ICSICCST-2013

1st International Conference on Sensing for Industry, Control, Communication & Security Technologies

June 24-26, 2013

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Abstracts Book

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CONFERENCE ORGANIZERS

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- Mr. Muhammad Ahmed Amin, Chair ICSICCST'13, Vice Chancellor, Indus University
- Prof. Dr. Muneer Ahmed Qureshi, Pro Vice Chancellor, Indus University

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ABOUT ICSICCST'13

The title of the conference, "Sensing for Industry, Control, Communication & Security Technologies" is very apt in capturing the main issues facing the industry of Pakistan. We believe the sensing industry, particularly in Pakistan, is currently at a critical juncture of its development. The future of the industry will depend on how the industry players choose to respond to the challenge of global competition and opportunities arising from strong growth in the Asian region for which we are pleased to note that the conference will cover a comprehensive spectrum of issues with an international perspective. This will certainly assist industry players to make informed decisions in shaping the future of the industry.

The conference mainly aims at forging and enhancing linkages between IT/Engineering industry and academia by creating a mechanism for strengthening dialogues between industry and academia by providing a platform to establish national level facilities of Engineering & Technology through collaboration between industry(s) and institutions for product development, basic research, consultancy & training purposes.

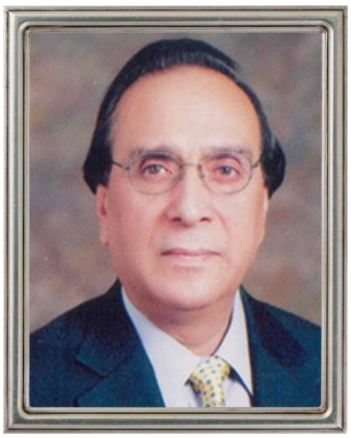
This conference will gather qualified researchers from developed countries like USA, UK, Sweden, Saudi Arabia, China, South Korea and Malaysia etc whose expertise resulting from the research can be drawn-upon to build an exploitable area of new technology that has potential Defense, Homeland Security, and Military applicability.

The major benefit of ICSICCST'13 include promotion, guidance and coordination of scientific and industrial research in Pakistan; and will provide a chance to share and study problems affecting particular industries and trades, therefore the primary beneficiaries of this conference will be local industry. Researchers from historically disadvantaged industries will be assisted through sensing technologies programmes. This will facilitate their full participation in the sensing industry.

More than 20 highly qualified researchers / professors are invited from different parts of the country and globe, having relative research ideas in order to promote research culture in the country by forming research groups.

This conference will provide platform for the researchers and developers of sensing industry to collaborate in development of sensing products, which are on the move towards commercial usage in the communication, automotive, security, and law enforcement, imaging, environment, and health. The researchers from different part of world gathers to form discussion groups that lead to the development of joint research projects in the country, therefore the citizens of country are also beneficiaries of this event. While the junior researchers of the sensing domain will also be beneficiary as they form a discussion group to promote their ideas for the advancement of technologies in the country.

Messages



Mr. Khalid Amin
Chancellor,
Indus University

I am overwhelmed that Indus University has taken a daring step in organizing the 1st International Conference on Sensing Technology, Control Communications & Security Technologies (ICSICCST 2013) keeping in view the rising trend being observed in the field of sensing technology. I extend my heartfelt gratitude to the conference steering committee, organizing team, volunteers, well-renowned sponsors from the corporate world (Hilton Pharma & Al-Riaz Agencies Pvt. Ltd.), national/ international speakers and last but not the least; H.E.J Research Institute of Chemistry (ICCBS) & National ICT R&D Fund for making this conference possible.

We are hoping that the platform of ICSICCST'13 will provide a tremendous opportunity to the audience and they can cultivate conversation with the academicians, researchers and the industry experts and might generate the possibility of working with them in the joint projects.

In addition, there is a void explicitly noticed between academics and industry and the students are not well-versed with the current developments taking place in the industry hence this conference will expose the young lot with the research & development culture and they would come to know about state of the art research activities.

I once again acknowledge the endeavors of all the stakeholders who have worked relentlessly to make this conference and its associated activities a worth attending event.

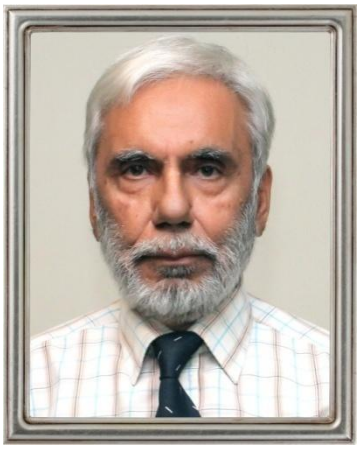
Mr. Muhammed Ahmed Amin
Conference Chair
ICSICCST'13
Vice Chancellor,
Indus University

It is noteworthy to mention that Indus University takes good heed of organizing conferences, colloquiums and guest speaker sessions to equip the students with the current trends and practices and in this regard, ICSICCST'13 has been held with an aim to:

- Develop practical solutions for creating widespread benefits & value for society thereby; enhancing the reputation of electrical, electronics, biological, and chemical research as a source of well being & prosperity.
- Encourage tran's disciplinary and translational research that will identify electrical, electronics, biological and chemical sensors development.
- Solicit applications from researchers/ scholars to present papers related to sensors/ sensing technology used extensively in Controls & Automation.
- Propose techniques/methods that could explore a unique multi-disciplinary approach to electrical, electronics, controls, bio medical and Bio Chemical sensing challenges that are high risk but have a considerable payoff and also develop data leading to significant future research.

Nevertheless, ICSICCST'13 received a marvelous response and 107 papers were received – confirming a trend of increasing interest in sensing technology – coming from 8+ different countries including; USA, UK, Sweden, China, Malaysia, Saudi Arabia, South Korea e.t.c. The proceedings of the papers will be published by IoP (Institute of Physics) open access database. The internal reviewing panel approved 63 papers out of the total, I am sure that the audience will be enthralled with the keynote speaker session, tutorial, poster session and a cultural show accompanied with the banquet dinner, especially conducted for our national and international invited speakers.

I congratulate the entire team for their untiring efforts and wish that such kind of events will be arranged by our University in the future to disseminate knowledge and excel the vision of our pupils.



Prof. Dr. Muneer Ahmed Qureshi
Pro Vice Chancellor,
Indus University

First and the foremost I express my utmost gratitude to ALLAH (SWT) who enabled us to arrange the 1st International Conference on Sensing for Industry, Control, Communication & Security Technologies. It's a great source of inspiration and satisfaction, that every member of the team extended generous cooperation and assistance while organizing ICSICCST'13. It is indeed my pleasure to thank them all for their tireless commitment to make this mega event a real success.

It's a matter of contentment to mention that ICSICCST'13 aims at providing an occasion for national and international researchers to present the most recent advances and future challenges in the fields of Electronics, Controls, Communication and Sensor & Systems, ICSICCST'13 aims to facilitate a dialogue between major industry players and academia to help create a roadmap for the development of tangible research environment in the country.

There has been overwhelming response in terms of paper submission as researchers and academicians from more than 8 countries including USA, UK, Sweden, Saudi Arabia, Malaysia, South Korea, China, and Pakistan submitted papers, All papers received have underground proper and intensive review process, Indus University indeed feels proud that ICSICCST'13 proceedings will be published by **Institute of Physics (IOP) Publishers in** *Materials Science and Engineering (MSE) Journal.*

It has been a tremendous experience to be a part of the ICSICCST'13, and I am hopeful that we all will be enlightened by the wisdom shared at the ICSICCST'13. All this would have not been possible without the help, cooperation and patronage of the entire organizing committee. .My heartiest congratulations to each and every person involved in ICSICCST'13 for playing his/her role in staging this mega International Conference

Last but not least, we wish to thank all participants for attending the conference and sincerely hope that you will admire ICSICCST'13.

Prof. Dr. Atta-ur-Rahman, *FRS*

Nishan-i-Imtiaz, Hilal-i-Imtiaz,
Sitara-i-Imtiaz, Tamga-i-Imtiaz
Ph.D. (Cambridge), Sc.D. (Cambridge)

UNESCO Science Laureate

HEC Distinguished National Professor

Patron-in-Chief, ICCBS

It gives me great pleasure to learn that Indus University is organizing the "International Conference on Sensing for Industry, Control, Communications, and Security Technologies (ICSICCST) 2013" in collaboration with H.E.J. Research Institute of Chemistry, University of Karachi. The theme chosen is critically important for Pakistan in view of the rapid advances in information technology and its impact in a variety of fields such as industrial control systems, communication technologies, internet security, bioinformatics and a host of other fields. Today cars can be driven purely by thought control, buildings can be constructed by flying robotic machines (quadcopters) and complex equipments can be manufactured by 3D printing. A revolution is also under way in education through the advent of Massive Open Online Courses (MOOCs). It is vitally important for Pakistan to use these new technologies for industrial and agricultural development as well as for defence purposes.

I wish the organizers all success and hope that the participants will find the event intellectually stimulating.

PROF. DR. ATTA-UR-RAHMAN, *FRS*
UNESCO Science Laureate *N.I., H.I., S.I., T.I.*
Patron-in-Chief

Prof. Dr. Muhammad Iqbal Choudhary
Hilal-i-Imtiaz, Sitara-i-Imtiaz, Tamgha-i-Imtiaz
Ph.D. (University of Karachi)
Director /Distinguished National Professor
ICCBS H.E.J Research Institute of Chemistry

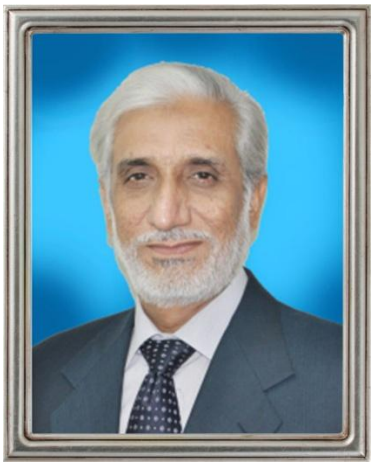
SENSOR TECHNOLOGY AS INSPIRATION

It gives me a great pleasure to write a few lines about the event entitled, "The International Conference on Sensing for Industry, Control, Communications and Security Technologies- ICSICCST 2013", aimed at finding sensor technology driving solutions for industries in Pakistan. The theme reflects the power of sensors to transform our work place, homes and society as a whole. This will demonstrate the future world when technology and inspiration will meet to achieve the solutions, whether interacting with our environment (and having it interact with us) or employing them for the production of value-added goods.

The conference program will help the participants to explore the most innovative and emerging solutions in sensor technology. Advances in sensor technology, electronics, and software expand the number and types of sensors available to us as well as altering and expanding the ways in which we use them. Advances are possible when we couple technology and imagination to discover solutions. This requires in-depth knowledge, research information and partnership with leading authorities in the field.

I am sure the local and foreign experts, participating in this important event, will enlighten us with the latest research conducted in this field and help us to achieve major direction to our own indigenous research aimed at creating an environment which brings well being and prosperity to the people. Once we are able to find the right approach to meet the challenges, being faced in the important fields of electrical, electronics, biological and chemical research, we will be able to develop data which will contribute to future research, bringing tremendous benefits to the mankind.

I wish that the conference turns out to be a major success and untiring efforts of the competent team of organizers, under the leadership of young and dynamic Vice Chancellor of Indus University, Mr. Muhammad Ahmed Amin, are suitably rewarded.



Engr. Syed Abdul Qadir Shah
Chairman,
Pakistan Engineering Council

It gives me immense pleasure that Indus University is organizing International Conference on Sensing for Industry, Control, Communication and Security Technology; (ICSICCST). It is a great pleasure and honor for me to extend this message which is to be published and distributed on the auspicious occasion of the ICSICCST'13. The Conference is bringing industry-academia in collaboration; a phenomenon that is vital for the technological development of a country.

ICSICCST'13 aims to bring together a wide spectrum of international experts to facilitate experts' collaboration and knowledge transfer. In particular it will facilitate to interact between major industry players, entrepreneurs and academia to help create a roadmap for the development of tangible research environment in the country.

The conference will provide opportunities to attend interactive, high quality, peer reviewed sessions and detailed insights from forward thinkers working in the theme of the conference.

On the auspicious occasion of International conference I sincerely congratulate the organizers of the conference and extend my appreciations to the Institute of Physics (IOP), National ICT R&D Pakistan, HEJ Research Institute of Chemistry and the Industry sponsors.

Ms. Zia Batool
Director General-QA & Statistics
Higher Education Commission
Islamabad. Pakistan

Attending a conference on any theme; be it social, academic or religious is always a rewarding experience as the participation is honored with the number of benefits. Conferences are a good source of professional development and apart from classroom learning; the academia get an opportunity to liaise with the industry experts, get lots of information which can help them to excel in their professional lives.

Since the Indus University is organizing an International Conference on Sensing for Industry, Control, Communication and Security Technology; it is honor for me to extend this message which is to be published and distributed on the auspicious occasion of the ICSICCST'13. The Conference is bringing industry-academia in collaboration; a phenomenon that is vital for a move towards building a knowledge economy.

ICSICCST'13 aims to bring together a wide spectrum of international experts to facilitate experts' collaboration and knowledge sharing. In particular it will facilitate a dialogue between major industry players, entrepreneurs and academia to help in creating a roadmap for the research development in the country.

The conference will consist of keynote speakers, both from industry and academia, panel discussion and multi-track technical programmes. The participants will be greatly benefitted by interactive, high quality, peer reviewed sessions which will provide detailed insights from forward thinkers working in the core thematic areas of the conference.

The contributions of Institute of Physics (IOP), National ICT R&D Pakistan, HEJ Research Institute of Chemistry and the Industry sponsors are appreciable for their support in organizing this conference.

Mr. Muhammed Ahmed
CEO,
National ICT R&D Fund
Ministry of Information Technology

I congratulate the team at Indus University for organizing the International Conference on Sensing for Industry, Control, Communications, and Security Technologies (ICSICCST) 2013. Let me take this opportunity to briefly describe the significant achievements of National ICT R&D Fund. The Fund established in 2006 by the Federal Government, under Section 42 of Companies Ordinance has the mandate to fund sound technical R&D proposals. The Fund encourages practical and concrete proposals in the field of Information and Communication Technologies (ICTs). The organization believes in an accurate mobilization of its resources where emphasis is given to achieve technical excellence, innovation and its diffusion and positive impact on the economic growth of the country as well as for the benefit of the society at large.

The Fund till-date has funded 86 Technical R&D projects worth about Rs1.42 billion. These projects aim at developing ICT enabled systems and tools in areas that are in congruence with the socio economic landscape of Pakistan.

In addition to this National ICT R&D Fund has also initiated a number ICT centric Human Resource Development initiatives, foremost amongst these is the Prime Minister's National ICT Scholarship Program, through which 3,197scholarships have been awarded to students of undergraduate studies in ICTs related disciplines mostly from rural areas on pure merit. Around Rs. 1.85 billion has been disbursed on such scholarships.

In addition this organization also funded a National IT Internship Program, through which 800 interns will be hired from all provinces of the country. The Fund has also launched initiatives like National Grass-roots ICT Research Initiative, which is aimed at providing financial assistance to undergraduate students of chartered Public and Private Universities enrolled in ICTs disciplines and have initiated their Final Year Projects (FYPs).The Fund also has a National ICT Research Outreach Program, which is aimed to create an enabling research environment within universities in under-served areas of the country that are not currently benefitting from our funding associated with technical R&D projects.

I appreciate the organizing committee and all people associated with this conference and hope for a successful conference.

Sardar M. Yasin Malik
Chairperson,
Hilton Pharma Pvt. Ltd.
Karachi, Pakistan

I appreciate the Organizing Committee of ICSICCST'13 for conducting a conference on a huge scale at H.E.J International Center of Chemical & Biological Sciences (ICCBS) and it is good to have speakers from almost eight countries. These events will certainly help to create a soft image of Pakistan across the world. The conference will provide the rich content of knowledge to the students and they will come to know how the things are actually applied and executed in the real world.

The Program chairs and the review committee deserve huge round of applause for their remarkable work carried out to produce high quality and error free papers. We take it as a privilege to be a part of this conference and it has been one of our prime objectives to serve the education sector in the best possible manner.

Moreover, the themes discussed in this conference focused on inter-disciplinary approach and presenters have tried their best to cover all the necessary substance in their papers.

In brief, the conference program is rich and comprised of various activities such as keynote sessions/ poster sessions, etc. I wish all the best to the concerned body and hoping that the desired results are achieved. The conferences / seminars should be arranged frequently as they pave the way for open dialogue and interaction with the role models.

We wish to work with Indus University in the forthcoming events and congratulate them for their unprecedented progress.

Mian Nasser Hayatt Maggo
CEO
Al-Riaz Associates Pvt. Ltd.
Karachi, Pakistan

Al-Riaz Associates Pvt. Ltd. since its inception has been a key promoter of higher education learning and in connection to this, many educational institutes/ universities have been provided financial support to hold the events appropriately. The endorsement of ICSICCST'13 has been a great experience and we firmly believe that this conference would play a vital role by informing the masses about the implications of sensing technology. The themes highlighted are rich and covers a wide area of knowledge including; chemical sensing, 3D imaging, automation, defense, signal processing, mining, etc. The latest developments in the said field have brought a paradigm shift in the modern age and life has never been so easy and convenient as before we, therefore, are glad to sponsor this mega-scale event and willing to develop long lasting and mutual relationships with Indus University in the future.

We desire to have some more organizations from the corporate world to come forward and being a responsible citizen, make their valuable contributions. It is high time to serve the planet and people along with generating the profits and our little efforts could change the socio-economic conditions of Pakistan.

The students who are the linchpin of the nation must attend all such events as they can enhance their learning and get a desired exposure of the practical world. They would be equipped with the novel ideas and develop a holistic approach towards life.
Nonetheless, we are grateful to the organizing committee as this association couldn't have been possible without their humble guidance and last but not the least, we wish to thank all the participants for attending the conference and sincerely hope that they will like ICSICCST'13.

Prof. Dr. Ahmed Shuja Syed

Executive Director, Centre for Emerging Sciences, Engineering & Technology, Islamabad & Advisor (Engineering Programs), International Islamic University, Islamabad

It gives me great pleasure to welcome everybody in the 1ST International Conference on Sensing for Industry, Control, Communications, & Security (ICSICCST) in Karachi. This international conference will provide an interdisciplinary discussion forum for experts in the fields of diverse sensor technologies and applications. The conference aims at bringing together engineers, computer scientists, physicists, chemists, mathematical modelers and biologists from both industry and academia to discuss works in progress and to explore the possibility of collaborative efforts and linkages. The market for sensors and allied technologies is expanding at a phenomenal growth rate. Consequently, the conference program is designed in such a way to exhibit the same trends and to explore the most up-to-date innovations in sensors for industry including physical sensors, sensor networks, biosensors, MEMS/nanotechnology, instrumentation & controls, intelligent systems, machine-to-machine communication, wireless sensing and enabling IT technologies. The technical program also focuses on today's most important sensing trends and technologies, including MEMS, Energy Harvesting, Wireless Sensing Solutions, Sensor and System Design, Novel Approaches to Measurement & Detection, Mobile Sensing, RFID and Applied Sensors etc. The evolution of the nano-and micro-technologies, nano-materials and devices, the new business services, and defense and security applications make the sensor industry and research on sensors very challenging, and thus this aspect is also covered in the technical program of this conference. I am sure that this first conference on sensor technology will pave its way as a regular feature with much wider and dynamic audience in coming years.

Invited Speakers

Dr. Muhammad Ali Imran
SENIOR MEMBER IEEE
READER IN COMMUNICATIONS,
UNIVERSITY OF SURREY, UK

Biography

Dr Muhammad Ali Imran obtained his BSc in Electrical Engineering (Electronics and Communications) from University of Engineering & Technology Lahore in 1999, and obtained his MSc degree from Imperial College London in Communications and Signal Processing in 2002. He was awarded the Diploma of Imperial College and the PhD degree from Imperial College and University of London in 2007.

In 2009, He joined the faculty of Engineering and Physical Sciences (FEPS) at the University of Surrey as a Lecturer in Communications. He coordinated the University of Surrey team involved in FP7 EC funded project EARTH - looking at Energy Efficient Next Generation of Cellular Networks. The project has won 2012 Best project for the Future of Internet award. I also lead the Theme 9 of India UK Advanced Technology Centre research - Self Organising Multihop Networks. He also supervised a Huawei funded project on a novel air interface technique: LDS-OFDM.

Currently, He is leading an EPSRC funded project - REDUCE that aims to reshape the energy demand of end users using ICT and economic incentives.

TITLE: Transforming energy demand of users using ICT and sensor networks: A multidisciplinary challenge

ABSTRACT:
The potential of wireless communications has been recognised for improving the energy efficiency of users and individuals through persuasive techniques. In this presentation, an experimental setup will be presented that is used for reshaping individual user[1]s behavior to make it more energy efficient. An overview of the persuasive energy network developed at a living lab in CCSR - Centre for Communication Systems Research at the University of Surrey - will be given. Some multidisciplinary challenges and the approaches to tackle them will be discussed. Recent results and findings will be summarized and reviewed. The presented work forms part of a £1.2 million project, titled [3]REDUCE[2], funded by Research Councils UK (RC-UK).

Dr. Shashi Buluswar

EXECUTIVE DIRECTOR, LAWRENCE BERKELEY NATIONAL LAB
BERKELEY, CA, USA

Biography

Dr. Shashi Buluswar joins LIGTT from Dalberg Global Development Advisors, an organization which gives strategic advice to governments, the UN, NGOs and foundations on issues such as economic development, health, agriculture, climate change, education and post-conflict reconstruction. Over the past year, he has worked with the LBNL team to shape the idea of LIGTT.

In recent years, Dr. Shashi has worked with the UN's Peacekeeping Department to restructure global operations, with the Bill & Melinda Gates Foundation to launch large-scale agricultural development programs in Africa and Asia, with the US government on post-conflict development in Afghanistan, with several multinational corporations to improve their social responsibility agendas, and dozens of NGOs fighting for human rights, health, education, and economic empowerment. Shashi also teaches International Development at UC Berkeley, and is currently writing a textbook on the topic.

He holds a Ph.D. in Robotics from the University of Massachusetts at Amherst, and an MBA from the Northwestern University's Kellogg School of Management. Before his career in Global Development, Shashi taught at Northwestern University, and was an Associate Partner at the consulting firm, McKinsey.

Beyond his professional interests, Shashi spent a decade competing on the Indian national rowing team, and recently made a critically acclaimed documentary film about the India-Pakistan conflict. Shashi was born and raised in India, and has traveled to about 70 countries.

TITLE: Breakthrough technologies for improving health among the global poor

ABSTRACT:

The LIGTT Institute focuses on developing a new generation of low-cost, energy-efficient technologies to combat global poverty and improve health and quality-of-life for the global poor. This talk will focus on:

i. A rigorous method for identifying the most critical scientific and technological required to address these problems:Using examples of two pressing health conditions—

TB and maternal mortality—this approach demonstrates how conventional approaches need to be revisited.

ii. An innovative technology for delivering vaccines to remote areas, along with tracking of immunization data: This new refrigeration technology is based on a thermoelectric cooling engine, an innovative heat transfer engine, and mobile telemetry.

iii. A device for low-cost DNA-based diagnosis for TB: By combing polymerase chain reaction, microfluidics, digital microscopy, and single-nucleotide polymorphisms (SNPs) of a large number of bacterial strains, this technology aims to deliver affordable point-of-care diagnosis of drug-sensitive, multi drug-resistant (MDR), and extensively drug-resistant (XDR) TB for low-income patients.

Prof. Dr. Asghari Maqsood
(SITARA-IMTIAZ), FELLOW PAKISTAN ACADEMY OF SCIENCES
MERITORIOUS PROFESSOR
NATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY
ISLAMABAD

Biography

Prof. Maqsood started her professional career with an outstanding background at Quaid-i-Azam University. She established the Thermal Physics Laboratory in collaboration with Gothenburg and Uppsala Universities, Sweden. It is the first advanced research laboratory in the country that was headed by a women scientist. Prof. Maqsood is involved in the cutting edge research of advanced materials comprising rare-earth disilicates, high-Tc superconductors, ferrites, composites and semiconductor thin films for solar cells applications.

She joined School of Chemical and Materials Engineering (SCME) in Jan-2008 with 37 years of teaching and research experience. Currently, she is at the National University of Sciences and Technology (NUST) where she is involved in post graduate teaching and research. Prof. Maqsood has established Thermal Transport Laboratory at SCME, NUST.

TITLE:

ABSTRACT:
Thermal conductivity and thermal diffusivity are two important physical properties for designing any food engineering processes. The knowledge of thermal properties of the elements, compounds and different materials in many industrial applications is a requirement for their final functionality. Transient plane source (tpl) sensors are reporte d to be useful for the simultaneous measurement of thermal conductivity, thermal diffusivity and volumetric heat capacity of insulators, conductors liquids and high-Tc superconductors. The tps-sensor consists
of a resistive element in the shape of double spiral made of 10 micrometer thick Ni-foils covered on both sides with 25 micrometer thick Kapton. This sensor acts both as a heat source and a resistance thermometer for recording the time dependent temperature increase. From the knowledge of the temperature co-efficient of the metal spiral, the temperature increase of the sensor can be determined precisely by placing the sensor in between two surfaces of the same material under test. This temperature increase is then related to the thermal conductivity, thermal diffusivity by simple relations. The tps-sensor has been used to measure thermal conductivities from 0.001 $Wm^{-1}K^{-1}$ to 1000 $Wm^{-1}K^{-1}$ and temperature ranges covered from 77K- 600K. This talk gives the design, advantages and limitations of the tpl-sensor along with its applications to the measurement of thermal properties in a variety of materials.

Prof Dr Bhawani Shankar Chowdhry
DEAN
FACULTY OF ELECTRICAL, ELECTRONICS, & COMPUTER ENGINEERING
MEHRAN UNIVERSITY OF ENGINEERING & TECHNOLOGY
JAMSHORO - PAKISTAN

Biography

PROFESSOR DR BS CHOWDHRY is presently serving as a Dean Faculty of Electrical Electronics and Computer Engineering and has been serving as a Chairman Electronics Department MUET since past 19 years. He is pioneer of two more departments viz-a-viz Telecommunication Engineering and Biomedical Engineering in the University. He also recently completed one year Postdoctoral Fellowship from the School of Electronics and Computer Science, University of Southampton, UK.

He has varied experience in diversified fields such as Electronics, Computer Systems, Telecommunication, Microprocessor Technology, Intelligent Instrumentation, Telemedicine, e-Commerce, computer application and system optimization etc. After completing his first degree in Electronic engineering discipline, he did PhD in the field of Microprocessor Based Intelligent Instrumentation from the school of Electronics and Computer Science (ECS) University of Southampton, UK. Upon his return to Pakistan, he rejoined Electronics department as a faculty and have been serving since past 19 years in various capacities from Lecturer to Professor and Head of the dept. In addition, I was appointed as a Dean Faculty of Electrical Electronics and Computer Engineering in April 2011 for period of 3 years.

He supervised/co-supervised 5 PhD's and more than 50 MPhil/Master's Thesis in the area of ICT. His list of research publication crosses to over 60 in national and international journals, IEEE and ACM proceedings. He also has credit of becoming one of the editor of books "Wireless Networks, Information Processing and Systems", CCIS 20, and "Emerging Trends and Applications in Information Communication Technologies", CCIS 281 published by Springer Verlag, Germany in addition to more than dozen books published nationally. He is recipient of Higher Education Commission (HEC) University Best Teacher Award 2001 (Awarded by Federal Minister of Education) and National Cultural Award-2002 in recognition of achievements in the field of Engineering Profession (Awarded by Federal Minister of Culture, Tourism, Minorities affairs, 23 Sep 2002) and Presidential Highest Academic Distinction Award (Izaz-e-Fazeelat) in 2009.

He is also actively serving national and international professional and scientific bodies in various capacities including: Chairman IEEE Communication Society (COMSOC), Karachi Chapter, Region10 Asia/Pacific, Fellow IEEEP, Fellow IEP, Senior Member, Institute of Electrical & Electronic Engineers Inc. (USA), Senior Member, Association of Computer Machinery (ACM), USA, Member IEEE Industrial Electrical Society, Member IEEE Communication Society, Member IEEE Society on Social Implications of Technology, Member IEEE Education Society, Member IEEE Instrumentation & Measurement Society, Member, The International Society for Telemedicine & e-Health (ISfTeH), Switzerland, Member, World Federation of Engineering Organization (WFEO), France, Member, International Association of Engineers (IAENG), Member Engineering Accreditation

Committee PEC, Member Governing Body PEC (2012-2014), Expert reviewer ICTR&D, and various HEC reviewers/experts Committees, Honorary Consulting Editor Engineering review.

Also he was appointed as a Lead person at MUET for two European Commission Erasmus Mundus exchange programs "Mobility for Life" and "Strong-Ties".
He is the founder Branch Counselor of IEEE MUET Chapter and holding the position since more than a decade. In this capacity, he organized more than 3 dozens events/seminars/conferences/workshops under the umbrella of IEEE including mega events like IEEE SCONEST and Tech-Combat.

He remained Chief organizer of three International conferences IMTIC08, IMTIC12 and WSN4DC13, reviewer / TPC member of many IEEE/ACM conferences, and the Guest editor of Springer impact factor Journal of Wireless Personal Communication.

TITLE: Wireless Sensor Networks: A Journey from Laboratory to Industry for all time to come

ABSTRACT:

With the emergence of nanotechnology, the pervasive and ubiquitous environments are becoming reality. The key enabler technology for these environments is Wireless Sensor Networks (WSNs). We have seen lot of WSN advancements during recent past at the laboratories level research and military domain. The world is now moving fast toward the use of WSN and its endless applications in the industry for all time to come.
WSN is a large grouping of low-cost, low-power, multifunctional, and small-sized sensor nodes. These sensor nodes typically comprise hundreds of small devices all wirelessly communicating with each-other. Sensor networks are distinct from traditional computing domains. Their design is being embedded in common environments instead of dedicated ones. A sensor node typically contains an application-based sensor, a processor and a communication device, all built on a single tiny chip. A wireless sensor network is concerned to be a major drift towards new generation of communications. It is the biggest factor supporting ongoing miniaturization of processing and storage, which paves new highways for embedded system. Wireless sensor networks are enabling applications that previously were not practical. WSN are deployed in many industrial and civilian application areas, including industrial process monitoring and control, health monitoring, environment, glaciers and habitat monitoring, healthcare applications, home automation, and traffic control and monitoring.

As new standards based networks are released and low-cost low-power systems are continually being developed, we will start to see the widespread deployment of wireless sensor networks in every walk of life.

Prof. Dr. Ahmed Shuja Syed

EXECUTIVE DIRECTOR, CENTRE FOR EMERGING SCIENCES, ENGINEERING & TECHNOLOGY (CESET), ISLAMABAD
& PRINCIPAL INVESTIGATOR, IDB FUNDED ADVANCED ELECTRONICS LABORATORIES, INTERNATIONAL ISLAMIC UNIVERSITY, ISLAMABAD

Biography

Prof. Dr. Ahmed Shuja Syed is currently the Executive Director of Centre for Emerging Sciences, Engineering & Technology (CESET), Advisor on the Engineering Programs to the Higher Management of International Islamic University (IIU) and Principal Investigator of Islamic Development Bank's Funded Advanced Electronics Laboratories. He is also the former Dean of Faculty of Engineering & Technology at IIU. With MS Engineering from Sweden and Ph.D. in Electrical and Electronics Engineering from University of Surrey, UK, Dr. Shuja started contributing the world's most reputed Ion Beams Facility in UK as Facility Liaison Fellow, where he served for four years engaging him with global industrial and academic partners. He conducts research in the broader areas of Nano-scale Semiconductor Process Engineering with a special focus on designing and fabrication of next generation electronic and photonic devices, sensors and micro-systems. Most of Dr. Shuja's work in public domain deals with the real-time applications of ion beam induced damages for applications in future electronic and photonic industry. As guest scientist, Dr. Shuja maintained very close collaborative linkages with some of the world's most renowned scientific facilities such as Lawrence Berkeley National Laboratory, USA, Bell Labs, USA and Nanoelectronic engineering facilities at MIT, KSU and Michigan, USA. Prof. Shuja also co-founded two companies in 2006 and 2012, which are now having presence in UK, USA and Pakistan with a focus on IT and next-generation electronics. Higher Education Commission has also focused and highlighted Dr. Shuja's contributions as academic leader of Faculty of Engineering at International Islamic University in its official newsletter in February 2011.

TITLE: Semiconductor Process Engineering For Devices And System Development In Sensor Technology

ABSTRACT:

Our research in the area of micro and nano-electronic devices (such as Si-CMOS, Nano Electro Mechanical Systems (NEMS), CMOS process compatible bio-MEMS etc.) and photonics (such as photonic ICs, Quantum Well Infra-red Photodetectors (QWIP) etc.) is focused on the applications of ion beams to these structures and systems used for sensor technology. Ion beams play a vital role in the manufacturing of silicon microchips and III-V hetero-structures and have underpinned many of the major technological breakthroughs in these areas. An overview of such research will be presented to evaluate the potential of semiconductor process engineering for the next generation sensor technologies.

Dr. Amir Karim
SENIOR RESEARCH SCIENTIST
ACREO SWEDISH ICT
KISTA, SWEDEN

Biography

Dr. Karim graduated (PhD Material Science) from Linköping University, Sweden, in 2008. He continued working there until 2009. During PhD He has been working on Si based light emitters and detectors for near infrared range. He has competence in experimental techniques of Si-MBE, TEM, SEM, FIB, device fabrication, and optical characterizations (PL, EL, photoresponse, etc). He started working at the nanotechnology department of Acreo from 2010 and involved mainly in the research and development of infrared photo detectors. Currently his work is focused on development of high-performance cooled infrared detectors based on quantum dots and strain layer superlattice. He perform structural and optical characterizations of the infrared material as well as devices. Apart from that He is also involved in the design of detector devices.

TITLE: Infrared detectors: Advances, challenges and new technologies

ABSTRACT:

The history of human knowledge to infrared (IR) radiation is about 200 years old. However it was in the late 20th century when we have developed a wide range of smart technologies to detect it and started to take advantage it for our benefits. Today the IR detector technology is entering into the 3rd generation with challenging demands on the performance. Based on the propagation of IR radiation through free space it is divided into different transmission windows. The most interesting for thermal imaging are the mid-wave IR (MWIR) and the long-wave IR (LWIR) range. Infrared detectors for thermal imaging have a number of applications in industry, security, search & rescue, surveillance, medicine, research, meteorology, climatology and astronomy. Currently the high-performance IR imaging technology is mainly based on epitaxially grown structures of the small-bandgap bulk alloy mercury-cadmium-telluride (MCT) [1, 2], indium antimonide (InSb) [3] and GaAs based quantum-well infrared photodetectors (QWIPs) [4], depending on the application and wavelength range. However they operate at low temperatures requiring costly and bulky cryogenic systems. In addition there is always a need for better performance generating possibilities for developing new technologies for IR imaging. Some of the emerging technologies are quantum dot infrared photodetectors (QDIPs) [5] and type-II strained layer superlattice [6]. In this report the advances and challenges in new technologies for high performance IR detectors, will be presented. Apart from that an introduction will be given about the activities at Acreo Swedish ICT on quantum-dot and quantum-well based IR detectors.

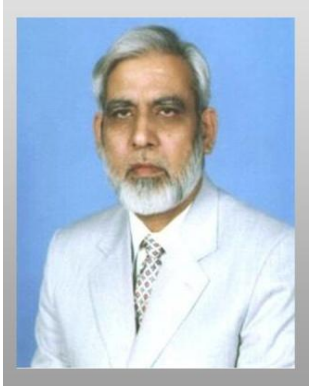
Dr. Muhammad Saleem
CHAIRMAN, DEPARTMENT OF CIVIL ENGINEERING
JUBAIL UNIVERSITY COLLEGE
JUBAIL, SAUDI ARABIA.

Biography

Dr. Saleem has now had at least about twenty one years experience of teaching both at Undergraduate and Postgraduate level, both in Saudi Arabia as well as in Pakistan. He has been working at Karachi Institute of Power Engineering affiliated with one of the best Universities in Pakistan since year 1990. He also involved with a range of Universities and industries in Pakistan for academic teaching, research and administrative duties. All organizations, including the one he is currently working for have glowing remarks on his achievements. He received several awards and certificates (such as Best Teacher, Distinguished Staff) from these organizations.

TITLE: Biosensors a promising future in measurements

ABSTRACT:
Biosensor is an analytical device which can be used to convert existence of a molecule or compound to measurable and useful signal. Biosensor uses stimulus to translate changes to reckonable signals and has great importance in the development of humanity and brings comfort in the society. Most common applications of biosensors are diagnosis tools for diseases, security appliances, and other biomedical equipments. It may have applications in the detection of disease causing pathogens and other microorganisms in the food, drug and processing industries. Enormous progress and advancementhas been witnessed in this area. Research and development in micro level systems pursued to interface biology together with novel materials such as nanomaterial. Development of high speed and accurate electronic devices that finds applications in medicine and in energy storage (such as biofuel cells) is one of the targeted areas. This presentation discusses the importance, use and current and future trend in the application of biosensors.



Prof. Dr. Anwar Ul Haq *T.B, POP, S.I.,FPAS, FTWAS*
ACTING HEAD, BIOMEDICAL ENGINEERING DEPARTMENT,
AND ASSOCIATE DEAN
RIPHAH INTERNATIONAL UNIVERSITY, ISLAMABAD

Biography

Dr. Anwar ul Haq is an internationally known materials scientist. He has 44 years research and teaching experience. He has been Chairman Pakistan Council of Scientific and Industrial Research.

He has won several national prizes including Pakistan academy of Sciences Gold Medal (1995), Gold Medal by Pakistan Vacuum Society (1999) and Dr. A.Q. Khan Gold Medal (2000). He has been awarded three civil awards by Government of Pakistan: Sitara-e-Imtiaz (2001), Presidents award for Pride of Performance (1995) and Tamgha-e-Baqa (2001). He is Fellow of Pakistan academy of Sciences and The World Academy of Sciences (TWAS), Italy. He is on the editorial Board of many national and International Journals. He has been member of various committees of academic and Government institutions. He has 72 research publication in ISI index Journals and 85 conference publications. His impact factor is 65andcitations are250. Now he is Professor of Bio-Materials at Riphah International University, Islamabad.

TITLE: Recent Advances in Wearable Sensors

ABSTRACT:
The population of the world is more than 7 billion. There are more than 8% people whose age is 65 years or more. The number of hospital beds per 1000 people is less than 3 in the world whereas in Pakistan it is 0.6. Thus every old person cannot be hospitalized. Furthermore, according to the International Agency for the Prevention of Blindness, there are approximately 800 million people are blind in the world. However, they can be provided good health care and continuous monitoring of their health conditions in the home and community settings. So, all these people need sensors which can record the desired parameters at a distance and medical doctors can advise them on phone or wireless. In case of blinds, they can be facilitated by some means to do their work without extra help.
This review paper summarizes clinical applications of wearable technology currently undergoing assessment or trials. Here, key enabling technologies (i.e. sensor technology, communication technology, and data analysis techniques) have been briefly described. Applications are discussed which focus on health and wellness, safety, home rehabilitation, assessment of treatment efficacy, and early detection of disorders.

Prof. Dr. Muhammad Subhan Qureshi

DEAN, FACULTY OF ANIMAL HUSBANDRY AND VETERINARY SCIENCES,
KHYBER PAKHTUNKHWA AGRICULTURAL UNIVERSITY, PESHAWAR, PAKISTAN
ADJUNCT PROFESSOR, CHARLES STURT UNIVERSITY, AUSTRALIA

Biography

After graduating from the University of Veterinary and Animal Sciences, Lahore during 1982, Prof Qureshi joined the provincial Livestock Department as Veterinary Officer and was involved in semen processing, quality monitoring and farm management practices. Then he shifted to Civil Veterinary Hospital Peshawar and worked on veterinary and reproductive clinics and disease investigation. Later he joined the University again and completed MSc Hons degree in Animal Reproduction and investigated corpus luteum function in dairy buffaloes. After completing master studies he joined the Enzyme Immunoassay laboratory of Veterinary Research Institute Peshawar and worked on endocrinology of dairy animals. He introduced herd health program for the peri-urban dairy farmers and investigated reproductive performance and health status of buffaloes and other food animals; preparation, implementation and monitoring of research and development programs; assistance to IUCN, WTO, SMEDA, FAO, Bank of Khyber, etc., in livestock development. Assistance was also provided to Inland universities in postgraduate research programs.

TITLE: Scope for biological sensing technologies in meat production and export in northern Pakistan

ABSTRACT:

Vodafone and Accenture research indicates potential $138 billion addition to developing world farmers' incomes by 2020 (Mobile communications to transform smallholding farmers' livelihoods in emerging markets, Accenture, USA, 2011). The Khyber Pakhtunkhwa province of Pakistan is rich in natural resources, dominated by livestock, including the 14.84 million sheep and goats valuing Rs.160 billion and 27% share in the national poultry sector having an investment of Rs.200 billion, producing 834 billion kg meat. The huge assets have got the potential to support the agro-based economy of the province through income generation, self employment and production of certified high quality food items for domestic and international Halal Food Market.

A model has been developed for analyzing the gaps in the status of health, productivity, nutrition, fertility and management aspects of the local farming. Improved practices based upon studies to be conducted, would be introduced. The research studies would focus on management interventions for enhancing ovulation rates, conception/birth rates, growth rates, feed conversion efficiency and health status with special focus on debilitating, parasitic, infectious and zoonotic diseases of small ruminants. Quality control system would be established for the feed, biologics and medicine as recommended under local and international laws. Two Farmers Welfare Centers would be established to provide a platform for the farmers, scientists and marketing partners to abridge the gap among the framers and

service providers. One Business Incubation Center would be established for demonstrating livestock based entrepreneurs. The change in the profitability would be documented and analyzed. Three model abattoirs supported by chilling facilities would be introduced at farming clusters.

The model will comprise a farming network linked to farmers' welfare center, a central lab and an expert group. A strong sensing technology would be introduced for data transfer and quality control of the inputs and products. The farmers will e-tag their animals for the purpose of traceability, online history and biodata. The data will be maintained in remote and central servers. A communication system would be developed utilizing mobile phones for the prices, demands and availability status of inputs and produce at local and international markets. A mobile money transfer systems will be introduced to exchange, save and borrow small amounts of capital as well as take out short-term insurance policies. The producers will be linked with the services centers and expert groups for disease diagnosis and control and weather status through a helpline. Breakeven points would be monitored for assessing profitability of the units. Hazard analysis and critical control point (HACCP) and Halal Certification would be introduced at the production, processing, storage and marketing setups.

Dr. Muhammad Islam
ASSISTANT PROFESSOR, ADVANCE MANUFACTURING INSTITUTE
KING SAUD UNIVERSITY
RIYADH, SAUDI ARABIA.

TITLE: Development of IR, UV and Gas (CO, NO_x) Sensors based on different Nanostructured Materials

ABSTRACT:

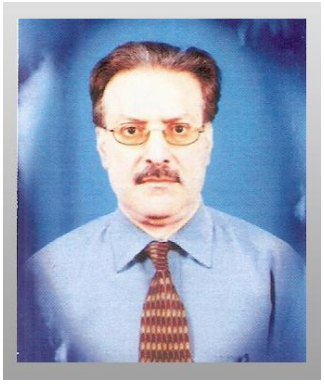
As an important application area of fast evolving nanotechnology, sensors based on nanostructured materials have received lot of attention in recent years. Materials at the nanoscale such as nanoparticles (0–D structures); nanotubes, nanorods and nanowires (1–D morphologies) and thin films (2–D features) offer extremely large specific surface area for enhanced sensor performance in terms of sensitivity, selectivity and fast response time. An overview of research progress in my group on fabrication and testing of various sensor types will be presented in my talk. Infrared (IR) sensors were made using different morphologies of multi-walled carbon nanotubes (CNT) as an active sensing layer. The CNTs were produced over silicon substrates loaded with mixed ferrite nanoparticles via catalytic chemical vapor deposition using acetylene gas. The prototype sensors so developed exhibited good IR response with better control at low temperatures. Using vapor transport method, one-dimensional ZnO structures with comb-like, needles and rods, and needle-shaped morphologies were produced and explored for their UV and CO gas sensing properties. Among all nanostructures, comb-like ZnO structures showed high response to UV radiation and a sensitivity value of 1.4 for CO gas at 75oC. Due to the detrimental effects of oxides of nitrogen (NO^2, NO and N^2O, generally referred to as NOx gases) on environment and human health, materials characteristics and sensing properties of NOx gas sensors based on SnO^2 and ZnO nanostructures produced using sol-gel and hydrothermal processes will be presented and discussed.

Dr. Abdul Basit
POST DOCTORATE RESEARCH FELLOW,
MONASH UNIVERSITY, SUNWAY CAMPUS
MALAYSIA

TITLE: Bio-medical imaging: Localization of main structures in retinal fundus images

ABSTRACT:
In retinal images, optic disc, fovea and blood vessels are main structures and their appearance is an important diagnostic indicator of various clinical disorders of the eye and the body. Optics disc, fovea and blood vessels have been shown to provide evidence in terms of change in diameter, area, branching angles, or tortuosity, as a result of different diseases. In this talk, automatic segmentation of these structures will be discussed. Blood vessels are extracted using a unique combination of methods for retinal blood vessel skeleton detection and multidirectional morphological bit plane slicing from the colour retinal images. Directional differential operators are applied and evaluation of combination of derivative signs and average derivative values is utilized to extract the main vessels. A multidirectional top-hat operator with rotating structuring elements is used to emphasize the vessels in a particular direction, and information is extracted using bit plane slicing. An iterative region growing method is applied to integrate the main skeleton and the images resulting from bit plane slicing of vessel direction-dependent morphological filters in order to segment out the blood vessels. Optic disc detection is based on morphological operations, smoothing filters and markers, controlled watershed transform. Detection of Fovea is dependent upon approximate location of optic disc. After obtaining the location of optic disc, erosion and dilation operations are performed on gray scale fundus images. The region of interest is defined with respect to the location of optic disc. Since in the case of normal retina image fovea is the darkest spot inside macular region and morphological operations make it more visible than its macula background. So the set of all the darkest spots are detected and their median point is selected as center of fovea. This detected location is then mapped in blood vessel map of retina. If it lies in the vicinity of any blood vessel then image shows signs of macular edema and take the second minimum intensity value for fovea location. This method has shown significant improvements in terms of detection, boundaries extraction and computational cost.

Dr. Mobashir Sheikh
TECHNICAL ADVISOR, ETIHAD AL-AFANDI L.L.C
JEDDAH, SAUDI ARABIA



TITLE: Use of Multidisciplinary Technologies for a country wide Integrated Security and Traffic Management Project In Saudi Arabia

ABSTRACT:

The paper describes an overview of one of the world's most sophisticated and integrated countrywide project covering Security and Traffic Management, utilizing multidisciplinary technologies, that include modern Sensing devices, Image and Data processing technologies, Automation, Command and Control concepts and the use of modern telecom networks.

Dr. Muhammad Zubair
ASSISTANT PROFESSOR,
KYUNG HEE UNIVERSITY
SOUTH KOREA

TITLE: An Online Risk Monitor System (ORMS) to increase safety and security levels in industrial area

ABSTRACT:

The purpose of this research is to make Quantitative and Qualitative analysis of safety parameters by using Online Risk Monitor System (ORMS). An ORMS considers the increasing potential for failure for a working component due to ageing, which appears in the form of component's performance degradation. ORMS therefore requires a continuous feedback regarding performance and failure probabilities of components which directly or indirectly contributes to the failure of a system. To achieve this goal the essential features and functions of ORMS including Reliability Data Update Model (RDUM), running time update, redundant system unavailability update, Engineered Safety Features (ESF) unavailability update and general system update has been described in this article. ORMS not only provide quantitative analysis but also highlights qualitative aspects of risk measures. ORMS is capable of automatically update the online risk models and reliability parameters of equipments in time. ORMS can support in decision making process of operator and manager in Mechanical, chemical and Nuclear industry.

Prof. Dr. Farkhanda Manzoor
PROFESSOR,
DEPARTMENT OF ZOOLOGY
LAHORE COLLEGE FOR WOMEN UNIVERSITY, LAHORE

TITLE: BIOSENSORS FOR TERMITE CONTROL

ABSTRACT:

Termites are major urban pests of Pakistan that cause damages to wooden structures and buildings. In Pakistan in order to prevent termite infestation and decay of wood, soil termiticides are applied. Termite management has two parts: prevention and control. The most difficult part of termite control is termite detection as they are substerranean and have tunneling habit. Throughout the world, chemical termiticides are going to be replaced by baits, microwave and sensor technology. Termites are the insects that have their own biology and foraging behavior that is specific for every species. This sensoring technology is similar to home security system. Termite Detection Radar, Moisture Sensor and Remote Thermal Sensor with Laser are available throughout the world and these are used to detect termites as they remain underground and help in using less chemicals too.A tiny sensor detects termites by 'hearing' them chew through wood. Similarly in wooden buildings, A termite sensor and intrusion detection system for detecting the intrusion of termites are also designed. Conductive particles fill a container which termites can eat. A pair of electrodes are disposed opposite each other inside the container. A pair of terminals are connected to the electrodes and extend outside the container. Termites are detected by a change of conductivity between the electrodes, when termites are detected a warning device generates a warning signal.

In Pakistan, there is dire need to develop such biosensoring devices locally to detect termites and then apply control methods that would save the money and environment also.

Prof. Dr. Gulistan Raja
PROFESSOR, ELECTRICAL ENGINEERING DEPARTMENT
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TITLE: The Emerging High Efficiency Video Coding Standard

ABSTRACT:

Imagine that you want to transmit or store a TV quality digital video. Transmission or storage capability of 37.32 Mega bytes is required for 1 second of video and 134. 37 Giga bytes are required for 1-hour uncompressed (raw) video program. This requires enormously high data transmission and/or storage medium, which is beyond the capabilities of today's systems. Therefore, there is a need for compression to deal with this kind of high-bit rate data. Moreover, increasing demand for superior level quality and higher resolution video calls for need of high definition video in comparison to standard video. Applications like Blue-ray, HD-DVD, HDTV, IPTV, digital cable, dish HD, Web HD downloads etc. are becoming common day by day. The amount of data to be processed and transmitted in case of HDV is significantly high and this requires video compression for efficient archival and transmission. The High Efficiency Video Coding (HEVC) is a latest video coding standard currently under development jointly by ITU-T Video Coding Expert Group (VCEG) and ISO/IEC Moving Picture Experts Group (MPEG) in a Joint Collaborative Team on Video Coding (JCT-VC). The first version of HEVC is expected to be finalized in first quarter of 2013. The main HEVC incorporated features in comparison to its predecessor video coding standard H.264/AVC are: (1) Coding tree units and coding tree block structure (2) Transform units and transform blocks (3) Intrapicture prediction (4) Enhanced entropy coding (5) Modified loop filtering. Performance analysis of HEVC standard shows that it can achieve significant bit rate reductions in comparison to existing standards for equal perceptual quality video.

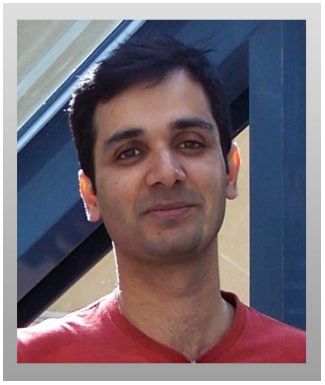
Dr. Ghalib Asadullah Shah
FOREIGN PROFESSOR
AL-KHAWARIZMI INSTITUTE OF COMPUTER SCIENCE,
UNIVERSITY OF ENGINEERING & TECHNOLOGY, LAHORE

TITLE: Wireless Sensor Network: A Key Enabling Technology for Smart Grids

ABSTRACT:

Smart grids are recognized as the next generation power systems, which employ various monitoring and actuating devices to autonomously monitor, diagnose, control and to efficiently operate the power equipments used in power generation, distribution and utilization. Recently, wireless sensor networks (WSNs) have been considered as a promising technology to achieve seamless, reliable, and low-cost remote monitoring and control in smart grids. The current and envisioned applications of WSNs in power-grid span a wide range, including advanced metering, remote power system monitoring and control, electricity fraud detection, fault diagnostics, demand response and dynamic pricing, load control and energy management, power automation and electrification of transportation. The key design challenge in smart grid is to support reliable and real-time data delivery for a variety of heterogeneous sensing and actuating devices installed at power systems. Hence, providing appropriate QoS support to WSN based smart grid applications is very essential to achieve their potential benefits. In this talk, I will provide an overview of the smart grids, key challenges in implementing various smart grid applications and the current communication technologies exploited for smart grid.

Dr. Usman Zabit
ASSOCIATE PROFESSOR,
RIPHAH INTERNATIONAL UNIVERSITY,
ISLAMABAD



TITLE: REAL-TIME SELF-MIXING INTERFEROMETRIC LASER SENSOR FOR EMBEDDED APPLICATIONS

ABSTRACT:

Traditionally, laser displacement sensors have necessitated a stand-still support (such as an optical table and/or anti-vibration material) in order to ensure an accurate target measurement as any movement of the laser sensing system can corrupt the true target displacement measurement. Such a situation has thus hindered the utilization of SM sensors for embedded applications. Now, a Solid-State Accelerometer (SSA) coupled Self-Mixing (SM) interferometric laser displacement sensor is presented which is capable of guaranteeing correct measurements in real-time while being subject to extraneous movements. Such an approach thus paves the way for those embedded applications where a sensor needs to operate under non-stationary conditions. The SSA-SM sensor achieves this robustness through a real-time data fusion between the SM interferometric signal and the acceleration signal. It has been compared with a reference commercial sensor and has a precision of 96 nm rms with a bandwidth of 40Hz-500Hz for a laser diode emitting at 785 nm.

The said SSA-SM embedded sensing system is the object of an international patent (WO2011/141482 A1 published in 2011), has engendered various publications, and has equally won European Mechatronics Award (2010).

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(HEC APPROVED PHD. SUPERVISOR)
ASSISTANT PROFESSOR, DEPARTMENT OF ELECTRONIC ENGINEERING
NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY

TITLE: FPGA based Smart Wireless MIMO Control System

Syed Muhammad Usman Ali, Sajid Hussain and Ali Akbar Siddiqui

ABSTRACT:

In our present work, we have successfully developed a FPGA based smart wireless MIMO (Multiple Input & Multiple Output) system to control the multiple industrial process parameters. Such as temperature, pressure, stress, vibration etc. To achieve this task we have used Xilinx Spartan 3E FPGA (Field Programmable Gate Array) instead of conventional microcontrollers. By employing FPGA kit to PC via RF transceivers which has a working range of about 100 meters. The developed smart system is capable of performing the control task assigned to this system. We have also provided a provision to our proposed system that can be accessed for monitoring and control through the web and GSM as well. Our proposed system can be equally applied to all the hazardous and rugged industrial environments where conventional system cannot work effectively.

Dr. Muhammad Jawed Iqbal
INCHARGE AND ASSISTANT PROFESSOR
INSTITUTE OF SPACE AND PLANETARY ASTROPHYSICS
UNIVERSITY OF KARACHI

TITLE: Sensor Integration in Land Vehicle Systems
M Ayub Khan Yousufzai and M Jawed Iqbal

ABSTRACT:

GPS is used in automotive systems for locating vehicles, tracking vehicles and providing navigation assistance to drivers. This communication examines integrated positioning systems found in vehicle systems, automotive electronics, and mobile consumer electronics. Low cost sensors and method used to augment GPS solution are presented.

Abstracts

Patch Antenna For Satellite Communications

Dr. M. Amir Yousuf
Indus University, Karachi

The growing demands of personal communications require new ways of telecommunications. One such way is the satellite personal communication and recently, considerable work has been performed for the design and implementation of satellite networks capable of providing worldwide telecommunication coverage. This last requires a portable communication system of which the antenna part is the most challenging task due to the size and weight limitations. The satellite terminals use antennas such as Quadrifilar Helix, which are not suitable for portable system due its volume. This paper proposed a solution of antenna- volume issue by the use of printed antenna technology. The proposed antenna design is small in size and light weight and can be easily embedded in any portable and as well as fixed satellite systems such as phase array systems. The design is simulated through Finite Difference Time Domain (FDTD) Electromagnetic (EM) based solver. To find the best possible design, the geometry is broken into trapezoidal shapes and the parameters of trapezoids are changed through Genetic algorithm. The final geometry is an optimized solution with in the limited space vs achieved frequency bandwidth.

Hand Gesture Recognition Based On Digital Image Processing using Matlab

Tahir Khan, Dr. Amir Hassan Pathan
Faculty of Engineering, Sciences and Technology, Iqra University Karachi, Pakistan

This research work presents a prototype system that helps to recognize hand gesture to normal people in order to communicate more effectively with the special people. Aforesaid research work focuses on the problem of gesture recognition in real time that sign language used by the community of deaf people. The problem addressed is based on Digital Image Processing using Color Segmentation, Skin Detection, Image Segmentation, Image Filtering, and Template Matching techniques. This system recognizes gestures of ASL (American Sign Language) including the alphabet and a subset of its words.

A Colorless WDM-PON Architecture Based on Detuned Array Waveguide Gratings

Muhammad Idrees Afridi, Yousaf Khan Khalil and Noman Ahmed Khan
Beijing University of Posts & Telecommunication, China, Iqra National University, Peshawar

We proposed and demonstrated a WDM PON architecture based on detuned AWG which simultaneously performs Demultiplexing & Demodulation of Wave Length Division Multiplexed (WDM) Return-to-Zero Differential Phase-Shift Keying (RZ-DPSK) signal by a standard Arrayed Waveguide Grating (AWG) at 10-Gbps data rate using ITU grid of 100GHz channel spacing. Simulation results shows error free transmission of such WDM PON architecture spanning a distance of 25 km with negligible power penalty and improved receiver sensitivity. In this we realized a very simple receiver having only one photodiode instead of DPSK receiver having Mach-Zehnder Delay Interferometer (MZDI) and balanced photodiodes.

Wireless Control of Miniaturized Mobile Vehicle for Indoor Surveillance

Sarmad Hameed, Syed M. Taha Saquib and Dr. Syed M.Usman Ali
SZABIST, Usman Institute of Technology, NED University of Engineering & Technology

In the present work, we have successfully applied the emerging trends in the field of electronic automation and smart control techniques. These techniques provided a great deal in control area network (CAN) and Personal Area network (PAN). This paper describe a physical application of programmable controller and Bluetooth technology in which we designed a multitask vehicle. It proposes a network which contains a remote, mobile host controller and an android operating system based mobile set (Client). The client communicates with host controller through Bluetooth devices. The system incorporates duplex communication after successful confirmation between the host and the client; the android based mobile unit controls the car through Bluetooth module and performs further acquisition. The proposed vehicle is designed to perform basic functions of vehicle movement (forward, reverse, left and right turns) with 360 degree rotation. The application can be served for many purposes i.e. mine detection, security and surveillance etc. This system is conceived to be of minimum operating expense and scalable enabling plenty of devices to be controlled with fewer changes to its core. The system also incorporates user authorization which authenticates an authorized user for control of this miniaturized vehicle.

Advanced data communications for downhole data logging and control applications in the oil industry

Tim Spracklen and Tariq Aslam
Habib University, Ericsson United Arab Emirates

We present details of 'Mercury', a high-speed downhole communications system that utilizes the (metallic) wall of a gas or oil pipeline or a drill 'string' as the communications 'channel' to control or monitor equipment or sensors used in the oil industry. Conventional downhole communications systems typically use 'mud pulse' telemetry for 'Measurement While Drilling' (MWD) operations. Current mud pulse telemetry technology offers bandwidths of up to 40 bit/s. However the data rate drops with increasing length of the wellbore and is typically as low as 1.5 bit/s - 3.0 bit/s at a depth of 35,000 ft. - 40,000 ft. The system described, by contrast, offers data rates of several megabits per second over distances of many kilometers and uses Orthogonal Frequency Division Multiplexing (OFDM) coupled with Wideband Frequency Division Multiple Access (W-CDMA). This paper presents details of our system; results of several trials undertaken on actual gas pipelines in the United Kingdom will be presented at the Conference.

Energy Efficient and QoS sensitive Routing Protocol for Ad Hoc Networks

Tariq Saeed Tanoli and Muhammad Khalid Khan
Karachi Institute of Economics and Technology (KIET)

Efficient routing is an important part of wireless adhoc networks. Since in adhoc networks we have limited resources, there are many limitations like bandwidth, battery consumption, and processing cycle's etc. but reliability is also required since there is no mean of invalid or incomplete information. But also expired data is useless. There are various protocols that perform routing by considering one parameter but lack on other parameters. In this paper we present a protocol that finds route on the basis of bandwidth, energy and mobility nature of the nodes participating in the communication.

Literature Survey on Life-Cycle of Liver Segmentation Techniques MRI, CT and Ultrasound Imaging Modalities

Saima Rathore, Aksam Iftikhar, Mutawarra Hussain and Abdul Jalil
Pakistan Institute of Engineering and Applied Sciences, Islamabad

Computer aided diagnosis of liver using image processing techniques is complementary to clinical practices. One such method is liver segmentation which being a two-step process of identifying liver boundary from abdominal region and then extracting focal lesion from liver is extremely challenging due to numerous factors. Many organs like spleen, stomach and gall bladder closely encircle liver thus hinder identification of liver boundary. In addition, focal lesion extraction is tricky due to least variability between intensity values of lesion and its surrounding area. Image noise and liver geometry between patients also adds to the delicacy of the process. Over the years, several automatic and semiautomatic techniques have been devised for liver segmentation, with each having its own merits and demerits. This paper is an attempt to summarize multiple liver segmentation methods in chronological order, providing detailed information on life cycle of liver segmentation techniques on CT, MRI and Ultrasound imaging modalities.

Designing, Fabrication and Controlling of Multipurpose 3-DOF Robotic Arm

Hafiz Muhammad Nabeel, Anum Azher, Syed M. Usman Ali Shah and Abdul Wahab Mughal
NED University of Engineering & Technology, Karachi

In the present work, we have successfully designed and developed a 3-DOF articulated Robotic Arm capable of performing typical industrial tasks such as painting or spraying, assembling and handling automobiles parts and etc., in resemblance to a human Arm. The mechanical assembly is designed on SOLIDWORKS and aluminum grade 6061-T6 in used for its fabrication in order to reduce the structure weight. We have applied Inverse kinematics to determine the joint angles, equations are fed into an efficient micro-controller ATMEGA16 which performs all the calculations to determine the joint angles on the basis of given coordinates to actuate the joints through motorized control. The good accuracy was obtained with quadrature optical encoders installed in each joint to achieve the desired position and a LabVIEW based GUI is designed to provide human machine interface.

INTERSTELLAR TRAVEL AND PROPOSED METHODS

Rohail AKS, Sehar Ali
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The idea for travelling to the stars has been discussed in the science fiction literature for over decades, however practical experiments to any such approach are often neglected, Since the total energy required for this mission is enormously high and require thousand tons of Uranium fissioning (roughly cost around 2.5 billion US$) to attain the velocity required to accomplish the experiment within the lifetime of the principal investigators, which makes interstellar flight as an expensive subject, but not unaffordable if the cost of powerplant building can be minimized. In this presentation some proposed methods of Interstellar Travel are discussed, their limitations are defined and proposed methods to reduce those limitations.

CALIBRATION OF OPEN SURFACE WATER BATH

M. Ghazanfar Ali
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Calibration and testing of open surface water bath is a new technique for water bath calibration and may be this technique could be used for other liquid bath testing as well.
Due to some critical circumstances the bath is not covered by the manufacturing company and environmental condition would be affected in the bath temperature directly. So that calibration and testing cannot be performed under these conditions.
For this type of calibration the reference instruments should be used for measuring temperature with very high class accuracy.
Platinum resistance thermometer (PRT) with super thermometer (indicator) Cropico made, used for the high accuracy calibration in different position with oil filled flask for high stability of temperature in the water bath and got the accurate result according to standards.

DESIGN AND SIMULATION OF A BIRDCAGE COIL USING CST STUDIO SUITE FOR APPLICATION AT 7T

Bernat Palau Tomas, Houmin Li and Anjum M. R.
Beijing Institute of Technology, China

This work describes the study of coil for Magnetic Resonance Imaging (MRI) application. Mainly the principal objective is the design of a birdcage coil Radio Frequency (RF) coil to use in a 7 Tesla (7T) scanner. More strength field has a better SNR and increased chemical shift effects, improving spectral fat suppression and spectroscopy. Moreover, a better SNR increases the spatial resolution or reduces the imaging time. This research work presented recent development based on high fields 7T design using CST studio. The birdcage coil achieves circular polarization and generates a high homogeneous radio frequency magnetic field under many conditions. Design of a Birdcage coil for a 7T to obtain the images from small animals i-e mouse. It opens the door to design and construct a Birdcage coil for a 7T to obtain human brain images. Firstly we design a birdcage coil then the results is obtained with simulator CST Wave Studio, creating a 3D model and generating a simulation. Finally the parameters are re adjusted to obtain our desired Larmor frequency 298.2 MHz for a correct operation in 7T. This research work demonstrate the theoretical results from our design and it shows the designed antenna behavior as well.

Sensitivity Analysis of Digital I&C Modules in Protection and Safety Systems

Khalil Ur Rahman, Muhammad Zubair and Gyunyoung Heo
Kyung Hee University, South Korea

This research is performed to examine the sensitivity of digital Instrumentation and Control (I&C) components & modules used in regulating and protection systems architectures of nuclear industry. Fault Tree Analysis (FTA) was performed for four configurations of RPS channel architecture. The channel unavailability has been calculated by using AIMS-PSA, which comes out 4.517E-03, 2.551E-03, 2.246E-03 and 2.761E-04 for architecture configuration I, II, III and IV respectively. It is observed that unavailability decreases by 43.5 % & 50.4% by inserting partial redundancy whereas maximum reduction of 93.9 % in unavailability happens when double redundancy is inserted in architecture. Coincidence module output failure and bi-stable output failures are identified as sensitive failures by Risk Reduction Worth (RRW) and Fussell-Vesely (FV) importance. RRW highlights that risk from coincidence processor output failure can reduced by 48.83 folds and FV indicates that BP output is sensitive by 0.9796 (on a scale of 1).

LONGITUDINAL MEASUREMENT OF CHROMATIC DISPERSION ALONG AN OPTICAL FIBER TRANSMISSION SYSTEM WITH NEW CORRECTION FACTOR

Madiha Abbasi
Sir Syed University of Engineering and Technology, Karachi

In present existence OTDR based techniques have become a famous practice for measuring chromatic dispersion distribution along an optical fiber transmission link. In this paper, a constructive measurement technique, which uses a four wavelength bidirectional optical time domain reflectometer (OTDR) to compute the chromatic dispersion distribution beside an optical fiber transmission system, has been offered. A novel formulation has been developed to improve the correction factor, which leads to an enhanced and defined measurement. The obtained experimental outcomes are in good agreement with those obtained by the interferometric technique.

Xilinx Fpga Based Spectrum Sensing To Detect The Unknown Frequency Of A Transmitter

Engr. Ubaid Ullah Saleem
Indus University, Karachi

A receiver can employ different mechanism for spectrum sensing. Using efficient coding techniques an intelligent wireless system is developed .This system is based on Xilinx FPGA that uses a spectrum sensing method to detect the unknown frequency of the transmitter. This system also establishes a link that is found after detection. The system is also capable of searching the lost connection and re-establishes it.

Cloud vector mapping using daily MODIS satellite data for 2010 and 2011

Asjad Asif Jah, Yousaf Bin Farrukh and Rao Muhammad Saeed Ali
National University of Science and Technology, Islamabad

There is a myriad of online data sources freely available on the internet. Amongst these one of the most widely used is the MODIS satellite. Most earth-scientists and GIS professional consider this data useless for scientific application due to the excessive cloud cover that it carries. And hence in some cases is it necessary to remove this cloud cover through application of cloud masks or removal through image averaging depending on the application. We however, have sought an alternate method to use this immense source of information for cloud vector mapping from daily time series imagery for the year 2010 and 2011. MODIS Level-02 daily land-cover images was downloaded and subsequently rectified and clipped to the study area. These images were then put together to observe the direction of cloud movement and vectorize the observed paths. One of the major use of such exercises is one's ability to visualize and understand the process of cloud formation over different parts of the country. This work can be extended further by the inclusion of TRMM rainfall measurement data to derive estimates of cloud formation and observed precipitation rates.

This paper proposed systematic approach to develop mathematical model for an industrial heating system by adopting system identification techniques with the aim of fulfilling, design requirement for controller. The model identification process will begin by collecting real measurement data samples of 801 with an interval of 2 sec, then two-third data is selected for estimation and one-third data has been reserved for validation with the aid of MATLAB system identification toolbox. The criteria to select the model that could validate model output with actual data will based upon; parametric identification technique, picking the best model structure with low order among ARX, ARMAX and BJ, and then apply model estimation and validation test. Simulated results has shown that BJ model has been best among all model structures that provide good estimation and validation based upon the performance criteria such as, final prediction error, loss function, best percentage of model fit, and co-relation analysis of residual for output.

Semantic Mapping and Motion Planning with Turtlebot Roomba

Rizwan Aslam Butt and Dr. Syed Muhammad Usman Ali Shah
NED University of Engineering & Technology, Karachi

In this paper, we have successfully demonstrated the semantic mapping and motion planning experiments on Turtlbot Robot using Microsoft Kinect in ROS environment. Moreover, we have also performed the comparative studies on various sampling based motion planning algorithms with Turtlebot in Open Motion Planning Library (OMPL). Our comparative analysis revealed that the Expansive Space Trees (EST) surmounted all other approaches with respect to memory consumption and processing time. We have also tried to summarize the related concept involved with autonomous robotics which we hope would be helpful for beginners.

Comparative Study of SVPWM (Space Vector PWM) & SPWM (Sinusoidal PWM) Based Three Phase Voltage Source Inverters for Adjustable Speed Drives.

Waheed Ahmed and Dr. Syed Muhammad Usman Ali Shah
NED University of Engineering & Technology, Karachi

In the present work, we have performed the comparative studies of Space Vector Pulse Width Modulation (SVPWM) and Sinusoidal Pulse Width Modulation (SPWM) modulation techniques utilizing MATLAB Tools. During these investigations we have carried out intensive simulations, comprehensively analyzed the obtained results and compared the harmonic density, power factor (PF), & switching losses of SVPWM and SPWM. It has been observed during investigations that if the switching frequency is high then losses due to harmonics are negligible, thus based on obtained results we suggested that the SVPWM technique is a more reliable solution. Because the SVPWM utilizes DC bus voltage more efficiently & generates less Total Harmonic Distortion (THD) & high output quality and it provides flexible control of output voltage & output frequency for Variable Speed Drive (VSD).