

## Executive Committee's Desk :

It is an honour to revive the IEEE "MADRAS Link", our Section's Newsletter. I wish to convey my cordial greetings and grateful thanks to our honourable members, for the opportunity, to serve, as your Section Chairman, in our **Silver Jubilee year**. I congratulate the elected members of the Execom and value their assistance.

We, the IEEE volunteer-members, belong to one family, bound to each other, with love and respect and we are committed to highest ethical & professional conduct. We believe in Teamwork.

For us, to be successful, in our Mission, we need to first provide opportunity to our members and volunteerism must be made satisfying and prestigious. We shall pay more attention to technical & professional issues and synergism between Governments, Universities & Industries and expand and encourage student activities. Membership in IEEE is a badge of distinction & we should be proud as an IEEE member.

Our technologies are becoming increasingly interdisciplinary and IEEE promotes electro-technology & allied sciences, enables members' careers and facilitates networking worldwide. We learn technical innovations through IEEE's world-class technical publications. IEEE is the leader in formulating internationally recognized Standards. There is peer recognition for members' contributions & accomplishments.

Dear Members, - our challenge is to build on these strengths and reach out to members, in fulfilling their aspirations and get more and more new members.

I would encourage better communication, which will build more trust and I believe that the revival of **IEEE-MADRAS Link**, is one channel, to do this. I compliment the Link Editor, Mr. Rajeev Ganesh, for doing an excellent job. He has, wonderfully tailored the look and content.

I seek your enthusiastic participation and whole-hearted help, support and co-operation. I invite your valuable suggestions for the celebrations of our Section's 25<sup>th</sup> Anniversary

IEEE-MAS Section Chairman  
Suresh Chander Pal (sureshcpal@vsnl.net)

## From the Editor's Desk -The IEEE Madras 'Revolution'

-The Chief Editor

-Rajeev Ganesh ([Rajeev.Ganesh@ieee.org](mailto:Rajeev.Ganesh@ieee.org))

"For thousands of years humans lived on par with animals. Then something happened that acted as the dramatically turning point. Man had learned to speak."

-By Stephen Hawking in 'A Brief History of Time'.

With this quote as an analogy I'd like to open the 1<sup>st</sup> issue for 2004 of the IEEE-Madras Section Newsletter, since it is going to act in the same way as the dramatical turning point for knowledge through interaction for all those who 'take part in it'. The primary purpose of this Newsletter is to ring a general bell of 'Arise & Awake' amongst all of us besides reporting about the Events what've taken place or yet to take place within the Ring of the IEEE. An astonishing fact I came to know was that in most colleges, almost all students of the 1<sup>st</sup> or 2<sup>nd</sup> year become IEEE members and then the number of members drastically falls by the 3<sup>rd</sup> or 4<sup>th</sup> year. Reason-many students feel that they get potentially nothing by continuing membership. Just to show how wrong they are; We've put up a column devoted to the 'Power of the IEEE' to gradually create awareness on the Potential you gain by being an IEEE Member besides huge Concessions & care in International Conferences. Beyond that, we wanted the template of the letter to look totally unique from that of other Sections. So, there came the TechBuzz. Get to know about the words that are currently running 'Hot' in the Technological world. To make things much more interesting and informative we took a topic to focus on each month. This month our choice was 'NanoTechnology'. Both these articles combined together give you a touch on what's going on in the world of in depth Research & Development. Then comes the regular report of IEEE Tech talks and conferences at all levels (Regional, National & International). Some of the conferences might have never appeared on your notice board though they are in your fields of interest. We'll provide you with the links to take part & present in them (especially international ones Beyond all that, we want you to become authors of articles to be published in this Newsletter (a good response has already started), which I was going to go to all institutions & colleges in the region and also get published on the net. For this we'll give you a few topics to contemplate on. Please do send in your contributions to the mentioned address. Last but not least, we leave you with a few brainteasers. Pass your time getting to know more. The answers will come on the next issue. All the effort put in by the team is to increase the interaction & awareness amongst the members. So, feel free to write or mail to me or any of the writers on doubts & comments. They will be published in a special column in forthcoming issues. I would like to end my statement with a special thanks to the committee and the publishers. We've just thrown in the seed. Its up to you-IEEE Members to make it grow into a tree. So, let the Revolution begin.

### **POWER OF IEEE UNLEASHED**

**-Aparna Murali ([aparnamurali81@hotmail.com](mailto:aparnamurali81@hotmail.com))**

This column provides insight into the various services and benefits available to IEEE members. This time we focus on the "Distance Learning Campus Program" of the IEEE Computer Society.

**What is the Distance Learning Campus?** The Distance Learning Campus is a free service for IEEE Computer Society members who may enroll for any of the 100 Web-based training courses that are available.

#### **Benefits and Features of the Distance Learning Campus:**

- 1) From Anywhere at Any Time: Access the Distance Learning Campus with as little as a 56K Internet connection any time you want.
- 2) Topics Cover What You Need to Know: Courses covered include Java, Project Management, TCP/IP Protocols, Cisco, UNIX, CompTIA, HTML, PowerPoint, Windows Network Security, Visual C++, and much more. Many courses are focused on helping you prepare for certification exams. All courses are vendor-certified, bringing you the freshest content.
- 3) Multimedia Environment for Optimal Learning: Voiceovers, 3-D graphics, flash animations, on-screen text, and 'visual' sentences turn complex concepts into easy-to-understand images.
- 4) Personalize Your Campus Environment: Choose what you want to learn and when with self-paced courses. Pre-assessment tests and Assessment tests help to keep track of your ongoing progress.
- 5) Use the Distance Learning Campus as a Reference Library: You can use the Distance Learning Campus as a reference library.

***Hope to meet many of you at the Distance Learning Campus!!!***

### **Invitation for Articles: Go on to become an Author Yourself**

**-Rajeev Ganesh**

The potential within many of you is not often shown due to lack of opportunity. In order to bridge this gap, here's a chance for you to reach out. Publishing a paper here would carry greater value than any college level paper presentation.

So, Here are the Topics for you to look onto this month:

1. 3G Mobile, what's so special about it?
2. Worms on the Net-how do they work?
3. "Small Talk"-a new whispering language?
4. 'USB'-what is it, how does it work & how much can it store?

You can send answers to any of these questions in the form of an article (1/2 page) and the correct & appropriate ones "WILL" be published. Please send them to [ieee\\_news@yahoo.com](mailto:ieee_news@yahoo.com) or send them to my address directly.

The Deadline for the next issue is Feb-20<sup>th</sup>.

### **TECHNICAL QUIZ (Brain teasers)**

**-Amit Mohan Easow ([mindschild@hotmail.com](mailto:mindschild@hotmail.com))**

1. What is the Topic/subject of the book "Where wizards stay up late" by Katie Hafner Mathew Lyon?
2. What feature was incorporated into UNIX by M.D. McIlroy a long time advocate of "Non hierarchical control flow"?
3. What was created specifically for editing and formatting text in the late 1960's?
4. To what did Kernighan and Pike remark "His name for the program is ironic in that his has endured while most of the others have now been retired"?
5. He is one of the co-creators of the ENIAC. His doctoral thesis was on carbon monoxide, who?
6. Apple in the 1980's considered shortening their Macintosh to simply - MAC. Expand MAC for me, please.
7. This file has a magic number1, which is 0xCAFEBABE2, what file are we talking about?
8. What would I get if I plotted the points that belonged to this set:  $Z = \text{power}(Z, 2) + c$

9. What is the Portuguese word for BYTE?
10. An easy one: In computer jargon "Little endian and Big endian" are derived from which book?
11. What is GW in GWBASIC?
12. Dr. Seuss is his book If I Ran the zoo inadvertently contributed a 'noun', which is used informally in the English language?
13. What according the George Boole is Universe and Nothingness?
14. John Warnock is the creator of the postscript page description language. Which company did he go on to start?
15. An easy answer for a question that borders on the vague: Which company stands for compatibility and quality?
16. 1980, a group at Berkley led by David Patterson and Carlo Sequin began designing VLSI chips that did not use interpretation. They coined a new term for this concept, what is the term?

17. At XEROX PARC this researcher was working on a wire-based system modeled on ALOHA protocols, this was to go on become txhe...?
18. On version 7 (V7) there was a "New portable I/O library" written by Dennis M Richie. What was it called?
19. What is Shugart Associates claim to fame?

20. The first forty of the most frequently occurring words on the WWW are proper nouns such as 'YOU', preposition or small connecting words 'the' and 'that'. The first common noun to appear is at number 42 in the list, what is it?

### TOPIC OF THE MONTH -Insight into the NanoTech World

-Rajeev Ganesh

To start with, the common misconception of Nanotechnology is that it's still Silicon playing a major role on the Nano-scale. Though MOSFETs have reduced to 20nm today, they still remain in the field of Microelectronics. NanoTech has a lot more to do with Quantum Physics & organic Chemistry (proteins). When I mention Organic, I mean Carbon, which is the main player in NanoTech today in the form of Carbon NanoTubes (CNT).

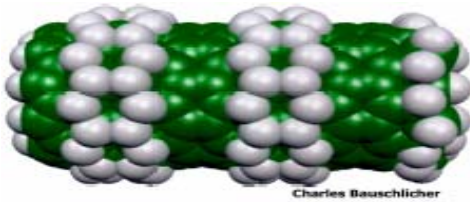


Figure 1-a piece of a typical CNT.

The extraordinary properties of carbon nanotubes, superlative resilience, tensile strength, thermal stability and excellent electronics properties have fed predictions of future applications. For example, reinforcement materials for automotive and aeronautic industry are being pursued. It is the electronic properties of carbon nanotubes that have led to the first real applications; Samsung Institute of Technology has produced a flat panel display using nanotubes as field emitters. This will probably replace Silicon Channels in law.

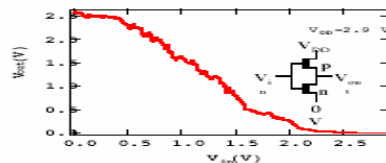
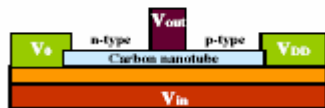


Figure 2-\*First single nanotube logic device – Inverter demonstration. (Appl. Phys. Lett., Nov. 2001)

This shows that NanoComputing is on the way. It has also been demonstrated that carbon nanotubes can be used for memory devices with capacity of several GB or TB

(imagine an entire University Library stored in a CNT). CNTs can also boost performance of scanning microscopes, nanotweezers and chemical and genetic probes. The excellent electronic properties deem carbon nanotubes suitable as interconnects in molecular electronics applications.

One of the main impediments is processing nanotubes. Based on their hydrophobic nature it was thought that carbon nanotubes would dissolve in a hydrophobic solvent such as toluene. However, nanotubes fall out of solution. It has been demonstrated that carbon nanotubes can be rendered soluble using a polymer matrix.

The unique electronic properties of carbon nanotube can be used in sensor application. The carbon nanotubes act as the sensor electrode and due to its size; increases in sensitivity and real time detection can be expected compared to current micro/macro scale sensors. Did U know-NASA is working on - Networks of ultra small probes on planetary surfaces(Mars)- Micro-rovers that drive, hop, fly, and burrow- Collection of micro spacecraft making a variety of measurements. All this is just the Tip of the iceberg. Only time will tell upto what extent NanoTech can influence our daily lives in the future.

### NATIONAL AND INTERNATIONAL IEEE CONFERENCES COMING UP THIS MONTH:

-Aparna Murali

Here is a reminder of all IEEE conferences coming up this month.

#### INTERNATIONAL CONFERENCES:

**Conference Name:** IEEE Conference on Computer Communications, INFOCOM 2004

**Date:** 03 Mar - 13 Mar 2004 **Location:** Hong Kong

**Conference Web Site URL:**

<http://www.comsoc.org/confs/infocom/index.html>

**Conference Name:** IEEE International Conference on Pervasive Computing and Communications

**Date:** 14 Mar - 17 Mar 2004 **Location:** Kissimmee, FL

**Conference Web Site URL:** <http://www.percom.org/>

**Conference Name:** 2004 Pacific Rim International Symposium on Dependable Computing

**Date:** 03 Mar - 05 Mar 2004 **Location:** Tahiti

**Conference Web Site URL:** <http://www.laas.fr/PRDC10/>

**Conference Name:** 2004 International Workshop on Junction Technology (IWJT)

**Date:** 15 Mar - 16 Mar 2004 **Location:** Shanghai, China

**Conference Web Site URL:** <http://www.cie-china.org/iwjt-2004/>

**Conference Name:** 2004 IEEE International Conference on Microelectronic Test Structures (ICMTS)

**Date:** 22 Mar - 25 Mar 2004 **Location:** Awaji, Japan

**Conference Web Site URL:**

<http://www.see.ed.ac.uk/ICMTS/>

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### **TECH BUZZ**

#### **MEMS: Micro-Electro-Mechanical Systems**

*-Aparna Murali*

##### **WHAT IS MEMS?**

Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through micro fabrication technology.

##### **HOW IT WORKS:**

Sensors gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. This information is then processed by the electronics and through some decision-making capability directs the actuators to respond thereby controlling the environment for some desired outcome.

##### **AREAS OF CURRENT INTEREST:**

**Biotechnology:** Micro machined Scanning Tunneling Microscopes (STMs), Biochips for detection of hazardous chemical and biological agents, Microsystems for high-throughput drug screening and selection.

**Communications:** High frequency circuits using RF-MEMS technology. Inductors and tunable capacitors can be improved significantly using MEMS technology.

**MEMS accelerometers:** Crash air-bag deployment systems in automobiles

suitable for this purpose, an example of which is shown in Figure 1. This molecule should work in the following way: when the sum of voltages applied to the top and left nanowires exceeds a certain threshold, an additional electron is injected from the right wire into the trap island. The electron's electrostatic field opens the single-electron transistor connecting the top and right wires. This connection would survive a temporary reduction of the applied voltage because it takes time for the trapped electron to scape. As a result, the device should function as a two-input latching switch, essentially a single-bit memory cell controlled by two input signals.



##### **CONFERENCES (continued)**

**Conference Name:** 2004 IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE)

**Date:** 23 Mar - 25 Mar 2004 **Location:** Taoyuan, Taiwan

**Conference Web Site:** <http://lwf.ieee.org/wmte2003/>

**Conference Name:** 2004 8th IEEE International Workshop on Advanced Motion Control

**Date:** 25 Mar - 27 Mar 2004 **Location:** Kawasaki, Japan

**Conference Web Site URL:**

<http://www-oml.sum.sd.keio.ac.jp/AMC04/>

##### **NATIONAL CONFERENCES:**

**Conference Name:** Electrifying India - Engineering Management in Power Sector

**Date:** 12-13 Feb 2004 **Location:** Mumbai

**Conference Name:** All India Technical Festival TATHVA2004

**Date:** 28 FEB to MAR 1, 2004 **Location:** Calicut,

**Conference Web Site URL:** <http://tathva.nitc.ac.in>

**Conference Name:** KRITI - 2004

**Date:** 24<sup>th</sup> and 25<sup>th</sup> March 2004. **Location:** Nagpur

**Conference Web Site URL:** [www.raisoni.net/kriti2004](http://www.raisoni.net/kriti2004)



##### **EDITORIAL TEAM:**

*Rajeev Ganesh*

*Aparna Murali*

*Amit Mohan Easow*

*Dr Krishna V Prasad*

*T.S.Rangarajan*

#### **CMOL: a combination of CMOS and MOLEcular Technology**

*-Amit Mohan Easow*

##### **Problem faced:**

Ultra dense integrated circuits with features smaller than 10 nm would provide enormous benefits for all information technologies. But this is inhibited because below a 10-nm gate length, the sensitivity of silicon field-effect transistor parameters— most importantly, the gate-voltage threshold—to the inevitable random variations of device size grows exponentially.

##### **Solution:**

Many physicists and engineers believe that this impending crisis may be resolved only by a radical paradigm shift from purely CMOS technology to hybrid semiconductor- molecular circuits, which can be dubbed CMOL, a combination of CMOS and MOLEcular. The CMOL concept combines the advantages of nanoscale components, such as the reliability of CMOS circuits and the minuscule footprints of molecular devices, and the advantages of patterning techniques, which include the flexibility of traditional photolithography and the potentially low cost of nanoimprinting and chemically directed self-assembly.

##### **Latest developments:**

A group at the State University of New York at Stony Brook is working to develop and implement several molecules

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