanent magnet and stator magnetic fields. In reality, the nature of the interaction of the two fields, the field due to the permanent magnets and the field due to the current in the armature windings, are non-linear.

This interaction of the two fields in the machine affects the performance of the machine, and it deviates from the ideal case. For example, if the stator teeth are approaching saturation due to the



permanent magnetic field alone, then the addition of a significant armature reaction field will thoroughly saturate the stator teeth. This increases the stator reluctance and the magnet-to-magnet flux leakage, which drives the permanent magnet to a lower permanence coefficient and lowers the amount of force produced by the motor.

It is a known fact that the effect of armature reaction is twofold. The armature reaction has two components – demagnetizing and cross magnetizing. The demagnetizing component is in the direction or opposite to the direction of the permanent magnet field. The cross magnetizing flux is perpendicular to the permanent magnet field. The stator and rotor core operating-points shifts due to the demagnetizing and the cross magnetizing magnetic fields. This shift of operating points should be determined to get the exact air gap ampere turns (MMF). In addition to the nonlinear effects described above, the armature reaction magnetic field determines the movement of the magnet operating point under dynamic operating conditions irreversible demagnetization of the permanent magnet is possible if  $B_a$  is large and the permanent magnet is operating at an elevated temperature. Thus a proper design modification is required so as to enable proper operation of the motor even when it is operating near or in the saturated state.

In this paper, the authors present a procedure to calculate the air gap field mmf of a radial flux permanent magnet Brushless DC generator considering the non-linearity of the core and armature reaction. Non-linearity of the core is dealt-with by considering a differential element on the B-H curve of the core near its operating point where the curve is approximated to be linear. If an iteration loop is used with permanent magnet field flux and armature reaction flux as loop variables the operating points are known in each of the iterations and hence the system becomes linear in the differential element surrounding the operating point.

### **36. EDDY CURRENT MAGNETIC LEVITATION**

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Magnetic Levitation is the upcoming Eco-friendly, Low cost Technology involving either Permanent Magnets with Hallback array or Electromagnets to obtain contact-less motion or contact-less levitation. Such a technology is Eco-friendly because of the following reasons

- I. Almost Zero Frictional Losses
- II. High operating speeds due to reduction of losses
- III. Low Pollution
- IV. Less Operating Costs than the Conventional methods
- V. Increased Efficiency

This paper deals with EDDY CURRENT MAGNETIC LEVITATION in which magnetic levitation is directly achieved by placing a copper coil of certain gauge and certain number of turns supplied with AC, over a conductive plate of certain specified length and height. The reason for levitation, specifications of copper wire and conducting plate are described in detail in this paper. Eddy current magnetic levitation is used in levitating the maglev trains, magnetic floaters etc.,

### **37. OWN SHIP MANEUVERING TECHNIQUE AGAINST HOSTILE TORPEDO: A SOFT COMPUTING APPROACH**

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In the anti Submarine/surface ship Warfare (ASW) torpedo happens to be the most effective weapon that can be launched either by surface ships or aircrafts to attack submarine/surface ship[1]. The sophisticated design of torpedo can home in on the submarine with a

high speed between 32 to 50 knots. When a torpedo is dropped from the surface or air platform within a close range of a ship to attack it is difficult for the submarine to survive. Generally it is easier to employ soft skill counter measures to survive an attack from torpedo. There are two types of counter measures to attack the torpedoes. They are Decoy and Jammer, more often a decoy can operate either in decoy mode or jammer mode.

1. Decoy: The action of decoy is to confuse the hostile torpedo by transmitting the emulated submarine's signature from itself.
2. Jammer: The action of the Jammer is to screen the submarine from the hostile torpedo from detecting it by releasing air bubbles or by noise generators.

General terminology:

Torpedo: It has been invented 130 years ago. Even though it is the oldest weapon it remains to be a more lethal weapon to sub marine and surface ship than any other conventional weapon. Torpedoes are being classified into two categories. Heavy weight torpedoes are mainly confined to submarines and Light weights are used both an offensive weapon in anti-submarine warfare or as defensive anti-submarine weapons by surface warship.

Decoy: The decoy is modeled so that it is launched on a course perpendicular to the bearing to the incoming torpedo. The model allows the decoy to move with a constant velocity of 17 knots to a position 100 meters from the submarine. The distance of 100 meters is chosen to ensure that the decoy does not stop before the torpedo has had enough time to investigate it. The decoy is undetectable as long as it has the same position as the submarine, but the moment it leaves the platform it becomes detectable. When the torpedo has caught and killed the decoy, the decoy continues to exist in the model, but it is no longer detectable. It does not interfere with the torpedo's next task of detecting and attacking the submarine.

Jammers: Depending on the position of the jammer star board or port side of the sub marine orders the jammer to move to a position 40 meters away from the firing position and 30 degrees off the submarine's course to its chosen side. Each jammer is modeled with a speed of 8 knots and fast enough to get in front of the submarine. And it is equipped up to jamming radius set to 20meters. The jamming radius is copied and used by torpedo when it checks to see if the jammer shields the target. The jammers are modeled to take position in front of and on each side of the submarine, creating a protective screen around the submarine.

This paper proposes a new evasive techniques to evade the own ship from the enemy torpedo by luring it by deploying decoys, when only the range and bearing angle of the torpedo are known. The tracking of the torpedo has been done from the information given by sonar of the own ship. The necessary actions to evade the torpedo and the time of survivability have been estimated. The proportional navigation law has been adapted to device the algorithm. This proposed algorithm takes into consideration the only the available data i.e. bearing angle of the torpedo and the range of the ship with respect to the ship. The proposed algorithm suggests the submarine/surface ship the evasive maneuvering scheme also the optimal time to launch the decoy and jammers in order to lure the incoming torpedo.

### **38. PLASTIC POLLUTION - A THREAT TO ENVIRONMENT**

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Pollution Is The Introduction Of Contaminants Into A Natural Environment That Causes Instability, Disorder, Harm Or Discomfort To The Ecosystem I.E., Physical System Or Living Organisms. Plastic Is The Major Non-Persistent Pollutant That Is Responsible For Land, Water And Air Pollution.

The Widely Used Plastic Materials Are Like PET (Poly Ethylene Terephthalate), HDPE (High Density Poly Ethylene), PVC (Poly Vinyl Chloride), LDPE (Low Density Poly Ethylene), PP (Poly Propylene), PS (Poly Styrene) Etc. Toxic Substances Such As Ethylene Dioxide, Benzene And Xylene Are Emitted During Production Of Plastic And These Chemicals Can Cause An Array Of Problems Ranging From Birth Defects To Cancer And Damage The Nervous System And Immune System. The Additives Such As Nonylphenol, Phthalates, Bisphenol-A, Which Are Added During The Production Of Plastic, Contaminate The Food. The Dioxins ( $C_{12}H_4Cl_4O_2$ ) Which Are Released During Burning Of Plastics Are Carcinogenic In Nature And Cause A Skin Rash Called Chloracene. Over 1 Million Sea Birds And 1,00,000 Mammals And Sea Turtles Each Year Are Killed By Entanglement Or Ingestion Of Plastic Waste. Replacing The Plastic Bags With Eco-Friendly Jute, Paper, Cotton Or Cloth Bags, Using Degradable Plastic Packages, Composite Starch Based Materials Can Protect The Environment By Composting The Waste And Also Reduce The Carbon Foot Print.

### **39. ARSENIC REMOVAL FROM GROUND WATER BY LOW COST METHOD WASTE RUST FILTER MEDIA**

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Arsenic contamination of groundwater is a naturally occurring high concentration of arsenic in deeper levels of ground water, which became a high-profile problem in recent years due to the use of deep tube-well for water supply, causing serious arsenic poisoning to large numbers of people. A 2007 study found that over 137 million people in more than 70 countries are probably affected by arsenic poisoning of drinking water. Arsenic is a carcinogenic which causes many kinds of cancers as well as cardiovascular disease. Like many places of India, Arsenic in ground water is a serious problem at Bharatpur region of Rajasthan; the sample which was tested for arsenic was collected from ground water source from hand pump which was being used for so many daily needs like agricultural use,

for animals and for drinking also. There the ground water was being processed by R.O but still the Arsenic removal was unsatisfactory. In this research work we did lots of experiments upon Bharatpur groundwater sample as well as on an artificial standard arsenic sample also and we found drastic results from it. This study was done to check potential of removing Arsenic from ground water by available waste of common Iron rust, which is chemically  $\text{Fe}_2\text{O}_3$ . It was found that the arsenic removal capacity of this rust is more than 90 % and which is superior to using hydrous ferric oxide ( $\text{FeOOH}$ ) gel, for removing Arsenic, TDS and color too. In this work various experiments were done to prove the better Arsenic removal capacity of rust, which were compared with the results of  $\text{FeOOH}$  for various water parameters. Lastly it was found that using Iron rust is more efficient in removing arsenic from ground water.

#### **40. A PICKING GRAB**

**Jitendra Nath Das**

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The present invention is a mechanical gadget claims to be a new way of cleansing in a sophisticated manner all filthy articles from underground drainage system and disposes off simultaneously in a near- by suitable place or on a trailer for transporting in dumping ground for creation of manure for fertilizing of barren cultivated land.

It can be termed as “mechanical hand” to grab article injurious to health. In several occasion, for cleansing of underground drainage chambers like manholes, gully pits etc. from its inverts, sewer cleansing mazdoors have to enter within it, got unconscious or even death due to presence of poisonous sewer gas, can be avoided, and shows a path of better environment. Speciality of this bucket to grab articles horizontally as cutting jaw is gradually dragged upward and similarly released down (other half of oscillation) enabling the edge of the cutting jaw to move in a horizontal path avoiding conventional radial one.

The bucket has jaws – one is stationary with 3 walled bottomless box shaped within which another rotating cutting bucket to ply to accumulate the scattered articles from one end to other in scrapping silt, sludge from invert of manholes, septic-tanks, gully pits etc. and disposed off simultaneously in an attached tailer or truck.

A conventional power-shovel or grab has two or more curved plates gradually pointed at bottom with cutting edge when operated to excavate on a surface, its horizontal line joining the edge of cutting jaws in stretched position penetrate within the surface radially [from common center of the jaws] keeping a concave surface which is not harmful during dredging of river or canal bed; but during scrapping silt, sludge from invert of manholes, gully pits, septic-tanks and other underground chambers well cemented in a horizontal plane, must damage its under-bed as cutting jaws will foul during picking the silt.

The movement of the jaw of the grab through a reciprocating rod or pipe, pivotally connected on its upper ends of the rotating bucket through link plates to operate the jaw of the rotating bucket “close & open” encased by a stationary pipe rigidly fitted on the upper ends of stationary bucket which is again fitted with chord/chain pulley arrangement, further connected with a boom of derrick support preferably fitted on rear end of trailer/truck for easy lifting of the grab collecting silt, sludge etc. from invert of manholes, gully pits, septic tanks of man height depth or more submerged with filthy water permitted a pause to drain out the excess fluid and subsequently disposed in nearby suitable site.

Similarly, it fitted from a floating boat or barge can de-silt navigation channel near port for easy entry of ship. It can favour in dredging of pond [re-excavation without bailing of water] for storing of rain water, for rain-water harvesting. The excess soil can serve the purpose of brick-manufacturing, not spoiling the costly paddy field. The grabs are of various capacities from 0.5cft. to 5cft. serve domestic to industrial /commercial purpose. It helps in partly solving of natural disaster like flood, draught, helps an economical up-liftment of Nation, in producing of bumper crops due to better

irrigation with proper fertilization, creates employment facility in manufacturing an export in abroad.





**99<sup>th</sup> Indian Science Congress**  
January 3-7, 2012, Bhubneshwar

**VI**

**LIST OF  
PAST SECTIONAL PRESIDENTS**



**PAST SECTIONAL PRESIDENTS**  
**ENGINEERING SCIENCES**

Vipin K Tyagi	(2011)	O P N Calla	(1997)
G S Mukherjee	(2010)	V M Trehan	(1996)
N B Basu	(2009)	V M Trehan	(1995)
Gurdip Singh	(2008)	Vijaya Agarwal	(1994)
Sujit Kumar Mitra	(2007)	Ramadhar Jha	(1993)
V K Mathur	(2006)	J H Agarwal	(1992)
Tara Singh Kamal	(2005)	P K Patwardhan	(1991)
P K Raychaudhuri	(2004)	M P Chowdiah	(1990)
S K Tandon	(2003)	H B Lal	(1989)
Suresh Chandra Bhatia	(2002)	P K Jena	(1988)
Jaswant Singh	(2001)	S C Chakravarty	(1987)
S T Deshmukh	(2000)	Manindramohan Chakrabarty	(1986)
P B Sharma	(1999)	S S Garg	(1985)
V K Aatre	(1998)	Biswesar Maitra	(1984)

*Proc. 99<sup>th</sup> Indian Science Congress, Part II:  
Past Sectional Presidents*

S C Lahiri	(1983)	Hem Chandra Guha	(1969)
T R Anantharaman	(1982)	K K Majumdar	(1968)
M K Das Gupta	(1981)	A K Sen Gupta	(1966)
S S Saluja	(1980)	S S Banerjee	(1965- 1964)
S Deb	(1979)	R G Mukherji	(1963)
R B Chakravarty	(1978)	V Cadambe	(1962)
J N Bhar	(1977)	H N Das Gupta	(1961)
<b>Engineering &amp; Metallurgy</b>		N N Sen	(1960)
D C Tapadar	(1976)	M Datta	(1959)
Harsh Vardhan	(1975)	C S Ghosh	(1958)
Jivan Datt	(1974)	G P Chatterjee	(1957)
G R Toshniwal	(1973)	B N Dey	(1956)
S N Ghosh	(1972)	B B Bhowmik	(1955)
J K Choudhury	(1971)	H N Srivastava	(1954)
S V Chandrashekhar Aiya	(1970)	S K Sircar	(1953)

Section VI: Engineering Sciences

J N Basu	(1952)	Karunamay Ray	(1945)
M S Thacker	(1951)	J J Ghandy	(1944)
D R Malhotra	(1950)	N V Modak	(1943)
M Sengupta	(1949)	B B Bhowmik	(1942)
N Sen	(1948)	<b>Engineering</b>	
H P Bhaumik	(1947)	C C Inglis	(1941)
P H Kutar	(1946)		