



Proceedings of

National Conference
on

Trends in Renewable Energy Sources, Applications & Climate Change

TRESAC '2010

July 23rd -25th 2010

CENTRE FOR NANOSCIENCE & NANOTECHNOLOGY

(A Joint Initiative of IGCAR, Kalpakkam & Sathyabama University)

SATHYABAMA UNIVERSITY

Chennai-600119



Sponsored
By
Ministry of Earth Sciences
Govt. of India
New Delhi



In Association
with
Indira Gandhi Centre for
Atomic Research (IGCAR),
Kalpakkam

Proceedings of
National Conference
on

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**Jeppiaar Nagar, Rajiv Gandhi Salai
Chennai-600119**



Sponsored by
Ministry of Earth Sciences (Govt. of India), New Delhi

ABOUT SATHYABAMA UNIVERSITY

Sathyabama University established under section 3 of UGC Act, 1956(A Christian Minority Institution) was formerly known as Sathyabama Engineering College established by JEPPIAAR EDUCATIONAL TRUST in the year 1987. It is pioneer institute imparting quality education in the field of engineering, science & technology. The institution's progress and contribution in the field of technical education for over two decades made the Ministry of Human Resources Development, Govt. of India to grant Deemed University status on 16th July 2001 and University status on 13th September 2006. Sathyabama University, under the dynamic leadership of Honorable Chancellor **Dr. JEPPIAAR** has been strengthening university development activities to bring the fruits of research for the betterment of the society with the able support and valuable guidance of our directors Er.Marie Johnson and Er.Mariazeena Johnson Directors. The university offers courses in 24 branches of Engineering and Technology at UG level and 24 courses at PG level in addition to sciences, MBA, MCA and Ph.D programmes in all discipline. To its credit it has been accredited by National Assessment and Accreditation Council (NAAC) and ISO 9001:2008 for professional quality management. The university has undertaken various sponsored and collaborative R&D projects funded by national organizations such as ISRO, DST, DBT, DRDO, BRNS, MoEF, IGCAR (DAE) etc.

ABOUT

CENTRE FOR NANOSCIENCE & NANOTECHNOLOGY

(A Joint Initiative of IGCAR, Kalpakkam & Sathyabama University)

The Centre for Nanoscience and Nanotechnology (CNSNT) has been established in January 2006 at the university campus to accomplish the goal of establishing advanced research in frontier areas of science and technology. The centre is a joint initiative of Indira Gandhi Centre for Atomic Research (IGCAR), Govt. of India and Sathyabama University. The centre, in addition to undertaking research and development projects in various areas of nanotechnology with a team of full time scientists and research fellows. Further, short term training programmes on recent developments in nanoscience are also offered on various themes of topical interest.



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Jeppiaar Nagar, Rajiv Gandhi Road, Chennai – 600 119, Tamilnadu, India



MESSAGE

I am indeed happy that Centre for Nanoscience & Nanotechnology, Sathyabama University is organizing a 3 days National Conference on Trends in Renewable Energy Sources, Applications & Climate Change (TRESAC) from 23rd to 25th July 2010 & the conference proceedings will be released on the occasion.

This conference is unique in the sense that it provides an opportunity to research scholars, students and scientists to get together and discuss with an open mind about the latest trends in Renewable Energy, Environment, Energy Efficient Modelling & Climate change. I always encourage research as it opens new avenues for invention & advancement.

I am sure that the organizers have given a strenuous effort to make this National Conference a grand success & interactive.

I wish this conference a grand success and my best wishes to all participants & delegates to share their experience.

**Dr. JEPPIAAR, M.A, B.L, Ph.D
Founder & Chancellor**



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Er. Marie Johnson
B.E, MBA, M.Phil, (Ph.D)



Er. Mariazeena Johnson
B.E, MBA, M.Phil, (Ph.D)

MESSAGE FROM DIRECTORS

We are glad that Centre for Nanoscience & Nanotechnology, Sathyabama University is conducting the National Conference on “**Trends in Renewable Energy Sources, Applications & Climate Change (TRESAC)**” “during 23rd to 25th July 2010.

It is touching virtually every facet of human endeavor. It provides an opportunity to intellectuals to put forward their research ideas. Due to the explosion in research activities, the goal of the conference is to provide an opportunity to academicians and researchers from various universities and research institutions in India to discuss the divergent issues related to Renewable Energy and Climate Change.

This three day National conference will help researchers, educationalists and industrialists to get together and expand the boundaries of innovation. We wish the delegates and organizers a purposeful and successful conference.

DIRECTOR

DIRECTOR



सत्यमेव जयते

डॉ. शैलेश नायक

DR. SHAILESH NAYAK



सचिव

भारत सरकार

पृथ्वी विज्ञान मंत्रालय

महासागर भवन, ब्लॉक-12, सी.जी.ओ. कॉम्प्लेक्स,

लोदी रोड, नई दिल्ली-110 003

SECRETARY

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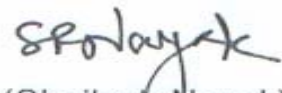
MESSAGE

I am delighted to note that a National Conference on "Trends in Renewable Energy Sources, Applications and Climate Change (TRESAC)" is being organized at the Sathyabama University in Chennai during 23rd to 25th July, 2010.

This Conference would bring together academicians, researchers, technocrats and experts in the field of Renewable Energy Sources and Climate Change to a Common forum, for a constructive dialogue on innovative concepts and practical ideas on the field of renewable energy sources and climate change.

The National Conference would provide an opportunity to various stakeholders and potential users from national agencies, industry, research centres and Government to get involved about the technological developments, achievements and future directions in the field of science in renewable energy sources and climate changes. The themes of the conference, such as renewable energy sources, effect of climate change in construction and agriculture, solar cells and applications, fuel cell, and environmental impacts are specific to the present scenario, and can generate new ideas.

I believe this is an important area which needs to be focused and discussed. I wish all success to the Conference on "Trends in Renewable Energy Sources, Applications and Climate Change (TRESAC)".


(Shailesh Nayak)

एस. सुन्दरेश
विशिष्ट वैज्ञानिक एवं
मुख्य नियंत्रक अनुसंधान तथा विकास (एसीई)
S. SUNDARESH
DISTINGUISHED SCIENTIST
&
CHIEF CONTROLLER R&D (ACE)



रक्षा मंत्रालय
MINISTRY OF DEFENCE
रक्षा अनुसंधान तथा विकास संगठन
DEFENCE RESEARCH & DEVELOPMENT ORGANISATION

Message



It is indeed a pleasure to note that **Sathyabama University** is organizing a national conference on “**Trends in Renewable Energy Sources, Applications & Climate Change (TRESAC)**” on 23-25 July, 2010. Energy is one of the most important needs of human kind in modern world. Conventional energy resources are fast depleting and soon the world is likely to face energy challenge. The solution to this challenge lies in nonconventional energy resources. Unquestionably, there is enormous potential of energy generation through nonconventional energy resources. It has been estimated that the quantity of energy, which could be tapped through nonconventional resources, is many time higher than the conventional resources. Nonconventional resources does not deplete rather it is renewable and does not cause any adverse effect to the environment.

The nonconventional energy generation has kindled enormous interests in the scientific community all over the world. Presently, Scientists and engineers are working on various technologies to tap nonconventional energy. There is need to address the issues of high efficiency and cost effective technologies for exploiting full potential of nonconventional energy resources. The most promising nonconventional energy resources are sun, wind, tides, herbs and garbage. Considerable work has been done by the researchers in the relevant areas but still more efforts are needed to make it commercially viable and popular.

I am sure that **TRESAC** would provide an appropriate technical platform to the participants, from academia, R & D organizations & industries from all over the country to deliberate on the technologies related to nonconventional energy, its applications and its role on conservation of environment. I hope the outcomes of this conference would open new areas of research and development for high efficiency and cost effective nonconventional energy technologies. I wish all success to **TRESAC**.

05TH JULY 2010

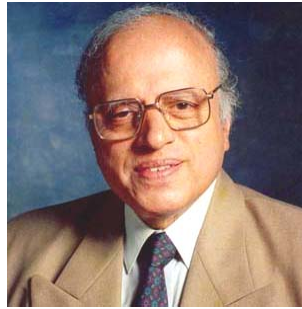

(S. SUNDARESH)

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Prof. M S Swaminathan
Member of Parliament
(Rajya Sabha)



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Message

MSS/DB/
21 June 2010

Dear Organizer,

Thank you very much for your kind letter. I congratulate you on the timely conference on Renewable Energy Sources. I wish the conference great success.

With warm personal regards,

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'M S Swaminathan'.

M S Swaminathan



भारतीय प्रौद्योगिकी संस्थान दिल्ली
Indian Institute of Technology Delhi
Hauz Khas, New Delhi-110016 INDIA

SATHYABAMA UNIVERSITY

Jeppiaar Nagar, Rajiv Gandhi Road, Chennai – 600 119, Tamilnadu, India

A National Conference on Trends in Renewable Energy Sources, Applications & Climate Change



Date: Friday, 16th July 2010

MESSAGE

I am glad to know that the Centre for Nanoscience and Nanotechnology of Sathyabama University is organizing a three-day national conference on “Trends in Renewable Energy Sources, Applications & Climate Change (TRESAC)” from 23rd to 25th July 2010.

Climate change and its consequences on human life are well appreciated challenges being faced worldwide. Every segment of society is being and will continue to be affected by the climate changes. In the context there is an indisputable need to explore newer sources of renewable energy, which has the least contribution in climate change, such as that harnessed from sun, wind, tidal waves etc. The traditional fossil fuels on the other hand produce green house gases, which affect the environment adversely leading to climate change. The conference would thus address the most crucial topic of the date and bring together researchers, academicians, thinkers and policymakers at one platform for deliberations. I have no doubt that many quality papers will be presented and discussed during the technical sessions over the three days of the conference and will be published in the form of conference proceedings. With the motto of making “Green World”, this conference is timely and important event being organized.

I wish the national conference TRESAC a grand success.


(Vasant Matsagar)

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From the Desk of the Organizing Secretary

It's my immense pleasure that Centre for Nanoscience and Nanotechnology of Sathyabama University is organizing a three days National Conference on "Trends in Renewable Energy Sources, Applications & Climate Change".

I hope this conference will make some live impact on the young and innovative minds of the researchers and scientists those are actively involved in the area of renewable energy and climate change.

I cordially welcome all the speakers, delegates, scientists and students to this interactive forum to make the conference a grand success.

Dr. T Sasipraba
(Dean Conferences & Publications)

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 Supraja
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 Inbakkandan, Scientist-C
 Ganesh V, Scientist-C
 D.Ramachandran,JRF
 Kamaljeet Singh

PROGRAMME SCHEDULE

Day I 23.07.2010	Day II 24.07.2010	Day III 25.07.2010
Inauguration Venue: Mini Auditorium (By Chancellor Dr. Jeppiaar) (9.00 AM – 9.30 AM)	Invited talk-I Venue: Mini auditorium Dr. D Arivouli, Professor, Anna university, Madras (9.00 AM – 10.00 AM)	Invited talk-I Venue: Mini auditorium Dr. B Venkatraman, Scientist, IGCAR (9.30 AM – 10.30 AM)
Key Note Address Venue: Main Auditorium Dr. V Jayaraman , Director, NRSC Hyderabad (9.30 AM - 10.00 AM)	Technical Session I Venue: Mini auditorium Session Chair: Dr. D Arivouli, Professor, Anna university, Madras (10.00 AM – 1.30 PM)	Tea break (10.30 AM – 10.45 AM)
	Tea break (11.00 AM - 11.15 AM)	
Invited Talk-I Venue: Mini Auditorium Dr. R Nagendran, CES, Anna University (10.00 AM - 11.00 AM)	Lunch (1.30 PM -2.00 PM)	Model Contest and Poster Venue: Mini auditorium session Chair: Dr. Vaidehi Ganesan , IGCAR, Dr.Vinita Vishwakarma, Mr. Subhranshu Sekhar Samal (10.45 AM – 1.00 PM)
High Tea (11.00 AM - 11.15 AM)	Invited talk-I Venue: Mini auditorium Dr. S. Gomathinayagam, Executive Director, C-WET, Chennai (2.00 PM -2.30 PM)	Lunch (1.00 PM -2.00 PM)
Technical Session I Venue: Mini Auditorium Session Chair: Dr. R Nagendran, CES, Anna University and S.Sathyamurthy,DRDO (11.15 AM - 1.30 PM)	Technical Session II Venue: Mini auditorium Session Chair: Dr. S. Gomathinayagam, Executive Director, C-WET and K. Santhanam, Centre for water Research, Sathyabama University (2.30 PM – 5.30 PM)	Brain storming Session on Global warming & Climate change- Green Practices in Day to Day life (Experts from different R & D organizations) (Interactive Session with participants and experts Dr. Vaidehi Ganesan , Dr. K Venugopal, Dr. S Sathyamurthy, Dr. S Seeni,

	Tea Break (3.30 PM – 3.45 PM)	Mr. K Santhanam, Dr. B Sheela Rani (2.00 PM -3.00 PM)
Lunch (1.30PM -2.00PM)	Technical Session II	Award Ceremony & Valedictory function (3.00 PM – 4.00 PM)
Invited Talk-II Venue: Mini Auditorium Dr. Vaidehi Ganesan , Senior Scientist, IGCAR (2.00 PM -2.30 PM)		
Technical Session II Venue:Mini auditorium Session Chair: Dr. Vaidehi Ganesan, IGCAR (2.30 PM – 5.30 PM)		
High Tea (3.30 PM – 3.45 PM)		
Technical Session III Venue: Remote Centre Session Chair: Mr. K Santhanam, Scientist(2.30 PM – 5.30 PM)		

Invited Talks

Day-1 (23 July 2010)	
<p>Morning Session:</p> <p>Professor R Nagendran, CES, Anna University Chennai</p>	<p>Afternoon Session:</p> <p>Dr. Vaidehi Ganesan , Senior Scientist, IGCAR Kalpakkam</p>
Day-2 (24 July 2010)	
<p>Morning Session:</p> <p>Dr. D Arivouli, Professor, Anna university, Madras</p>	<p>Afternoon Session:</p> <p>Dr. S. Gomathinayagam Executive Director C-WET, Chennai</p>
Day-3 (24 July 2010)	
<p>Morning Session:</p> <p>Dr. B Venaktraman IGCAR, Kalpakkam</p>	<p>Afternoon Session:</p> <p style="text-align: center;">Brain storming Session on Global warming & Climate change- Green Practices in Day to Day life (Interactive Session with participants and experts)</p> <p>Panelists:</p> <p>Dr. V Ganesan, IGCAR Dr. K Venugopal, Chief Scientist , CWR, SU Dr. S Sathyamurthy, DRDO Dr. S Seeni, Research coordinator, C-BIRD Mr. K Santhanam, Scientist-D, CWR, SU Dr. B Sheela Rani , Dean (PG Studies & Research)</p> <p style="text-align: center;">(2.00 PM -3.00 PM)</p>

Invited Papers

Carbon based Nanomaterials: Processing and energy related applications

S. Ramaprabhu,

Professor, Alternative Energy and Nanotechnology Laboratory (AENL),

Nano Functional Materials Technology Centre (NFMTC),

Department of Physics,

Indian Institute of Technology Madras, Chennai - 600 036, India.

The last few years have witnessed the discovery, development and large-scale manufacturing and production of novel nanomaterials, some of them promise exciting energy and biological related applications. One-dimensional Carbon nanotubes (CNTs) have outstanding properties which have sparked an abundance of research since their discovery by Iijima in 1991. CNTs possess outstanding properties such as high tensile strengths, ultra light weight, excellent thermal and chemical stability, high surface area and favorable electronic properties. These remarkable arrays of features have potential applications as biomedical materials and devices, biosensors, drug and vaccine delivery vehicles and novel biomaterials. In addition, they promise a wide range of energy applications such as catalyst supports in fuel cells, electronic devices, field emitters, gas sensors, gas-storage media, supercapacitors, nanofluids and molecular wires for next generation electronic devices. Use of nanomaterials, nanoparticles and nanocomposites for biomedical purposes constitutes nanomedicine and CNTs have been poised to revolutionise a variety of biomedical applications. The *in vivo* toxicological and pharmacological studies undertaken so far indicate that functionalised carbon nanotubes can be developed as nanomedicines. Many approaches to nanomedicine being pursued today are already close enough to fruition that their subsequent incorporation into valuable medical diagnostics is highly likely to occur very soon. In the longer term, nanorobots may join the medical giving physicians the most potent tools imaginable to conquer human disease.

The present talk offers a concise and focused review of the state-of-the-art in the synthesis of different types of nanomaterials and their properties. In addition, the processing of Carbon nanotubes and the applications will be addressed taking into consideration of the various key issues for the development of energy materials and nanomedicines.

Nuclear Energy- Safest Renewable Energy Source

Vaidehi Ganesan

Metallurgy & Materials Group, Indira Gandhi Centre for Atomic Research,

Kalpakkam-603 102, India

Email: vaidehi@igcar.gov.in

Analysis of electricity consumption per capita data of different countries clearly brings out the fact that our country, India is far behind the status of developed countries. It is high time that we accept the realities and try to improve the present scenario. Electricity consumption per capita is a measure of development (status of different countries, human development etc). Day by day, our energy requirement is increasing tremendously and we are running out of natural resources. We need more and more energy for our future requirements, to meet the industrial growth of our Nation. Since we do not have any other natural resources of energy aplenty, we have to rely on Nuclear Energy as the only clean source of safe energy. Fossil fuels may not last for long and of course there are problems due to CO₂ emission, climate change, environment concern etc. Fossil fuels are not safe from environment point of view since they contribute to large carbon foot print. Renewable energy sources are limited in our country (solar, tidal, hydro, biomass, wind mill etc). At present there are limited applications for solar energy. Considering the limited natural resources of energy in India, and the ever increasing demand of electricity, it is only imperative that one has to resort to nuclear route to meet the future energy demands of our country.

For our future energy requirement, Nuclear Power is the only alternative and economical too. In the overall cost of fossil fuel generated electricity, expenses for carbon mitigation (We have to pay for CO₂ emission!), global warming etc are not included. But in the Nuclear power, all the costs (including reprocessing and nuclear waste management etc are included). Uranium has the advantage of being a highly concentrated source of energy which is easily and cheaply transportable. The quantities needed are very much less than for coal or oil. One kilogram of natural uranium will yield about 20,000 times as much energy as the same amount of coal.

Safety is given top priority in almost all the Nuclear Power Plants (NPPs) all over the world. There are only two major accidents in the entire history of NPPs, namely “Three

mile island “and “Chernobyl”. The Nuclear Power Plants were designed and developed by the most powerful nations, i.e., US and Russia (erstwhile). Both accidents are mainly due to lack of safety culture. In India, there are about total 19 operating Nuclear Power Plants and there are about 7 are under construction. In India, there is no major accident history of Nuclear Power Plants and it is not anticipated in the future also, since safety of Nuclear Reactors is given top priority and there is zero probability for such accidents. Department of Atomic Energy, India has three stage Nuclear programmes, which ensures Nuclear energy as one of the most reliable and renewable energy resources. The stage-I of nuclear power programme in India is aimed at optimum utilization of the limited resources of uranium in the country. The Stage-II of India’s nuclear power programme is based on the utilization of the ^{239}Pu generated in Stage-I reactors. The third stage of nuclear programme in India is aimed at utilizing the vast reserve of thorium in the country by building reactors fuelled by ^{233}U obtained from Pressurized Heavy Water Reactors (PHWRs) and Fast Breeder Reactors (FBRs). Safety of Nuclear Reactors is given top priority and hence public awareness and public acceptances are ensured. Once spent fuel is reprocessed and the recovered plutonium and uranium is used in mixed oxide (MOX) fuel, more energy can be extracted. Of course, there are avenues for safe disposal of radioactive nuclear waste. Considering the overall merits, we can and should depend on Nuclear Energy resources for our future requirements. Nuclear energy is the promising safe renewable energy source and it is environment friendly and economical too for our future energy requirements (to meet the challenges of developed country). Nuclear energy is the only clean source of energy (Green energy) for India to become a developed Nation.

To be presented during the National Conference on Trends in Renewable Energy Sources, Applications & Climate Change (TRESAC), 23rd-25th July 2010, organized by ‘Centre for Nanoscience and Nanotechnology’, Sathyabama University, Chennai.

Trends in Renewable Energy Sources, Applications & Climate

R Nagendran
Professor, Centre for Environmental Studies
Anna university, Chennai

This paper presents different aspects in renewable energy sources, applications and climate changes, due to rising population & increase in energy demand. The natural influences of climate changes and its serious impacts in environmental factors are to be discussed. Renewable energy efficient technologies such as solar energy, wind energy and bio- energy using recent techniques and applications are to be presented.

Wind Energy Mix in Renewables: A Status

Dr S Gomathinayagam,
Executive Director, Centre for Wind Energy Technology
Chennai-600 100
E-mail: ed@cwet.res.in

Renewable Energy – We mean Biomass, Wind, Small Hydro, co-generation, Waste to Energy and Solar. Most of these renewable energy technologies also can be off grid applications where there is no electrical grid available. These renewable energy systems also serve as decentralized energy systems and thus can reduce the peak energy demand in the Country. Today out of 162 GW of installed generation capacity of electricity in India, nearly 17 GW is from renewables. In this, about 12 GW is from wind alone. The wind generated electricity mix among the renewables is the highest in most part of the World. In India, wind constitutes nearly 70% of the renewable and 7.4% of net generation. The advantage of wind energy over the solar energy is the low cost. The extent of wind energy mix in the overall electricity generation has become possible because of the cost per unit of electricity is comparable to that of gas based electricity generation and this wind energy mix will be sustainable when the spinning reserve (to overcome the infirmity of wind) is ensured using other renewables or mini/micro or small/hydro power or Green Power using bio-diesel.

In Tamil Nadu, out of the total installed capacity of about 11 GW, about 4.8 GW is from wind energy and about 1 GW is from cogeneration and bio mass. Wind energy will become more sustainable when it is mixed with localized regional distributed renewable energy systems. For some more time wind energy all over the world will dominate the renewable energy until other forms of energy such as solar become cost effective. Wind energy is sure to stay with storage geographically worldwide amidst all renewables even when wind stops randomly.

CONTRIBUTED PAPERS

ON

ALTERNATE ENERGY AND APPLICATIONS

Efficient renewable energy sources with electronics & power electronics technology

D.K.Bhingare

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This paper presents technological solutions that intend to contribute both for the efficient production of electric energy from renewable non-pollutant sources (namely Wind and Sun) and to the improvement of power quality in the electrical systems. Environmental issue and energy dependence represents a great concern of the Indian community. The quantity of CO₂ emissions must be decreased to satisfactory levels, in order to reduce the negative impact in the climate change. To achieve this reduction of CO₂ within a growing energy sources dependent. Alternative non-pollutant energy sources must be considered; the challenge is the generation of “clean” and efficient energy in India, in order to decrease both environmental pollution and the energy dependence. Renewable energy sources have not been sufficiently exploited yet, and must be promoted and developed. It proposes the development of low-cost and high-efficiency power controllers that optimize energy extraction from hybrid systems, constituted by photovoltaic solar panels and wind power turbines, in small renewable energy power plants. Main innovations are the use of a single microcontroller for both sources power control and the development of an interface between the DC link and the AC electrical system. This interface uses a control system based in the p-q theory that takes into account power quality issues.

Keywords: Wind power energy, photovoltaic energy, interface to power system

Developments and advancements in concentrating photo voltaic technology - An overview

V. N. Mani

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The power generation by Concentrating Photo Voltaic technology is continuously playing a minor role in R&D of photovoltaics for the last 25 years, because the photo voltaic industry is dominated by silicon based cells. These silicon cells are not an attractive option for CPV technology mainly because of theoretically achievable efficiency is relatively lower. Also in the elevated operating temperature the cell conversion efficiency deteriorates/ degrades rapidly. Initially CPV is not an attractive option mainly because of the need for optics and sun tracking. As the photovoltaic technology changes from bulk to thin film based and fabrication of III-V based solar cells proved higher efficiencies. The GaInP, GaAs, and Ge layers of triple-junction type solar cells were selected and used because of their collective ability to match band gap energies with the solar radiation spectra. GaInP, with band gap energy of 1.85 eV, absorbs the photons in the ultraviolet and visible part of the solar spectra. GaAs ($E_g = 1.42$ eV) absorbs near-infrared light, and Ge absorbs all the lower photon energies in the infrared that are above 0.67 eV. This triple junction cell will absorb photons from the entire solar spectrum and use them efficiently. Hence, the record efficiency of 40% could be achieved.

Concentrating solar power system can be sized for village power (10 kW) or grid-connected applications (up to 100 MW). Some systems use thermal storage during cloudy periods or at nights. Others can be combined with natural gas and the resulting hybrid power plants provide high-value power that can be supplied. These attributes, along with world record solar-to-electric conversion efficiencies, make concentrating solar power an attractive renewable energy option in the southwest and other sun-belt regions worldwide. There are four CPV technologies being promoted internationally. For each of these there exist various design variations or different configurations. The amount of power generated by a concentrating solar power plant depends on the amount of direct sunlight. Like concentrating photovoltaic concentrators, these technologies use only

direct-beam sunlight, rather than diffuse solar radiation. Although the principle of generating electricity from solar power, existing solar cell technologies are too expensive to be used on an industrial scale. Further development of this technology is the development of tandem cells and multi-junction cells. In this overview presentation, advancements, current trends and practices pertaining to the harnessing and sourcing electrical energy using Concentrator Photo Voltaic (CPV) technology concept through employing suitable tracking systems, different energy transfer media and other optical sub-systems will be discussed.

Keywords: Photovoltaics, solar cells, electricity, tandem cells

Modelling and analysis 6/4 switched reluctance machine for wind energy applications

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Climate change is a contemporary issue and the dangers of green house gas emissions have been accepted by the international communities. Renewable energy is one of the hot topics when it comes to deal with green house gas emissions treatments. One of the major solutions is wind power generation which is a renewable energy power source that helps in overcoming the air pollution and global warming. The wind energy conversion system is demanded to be more cost competitive, so that comparisons of different wind generator systems are necessary. Now Permanent magnet type synchronous Generator or Induction Generator is used for the wind power generating system. However the material cost of Permanent magnet type Synchronous Generator is high though the generator efficiency is high and the efficiency of Induction Generator is low though it is tough and requires little maintenance. It is shown that variable speed concepts with power electronics will continue to dominate and be very promising technologies for large wind farms. The Switched Reluctance Machine is robust and is appropriate for both high speed operation and operation in harsh environments due to the absence of windings and permanent magnets on the rotor. The lack of permanent magnets

will simplify the machine assembly .Hence Switched Reluctance machine when operated as Generator is proved to be most efficient with variable wind speeds. Knowledge on the performance characteristics of Switched Reluctance machine is essential for its optimum design. In this paper simulation results describing flux-linkage characteristics, torque characteristics and losses at various speeds for a 6/4 Switched Reluctance machine are presented.

Keywords: Climate change, renewable energy, wind energy, global warming

A review on the bio-diesel production from algae as renewable energy source

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One of the greatest challenges facing energy crisis is to replace the petroleum based diesel obtained from crude oil with more environmentally friendly bio-diesel. Bio-Diesel is made from renewable resources, is bio-degradable and non-toxic and has a higher flash point than normal diesel. Bio-Diesel also increases lubricity which prolongs engine life and reduces the frequency of engine part replacement. Another significant advantage of bio-diesel is its low emission profile and its oxygen content of 10-11%.It also provides a means to recycle carbon-dioxide, thereby not contributing to global warming. Algal oil is an interesting sustainable feedstock for bio-diesel manufacturing. It is an alternative to popular feedstocks like soybean, canola and palm. Algae are the highest yielding feedstock for bio-diesel. It can produce upto 250 times the amount of oil per acre as soybeans. The per unit area yield of oil from algae is estimated to be from 5000-20,000 gallons per acre to that of next best crop which is palm oil which yields 635 gallons per acre. Diatoms and Green algae are good sources for the production of bio-diesel. By a chemical process called transesterification, the viscosity of the raw oil is reduced so that it can be used as an engine fuel.Bio-Diesel is synthesized via the transesterification of lipid feedstock's with low molecular weight alcohols. Almost all bio-diesel is produced using base catalyzed transesterification as it is the most economical process requiring

only low temperatures and pressures and producing a 98% conversion yield. The transesterification process is the reaction of a triglyceride with an alcohol to form ester and glycerol. During the process the triglyceride is reacted with alcohol in the presence of an acid or base catalyst where the alcohol reacts with the fatty acids to form alkyl esters or bio-diesel. In most production, methanol or ethanol is the alcohol used and is base catalyzed by either sodium or potassium hydroxide. A successful transesterification reaction is signified by the separation of the ester and glycerol layers after the reaction. The heavier co-product glycerol settles out and may be sold as it is or it may be purified for use in other industries like pharmaceutical, cosmetics etc., A centrifuge is used for faster separation of the two materials .Once separated from the glycerol, the bio-diesel is purified by washing gently with warm water to remove residual catalyst or soaps, dried and sent to storage. The world is entering a period of declining non-renewable energy resources popularly known as “Peak Oil”. Since bio-diesel from algae has rapid growth rate, is biodegradable, is carbon-neutral, is economic has a high per acre yield 7-31 times greater than the next best crop –palm oil, it can be concluded that it is the only way to produce enough automotive fuel to replace current gasoline usage.

Keywords: Biodiesel, transesterification, feedstock, alternate fuel

Implementation of LCL-T resonant DC-to-DC converter for stand alone wind energy system

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This paper deals with simulation and implementation of DC-to-DC converter for stand-alone wind energy system. The LCL-T resonant inverter system and DC- to- DC converter system are simulated using MATLAB simulink power system blocks. This converter has advantages like reduced transformer size, reduced filter size and current source characteristics. The Simulink circuit model for closed loop system is developed and the same is presented. The simulation results are compared with the experimental results.

Keywords: Converter, Resonant Inverter, MATLAB

Modeling of photovoltaic array and maximum power point tracking (MPPT) using perturbation and observation (P&O) technique

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Solar energy is one of the most important renewable energy sources. As opposed to conventional non renewable resources such as gasoline, coal, etc., solar energy is clean, inexhaustible and free. In tropical countries like India, as well as other places where solar energy is available in abundance, photovoltaic (PV) has emerged as a major candidate for meeting the energy demand. It offers an option for clean (pollution free) energy source, with almost no running and maintenance cost. This paper proposes modeling and simulation of photo voltaic model. Taking in to account the temperature and sun's irradiance, the PV array is modeled and its voltage current characteristics and the power and voltage characteristics are simulated. This enables the dynamics of PV system to be easily simulated and optimized. Maximum power point trackers (MPPTs) play an important role in photovoltaic (PV) power systems because they maximize the power output from a PV system for a given set of conditions, and therefore maximize the array efficiency. Thus, an MPPT can minimize the overall system cost. MPPTs find and maintain operation at the maximum power point, using an MPPT algorithm with the help of a DC/DC power conditioner. Many such algorithms have been proposed. However, one particular algorithm, the perturb-and-observe (P&O) method continues to be the most widely used method in commercial PV MPPTs.

Keywords: Solar energy, renewable energy, photovoltaic, power point trackers

Studies on residential buildings with integrated solar systems

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The sun provides the basis for life on earth and sufficient energy to meet all our needs. Solar energy is an enormous resource that is readily available in all countries throughout the world, and all the space above the earth. Solar energy has great potential as a future energy source. It also has the advantage of permitting the decentralized generation and distribution of energy, there by empowering the people at the grass root level. India is a tropical country where the sunshine is available longer hours per day and great intensity. Solar is currently high on absolute costs as compared to the other sources of power such as coal. India should accelerate the use of all forms of renewable energy (photovoltaic, solar thermal, wind power, biomass, biogas, and hydro), and more proactively promote energy efficiency. Solar energy is environmental free and it has zero emissions while generating electricity or heat. The fossil fuel is the major fuel source for the generation of electricity. In view of the increasing energy demands, the consumption of fossil fuels is also bound to increase in the future. The use of fossil fuels emits green house gases and creates global warming effect. There are various renewable energy options like solar water heating system, solar electrical appliances, solar cooker, solar photovoltaic systems, that can be used in a domestic sector. The whole or part of the energy required for the building can be met by the renewable sources of energy. When solar energy is used, high energy consuming conventional devices must be replaced by energy efficient devices. The main objectives of this paper are to briefly analyse the performance, advantages, and limitations of residential building integrated solar systems.

Key words: Solar energy, solar thermal and electrical appliances, residential building

Recent trends in renewable energy resources and an investigation on Extraction and properties of biofuels

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The growing scarcity of imported oil and its increasing prices have become a major concern for India's energy security. The alternative sources of energy are being given emphasis, especially those which have the potential to replace oil in the transport sector. There is a need to look beyond these commonly available renewable energy sources and focus on new and other fossil fuels. Bio fuel is an alternative fuel for diesel engines. Based on the above facts, Transesterification pilot plant is fabricated and oil is extracted from Jatropha and its allied plants and the viscosity of the fuel is reduced by Trans-esterification process. The properties such as fire point, flash point, viscosity and engine performance were studied. The emission test conducted shows that emission levels for bio-diesel are lower than diesel. Blending ratio has been optimized to achieve maximum fuel efficiency especially for Internal Combustion Engines, with an eye on cost effectiveness and also as a suitable and viable alternative fuel.

Key Words: Bio fuel, jatropha, viscosity, internal combustion engine, emission

Solar energy developments in India

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Increased concerns over fossil fuel depletion and global warming necessitated working towards renewable sources of energy over the conventional fossil fuel based energy sources. Wind, biomass, and solar are proved to be the most viable renewable energy technologies, next to hydropower. Among these technologies, development in solar is very low, in spite of the huge potential. This paper discusses in detail the historical developments in solar energy usage, and steps taken in India, to bring the solar energy technologies to occupy a considerable share in total energy usage. Research areas in solar energy are also discussed.

Keywords: Renewable energy, developments, solar energy

A comparative study on quality of vegetable oils for biodiesel production

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Increased use in the fossil fuel, their depletion and the effect on the environment need a sustainable fuel source likely from the biomass. For these case algae is one of the promising source to produce biogas (Biomethanation), biodiesel (Tranesterification), biohydrogen. From the earlier studies and research *Spirulina*, *Botryococcus* and *Chlorella* can be cultivated for the better oil yield. They are simple autotrophic plants, utilizing the naturally available substances such as sunlight, Carbon dioxide and water for their growth. It contains 20 – 80 per cent of oil by their dry weight. Using photobioreactors and open ponds they can be cultivated artificially. The optimum conditions required to them in terms of light intensity ($180 \mu\text{mol m}^{-2} \text{s}^{-1}$), temperature ($18\text{-}24^\circ\text{C}$), pH ($8.2 - 8.7$), salinity ($20 - 24 \text{ g l}^{-1}$) and the photoperiod for 16 – 24 hr. While providing this atmosphere the algae can grow within 24h and they can be harvested by centrifugation and the lipid is extracted by hexane as a solvent. This oil is used in the tranesterification process to convert the Free Fatty Acids into Methyl Esters. The optimum conditions for the production of biodiesel is 56:1 molar ratio of Methanol:oil, Temperature (30°C), and 100 percent acid catalyst. The biodiesel was characterized by a high heating value of 41 MJ kg^{-1} , a density of 0.864 kg L^{-1} , and a viscosity of $5.2 \times 10^{-4} \text{ Pa s}$ (at 40°C). Cost of algal oil is Rs.23/l. When comparing to other crops the oil yield from algae is significantly more and they can be cultivated in saline water & the waste water can act as a nutrient source. From these studies algae micro algal biodiesel is technically feasible. It is the only renewable biodiesel that can potentially displace liquid fuels derived from petroleum.

Key words: Bio-oil, Biodiesel, tranesterification, methyl esters

An optimistic way to utilize waste material with coal for power generation

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The increasing population and urbanization are the important factors to project the energy need of a country. The Indian energy is mostly depended on coal. 70 per cent of the country's electricity generation is from coal. The increased usage of this fossil fuel exposed the emissions to the environment. Net cropped area of our country is 45 per cent of the total geographical area and it can generate 450 MT of crop residues can capable to produce 19,500 MW. In this case, various agro residues are combined with coal and utilized for power generation. Fuel properties and availability of the agro-residues are discussed. To associate the biomass with coal, pretreatments like pelletization, sizing etc., are required. The treatments are required in terms of economical transportation, energy value and storage. The pretreated biomass was utilized in the gasification, combustion and pyrolysis process for the power production. Performance of the boilers and emissions were analyzed. From the study, the optimum biomass and coal mix was in the range of 1-20 per cent to achieve better fuel efficiency. While adapting the co-firing technology the fuel efficiency and performance of the boiler were not affected and the emissions also reduced.

Key words: Biomass, Densification, Co-firing, Pyrolysis, Emissions.

New structural orientation for power generation from heat

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The conversion and conservation of energy is a challenging task in present scenario. The most successful energy conversion is light energy to electric energy that is photovoltaic conversion. Nanotechnology is a booming technology in effective way of using resources. The energy can be conserved by using this technology. The conversion of any heat energy to electric energy can be achieved by using only carbon nanotube and composites. The structural orientation of carbon nanotube helps in conversion of energy

without loss to surrounding. The new structural orientation can be attained by arranging the **single walled nanotube (SWNT) and multi walled nanotube (MWNT) properly**. The upper two arms left and right arm and the lower arm called base arm. The upper arm of single walled nanotube and the lower arm of multi-walled nanotube, these arms are connected by using new technology called Nano-welding. This structure resembles Y-(we) shape. This type of arrangement called **PONG. Poly Orientation Nano Grouping**. The upper arms are named as **ARM-L** and **ARM-R**, the lower arm called **ARM-B**. All the arms are joined by Nano welding under noble gas at very high temperature ranges in between the melting point of SWNT and MWNT. At the Centre of joint acts as blank zone. By coating this arrangement with heat sensitive Nano paste such as Nano-silver or Nano-gold for increasing sensitiveness. This results in obtaining electric impulse from any form of heat. By varying the external heat, the output is obtained as electric impulse. The impulse is continuous; it is used in real time application by proper manufacturing arrangement.

The output energy is given by, Above 0 C, the equation is given by o

$$I = \mu (1 - \exp(-H/H)) \text{ nV IMP B}$$

Below 0 C, the equation is given by, o

$$I = \mu (1 - \exp(H/H)) \text{ nV [BY MATHEMATICAL RELATION] IMP B}$$

Keywords: Heat energy, carbon nanotubes, noble gas, nano paste

Fuzzy logic based maximum power tracking method in wind power generation

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Nowadays wind power has become highly reliable and usable by the power generation industry. Depleting rate of conventional sources also led the power engineers to look into this energy crisis and act suitably to find the solution with the hybrid power generation which constitutes wind, solar and diesel systems. As the wind profile changes frequently and power extraction from solar energy is not optimum in gloomy times and hence the fluctuation in the output power is obvious and that is one of the major

limitations of hybrid generation system to be solved yet. The reactive power compensation and optimum power strategy both for wind and solar systems is peculiar and so the utilization of these renewable energy sources require realistic cost and reliability evaluation models that can sense the highly erratic nature of these energy sources. Both for reasons of network compatibility and mechanical load reduction, many large wind turbines installed either offshore or onshore will operate at variable speed and use doubly fed induction generators. The wind turbine has to be well controlled even when operating in variable speed mode considering the critical rotational speed, tip speed ratio and turbine power co-efficient. With the increased use of wind energy, wind farms continue to operate during system disturbances and support the network in spite of instability in voltage and frequency. Power quality issues, reactive power compensation, flicker emission, three phase fault in utility grid, total harmonic distortion in power electronic converters are the major issues to be handled seriously for the better result of the overall system. Fuzzy logic control technique is a powerful and versatile tool for representing imprecise ambiguous nonlinear system which plays a vital role in controlling the speed of the induction machine generating variable voltage and variable frequency, rectified to dc by IGBT SPWM. Power Electronic Converters with appropriate protection circuits and 12 pulse firing angle are given both for rectifier and inverter and the simulation is carried out in Simulink/MATLAB. Three fuzzy logic controllers are being employed to achieve the optimum power irrespective of the change in wind velocity. The first fuzzy logic controller would track the generator speed which affects the aerodynamic efficiency while the second one tries to reduce the generator rotor flux for improving the machine converter efficiency. One fuzziar controls the speed against wind current and turbine oscillatory torque. An attempt has been made to achieve the optimum power output by suitable control strategy applicable to both converters near utility grid and the generator.

Keywords: Wind power, wind turbine, solar energy

Removal of Pb²⁺ ions from waste water using a natural adsorbent

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In this study, bael tree (BT) leaf powder was used as an adsorbent for removal of Pb²⁺ ions from aqueous solutions through batch equilibrium technique. The influence of pH, equilibrium time, temperature, adsorbent dosage and initial concentration of metal ions on adsorbed amount of metals ions were investigated. Studies showed that the pH of aqueous solutions affected Pb²⁺ ions removal as a result of removal efficiency increased with increasing solution pH. The experimental isotherm data were analyzed using the Langmuir, Freundlich, Temkin and Dubinin-Radushkevich equations. The monolayer adsorption capacity is 4.065 mg/g with the correlation coefficient (R²) of 0.993. The experiments showed that highest removal rate was 84.93% at solution pH 5, contact time 60 min and initial concentration of 50 mg/L. Thermodynamic parameters such as ΔG° , ΔH° and ΔS° have also been evaluated and it has been found that the sorption process was feasible, spontaneous and exothermic in nature. Three simplified kinetic models including a pseudo-first-order equation, pseudo-second-order equation and intraparticle diffusion equation were selected to follow the adsorption process. Kinetic parameters, rate constants, equilibrium sorption capacities and related correlation coefficients, for each kinetic model were calculated and discussed. It was shown that the adsorption of Pb²⁺ ions could be described by the pseudo-second order equation, suggesting that the adsorption process is presumable a chemisorption.

Key words: Lead (Pb²⁺), Bael Tree, Isotherms, Kinetics, Thermodynamics.

Structural, Optical and Luminescent properties of DC magnetron sputtered TiO₂ thin films for solar cell applications

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In Gratzel cells (Solar cell) particles of TiO₂, coated with a dye that absorbs at a wide range of wavelengths given off by sunlight, are placed between two electrodes in an

electrolyte solution containing iodine ions. Titanium dioxide(TiO_2) films were deposited on glass substrates by the DC magnetron sputtering technique. The substrate temperature was varied in the range of 30 – 250 °C. The films were polycrystalline with peaks corresponding to the rutile phase. The lattice parameter, lattice strain, dislocation density and grain size were determined from the x-ray diffraction data. Surface morphology of the films indicated uniform distribution of spherical grains with grain size around 80 nm. Refractive index, extinction co-efficient and optical band gap were estimated from the Transmission and absorption spectrum. FTIR spectrum exhibits the skeletal frequency of bulk TiO_2 . Photoluminescence studies indicated a peak at 385 nm corresponding to the band edge emission of the rutile TiO_2 film. Electrochemical properties of the films were studied by cyclic voltammetry(CV) in lithium ion containing organic electrolyte.

Keywords: Titanium dioxide, thin films, magnetron sputtering, refractive index

Renewable energy: Achievements and potentials

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Energy demand renewable energy (non-conventional) sources such as small hydro power, biomass, wind, solar, and geothermal can provide sustainable energy services, based on the use of routinely available, indigenous resources. A transition to renewable-based energy systems is looking increasingly likely as their costs decline while the price of oil and gas continue to fluctuate. This paper discusses the potential and achievements of non-conventional energy resources, especially small hydro power. It discusses about various non-conventional energy resources keeping in view the immediate requirements of having various advantages of these over conventional energy resources.

Keywords: renewable energy, non-conventional energy, conventional energy hydro power

A ZVS bidirectional dc-dc converter for fuel cell and battery application

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A soft switching implementation without additional device, high efficiency, simple control zero voltage switching (ZVS) bidirectional DC-DC converter for high power application especially for power supply in fuel cell vehicles and power generation where a high power density, low cost, light weight and high reliability power converter are required is developed by performing a simulation on multi-domain simulation of a HEV power train based motive power sources, an electric motor and an internal combustion engine (ICE) used in order to increase the drive train efficiency and reduce air pollution. It combines the advantages of the electric motor drive which provide no pollution and high available power at low speed and the advantages of an internal combustion engine which provide high dynamic performances and low pollution at high speeds. The energy management sub-system determines the reference signals for the ICE and the electric motor drives at each time step in order to improve the energy efficiency of the drive vehicle. These signals are calculated using mainly the position of the accelerator which is between 0 and 100% and the measured HEV speed.

Keywords: DC-DC converter, power generation, energy management sub-system, HEV, ICE, and ZVS

Fuel cell and environmental impacts

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Fuel cells systems represent a new technological approach, which meets all requirements for a future sustainable conversion technology: high electrical efficiency, low emissions, good part-load characteristics, and possibility of cogeneration. They combine hydrogen & oxygen electrochemically to produce electricity, water and useful heat. Fuel cells generate electricity through a chemical process. This means that they are not subject to

the Carnot Limit (a theoretical limit on the efficiency of an engine based on the flow of heat between two reservoirs), and that they can effectively extract more energy from fuel than combustion-based methods. Traditional internal combustion engines typically have efficiencies of around 30%, whereas fuel cells can achieve 40-70% efficiency. Why we mainly go for fuel cell technology, is because, it is a clean, quiet and highly efficient process- two to three times more efficient than fuel burning. Hydrogen fuel cells have been widely touted as an environmentally-friendly alternative to conventional fossil fuels. By oxidizing molecular hydrogen, the only direct by-product of their energy generation is water, which means they could significantly reduce pollution and man-made greenhouse gases. But a group of researchers in the US believes that fuel cells could themselves have a detrimental effect on the environment. Fuel cell powered vehicles or generating stations have no real emissions of greenhouse or acid gases, or any other pollutants. It is predominantly during the fuel processing stage that atmospheric emissions are released by a fuel cell power plant. When methanol from biomass is used as a fuel, fuel cells have no net emissions of carbon dioxide (CO₂ a greenhouse gas) because any carbon released was recently taken from the atmosphere by photosynthetic plants. Fuel cells, using processed fossil fuels, have emissions of CO₂ and sulfur dioxide (SO₂) but these emissions are lower than those from traditional thermal power plants or spark ignition engines.

Keywords: Fuel cells, environment, atmospheric emissions, thermal power plants, gas emissions

Utilization of industrial effluents for bio-hydrogen production

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Fast depletion of fossil fuels has forced us in search for a comprehensive alternative energy source. The fossil fuels, apart from being non-renewable, pose significant risk to the environment by emitting green house gases leading to global warming. Biomass energy is a renewable energy with potent of self reliant and sustainable with distinct advantages. Bio-Hydrogen is one such renewable energy found to be an effective alternate for future energy demand. In this study carbon containing effluents viz. dairy effluent and distillery spent wash were utilized for Hydrogen production using

Citrobacter freundii. Among them distillery spent wash was found to be effective media for maximum hydrogen production with 67% of Hydrogen gas remaining were CO₂ and other gases. About 160 ml of hydrogen gas was produced when 1 L of Distillery spent wash effluent was used as medium. This method of utilizing the effluent helps in production of a renewable energy as well as bioremediation of effluents with the reduction of BOD and COD of the industrial effluents.

Key words: Bio-Hydrogen, Bacteria, Distillery and Dairy effluents

Five trends of renewable energy Industries

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The report put the spotlight on five trends to watch as renewable energy industry surges ahead. The first was the new structure taking shape in the electric vehicle market where startups are taking center stage. There are currently 200 U.S. companies working, in some way, shape or form, on bringing the electric car to market. The second trend to watch according to Clean Edge is the movement toward sustainable cities, including the new Masdar City in Abu Dhabi a city that plans, by 2016, to serve a population 50,000 individuals and 1,500 businesses all powered by solar energy. Another emerging eco-city is Dongtan on Chongming Island near Shanghai, which plans to serve 20,000 people by 2010 and be powered completely by renewables, mostly wind and biomass. Third in the series of trends is the growing presence of overseas companies in the U.S. wind energy market, a trend that will continue to grow according to the Clean Edge report as the dollar remains relatively weak and the demand for wind in the U.S. continues to grow. Geothermal energy's return to the main stage is the fourth trend to watch. According to the report, "geothermal is the only clean-energy resource besides hydroelectric that provides baseload power 24 hours a day, and with average plant uptime of 98 percent, it does so even more reliably than nuclear or coal-fired power plants, both of which require more downtime for maintenance." And finally, the fifth trend is a building movement to make shipping by sea more environmentally friendly. Driven more by the major shippers worldwide, than the shipping companies themselves, the idea is to lessen the negative impact that cargo ships currently put on the environment. Cargo ships

account for more than 4 percent of the global carbon dioxide emissions, double the emissions of aviation, according to a study commissioned by the UN's International Maritime Organization. Companies that are developing technologies to propel ships without greenhouse gas emissions are gaining ground. Kite for sail, Kite Ship and Sky Sails, all of whom are working on designing kites that, when combined with better navigation tools and software will allow large ships to use the wind for propulsion.

Key words: Electric vehicle, solar energy, wind energy, geothermal energy.

Modelling and simulation of a solar absorption cooling system

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This paper presents modeling and simulation of a solar absorption cooling system. In this paper, the modeling of a solar-powered, single stage, absorption cooling system, using a flat plate collector and water–lithium bromide solution, is done. A computer program has been developed for the absorption system to simulate various cycle configurations. The effects of hot water inlet temperatures on the coefficient of performance (COP) and the surface area of the absorption cooling component are studied. The hot water inlet temperature is found to affect the surface area of some of the system components. Moreover the effect of the reference temperature which is the minimum allowable hot water inlet temperature on the fraction of total load met by non-purchased energy (FNP) and coefficient of performance (COP) is studied and it is found that high reference temperature increases the system COP and decreases the surface area of system components but lower reference temperature gives better results for FNP than high reference temperatures

Keywords: solar absorption, flat plate collector, water–lithium bromide solution, cooling, simulation

REVIEW ASSESMENT ON GREEN BUILDING CONCEPTS

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The purpose of this research is to contribute to a better understanding of the concept of green building and to make a review assessment on it. Developing such concepts is

becoming necessary in the Developing World because of the considerable environmental, social and economical problems. A study was made on concepts which include needs, ratings and assessment tools such as LEED (Leadership in Energy and Efficient Buildings) which was developed by the U.S Green building council (USGBC). Natural lighting, which results in substantial savings in energy consumption, Insulated walls and double-glazed glass windows for lower energy consumption, Green lawns around the building which results in substantial savings in energy . Use of non-toxic house-keeping materials, green seal approved products and Water recycling were also recommended. Finally, green buildings are good for the environment.

Keywords: Green buildings, energy conservation, eco friendly

Global environmental issues –need of the hour

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Global environmental issues are the environmental problems with which the damage and effects don't stop at a single country or religion, but spread out onto a global scale. Global environmental issues are environmental problems mainly centered in economically developing countries, but requiring international effort from everyone, including economically advanced countries. Looking deep into what's special about global environmental issues, we could find the expansion of the scale of human activity in recent years has put so much strain on the natural environment of this planet that in such cases nature can no longer recover .Exceeding the limits of nature's ability to recuperate means that damage or harmful effects in one part of the world don't stop in that area, but go beyond national borders and become environmental problems. Human beings are the victims of global environmental problems and also the culprits.It is difficult to accurately analyze the mechanisms of global environmental issues.

Keywords: Global environmental, developing countries, environmental issues

An approach for energy conservation to control global warming engendered by computers using data decentralization

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Climate change is a long-standing phenomenon, as the mix of the various gases that make up the earth's atmosphere have changed over long periods of time, so average global temperatures have fluctuated. In this paper, one of the ingredients of global warming, computers and its continuous usage are taken for our research. Here, we carried out our research in a single computer. Bigram and trigram tagging algorithms using stochastic based hidden Markov Model are applied to formulate part of speech tag set with centralized and decentralized text data sized only 37689. We found the average processing time for text tagging with centralized data was 4.23 seconds, but for the same, only 0.76 seconds with decentralized data. Data decentralization really saves the energy conceived by the processor; it makes the computers work with less power which leads to less electricity, which indirectly reducing CO₂ on air by energy conservation.

Keywords: Climate change, global warming, energy conservation

PEE power technology – Alternative energy resource (urine as a fuel)

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A new alternative fuel is developed from urine. Urine is the metabolic waste and refuses from all living organisms. Researchers all over the world concentrate on the urine as the source of next alternative fuel. This may also be considered as the renewable energy resource. "A cow can provide enough energy to supply hot water for 19 houses" said by a professor at Ohio university. This may be called as pee power. Pee power is based on hydrogen, the most common element in the universe but one that has resisted efforts to produce, store, transport and use economically.

But the main disadvantage is the storage of hydrogen. Storing pure hydrogen gas requires high pressure and low temperature. Nanomaterials with high surface areas can adsorb hydrogen. Chemically binding hydrogen to other elements, like oxygen to create water, makes it easier to store and transport, but releasing the hydrogen when it's needed usually requires financially prohibitive amounts of electricity. By attaching hydrogen to another element with nitrogen, we can store hydrogen without the exotic environmental conditions, and then release it with less electricity, 0.037 Volts instead of the 1.23 Volts needed for water,

Keywords: Pee power, renewable energy, nanomaterial

An innovative approach to save energy in converting solar power to hydrogen fuel – An overview

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The question is whether solar energy development can meet rising global energy demand amid international concerns over fossil fuel dependence, global warming. A causal loop diagram illustrates the interrelationships between the developments of solar energy as a renewable energy fuel. The illustration revealed that the solar energy system would reduce fossil fuel use and CO₂ emissions by some extent. Solar energy systems can become much more efficient and it is a competitive source of renewable energy and by implementing this energy for the electrolysis of water to produce hydrogen gas which can be stored for future.

Keywords: solar-power, electrolysis of water, hydrogen gas (H₂) production.

A study of emission reduction on reformer gas enrichment of compressed natural gas fueled homogeneous charge compression ignition combustion using plasma boosted fuel converters

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Compressed Natural Gas (CNG) is a difficult fuel to use in a Homogeneous Charge Compression Ignition (HCCI) engine because of high octane number, high auto-ignition temperature, low volumetric energy density, composed mostly of methane and relatively pure fuel. Methane molecules have single-stage combustion and resist destruction by free radicals and produces negligible heat release at low temperature. An approach to improve these properties is to convert part of the CNG to Reformer Gas (RG) that blends with base CNG fuel. RG is a mixture of light gases dominated by Hydrogen (H₂) and carbon monoxide (CO) and can be produced from CNG using low current and non-thermal plasma boosted fuel converters. To avoid heavy knocking, preheat the mixture and dilute that mixture with Exhaust Gas Re-circulated.

Keywords: Compressed natural gas, homogeneous charge compression ignition

Integrated renewable solar energy in wireless mesh networks

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Mesh networking is a type of networking wherein each node in the network may act as an independent router, regardless of whether it is connected to another network or not. It allows for continuous connections and reconfiguration around broken or blocked paths by “hopping” from node to node until the destination is reached. Mesh networks differ from other networks in that the component parts can all connect to each other via

multiple hops, and they generally are not mobile. Mesh networks can be seen as one type of ad hoc network. Mesh networks are self-healing: the network can still operate when one node breaks down or a connection goes bad. As a result, the network may typically be very reliable, as there is often more than one path between a source and a destination in the network.

A MESH network is comprised of many individual wireless transceivers connected to one another. Should one transceiver lose connectivity, the signal hops to the next, ensuring a redundant reliable network. Wireless Internet Service Providers (WISPs) are extending wireless network coverage to public spaces, city wide, via wireless mesh network power systems. Transceivers can tap into existing infrastructures such as street lighting for their power. Where AC line power is used, the Solar craft Wi-Fi UPS converts AC power to uninterrupted DC power, providing backup power to maintain network operation in case of power interruptions or catastrophic failures. Where grid power is difficult to access, integrated solar power systems are an easy-to-deploy uninterruptible power solution. A Solar craft solar Wi-Fi Power-Pak offers a reliable power option for off-grid access points.

Solar and wireless walk hand in hand as if they were made for each other because they both do something very important. They bring something to a location that normally would not be possible without a wire. For Solar energy it is power, for wireless it is data. It's no small coincidence that wireless systems need power, and the solar systems can provide it creating completely autonomous installations. There are many reasons why solar power is a good alternative to traditional power sources, for wireless networks: When deploying a wireless network, power isn't always where you need it and it is cheaper to install solar than it is to run a traditional power line. Solar power is always on in times of emergency when traditional power may have gone down. Solar pays for itself over time. Solar is an alternative to fossil fuels which uses a renewable source in sunlight. This paper focuses on solar energy and how it pertains to outdoor wireless broadband, wireless mesh networks.

Keywords: Wireless mesh networks, Wi-Fi, MANET, wireless internet service providers

Ethanol additives on diesel engine to improve fuel properties and performance aspects

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Diesel engines are prime movers on world wide heavy vehicles. Depending on fuel, pressure to reduce fuel consumption (CO₂ emissions) and operational costs have increased the market share of diesel engines in new vehicle sales to over 40% in some countries. At the same time diesel engine technology improved considerably with significantly higher performance, lower emissions and excellent customer acceptance. The conflicting demands for optimum combustion (which means high cetane quality paraffins) and low temperature operability, i.e, avoidance of paraffin waxing can be resolved by additives. Ignition improvers lead to better combustion which results in lower exhaust emissions, better fuel economy and improved cold start performance ethyl alcohol additives keep vital engine components clean so that performance, fuel economy and emissions levels do not deteriorate over the life time of the engine. Both additives also lead to lower engine noise emissions to reach all these goals, fuels, lubricants and coolants must meet high quality standards. In this respects fuel additives can contribute considerably to such performance aspects, and improve quality. Diesel fuel additives therefore have the potential to improve the quality of diesel fuels with regard to emissions, noise, engine performance and customer perception whilst offering flexibility in the optimization of refinery production costs.

Keywords: Diesel engines, emissions, combustion

Performance and exhaust gas characteristics on methanol blended diesel fuelled glow plug C.I engine

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Suddenly increasing numbers of automobiles result in making worse air pollution problems. In particular, the emissions from automobiles affect badly on atmosphere. Due to this we experience the fuel shortage also, For this we are in the need to search an alternative fuel. Methanol is a right choice of an alternative fuel. Methanol is the simplest alcohol chemically contains one carbon atom per molecule. Its surest that methanol blended with diesel can reduce pollution and it can reduce the usage of fossil fuels. Nowadays, research on catalyst converter and filter trap as a modern technology is very active because PM is designated as a major cancer material and stringent regulations on this are necessary and required. The ceramic filter is very efficient in reducing particular materials up to 80-90% and is evaluated as a very efficient after-treatment technology. However, it comes with decreased engine performance due to increased backpressure occurred by thermal crack. In order to solve these problems, several methods are proposed such as fuel additive, electric heater and burner types. This experimental study has been conducted with equipped and unequipped a ceramic filter on a displacement 11,000cc diesel engine and compared in terms of engine performance and emission. To measure the emission, D-13 mode is applied and measured quantities of the exhaust gases, particularly in CO, HC, PM, and NOx. Therefore, this research is focused on the basic mechanism and characteristics on the various factors affecting the performance of the glow plug hot surface ignition methanol engine, like injection pressure, BP, SFC, BSFC, and finally conduct performance tests with methanol at various ratios (80% methanol and 20% Diesel, 60% methanol and 40% Diesel) at the compression ratio 16.1 and the characteristics of C.I engine was analyzed.

Keywords: Engine, diesel, compression, ratio, performance, smoke, density, DPF, CO, NOx, Diesel, PM, Emission

Fuel cells & environmental impacts

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Fuel cell will be the technology of choice of the future hydrogen economy that will certainly be a reality due to depletion of fossil fuels. Fuel cells are potentially a very clean, **environmentally-friendly source of energy** due to their super-efficient use of fuel for electricity and heat. Energy sources of the future will have to be cleaner and more efficient than current sources, fuel cells fulfill these requirements. The environmental impacts of fuel cell use depend upon the source of the hydrogen rich fuel used. By using pure hydrogen, fuel cells have virtually no emissions except water. Hydrogen is rarely used due to problems with storage and transportation, but in the future many people have predicted the growth of a '**solar hydrogen economy**'. According to conventional wisdom, hydrogen-fueled cars are environmentally friendly because they emit only water vapor -- a naturally abundant atmospheric gas. However, leakage of the hydrogen gas that can fuel such cars could cause problems for the upper atmosphere and potentially **deplete polar ozone layers**. Fuel cell powered vehicles or generating stations have no real emissions of greenhouse or acid gases, or any other pollutants. It is predominantly during the fuel processing stage that atmospheric emissions are released by a fuel cell power plant. When methanol from biomass is used as a fuel, fuel cells have no net emissions of carbon dioxide (CO₂ a greenhouse gas) because any carbon released was recently taken from the atmosphere by photosynthetic plants. Any high temperature combustion, such as that which would take place in a spark ignition engine contributes to **acid rain**. Fuel cell power plants also have longer life expectancies and lower maintenance costs than their alternatives.

Keywords: Fuel cell, energy sources, acid rain

Increasing efficiency of photovoltaic cell using carbon nanotube fibres

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Due to the increasing energy crisis around the world solar energy being a renewable resource, has started to gain increasing importance. Solar energy can be directly harvested using a photovoltaic cell. In this paper we describe how we can improve the efficiency of solar cells using carbon nanotubes. A photovoltaic cell is basically made up of a "p" and "n" types of semiconductors which correspond to "positive" and "negative" because of their abundance of holes or electrons. Sandwiching these together creates a p/n junction at their interface, thereby creating an electric field. After the creation of an electric field, the excess electrons in the n-type material flow to the p-type, and the holes thereby vacated during this process flow to the n-type. It's this field that causes the electrons to jump from the semiconductor out toward the surface and make them available for the electrical circuit. At this same time, the holes move in the opposite direction, toward the positive surface, where they await incoming electrons. Graphene is a one atom thick layer of sp² carbon atoms that have been arranged in the form of a honeycomb lattice. When this graphene sheet is rolled up in the form of a cylinder, it forms a single wall thick carbon nanotube. This carbon nanotube has different electrical properties when compared to other forms of carbon. A single walled carbon nanotube placed between two metal electrodes has recently been shown to display photovoltaic effects. A potential difference is applied between the two metal electrodes. This creates an electric field in the carbon nanotube. On shining light of different intensities on these nanotube different levels of photocurrent is achieved. The most interesting aspect of this solar cell is that it forms an ideal solar cell in which the excess energy of an electron can be used to activate other electrons. Electrons are squeezed one by one through the nanotube. Carbon Nanotubes can either be used directly to create a solar cell or can be used in combination with a silicon p-n junction to increase its efficiency. Carbon nanotubes are grown in between the silicon layer perpendicular to the

junction layer. Carbon nanotubes being transparent allow more light to enter into the solar cell. They also help transport the electrons from the junction to the metal electrode. Apart from this they can also be used to separate electron and holes in the junction layer.

Keywords: Solar energy, carbon nanotube, photovoltaic current, solar cell

Renewable hybrid energy

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Renewable energy is energy generated from natural resources—such as sunlight, wind, rain, tides—which are renewable (naturally replenished). Hydroelectricity is the largest renewable source next to solar and wind, providing 3% of global energy consumption and 15% of global electricity generation. Renewable energy sources is an important element of India's power policy to meet the needs of power in an environmentally friendly way and to provide power to remote areas. India is the first country to have a dedicated ministry for developing and promoting non conventional energy sources in the country. Certain forms of renewable energy sources (wind energy, small hydro and solar) have been able to establish a strong presence. There is relatively strong participation of private sector in response to the policy and incentives extended to the participants

Keywords: Renewable energy, hybrid energy, wind energy

Hybrid solar-wind electricity generator

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The pace of technological innovation throughout the global community is relentlessly pushing forward. Power crisis has become a major concern of today's world. Several renewable energy resources like solar energy and wind energy etc are being used to obtain electricity. But these systems are expensive and also have low efficiency. Another major disadvantage is that these systems cannot be installed everywhere as each of them require specific working conditions. The objective of our paper 'Hybrid solar wind electricity generator' is to simultaneously, use two different sources of energy

namely solar energy and wind energy for generation of electricity. This innovation is one of the master keys to unlock the energy crises of today's world. Hybrid solar wind electricity generator works on the principle of gas expansion and mechanics. The total system consists of a centre cylinder made up of steel with bevel gear fitted on to it. And a projection cylinder painted black to absorb maximum solar radiation and also have fins on the top and bottom surfaces to enable enhanced rotation using wind energy. The projection cylinders are fitted on the top of the centre cylinder. The entire process occurs inside the cylinder. Carbon dioxide is sealed inside the cylinder and is used as a working medium. When the cylinder is exposed to solar energy, carbon dioxide expands due to increase in temperature. This creates force which in turn moves a load to the end of the cylinder. Thus due to unstable equilibrium a rotational movement is obtained. This rotational movement is in turn used to produce electricity. The most astonishing fact is that, this rotation can be obtained from wind energy too. Thus both these sources of energy are used to drive this system. Thus this system integrates the energy from both sources and enables hybrid working. Generation of electricity can be done by using an armature and alternator setup just below the vertical axis of the cylinder so that the armature rotates during the rotation of the set up, and another effective method is to use bevel gear mechanism to generate power when the system rotates. This concept of using a single system to harness two different sources of energy using mechanics has never been attempted before. This system relies on green energy and helps to reduce pollution.

Keywords: Solar energy, wind energy, Hybrid solar

ENERGY MANAGEMENT

FACTS technology, an effective tool of energy management: An Indian scenario

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A transmission system can carry power up to its thermal loading limits. In practice, however, before the thermal limit is reached, the system is most often constrained by transmission stability and voltage limits and loop flows. A Flexible Alternating Current Transmission System (FACTS) technology is a system comprised of static equipment used for the AC transmission of electrical energy. It is meant to enhance controllability and increase power transfer capability of the network. In this paper the present Indian scenario of FACTS technology has been presented. The various FACTS devices have been installed at various points in the Indian power grid.

Keywords: FACTS, transmission, thermal loading, power grid

Numerical modelling of coastal aquifer

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The development and management of fresh ground water resources in coastal aquifers are seriously constrained by the presence of seawater intrusion. Seawater intrusion is a process that occurs in virtually all coastal aquifers, where they are in hydraulic continuity with seawater. This process is caused by the higher density of sea water than freshwater. Over the years, many models have been developed to represent and study the problems related to seawater intrusion. Numerical models provide effective tool to handle ground water problems. This paper presents simulation of seawater intrusion in a section of the

Veraval coast of Gujarat through Saturated and Unsaturated Transport model and examines the impact of increased pumping scenarios on extent of seawater intrusion. The density driven salt-water intrusion process was simulated with the use of commercially available finite element based software, **SUTRA** (**S**aturated-**U**nsaturated **TR**ansport). Initial and boundary conditions determined from the aerial calibration were used to evaluate steady-state, hydraulic heads. Pumping and inflow of coastal area was estimated for three different time periods using the model.

Keywords: Sea water intrusion, SUTRA model, saurashtra, coast, numerical modeling, recharge, pumping

TES technology in air-conditioning systems -A Step in energy conscious architecture

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Energy efficient or energy conscious architecture is an approach to building which has become more popular in the last 25 to 30 years. Also known as sustainable design, it is a method of design that minimizes the impact of building on the environment. Once thought of as unconventional and nonstandard, both regulatory agencies and the public alike are quickly accepting energy conscious architecture as a socially responsible and logical means of construction. Talking about energy in any built form we get a glimpse of various energy usages and the major one without doubt is the electrical energy. Air conditioning systems are major energy users in buildings. Right from the installation, functioning and maintenance some 30% up to 50% of the project cost is related to Air conditioning systems in case of IT buildings. Similarly the cost is somewhere between 5% to 10% in case of domestic buildings. Hence, considering the impact of Air conditioning systems on the environment and also the economy well based decisions has to be made. Therefore the main aim of this paper is to analyse the introduction of Thermal Energy Systems (TES) in air conditioning systems and its role in minimising the usage of electrical energy. This in turn shows the impact in the cost reduction with regard to the energy consumption. This study analyses the data collected in an IT building with and without the installation of TES. Comparative study and analysis of data collected with various systems of air conditioning with TES technology and their role in energy

and cost reduction is studied and summarized. It was found that the introduction of TES technology reduced the energy consumption which directly influenced the reduction in cost of about 12% to 25%. This study enables the HVAC designers in monitoring and evaluating the energy usage as well as cost reduction in HVAC design. From an economic point of view it is important to minimize energy consumption while maximizing comfort.

Keywords: Thermal energy systems, energy efficient, energy conscious, energy consumption

Improved sensing sensitivity of double turn piezo-resistive MEMS pressure sensor in marine environment

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Pressure measurements in marine environment are of utmost importance to better understand the ocean processes, for maritime security and even for tsunami wave detection. This paper focuses the structural design and optimization of the MEMS double turn piezoresistive pressure sensor to enhance the sensitivity and linearity. Finite element method (FEM) is adopted to optimize the sensor parameters, such as the resistor location and number of turns. MEMS double turn piezoresistive pressure sensor was tested to achieve both higher sensitivity and larger full scale span compared to conventional single diaphragm. By eliminating large deflections and linearity error, the double turn piezoresistive pressure sensor design showed about 15% higher sensitivity and twice the operating range.

Keywords: MEMS, piezoresistive, FEM, sensor

VLSI Implementation of an Edge-Oriented Image Scaling Processor

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Image scaling is a very important technique and has been widely used in many image processing applications. In this paper, we present an edge-oriented area-pixel scaling processor. To achieve the goal of low cost, the area-pixel scaling technique is implemented with low-complexity VLSI architecture in our design. A simple edge catching technique is adopted to preserve the image edge features effectively so as to achieve better image quality. Compared with the previous low-complexity techniques, our method performs better in terms of both quantitative evaluation and visual quality. The seven-stage VLSI architecture of our image scaling processor contains 10.4-K gate counts and yields a processing rate of about 200 MHz by using TSMC 0.18 μ m technology.

Keywords: Image scaling, interpolation, pipeline architecture, VLSI.

Role of industries in E waste management

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"E-waste" is a popular, informal name for electronic products nearing the end of their "useful life." E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density. E-waste encompasses ever growing range of obsolete electronic devices such as computers, servers, main frames, monitors, TVs & display devices, telecommunication devices such as cellular phones & pagers, calculators, audio and video devices, printers, scanners, copiers and fax machines besides refrigerators, air conditioners, washing machines, and microwave ovens, e-waste also covers recording devices such as DVDs, CDs, floppies, tapes, printing cartridges, military electronic waste, automobile catalytic converters, electronic components such as chips, processors, mother boards, printed circuit boards, industrial electronics such as sensors, alarms, sirens, security devices, automobile electronic devices. Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle.

Although this development has helped the human race, mismanagement has led to new problems of contamination and pollution. The technical process acquired during the last century has posed a new challenge in the management of wastes. The toxic materials pose an environmental and health threats, proper management is necessary while disposing or recycling ewastes. Electronic waste or e-waste is one of the rapidly growing environmental problems of the world. In India, the electronic waste management assumes greater significance not only due to the generation of our own waste but also dumping of e-waste particularly computer waste from the developed countries. With extensively using computers and electronic equipments and people dumping old electronic goods for new ones, the amount of E-Waste generated has been steadily increasing. Disposal of e-wastes is a particular problem faced in many regions across the globe. Computer wastes that are land filled produces contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil. This paper highlights the hazards of e-wastes and the role of industries in E waste management.

Keywords: E-waste, waste management, acidification

Waste management using plasma pyrolysis technology

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Safe disposal of medical waste along with energy recovery options makes the Plasma Pyrolysis technology very attractive. Plasma pyrolysis is a destructive decomposition process. In this process the waste is exposed to high temperatures in an oxygen starved environment. High temperature is produced by a plasma torch which converts electrical energy into heat energy. The pyrolysis results in main chain scission and generation of free radicals which efficiently break C-C bonds and C-H bonds present in plastic and cotton molecules. As a result, gaseous products like light hydrocarbons, aromatics, hydrogen and carbon monoxide, and considerable amount of soot are formed. The efficiency of production and concentration of the above mentioned products depend primarily on the temperature of the pyrolysis process.

Plasma technology provides a means for efficiently cracking tars, with a small foot-print unit, and at potentially low capital costs. However, plasma capital cost benefits might be offset by opex costs in particular high electricity costs. This might be counteracted by using RF plasma torches instead of arc plasma. The concept here is to drop the char into a circulating fluid-bed char combustor, where the heat of combustion is transferred to the sand, which is separated from the hot gas in a cyclone. Pyrolysis conditions as well as some technical measures such as the quenching process and steam reforming have significant influences on the properties of these pyrolysis products. Research results indicated that thermal plasma pyrolysis may be a useful way of waste management for energy and material recovery.

Keywords: Waste management, plasma pyrolysis, energy

Electronic waste management by thermal plasma pyrolysis technology

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This paper outlines the principles of thermal plasma pyrolysis processes and discusses recent research activities about organic waste treatment using thermal plasma pyrolysis technology. Expansion in electrical and electronic equipment trade has led to significant increase in electronic waste which should be dealt with special priority due to its potential negative impact to the public health and the environment. Different kinds of organic wastes, varying from plastic to agricultural residue and medical waste, have been subjected to thermal plasma pyrolysis treatment. In this paper, a futuristic laboratory scale apparatus for generating high temperature plasma flame will be presented. Pyrolysis conditions as well as some technical measures such as the quenching process and steam reforming have significant influences on the properties of these pyrolysis products. It was shown that the system was able to convert the electronic waste into combustible gas and inert solid residues. Researchers in India & abroad suggested that thermal plasma pyrolysis may be a useful way of waste management for energy and material recovery.

Keywords: Arc discharge; hazardous waste, plasma burner, plasma pyrolysis, thermal treatment, waste management

NDT evaluation ON AA 7075-T6 aluminium alloy in GTAW joints by conventional and digital radiography method

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Non Destructive Testing's are inspections, checks and surveys carried out by means of methods that do not alter the material and do not require the destruction or removal of test samples from the concerned structure. The main feature of this kind of tests is the possibility to check the concerned parts without interfering with the tested material. On-destructive tests are thus a crucial tool for the product final check. As for safety parts, the check by means of non-destructive test also ensures the product conformity. Aluminum and its alloys have been used in recent times due to their light weight, moderate strength and good corrosion resistance aluminum alloy- AA 7075 has been researched upon especially as a potential candidate for aircraft material. This alloy is difficult to weld using conventional welding techniques like GMAW and GTAW. An attempt has been made in this paper to weld 7075 alloy using GTAW and with argon as a shielding gas. Mechanical properties of the joint like tensile strength, Hardness and impact strength have been reported. Radiography is widely used in crack detection and other defects inspection. Liquid Penetrate testing, Ultrasonic testing, Eddy current inspection etc. are the various NDT techniques used in industries for final inspection. In this paper detailed discussed about the Conventional radiography and digital radiography method.

Key words: GTAW, Ultrasonic, Radiography, defects detection

Energy conservation and techniques used for reduction of stack gas emissions in the petrochemical industry

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Flue gas desulfurization (FGD) is the current state-of-the art technology used for removing sulfur dioxide (SO₂) from the exhaust stack gases in petrochemical refineries

that burn coal or oil to produce steam for the steam turbines that drive their electricity generators. Before flue gas desulfurization was installed, the emissions from plant are in excessive amounts of sulfur dioxide. Sulfur dioxide is responsible for acid rain formation. Tall flue gas stacks disperse the emissions by diluting the pollutants in ambient air and transporting them to other regions. Sulfur dioxide exhaust should be removed, rather than emitted high into the atmosphere where it affects many more people. A number of countries now have regulations limiting the height of flue gas stacks. As a result of stringent environmental protection regulations regarding SO₂ emissions that have been enacted in a great many countries. For a typical coal-fired power station, FGD will remove 95 percent or more of the SO₂ in the flue gases. The flue gas temperature must be measured in the hottest part of the gas stream. Generally this will be in the centre of the flue, but eddy effects may cause it to be slightly displaced. It is vital to have the correct fuel programmed into the flue gas analyzer before measuring combustion efficiency. The fuel parameters have a noticeable effect on the value of combustion efficiency, and failure to follow this step will result in erroneous data.

Keywords: Emissions, Desulphurization, Sulphur dioxide, Combustion

Design and analysis of boat material produced from fiber Reinforced polymer composite material

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In recent years advanced polymer material composites are used to manufacture a fishing boat in glass fiber with polyester resin. This paper presents a modified laminate structure from existing laminate structure and to produce the boat of 650 Kg in the fiber-reinforced polymer. The analytical expression for calculation of stiffness and stress for both laminate plates were derived. The failure analyses were carried out for both the laminate plate by using maximum stress criteria to avoid failure during real time application of laminate structure. The fiber materials, which are used to prepare a laminates, are

chopped strand mat (CSM) glass fiber (random orientation), woven roving mat (WRM) glass fiber (Cross ply orientation of 0° & 90°) and unidirectional glass fiber (UDF) with polyester resin. The existing composite plate and modified composite plate were prepared by 16% and 23% of fiber volume fraction respectively. The manufacturing method was used to produce a laminate plates is by hand lay-up process. The laminates were prepared by different stacking sequence and thickness to produce a symmetric and non-symmetric laminates. The laminate structures are [5 CSM, 1 WRM] and [4 CSM, 1UDF]. The specimens were cut as per ASTM and BS standards from the both laminates and tested in Instron Universal Testing Machine. The mechanical properties such as Tensile, Flexure and Interlaminar shear of composite were tested and compared. It was found that a modified symmetric laminate is a suitable laminate for the manufacture of fishing boat.

Keywords: Polymer matrix composite, woven roving, interlaminar Shear, Flexural, Tensile Properties

Plasma technologies for waste management

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The quantum of waste is ever increasing due to increase in population, developmental activities, changes in life style, and socio-economic conditions. Efforts are being made to produce less waste while increasing the recycling ratio. Concurrently, it is of importance to place waste management in a sustainable context. This review describes waste management using plasma technology. The principles of thermal plasma generation and the technologies available are outlined, together with the advantages of plasma technology. The intense heat generated by the plasma enables it to dispose all types of waste including municipal solid waste, biomedical waste and hazardous wastes such as electronic waste in a safe and reliable manner. There have been continued advances in the application of plasma technology, and this is now a viable alternative to other potential treatment/disposal options.

Keywords: Waste management, Plasma Technology, Thermal Treatment, Hazardous, waste

Optimizing thermal efficiency of domestic geyser

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Heat energy is the vital source of energy being utilized in various fields. Melting and solidification of phase change materials (PCM) in a capsule is of practical importance in latent heat thermal energy storage (LHTES) system which are considered to be very promising to reduce a peak demand of electricity. Here heat energy is stored in domestic geyser with encapsulated PCM, it has been planted inside the geyser. The encapsulated PCM balls used as energy conserving or storing unit. Heat energy is to be stored in the geyser by providing phase changing materials as latent heat thermal storage, when power supply is given to geyser then water is heated by heating rod up to a temperature range of 55°C to 60°C at the same time heat is transferred to number of encapsulated PCM balls inside the geyser. Since large amount of heat is stored in that PCM material. This stored energy can be retried by pouring water for next usage of hot water without giving heat supply again. Modified geyser is different from the conventional geyser PCM encapsulated are used inside it to increase the efficiency of geyser by giving better heat storage unit. PCM material can store 5 to 14 times more heat per unit volume than conventional geyser. PCM encapsulation inside the modified geyser can hold or conserve heat energy for a much longer time as compared with ordinary geyser, in this paper to improve the thermal capacity of domestic geyser an experiment has done and examined.

Key words: geyser, thermal storage system, PCM encapsulated balls

Hybrid metal matrix composite materials: experimental issues and environmental concerns

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Metal Matrix composite materials have found application in many areas of daily life for quite some time. Often it is not realized that the application makes use of composite materials. These materials are produced *in situ* from the conventional production and processing of metals. Materials like cast iron with graphite or steel with high carbide content, as well as tungsten carbides, consisting of carbides and metallic binders, also belong to this group of composite materials. For many researchers the term metal matrix composites is often equated with the term light metal matrix composites (MMCs). Substantial progress in the development of light metal matrix composites has been achieved in recent decades, so that they could be introduced into the most important applications. In traffic engineering, especially in the automotive industry, MMCs have been used commercially in fiber reinforced pistons and aluminum crank cases with strengthened cylinder surfaces as well as particle-strengthened brake disks. These innovative materials opened up unlimited possibilities for modern material science and engineering applications.

From this potential, metal matrix composites fulfill all requirements of the designer. The advantages of the composite materials are only realized when there is a reasonable cost – performance relationship in the component production. The possibility of combining various material systems (metal – ceramic – nonmetal) gives the opportunity for unlimited variation. The properties of these new materials are basically determined by the properties of their single components. For special economic and ecological interest for newly developed materials by conventional melting treatments in reprocessing plants the matrix alloy can be recycled without problems.

Key Words: MMC, Ecological, Composite, Economic, Matrix

NANOTECHNOLOGY

Nanorobotic challenges in biomedical applications design and control

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Ongoing developments in molecular fabrication, computation, sensors and motors will enable the manufacturing of nanorobots - nanoscale biomolecular machine systems. The present work constitutes a novel simulation approach, intended to be a platform for the design and research of nanorobots control. The simulation approach involves a combined and multi-scale view of the scenario. Fluid dynamics numerical simulation is used to construct the nanorobotic environment, and an additional simulation models nanorobot sensing, control and behavior. We discuss some of the most promising possibilities for nanorobotics applications in biomedical problems, paying a special attention to a stenosed coronary artery case.

Keywords: Biomedical computing, control systems, coronary stenosis, mobile robots, nanomedicine, nanorobots, nanotechnology

Application of nanotechnology for the conversion of solar energy

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Solar energy is the most prevalent renewable resource on the planet, and efficient conversion of solar energy to more useful forms such as electricity and hydrogen gas will help meet the increasing demands for energy in the near future. In this paper, we will discuss ways nano-materials can increase the conversion efficiency between solar energy and hydrogen gas. In addition, we will discuss nanostructures that enable high efficiency solar cells by providing transparent electrodes and high absorption photovoltaic (PV) materials. Finally, we will explain how multi-exciton generating processes in nano-materials such as quantum dots can increase the efficiency of solar cells by wasting less energy to heat.

Keywords: Solar energy, nano-materials, quantum dots, solar cells

Integrating solar cell array and planar antenna in a nano structure for solar power transmission in UHF-VHF bands

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This paper describes integrating solar cells and antenna in Nano structure, which demand the compromise in utilization of the limited surface area available. The radiating patch element of planar antenna is replaced by solar cell and the radiating slots are built due to cell spacing in a solar cell array. The solar cell is now able to receive and transmit power in VHF – UHF bands. A Planar antenna is designed based on the transmission line model with input impedance of 50Ω . The simulation results are well coincided with calculated values. A simulation of proposed antenna for solar transmission system is done by IE3D software. The noise Interference signals in the UHF – VHF are studied.

Keywords: Solar cell, wire less power transmission, antenna, electro magnetic interference

Intensity identification of nano materials in resolving restructuring complications

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As Energy and Environment are interrelated to each other, the production or generation of energy is by extracting the environmental resources or by converting the resource into energy itself. The process implemented in doing so can be alternated with nanotechnology in the materials used, thereby restructuring the existing process flow in an effective manner. Such an intention while implementing has certain complications since there exists the circumstances under which the nano materials can be used only with a particular intensity. The complications interfered can be resolved by evaluating and identifying the proper replacement of nano materials and desired intensity of use to achieve effectiveness in the process and efficiency in output with optimization.

Key words: Nano materials, restructuring, complications, evaluation, intensity, effectiveness, efficiency.

Use of nanoparticles in preventing environmental hazards

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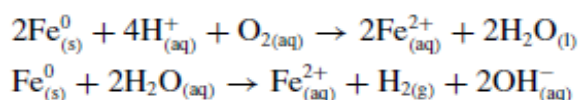
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Nanoscale iron particles represent a new generation of environmental remediation technologies that could provide cost-effective solutions to some of the most challenging environmental cleanup problems. Nanoscale iron particles have large surface areas and high surface reactivity. Equally important, they provide enormous flexibility for *in situ* applications. Research has shown that nanoscale iron particles are very effective for the transformation and detoxification of a wide variety of common environmental contaminants, such as chlorinated organic solvent, organochlorine pesticides, and PCBs. Modified iron nanoparticles, such as catalyzed and supported nanoparticles have been synthesized to further enhance the speed and efficiency of remediation. In this paper, recent developments in both laboratory and pilot studies are assessed, including: (1) synthesis of nanoscale iron particles (10–100 nm, >99.5% Fe) from common precursors such as Fe(II) and Fe(III); (2) reactivity of the nanoparticles towards contaminants in soil and water over extended periods of time (e.g., weeks); (3) field tests validating the injection of nanoparticles into aquifer, and (4) *in situ* reactions of the nanoparticles in the subsurface.

Nanoscale iron particles:

Metallic or zero-valent iron (Fe⁰) is a moderate reducing reagent, which can react with dissolved oxygen (DO) and to some extent with water:



The above equations are the classical electrochemical/corrosion reactions by which iron is oxidized from exposure to oxygen and water. The corrosion reactions can be accelerated or inhibited by manipulating the solution chemistry and/or solid (metal) composition.

Key words: Nanoparticles, nanoscale iron particles environmental hazards, electrochemical, corrosion

Photocatalytic disinfection of water pollutants using TiO₂

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Organic chemicals not only occur as the major pollutants in waste water effluent from industrial manufacturers and households, but also appear in ground water wells, surface water and river water. The aim of this paper is to study the Photocatalysis process by titanium dioxide (TiO₂) to remove the water pollutants. Photocatalysis by titanium oxides are finding an increasing application in removal of organic pollutants. Some of the methods that are recently used for this purpose are advanced oxidation processes (AOPs), which use UV-C irradiation along with a photocatalyst such as TiO₂ to destroy the microorganism. When irradiated TiO₂ particles are in direct contact with or close to microbes, the microbial surface becomes the primary target of the initial oxidative attack. The wavelength range of UV-C irradiation is from 100 nm to 290 nm. Titanium oxide nanomaterials including nanoparticles and nanowires are synthesized by hydrothermal processing and further treated by secondary hydrothermal processing. The effects of the processing parameters on the morphology, crystal structure of titanium oxide nanostructures. In addition, this paper explains about the doping of nitrogen into titanium oxide nanostructures which will extend their absorption wavelength range to visible region, which will result in the visible light responsive photocatalyst to remove the water pollutants.

Key words: Photocatalytic, titanium dioxide, nanomaterials, nanoparticles, pollutants

Nanotechnologies for environmental cleanup

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Among the many applications of nanotechnology that have environmental implications, remediation of contaminated groundwater using nanoparticles containing zero-valent iron (nZVI) is one of the most prominent examples of a rapidly emerging technology with considerable potential benefits. There are, however, many uncertainties regarding the fundamental features of this technology, which have made it difficult to engineer applications for optimal performance or to assess the risk to human or

ecological health. In this review, we address three of the fundamental features commonly contributing to a misunderstanding of this technology showing that:

- (i) The nZVI used in groundwater remediation is larger than particles that exhibit ‘true’ nanosize effects
- (ii) The higher reactivity of this nZVI is mainly the result of its high specific surface area.
- (iii) The mobility of nZVI will be less than a few meters under almost all relevant conditions. One implication of its limited mobility is that human exposure resulting from remediation applications of nZVI is likely to be minimal. There are, however, many characteristics of this technology about which very little is known: e.g. how quickly nZVI will be transformed and to what products, whether this residue will be detectable in the environment, and how surface modifications of nZVI will alter its long-term environmental fate and effectiveness for remediation.

Among the numerous promising applications of nanotechnology, there are many that involve the environment. This is reflected in the selection of ‘environmental improvement’ as one of eight cross-cutting areas of nanotechnology applications identified by the US National Nanotechnology Initiative (NNI). In fact, almost all of the NNI’s seven program component areas (fundamental phenomena, materials, devices, metrology, etc.) have environmental aspects, and environmental concerns figure in the missions of almost all 11 US Federal agencies that participate in the NNI.

Keywords: Zero-valent iron, nanosize, environment, nanotechnology

Nanotechnology for agricultural and food systems

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Nanotechnology application in food and agriculture is in its nascent stage and over the next decade we will see increasing uses of tools and techniques developed by nanotechnology to detect carcinogenic pathogens and biosensors for improved and contaminated food and agricultural products. The word Nano means dwarf in greek language refers to the dimensions on the order of 10^{-9} . Nanotechnology, focusing on

special properties of materials emerging from the nanometre size. For example, in biological systems, the first level of organization where all the fundamental properties and functions are systematically defined. Nanotechnology has the potential to revolutionize the scientific world by allowing scientists to manipulate at the atomic or molecular scale using physics, engineering, chemistry and biology. Nanotechnology is a broad and interdisciplinary area of research and developmental activity that have been growing at a rapid pace world wide in the past few years. It enables researchers to understand the relationship between macroscopic properties and molecular structure in the environment.

Keywords: Agriculture, nanotechnology, molecular structure, environment.

Recycling of green house gas for high-energy fuel using nanotechnology

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An ingenious method of turning captured carbon dioxide (CO_2) into methane (CH_4), a combustible fuel, using the energy of the sun has been proposed to recycle Green-House gas. Efficient solar conversion of carbon dioxide and water vapour to methane and other hydrocarbons is achieved using nitrogen-doped Titania nanotube arrays, with a wall thickness low enough to facilitate effective carrier transfer to the adsorbing species, surface-loaded with nanodimensional islands of co-catalysts platinum and /or copper. The nanotube arrays were placed inside a stainless steel chamber filled with CO_2 infused with H_2O vapors. The chamber was then set outdoors in sunlight; the CO_2 was converted into useful fuels. Using outdoor global AM 1.5 sunlight, 100 mW/cm^2 , a hydrocarbon production rate of $111 \text{ ppm cm}^{-2} \text{ h}^{-1}$, or $\approx 160 \text{ }\mu\text{L}/(\text{g h})$, is obtained when the nanotube array samples are loaded with both Cu and Pt nanoparticles. This rate of CO_2 to hydrocarbon production obtained under outdoor sunlight is at least 20 times higher than previous published reports, which were conducted under laboratory conditions using UV illumination. By this method capturing CO_2 at some points, such as fossil fuel burning power plants and turning it into a transportation fuel in a cheap conversion rate can be

further increased by modifying the co-catalyst and changing the reactor design from a batch reactor to a flow through catalytically design.

Keywords: Green-House gas, solar conversion, Titania, nanotube arrays

Applications of nanotechnology in energy

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Nanotechnology is fundamental over the next 50 years to providing sufficient energy for a growing world and to protecting the environment in which we live. There are an energy/environmental storm gathering and we must pay attention. Our children's' and our grandchildren's' lives are at stake if we mess up the energy/ environment issue. Under all practical solutions nanotechnology will play a critical role in any successful outcome. Just as we claim that nanotechnology will change our entire economic structure and our lives over the next decades, so will world energy demand and supply. The two are intimately intertwined. Detailed energy data, options, nanotechnology involvement and intelligent discussion are appearing regularly from responsible institutions. Some of the best energy information has just been mounted on the web. If you haven't considered investing in promising nanotech energy applications up to now, the following may change your mind. Nanotech is fundamental to increasing production from old wells. Assuming consensus projected world wide growth in developed and third world energy demand every increase in percent recovery extends available worldwide oil supplies 1.5 - 2 years. Increasing old well yield is one of the more productive research activities because producers know the oil is there. Some current nanotech developments for improving lifting percent include harder and more versatile drilling, platform and pipe line materials (stronger, lighter, more flexible and more impervious to heat and corrosion), better catalysts for processing lower quality crude, stronger impeller blades for oil pumping motors, and finer and more selective filters to minimize contamination and improve usable yields.

Keywords: Nanotechnology, environmental storm, economic structure

Nanotechnology for waste minimization and pollution prevention

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The aim of the paper is to give an overview of existing and potential applications of nanotechnology in facilitating waste minimization, specifically to identify how nanotechnology could be used to reduce the human health and environmental risks related to the manufacture, use and disposal of hazardous substances. Most nanomaterials are either just entering commercialization or are still being developed in academic settings, and the challenge of this report is to find promising applications in an area that has been relatively ignored. However, commercially available nanotechnology based products that facilitate waste minimization were found for coatings, treatments and catalysts. A few emerging applications, such as alternative dry cleaning solvents and improved plasticizing materials are also discussed. In addition, applying nanomaterials developed for remediation towards waste treatment applications would not only reduce the toxicity of the hazardous waste through conversion but possibly prevent future contamination as well. Therefore, a paradigm shift is suggested to focus on utilizing these remedial nanomaterials for waste treatment. Evaluation of the feasibility, efficiency and net waste minimization impact of the nanotechnology applications reported is considered beyond the scope of this report. Finally, as nanotechnology based substitutes may potentially be hazardous themselves, life cycle issues related to the resulting increased use of nanomaterials are also briefly discussed.

Key Words: Nanomaterials/ coatings/cleaning/nanotechnology

Nanotechnology in energy and environment

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With current state-of-art technologies, human race as well as other species on earth is victimized by air and water pollutions, threatened by hazardous and nuclear wastes. Acid rain, global warming, ozone depletion have become household daily vocabularies. Environmental sustainability based on technology-to-date is pessimistic. Emerging molecular nanotechnology in all industrial fronts, such as nanoelectronics, nanobiotechnology, nanomaterial, nanoenergy, and etc., offer radical tools for human society for the first time to be on the upper hand in the struggle toward sustainable economic growth. Furthermore, it will have extra capacities for human civilization not only to remediate environmental liabilities accumulated since industrial revolution of 18th century, but also to produce unlimited material and energy with ultra green processes. This paper traces the causes of sustainability problems and diagnoses the defects of current industrial manufacturing processes in light of molecular nanotechnology. This paper also analyzes and extrapolates the prospect of additional capabilities that human may gain from the development of nanotechnology that have the potential to ascertain environmental sustainability, restore global environment while we still enjoy the abundance of material and energy. Major energy production processes adopted currently are hydroelectric, fossil fuels, and nuclear. They are the major pollution sources and destructive forces to the environment. Combined they produce more pollution and destroy more environment than any other single industry. Other minor power generation processes are solar, wind, geothermal, ocean thermal energy, tidal, and other renewable resources. Nevertheless, renewable energy facilities also affect wildlife, involve hazardous wastes, or require cooling water, and due to their lower production quantity and higher cost, the effect in enhancing environmental sustainability is limited. Source control is most effective for TTD, and it remains so for MNT. TTD has been usurped to minimize human activity impact on the environment. Its mediocre effect is obliterated by attached secondary pollution and consumption rise. Net damage to the environment still exceeds nature's recovery capacity. Using TDBT to meet climbing

material demand rendered further environmental damage inevitable and sustainability impossible. MNT's revolutionary production processes promise eventual total elimination of all pollution sources.

Keywords: Energy, environment, nanotechnology

Enhancement of heat transfer characteristics of TiO₂ nanofluid

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Heat transfer fluids such as water, mineral oil ethylene glycol and nanofluids play a vital role in many industrial processes, including power generation, chemical processes, heating or cooling process, and microelectronics. The performance of the conventional heat transfer fluids is often limited by their low thermal conductivities. The thermal conductivity of the base fluids and the nanofluids plays a main role in the development of energy efficient heat transfer equipment. As solid materials in particular metals can have very high thermal conductivities, studies have been carried out in the past on the thermal behavior of suspensions of particulate solids in liquids. Recent advances in nanotechnology have allowed development of a new category of fluids termed nanofluids. Such fluids are liquid suspensions containing particles that are significantly smaller than 100 nm, and have a bulk solids thermal conductivity of orders of magnitudes higher than the base liquids. So many researches tried in nanofluids which have higher heat conduction, stability, reduction in pumping work etc. This report deals with the TiO₂ nanofluids which has advanced properties when compared to nanofluids and also high heat transfer rejection rate are involved in the industries, we go for nano-porous layer. Compared with the existing techniques for enhancing heat transfer, the TiO₂ show a great potential increasing heat transfer rates in a variety of application cases. The use of particles of nanometer dimension was first continuously studied by a research group. Compared with suspended particles of millimeter or micro meter dimensions or nanofluids, nano-porous layer show better stability and theological properties, significantly higher thermal conductivities, and no penalty in pressure drop.

Keywords: Heat transfer, nanofluids, thermal conductivity

Nanotechnology on energy and environment

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“There’s plenty of room at the bottom”. Richard Feynman during his historic talk 50 years talked about the possible results we can achieve through modifications of materials at molecular scale. Today we are still trying to reach the bottom of this field and in every step we encounter new challenges and new surprises. In this paper we try to understand the recent developments in the field of environment with the help of nanotechnology.

Nanotechnology for better sensors: In the past decade, we have seen a tremendous increase in the number of sensors and chips based on nanotechnology. Primarily these chips were developed in the field of health for better detection of antigens and drugs, but with the increasing environmental crisis chips to detect carcinogenic pollutants and other harmful substances in the air were produced. In our paper we decided to review, the latest sensors based on Silicon Nanowires. The basic principle behind these sensors is that the resonant frequency of the nanowire changes on adding particles of different weight on the wire. Another sensor that has been developed recently is based on the principle of change in conductance of the nanowire. By measuring the conductance of the nanowire we can identify the pH of the solution very accurately. Apart from the sensors, we have also described another important application of nanotechnology in helping our environment that is catalytic converters. We have described the latest generation of platinum nanoparticle based converters which are used by almost all of the latest car models. This nano-particle based system helps in increasing the adsorption area and decrease the number of harmful particles released into the atmosphere. For every coin there are two sides, our paper also describes the negative impact of nanotechnology on the environment. Nanoparticles released into the atmosphere from various electronic industries have been found to cause health related problems to humans and also a large number of animals. In short, our paper will review the latest trends in the field of nanotechnology and its effects on environments.

Keywords: Energy, environment, nanotechnology, nanowires

Toxicity studies on the effect of nano particles released in aquatic environments

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Nano particles comprise the latest technological advances designed to do everything from absorbed environmental toxins to deliver drugs to a target organ. Recently, however, they have come under scrutiny for the potential to cause environmental damage. Because compounds in this miniature size range have chemical properties that differ from those of their larger counterparts, nano particles deserve special attention. The main objective of this paper is to assess the potential impact that nano particles may have on release into aquatic environments with the physiological and behavioral studies of *Daphnia magna*. Synthetic titanium dioxide (TiO₂) and fullerene (C₆₀) nano particles were prepared by filtration and sonication and *Daphnia magna* were exposed to four varying solution concentration. Acute toxicity tests, median lethal concentration, lowest-observable-effect concentration, and no-observable-effect concentration were determined and statistically subjected for accuracy. In addition to the toxicity tests images of the particle solutions were recorded using transmission-electron microscopy. Results showed that exposure to filtered C₆₀ and filtered TiO₂ caused an increase in mortality with an increase in concentration, whereas fullerenes showed higher levels of toxicity at lower concentrations. Understanding the potential impacts of nano particles will help to identify the most appropriate nanotechnology to preserve the aquatic environment along with the much heralded nano technology.

Keywords: Nano particles, marine environment, daphnia *magna*, titanium dioxide, fullerene

Nanotechnology aids environment and energy

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Beginning with the coining of 'Nanotechnology', we have a peek at the words of it's pioneers; what is meant by nanotech and how far it is in use today. Then we discuss it's two major areas of applications – Energy and Environment. Concerned with energy, we have a view on how nanotechnology is used to enrich fuel cells; how it redefines “fuels”; how it can convert waste heat to energy; how it can work wonders to create energy from our clothes(more specially known as 'Power Suites'); it's use in batteries and how can it be used to strengthen windmills. In the domain of 'Environment', we cite it's use in solar cells; how it can be used to provide drought relief; how can it remove water pollutants; it's use as a weapon against green house gases and even it's capability to detect gases. The entry of nanotechnology, the type of advancements it shall make to them; the potential growth areas and dimensions are predicted. Finally, we conclude how it can be promoted even better to become a “boon to mankind”.

Keywords: Nanotechnology, environment, energy, water pollutants

Nanotechnology in treatment of cardiac diseases

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The use of nanotechnology in medicine offers some exciting possibilities. Nanotechnology in medicine currently being developed involves employing nanoparticles to deliver drugs, heat, light or other substances to specific types of cells (such as cancer cells, arteries etc). Particles are engineered so that they are attracted to diseased cells, which allow direct treatment of those cells. This reduces damage to healthy cells in the body and allows for earlier detection of disease. A nanoparticle that can deliver drugs to plaque on the wall of an artery. They attach a protein called a peptide to a nanoparticle, which then binds with the surface of the plaque. The researchers plan to use these nanoparticles to deliver imaging particles and drugs to both determine the amount of existing arterial plaque and treat the condition. Nanotechnology is a broad and fast

growing area of development and research. It enables the researches to enable the relationship between the macroscopic properties and the molecular structure of the bodily tissues .

Keywords: Nanotechnology, nanoparticles, drug delivery

Energy applications of nanotechnology

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Over the past few decades, the fields of science and engineering have been seeking to develop new and improved types of energy technologies that have the capability of improving life all over the world. In order to make the next leap forward from the current generation of technology, scientists and engineers have been developing **Energy Applications of Nanotechnology**. Nanotechnology, a new field in science, is any technology that contains components smaller than 100 nanometers. For scale, a single virus particle is about 100 nanometers in width. An important subfield of nanotechnology related to energy is nanofabrication. Nanofabrication is the process of designing and creating devices on the Nano scale. Creating devices smaller than 100 nanometers opens many doors for the development of new ways to capture, store, and transfer energy. The inherent level of control that nanofabrication could give scientists and engineers would be critical in providing the capability of solving many of the problems that the world is facing today related to the current generation of energy technologies.

People in the fields of science and engineering have already begun developing ways of utilizing nanotechnology for the development of consumer products. Benefits already observed from the design of these products are an increased efficiency of lighting and heating, increased electrical storage capacity, and a decrease in the amount of pollution from the use of energy. Benefits such as these make the investment of capital in the research and development of nanotechnology a top priority.

Nanotechnology can play a vital role in production of energy. The solar cell presently being manufactured by conventional techniques are costly and Nano material based solar cells could be produced economically. Thus by cutting production and material cost the solar power can be made economically available to the large masses and

at the same time the energy production will be economically clean than the existing energy producing methods. Nanotechnology cannot be used only for monitoring environmental pollutants but it can also remediate various environmental problems. Nanotechnology can help in developing new environmental safe and green technologies that can minimize the formation of undesirable byproducts or effluents. The technology is already being examined in several chemical and allied industries for the possible outcome of large reduction in pollutants and energy saving. Several chemical manufacturing and allied industries are in the process to develop Nano particles that can replace the metallic components especially in auto industries. As per an estimate, use of these Nano composites could reduce 1.5 billion liter of fuel consumption and reduce carbon dioxide emission by more than 5 billion kilograms annually. Nanoparticles of inorganic clays and polymers will replace carbon black tires and therefore we will have environmental friendly, wear resistant tires. Catalysis is one of the largest areas where nanoparticles can be used for reducing pollutants, considerable end products and it is expected that the nanoparticles worth \$ 30 billion will be used by the industry annually.

Keywords: Nanotechnology, energy, nanoparticles, nanofabrication

Applications of nanotechnology in drug delivery

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Nanotechnology has been a boom in medical field by delivering drugs to specific cells using nanoparticles. The overall drug consumption and side-effects can be lowered significantly by depositing the active agent in the morbid region only and in no higher dose than needed. This highly selective approach reduces costs and human suffering. An example can be found in dendrimers and nanoporous materials. Another example is to use block co-polymers, which form micelles for drug encapsulation. They could hold small drug molecules transporting them to the desired location. Another vision is based on small electromechanical systems; NEMS are being investigated for the active release of drugs. Some potentially important applications include cancer treatment with iron nanoparticles or gold shells. A targeted or personalized medicine reduces the drug consumption and treatment expenses resulting in an

overall societal benefit by reducing the costs to the public health system. Nanotechnology is also opening up new opportunities in implantable delivery systems, which are often preferable to the use of injectable drugs, because the latter frequently display first-order kinetics (the blood concentration goes up rapidly, but drops exponentially over time). This rapid rise may cause difficulties with toxicity, and drug efficacy can diminish as the drug concentration falls below the targeted range.

Keywords: Drug delivery, nanoporous, encapsulation

Characteristics of semiconducting carbon nanotube field effect transistor

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This paper presents the drain characteristics of an emerging nano device with classical behavior MOSFET like CNTFET. Specifically we have concentrated semiconducting carbon nanotube field effect transistor (SCNTFET) Device has been simulated using PSPICE. In this paper, we present the spice model creation of MOSFET like CNTFET and simulation of drain characteristics of semi conducting carbon nanotube field effect transistor.

Keyword: MOSFET, Carbon nanotube, PSPICE

Nanotechnology applications in future automobiles

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It is rare for a single technology to have the power to dramatically influence almost every major industry in the world. Nanotechnology falls into this category and offers fundamentally new capabilities to architect a broad array of novel materials, composites and structures on a molecular scale. This technology has the potential to drastically redefine the methods used for developing lighter, stronger, and high-performance structures and processes with unique and non-traditional properties. This paper focuses

on some of the automotive applications for nanotechnology and showcases a few of them that are believed to have the highest probability of success in this highly competitive industry. No discussion of nanotechnology is complete without touching upon its health and environmental implications. This paper addresses some of the safety issues and the precautions that we as an automotive industry need to take in the production, processing, storage and handling of such minute particles. The goal of this paper is to raise the awareness on the promise of nanotechnology and the potential impact it will have on the future of the automotive industry.

Keywords: Automobile, environment, safety, nanotechnology

A new and robust solar cell design based on nano structured diffractive gratings

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In this paper, we discuss about the design of a solar cell with one dimensional photonic crystal to reflect and transmit desired bandwidth along with gratings to increase optical path length of light. Scattering matrix method is the simulation tool as it can be used in multiple stacked layers, regardless of thickness of each layer and can be incorporated with dispersive and glossy materials also. In this method, the field along the lateral direction is expanded using Fourier series to determine diffraction orders. Population based stochastic technique is used for optimization. This designed solar cell absorbs energy within 400-1100nm bandwidth and transmits higher wavelength to other cells and thereby increases efficiency. Also, the enhancement factor is improved along with short circuit current.

Keywords: Grating, Optimization, one dimensional photonic crystal, enhanced structure.

Application of nanotechnology in energy sources

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We have found that bacteria that can grow nano wires. A bacteria called *Geobacter sulfur reducer* dumps electrons onto metal atoms, that occurs due to bacterium's fuel consumption. If there is a shortage of metals in the bacterium's environment, it will create nano-wire to discharge the ions to any metal body to consume energy. Thereby, we can create our own energy from the sewage of this bacteria, that can produce a renewable product such as a nano transmission, both by using nano-wires and using wireless nano-communication in the future. We can save energy by filling these nano-wires of about 3-4nm of length, which can be incorporated in tube to create nano-cells for energy in the future.

Keywords: Nanotechnology, energy sources, save energy

Synthesis and characterization of CNT based Nano-Sensor for marine applications

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Carbon nanotubes (CNTs) have many distinct properties that may be exploited to develop next generation of sensors. The distinct physical, electronic, and mechanical properties of CNTs will be studied. The CNTs are synthesised by chemical vapor deposition (CVD) technique. The purity of CNTs can be evaluated qualitatively using Raman spectroscopy. Synthesised CNTs are analyzed by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscope (TEM) for surface morphological studies. Due to their small size, high strength, high electrical and thermal conductivity and high specific area, the synthesised CNTs can be employed as the sensing material in pressure, flow, thermal, gas, optical, mass, position, stress, strain, chemical, and biological sensors. Piezoresistive pressure sensors can be realized with CNTs, Single Walled Nanotubes (SWNTs) can be grown on suspended square

polysilicon membranes. When uniform air pressure was applied on the membranes, a change in resistance in the SWNTs can be observed. Moreover, the membrane will get restored to its original condition when the gas was pumped out, indicating that the process is reversible. The use of CNT will increase the sensitivity and dynamic range of sensors.

Keywords: Carbon Nanotube, Piezoresistive, Nano-sensors

A Study on Nanoclays as Sorbent for the Removal of Copper from Aqueous Solution

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Nanoclays have found acceptance as component of adsorbents for hazardous oily & organic liquids and these clay minerals are highly effective in the stabilization and solidification of heavy metals and wastewater containing organic matter. It is very effective on a variety of wastewater streams with pH 2-12, non-biodegradable and safe to use. Clay particles are in general consisted of bentonite, composed mainly of the clay mineral montmorillonite, with an extremely high surface area, have the ability to adsorb up to 50 to 70% of their weight in oil and grease, making them extremely cost-effective media as opposed to activated carbon. Clay minerals are further modified with organo compounds to make it organophilic. Thus the surface-modified clay compounds that is used for two purposes: 1) To absorb and stabilize hazardous organic liquid wastes, and 2) To remove organic compounds from water flows. The nano-size dimension, extensive surface area, and peculiar charge characteristics of clay materials lie behind their large propensity for taking up ions and organic compounds from their immediate environment. Considering the above mentioned characteristics of nanoclay, it was planned to assess and evaluate the suitability of nanoclays as a matrix for the adsorption of chromium, phosphorous, copper and other organic impurities from aqueous solutions and leather effluent by adsorption isotherm data under simulated conditions. The adsorption of metals via ion exchange process of nanoclay from a wide range of concentrations at high

solution/nanoclay ratios was studied. The data of adsorption in aqueous solutions were fitted to the Freundlich equation. This feasibility study together with the low cost and environmentally friendly nature of the clay material makes it as a superior candidate for the treatment of water.

Key Words: Nanoclays, clay minerals, organic matter

Biological applications of nanotechnology

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The world of biology awaits a major change aided by the emerging field of nanotechnology .Nanotechnology promises to make us healthy and wealthy. And it will be able to do so without consuming natural resources or spewing into the environment. Nanotechnology is about building things of atoms and molecule by molecule .The goal of Nanotechnology is to build tiny devices called Nano machines .To build things on such a small scale one has to be able to manipulate atoms individually. The challenge of nanotechnology is to place atoms precisely where u wish on a structure. Research in chemistry, molecular biology and scanning machine systems has enabled, scientists to construct natural; proteins and even synthesize new ones with novel properties never seen in nature. Once we have the ability to capture, position and change the configuration of a molecule the medical application of nanotechnology might even allow us to adapt our body for survival in the environment.

Keywords: Nanotechnology, biology, nanomachines

BIO RESOURCES AND CLIMATE CHANGE

Eco-friendly concrete

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The modern construction industrial growth has a direct impact on the development of a country. Cement and concrete industries are the backbone of modern construction industries. The greenhouse gases such as carbon-dioxide, methane and other adverse gases emanating from the cement production which eventually results in the global warming. The production cycle of cement consists of many steps such as: transportation of raw materials (limestone and clay), quarrying process, crushing process, mixing of lime and clay, heating of raw materials in kiln and addition of gypsum to the clinker. From this production cycle, evolves about 7% of global loading of carbon-dioxide into the atmosphere every year. The usage of partial replacement of flyash in the proportion of cement, it could reduce the emission of carbon-dioxide. Many studies carried out on the flyash usage of partial replacement of cement also influences the fresh and hardened properties of the cement and concrete such as: workability, bleeding, segregation, strength, durability, permeability, resistant to sulphate attack, etc., Since flyash is the byproducts of coal-fired power plants, the procurement is cheaper than cement. Usage of flyash results in the reduction of energy-intensive manufacturing of other concrete ingredients and emissions of greenhouse gases.

Keywords: Concrete, green house gases, flyash, Cement

Immobilization of mesophilic anaerobic bacteria on wood chips activated carbon to enhance hydrogen production

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Hydrogen is the vital alternative source to the depleting fossil fuels. In the developed nation's considerable interest are being shown in using hydrogen- in both combustion engines as a fuel and in connection with fuel cell technology. The main reason behind it is hydrogen represents a renewable energy source with lower or nil emissions than current fossil fuels. It has been known to us that, hydrogen can be produced through fermentation process from a range of long chain fatty acids (LCFA) by certain anaerobic microorganisms. Packed-bed bioreactors containing wood chips activated carbon (WCAC) as support matrix was used to produce hydrogen anaerobically from pre-hydrolyzed tannery solid wastes. The effects of bed height and substrate loading rate on hydrogen fermentation were examined using packed beds operated at hydraulic retention times (HRT) of 1 - 4h. The gas products resulting from fermentative H₂ production consisted of 30–40% H₂ and 60–65% CO₂. In the volatile fatty acids (VFA) tested, acetic acid was the primary soluble product, followed by propionic and valeric acid. Following the biological production of hydrogen the carbon and nitrogen percentage gets decreased in the wastewater. Thus this water can be used for different purposes like flushing, landscaping as well as cooling tower makeup if required by adding a softener.

Key words: Wastewater, hydrogen, fermentation, wood chips activated carbon, Packed-bed bioreactor and immobilization.

Biomass: An assessment of bio energy for future generation

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In recent days, all the nations are facing crisis in energy production. This situation paves a broader research orientation on analyzing the scope of alternate energy resources. Among the existing alternate energy sources like solar, wind, bioenergy, tidal, etc., Biomass energy is the ancient and economical one. The use of biomass energy has the potential to greatly reduce our greenhouse gas emissions and biomass feedstocks can also help increase profits for the agricultural industry. Biofuel is a product produced from biomass, this fuel is considered much cleaner than petrol/diesel alternatives. Biomass residues can be converted into various non-solid fuel forms. These fuels are referred to as biogas and liquid biofuels. The aim of this conversion process is to improve the quality, specific energy content, transportability, etc., of the raw biomass source or to capture gases which are naturally produced as biomass is micro biologically degraded or when biomass is partially combusted. The growing interest in biofuels in many developing countries as a means of “modernizing” biomass use and providing greater access to clean liquid fuels while helping to address energy costs, energy security and global warming concerns associated with petroleum fuels. This article provides information about assessment of biofuels for use in helping to understand technology-related implications of biofuels development.

Keywords: Biomass conversion, biofuels, bioenergy

Electricity generation in mediatorless microbial fuel cell using microorganism

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Abundant energy, stored primarily in the form of carbohydrates, can be found in waste biomass from agricultural, municipal and industrial sources. It is well known that we produce fuels such as ethanol, methane and hydrogen from these organic wastes. An alternative strategy is direct conversion of sugars to electrical power in Microbial Fuel

Cell (MFC). It is now known that we can derive electrical energy while the microorganisms are degrading the organic matter. We isolated several strains of bacteria and checked for their ability to produce electricity in MFC. We have found that organisms are capable of degrading complex sugars like cellulose and capable of producing electrical energy from it.

Keywords: Microbial fuel cell, electric energy, organic matter

Bio-production of ethanol using selected seaweed extract and cellulosic waste

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Renewable fuel resources are recent requirements to find out an alternate source for fossil fuels as they are rapidly depleting and are reason for global warming. Ethanol a commercially important organic solvent commonly used as a motor fuel is referred as green petrol which could be produced easily from available biomass such as wood, cellulose, starch, etc. In a preliminary attempt yeast strains capable of utilizing the seaweed extract and office paper waste was isolated from fruit wastes and optimized for its maximum production of ethanol at different growth conditions like pH and different carbon and nitrogen sources. The acid hydrolyzed office paper waste was found to be suitable cellulosic waste for ethanol production. Later optimized fermentation media using office paper wastes were used to scale up for ethanol production. The ethanol thus produced was separated and estimated by Gas Chromatography analysis. This method of ethanol production will help to overcome the fuel demand and effective method of office paper waste management.

Keywords: Seaweed, paper waste, cellulosic waste, waste management

Yield of biodiesel from fresh water microalgae by transesterification process

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In last ten years there has been significant rise in transportation fuel consumption all over the world. Compared to other plant oils, microbial oils have many advantages, such as short life cycle, less labor required etc. This project is covers the related research about the growth of algae, analyzing its various compositions, extraction of algal oil followed by acidic transesterification of algal oil with alcohols in presence of acid catalyst to give biodiesel as yield. The composition of fatty acid methyl ester (biodiesel) is determined by using Gas Chromatography method. Various optimizations were done to predict the yield.

Keywords: Biodiese, microalgae, transesterification, fuel

Microbially induced deterioration of concrete

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The concrete structures like cooling water systems, tanks, and reservoir in process industries are very susceptible to microbially induced concrete corrosion (MICC). Cooling water systems are attractive locations for microbial growth and bio-film formation. Since the cooling is highly oxygenated and acts as an incubator by providing a temperature range 27-60⁰ C and pH of 6-9. The majority of the studies concerning microbiology of MICC have indicated that the autotrophic sulphur oxidizing bacteria *Thiobacillus thiooxidans* and other *Thiobacillus* sp. are causative organisms. These chemoautotrophs oxidize various sulfur compounds to produce sulphuric acid, which is

responsible for the corrosion of concrete. Mechanisms have been proposed for the deterioration of concrete by sulphur oxidizing bacteria.

Keywords: Concrete, biofilm, concrete corrosion, sulphur oxidizing bacteria.

Harnessing energy from pollutants – using microbial fuel cells

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The pollution and environmental issues like global warming have emerged as the critical area of research. The economic growth of the modern world is feasible by industrialization which demands more energy and causes pollution. Currently the energy is obtained from burning fossil fuels. The burning of fossil fuels causes pollution and accelerates the global warming. The fuel cells are considered to be a remedy for pollution. But they need energy for heating and use expensive catalysts like platinum. The fuel cells require fuel like hydrogen which is derived from fossil fuel. Recently researchers have developed microbial fuel cells (MFC) that have the ability to extract electricity from pollution and organic waste products. The microbial fuel cell are powered by bacteria growing as a biofilm on an conductive solid surface serving as an electrode in a bath of organic waste. In the microbial fuel cells electricity is generated by converting organic pollutants and organic waste materials into energy sources like methane, hydrogen, or electricity. They operate at natural temperatures using simple naturally occurring microorganisms to convert waste into energy. The biological fuel cells will help slow global warming by cleaning excess carbon dioxide out of the atmosphere. At the same time this new technology would help deal with rising populations and resultant waste/pollution problems. This process would also eliminate the need to use fossil fuels as an energy source. The Microbial fuel cells are all natural having potential to become the ultimate sustainable energy system.

Key words: Microbial fuel cells, global warming, pollution

CLIMATE CHANGE

Analysis of fine particles (pm_{2.5}) in urban region of Ahmadabad city

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Today climate change is a big issue for the statistical distribution of weather. Therefore it is necessary to require a proper air quality monitoring in the urban region. Present study is planned to give an idea about the concentration of PM_{2.5} which is measured at 3 monitoring sites of urban area. In order to analyze PM_{2.5} through identified sources and its effect on human health and environment the study conducted from January 2010 to June 2010. The statistical analyses demonstrate from beginning to end develops a person's co-relation between the PM_{2.5} and metrological parameter with the help of SPSS-17. It also developed a strong relation between the PM_{2.5} and Metrological parameter (wind speed, Temperature, wind direction, air flow etc.) with the help of multiple regression analysis. In addition to this, a brief classified detailed of inventory of industries surrounding the monitoring station and the type of fuel to be used in this industry.

Keywords: Climate change, air quality, urban region, multiple regression, PM_{2.5}

Influence of climate change on Chhota Shigri glacier, Lahaul-Spiti valley, Himachal Pradesh, India

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Glaciers are regarded as sensitive indicators of climate change. A reduction of snow cover in space and time, due to higher temperatures, means a greater exposure of rocks and soils in the watersheds, which enhances weathering processes. The hydrochemistry of Chhota Shigri glacier is highly conditioned by the geology of the area, chemical composition of atmospheric deposition, & climate characteristics. In this paper we aim to evaluate the possible effect of these processes on long-term changes in the chemistry of

melt water of Chhota Shigri glacier. Chhota Shigri glacier melt water samples were collected during the July, August 2008 and 2009 and analyzed; the results were compared with previous published data (1987). Comparison between the two data sets shows an increasing of solute contents in the last two years. This result could be attributed to increased weathering rates due to climate warming. Increase in sulphate concentration recorded in last two years in melt water of Chhota Shigri glacier. This trend can be related to higher summer temperatures, a shorter snow-cover period and consequently more intense weathering, in particular the dissolution of easily soluble calcium and magnesium sulphate in the catchments. Impact of climate change on Chhota Shigri glacier is also identified by mass balance study on this glacier. Mass balance studies on Chhota Shigri glacier was carried out by Glacier Research Group, Jawaharlal Nehru University, New Delhi, during the period 2002 to 2008. During the study period, Chhota Shigri glacier showed negative mass balance, -1.4 m w.e in 2002-2003, -1.2 m w.e in 2003-2004, -1.4 m w.e in 2005-2006, -1.3 m w.e in 2006-2007 and -0.93 m w.e in 2007-2008. 2004-2005 was the only year when the glacier showed a positive mass balance of +0.01 m w.e. Cumulative specific mass balance of Chhota Shigri glacier during the period 2002-2008, was found to be -1.3 m w.e. Highly negative mass balance, definitely pointing to glacier recession which may be due to global climate change or global warming.

Keywords: Climate change, glacier, mass balance, global warming

Environmental informatics: A useful tool for climate modeling

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Environmental informatics is the science of information applied to environmental science. As such, it provides the information processing and communication infrastructure to the interdisciplinary field of environmental sciences aiming at data, information and knowledge integration, the application of computational intelligence to environmental data as well as the identification of environmental impacts of information technology. This paper represents the description of an open architecture for the management of environmental content using Web. The Web technology can be

effectively exploited in one hand for integrating dissemination of analytical data about environment, such as air, noise, traffic, etc., and on the other hand the needs of different users concerning the accessibility requirements of their devices, distributed and heterogeneous systems, remote and mobile control access. Environmental research, impact assessment, planning and management have grown increasingly reliant on computer-based approaches in the past few decades. Environmental Informatics is utilized in a variety of scientific and professional activities, ranging from forestry, landscape mapping and watershed ecology to archaeology, pollution detection and geology. In conclusion, the Web Services Technology could be a good solution for the management of environmental content because it provides open and mobile access to data, accessibility among different client-server nodes, and easy extensibility for integrating any kind of device into the system.

Keywords: Environmental informatics, web technology, pollution detection, accessibility, forestry

Reduction in green house gases by green buildings

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Climate change is arguably the greatest challenge facing mankind today. The world's future prosperity and social stability are under severe threat unless we take urgent and bold action to reverse the continuing rapid increase in greenhouse gas emissions from sources such as industry, transport, buildings and land use. Climatic factors affect the way the buildings use energy and comfort of their occupants. Making houses energy efficient can reduce the consumption of energy and also reduce the emission of green house gases. Green building has emerged as a *natural means* to conserve the scarce ecological resources and to enhance the environment. It takes a holistic approach to programming, planning, designing, and constructing or renovating buildings and sites. It involves connecting interlinked issues such as site and climate, building orientation and form, lighting and thermal comfort, materials, etc., and optimizes all its aspects in its performance. In building design, the weather conditions or the climatic parameters like air temperature, relative humidity, solar radiation, rainfall (precipitation), wind speed and

direction play an important role. The major Green house gases (GHG) are carbondioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydro-flurocarbons (HFCs), perflurocarbons (PFCs), and sulphur hexafluride (SF₆). As over one third of the global CO₂ emissions are attributed to the combustion of fossil fuels to meet the energy demands of buildings. In order to achieve right goal, it will be necessary to cut global emissions by at least 50% by 2050 compared to 1990. To reach this goal of halving wide emissions by 2050 developed countries need to reduce their emissions by 25-40% below 1990 figures in 2020. In developing countries, it will be 15-30%. This paper analyses various parameters influencing the performance of the green buildings and their role in reducing the GHG emissions.

Keywords: Green house gases, green building, climate change

Carbon neutral design in architecture – a step towards climate change mitigation

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The oil crisis of 1973 brought a tremendous change in the initiation of mitigation measures towards climate change and creating awareness about the significance of the fossil fuel levels throughout the world. Energy efficiency and sustainability have gone hand in hand in energy conservation for around three decades. Recently, Carbon Neutral Design is a principle that is being developed and followed to neutralize the green house gas emissions in to the atmosphere and also utilize minimum levels of carbon in the building construction and management. Carbon Neural design includes the design parameters in the site planning stages, choice of materials, carbon offsets, carbon sequestration, Emissions trading, etc. The paper intends to deal about the Indian Scenario in the global level, the building industries' contribution to green house gases and the role of Planning authorities, Industries, Planners, Architects and Governing bodies to take measures in the sustainability of the natural resources. The steps towards carbon neutral design are Reduce energy levels and minimize carbondioxide, Improve energy efficiency, Incorporate renewable energy, Carbon offsets

The paper would include case studies and recommendations for carbon neutral design to Indian context.

Keywords: Pollution, climate change, green house gases emission, carbon sequestration, carbon trading, building construction

CO₂ and CH₄ gas sensor using micro-cantilever

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Our country India is facing some drastic changes in the climatic conditions due to the heating effect caused by various greenhouse gases. The most harmful gases among them are Carbon dioxide and Methane. This paper aims in finding out the quantity of the major polluting gases like carbon dioxide, and methane. The gravimetric sensor works by absorbing the chemical in a special material, which alters the overall mass of the sensing element that can be measured or detected to identify the chemical absorbed. Here a micro-cantilever beam is fabricated using selective polymer coatings on the surface to absorb CO₂ and CH₄. As the gases are absorbed the mass increases and hence there is a change in resonant frequency. This change in frequency gives the measure of the gas present in that environment.

Keywords: Gas sensor, micro-cantilever, polymer coatings

Impact of climate change on agriculture

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Sustainable development includes social, economic, and environmental dimensions. Climate change modifies all these dimensions and therefore alters the potential development pathways. In particular, the effects of climate change in agriculture determine future of food security and ultimately influence the inequitable North/South divide. According to the IPCC Third Assessment Report, climate change is already happening, and will continue to happen even if global greenhouse gas emissions are curtailed. Many studies document the implications of climate change for agriculture and

pose a reasonable concern that climate change is a threat to poverty and sustainable development, especially in developing countries. The definition of the key vulnerable production sectors and regions and the design, evaluation, and the implementation of adaptation measures for agriculture define the overall future vulnerability of rural populations. The paper outlines the global scenario of the effect that climate change has on agricultural sector, the present trend and status of Indian Agriculture in response to changing climatic conditions, the parameters of climate responsible for the revealed effects on agriculture which directly affects the farmer's security and the adaptation strategies to be devised for persistent growth in the agricultural sector.

Keywords: Climate change, agriculture

Role of renewable energy in addressing climate change

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The world today is entering a new energy era requiring global action and cooperation. Concern is growing over energy security, climate change, and access by the poor to modern energy services. Energy security is becoming a central priority for all nations concerned with promoting healthy economic growth. It includes diversification of energy sources, increasing domestic supply to meet future demand growth, and strengthening efforts to reduce such demand. Over the last six months, a new consensus is developing concerning the need for early action to control greenhouse gas emissions. Climate change is unequivocal and demands urgent action. The atmospheric concentration of CO₂ is already higher than it has been for at least 650,000 years and the average temperature of the earth is heading for levels not experienced for millions of years. Hydro is the main renewable energy source for electricity production right now but is opposed by most of the people. They are used mainly to delay the switch to nuclear power that solves the global warming problem and thus contribute to global warming by keeping the fossil fuel industry in business. Solar is less variable but PV cells cost a lot more and it still needs backup at night and partial backup on cloudy days. The need for backup means that the fossil fuel industry still gets to exist and continue pumping CO₂ into the atmosphere if the way to address climate change is to use wind and solar. Hydro

and geothermal have the reliability to be used for base load although they only work in some locations. Wave and Tidal power when you calculate how much energy there is turn out to be way too diffuse to be useful. Bio fuels show promise but not much because you need land to grow them on and that land could be better used growing food or even being turned back into forest. On the other hand, climate change is a serious and long-term challenge—one that is truly global in its causes, potential effects, and possible solutions. The impacts of climate change are already occurring and future damages are a certainty. Globally, climate change is emerging as the most difficult energy-environment linkage. The production and use of energy contribute more than any other human activity to the buildup of greenhouse gases in the atmosphere and future energy trends will determine how quickly those levels continue to rise and by how much.

Keywords: Renewable energy, climate change, Energy security

Low power low area multiplier based on shift and add architecture by reducing switching activity

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BZ-FAD: A Low-Power Low-Area Multiplier Based on Shift-and-Add Architecture

In this paper, a low-power structure called bypass zero, feed A directly (BZ-FAD) for shift-and-add multipliers is proposed. The architecture considerably lowers the switching activity of conventional multipliers. The modifications to the multiplier which multiplies A by B include the removal of the shifting the B register, direct feeding of A to the adder, bypassing the adder whenever possible, using a ring counter instead of a binary counter and removal of the partial product shift. The architecture makes use of a low-power ring counter proposed in this work. Simulation results for 32-bit radix-2 multipliers show that the BZ-FAD architecture lowers the total switching activity up to 76% and power consumption up to 30% when compared to the conventional architecture. The proposed multiplier can be used for low-power applications where the speed is not a primary design parameter.

Keywords: Hot-block ring counter, low-power multiplier, low-power ring counter, shift-and-add multiplier, switching activity reduction.

Impact of global warming leads to vertical farming

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Climate change is likely to reduce yields of most crops in long-term. In short-term effects may be small (preliminary results, better field data and models needed). Increased climatic variability could cause significant fluctuations in production even in short-term. Adaptation strategies can help minimize negative impacts. These need greater research, policy and financial support. Costs of adaptation are less understood but likely to be high; costs of inaction could be even higher. Adaptation practices take time to become effective. A crop variety, e.g. takes 10-20 yrs to develop. Need to act now. Productivity of most crops would decrease due to increase in temperature and decrease in water availability (especially in Indo-Gangetic plains). Global reports indicate a loss of 10-40% in crop production in India by 2100. Increasing temperature would increase fertilizer requirement for the same production targets and result in higher emissions. Increasing sea and river water temperatures are likely to affect fish breeding, migration, and harvests. Coral reefs start declining from 2030. Increase in water, shelter, and energy requirement for livestock creating alternate livelihood options and reducing dependence on agriculture. In this paper we are going to introduce a new technique called “Vertical farming” is a term coined by Columbia University professor of environmental health. The concept of growing large amounts of food in urban high-rise buildings or so called “farm scrapers.” Each floor will have its own watering and nutrient monitoring systems. His Vertical Farm Project claims that a vertical farm on one acre of land can grow as much food as an outdoor farm on four to six acres. Also, vertical farms, being indoors, wouldn’t be subject to the vagaries of weather and pests. “The reason we need vertical farming is that horizontal farming is failing.”

Key words: Global warming, Climate change, farming

Review assessment on effect of shape of aggregate on super pave gradation of bituminous mixes

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Scientists and engineers are persistently trying to improve the performance of bituminous pavements by applying several kinds of techniques. Bituminous mix design is fragile balancing act among the propagation of various aggregate sizes and bitumen content. Currently, the conventional Marshall Stability method is widely used to design the flexible pavement with bituminous surfacing as wearing course thought in India. In 1987 to 1993, strategic highway research program (SHRP) developed a new product of design a superior performing asphalt pavement (Superpave). The Superpave system ties asphalt binder and aggregate selection into the mix design process, and considers traffic and as well as climate. Superpave was created to make the best technology and to prevent that would optimize asphalt mixtures resistance deformation, fatigue cracking and rutting potential and so on. In this study, the five different types of Gradation, which meets both Superpave and Indian gradation limits, were developed. The five types of gradation were designed and specimens were prepared by Superpave and Marshall Stability method. The specimens of both types are prepared by mixing the flakiness aggregate and elongation aggregate in the mix sample with the optimum asphalt contents. This paper details with assessment of previous paper on the related topic

Keywords: Cracking, Superpave, Asphalt binder, Asphalt Pavement, Gradation.

Energy efficient futuristic building with green standards

Somshekhar Mohanty, R.Abhishek

Dept of EEE

Sathyabama University

This paper outlines the solutions for the futuristic buildings which will be energy efficient and implementation of latest technology in architect and constructions which will serve humans with better standards and green home. Green Buildings has few major areas which have potential to be tapped through appropriate usage in the design of the building by means - The use of Cool Coat, Cool wrap, Insulation Wrap - IR reflection cool co paints result in reduction of power costs. Indoor application gives bright indoor effect due to its reflectivity hence in the visibility. Insulated interior cool co paints adds to the air conditions effectively. Aesthetics apart from the prescribed requirements of energy efficiency, recyclability and day lighting provide higher degree of Acoustic Insulation that ward off unwanted noise from the external atmosphere and can keep itself clean without any maintenance hassles. The rain water can be harvested and used for drip irrigation of the entire landscaping. Use of separate treatment for Black & Grey waste water which will be later treated with UV light, resulting in reduced maintenance cost. For cooling Evergreen Chillers are incorporated. Application of extensive usage of CO₂ sensors for better management of indoor air quality (IAQ) and ventilation. Energy efficient EUROVENT & ARI certified air handling units are used for regulation of better IAQ.

Key words: Insulation Wrap, Acoustic Insulation, innovation & design process, Grey waste treatment, Evergreen Chillers, CO₂ sensors.

Model Contest and Poster session: (25.07.2010)

11.30 AM – 1.00 AM

List of Models

S.No.	NAME	AFFILIATION	TITLES
1.	Nirupa Raghavan, R.Kameshwari, R.Supraja	SSN College of Engineering, Kalavakkam, Chennai	Wind and solar
2.	Aditya sagar & Alok Kumar	Sathyabama University	Solar energy storage
3.	Manigandan.K, Arvind.S, Manikandan.M,(final year)	Sathyabama University	CO ₂ recycle system for power plant
4.	Somshekhar Mohanty and R.Abhishek	Sathyabama University	Magneto Hydro Dynamic (MHD) power generation
5.	Md Sanaullah Siddiqui Sani Navodeep Singh	Sathyabama University	Installation of small scale wind turbine over railway coaches for electric power generation
6.	Atirek Wribhu	Sathyabama University	Pneumatic kit
7.	Manpreet singh Ramkrishna kumar singh	Sathyabama University	Hybridgen model
8.	R.Mary Merina, R.Vishnu Priya, Mohana Shankari,	Bharath University, Madha Engg College, Tagore Engg College	Intelligent sensors
9.	Anupama Maddineni Spandana L. Dhanwantri Singha Bandi. RM Sowjanya	Sathyabama University	Save Energy
10.	S.Vaishali, L.Saranye Shree, P.Aparna	Vels Srinivasa College of Engineering and Technology	Saving energy in household air cooling
11.	S. H Shrawan Kumar F. Syed Wasimullah hussain	Sathyabama University	Electricity from Nano

12.	M.Monisha,K.Mohanapriya, K.Anitha	Vels Srinivasa College of Engineering and Technology	Save energy
13.	Niraj Anand Kashyap Nitish Kumar	Mechanical & production Department B.E (final year) Sathyabama University	Save Energy
14.	Nagaravindra A Dilip Kumar Bhanu Vijay Kiran	Sathyabama University	Production of renewable energy from waste

List of Posters

S.No.	NAME	AFFILIATION	TOIPC
1.	R. Revathi and T. Kavitha	Dhanalakshmi Srinivasan Enginnering College, Perambalur	Detection and projection of moving objects
2.	R.Renugadevi and R.Mythili,	TNAU, Bioenergy, Coimbatore	An optimistic way to utilize waste material with coal for power generation
3.	Pranava.G and Guruswamy Revana	Associate Professor, Vasavi College of Engineering, Hyderabad, A.P	Nanotechnology for waste minimization and pollution prevention
4.	A.L.Skandhaprasaad , Kamaljeet Singh	Sathyabama University	Save Energy
5.	D.Ramachandran, Vinita Vishwakarma, and Subhranshu Sekhar Samal	Centre for Nanoscience and Nanotechnology,	Eco-friendly concrete

		Sathyabama University, Chennai	
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*****Candidates for Only participation in Conference***

R Vajubunnisa Begum -HOD, SIET College, Chennai

N Ramasami- Research Scholar, Andal Alagar College of Engg, Chennai

T Saravanan- Kurinji College of Engg and Technology, Trichy

M Satheesh Kumar- Kurinji College of Engg and Technology, Trichy

K Balamurugan- Kurinji College of Engg and Technology, Trichy

INSTITUTE PARTICIPATED IN TRESAC 2010

B D.College of Engineering,Sevagram ,Wardha, Maharastra
Centre for Materials for Electronics Technology(C-MET) , Hyderabad
JNTU, Andhra Pradesh
SRM University, Chennai
Pondichery Engineering College, Pondichery
Anna University, Chennai
Dhanalakshmi College of Engineering, Chennai
SSN College of Engineering, Chennai
TNAU,Coimbatore
St.Peter's engineering College, Chennai
Jawaharlal Darda Institute of Engineering and Technology, Maharashtra
Krishanasamy College of Engg and Technology ,Cuddalore
Bharathidasan University,Trichy
St.Joseph College of Engineering, Chennai
Sun College of Engineering and Technology, Nagercoil
Udaya School of Engineering, Nagercoil
SRR Engineering College, Chennai
Sudharsan Engineering College, Sathiyamangalam, pudukkottai
Dhanalakshmi College of Engineering, Chennai
N.I.T. Hamirpur (HP)
MVJ College of Engineering, Bangalore
Oxford Engineering College, Bangalore
R.G.M College of Engineering and Technology, AP
Rajalakshmi Institute of technology, Chennai
Hindustan College of Engineering, Chennai-103
Sri Shridi Sai Institute of Science &Technology, Andra Pradesh
Srisairam Institute of Technology, Chennai.
Vignan's Nirula Institute of technology and science for women, Guntur, AP
Vasavi College of Engineering, Hyderabad, A.P
Panimalar Engineering College, Chennai

Priyadarshini Engg college, Vellore
Sri Ramakrishna Engineering College, Coimbatore
Anand Institute of Higher Technology, Chennai
Jeppiar Engineering College, Chennai
Alagappa College of Technology, Chennai
Bharath University, Chennai
Vels Srinivasa College of Engineering of Technology, Chennai
National Institute of Ocean Technology, Chennai
Karunya university, Coimbatore
Central Leather Research Institute, Chennai
Adhiparasakthi Engineering College, Melmaruvathur
Indira Gandhi Centre for Atomic Research, Kalpakkam
L.D.College of Engineering, Ahmedabad, Gujarat
Jawaharlal Nehru University, New Delhi
SASTRA University
RGM Engineering College, Kurnool , Andhra Pradesh
Madha Engg College, Tagore Engg College
Dhanalakshmi Srinivasan Enginnering College, Perambalur
SIET College, Chennai
Andal Alagar College of Engineering, TN
Kurinji College of Engineering and Technology, Trichy
ESAB, Chennai

Special Poster Abstract

DETECTION AND PROJECTION OF MOVING OBJECTS

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¹Assistant Professor, ²Lecturer

Dhanalakshmi Srinivasan Engineering College, Perambalur

The use of video is becoming prevalent in many applications such as monitoring of traffic, detection of pedestrians, identification of anomalous behavior in a parking lot or near an ATM, etc. While a single image provides a snapshot of a scene, the different frames of a video taken over time registers the dynamics in the scene, making it possible to capture motion in the sequence. A key task in mining video data is the detection and tracking of moving objects, such as people and vehicles, through the video frames. Motion is very important in making objects easy to recognize as soon as they move, even if they are inconspicuous when still. Motion also carries information about the spatio-temporal relationships between objects. This allows us to model their interactions, enabling us to identify normal patterns and detect unusual events. The detection and tracking of moving objects is a task which must be performed accurately and robustly to minimize false alarms and missed positives, and in real-time to enable corrective action. Detection of moving objects in video can be difficult for several reasons. We need to account for possible motion of the camera, changes in illumination of a scene, objects such as waving trees, objects that come to a stop and move again such as vehicles at a traffic light, etc. Once the moving objects have been identified, tracking them through the video sequence can also be difficult, especially when the objects being tracked are occluded by buildings or move in and out of the frame due to the motion of the camera. This tracking approach infers the trajectory and bounding box of the moving objects by searching the optimal path with maximum joint probability within a fixed size of buffer. We demonstrate the performance of the proposed approach on real video sequences where parallax effects are significant

Key Words: Foreground extraction, subtraction techniques, foreground validation, region extraction

ENERGY SAVING CLIMATE CHANGE TIPS FOR YOU


ORGANISATIONS THAT CAN HELP

SOLAR SCHOOLS PROGRAM




WATER HEATING

PUT TIMERS ON URNS OR USE A KETTLE



CONSIDER GOING SOLAR FOR WATER HEATING SYSTEMS



USE LOCALLY GROWN PRODUCE

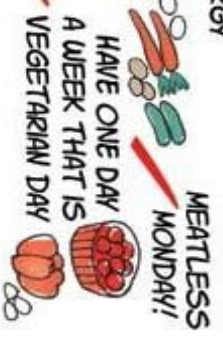


CHOOSE FRIDGE WITH A GOOD ENERGY STAR RATING



HAVE ONE DAY A WEEK THAT IS VEGETARIAN DAY

MEATLESS MONDAY!



CANTEEN

TRANSPORT

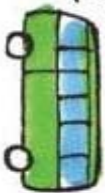
WALK



RIDE A BIKE



TAKE THE BUS TO SCHOOL



WASTE

REDUCE LUNCH TIME RUBBISH



COMPOST RECYCLE




LIGHTING


AT RECESS/ LUNCH



TURN OFF LIGHTS



USE ENERGY EFFICIENT LIGHTS



OFFICE EQUIPMENT

LOOK FOR A GOOD ENERGY STAR RATING



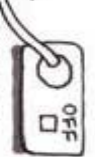
TURN OFF

TURN COMPUTER OFF AT POWERPOINT WHEN NOT IN USE



TURN OFF

TURN OFF AT POWERPOINT PHOTOCOPIERS, COMPUTER PRINTERS OUTSIDE SCHOOL HOURS



AIR HEATING AND AIR CONDITIONING

INSULATE BUILDINGS



LOW DO THIS



SET THERMOSTAT TO 18°C - 20°C IN WINTER AND 26°C IN SUMMER

ONLY USE HEATERS WHEN THE SPACE IS OCCUPIED

THEN POWER BILL \$110 NOW POWER BILL \$40



KEEP DOORS AND WINDOWS CLOSED WHEN HEATING OR USING REFRIGERATIVE AIRCONDITIONING

