

ELECTROVISION



DEEP FROM THE CORE



I am happy to note that ELECTRONAUTS the association of ECE is releasing the first issue of their news letter "ELECTROVISION" on September 5th, 2008 during the occasion of Teachers Day Celebration. Let this effort continue successfully and help to bring out the hidden potentials and technical creativeness of the students of the ECE department.

Congratulation, May God Bless you all.

Fr. Jose Alex Oruthayapally CMI
Director, RASET

STRAIGHT FROM THE SHELL

I am happy to note that Electronics & Communications Association is bringing out a news Letter. This is a commendable venture and will give an opportunity and practice to the students in making a good write-up on technical matters. I wish that the department will be able to bring out news letters regularly.

Dr. J. Isaac
Principal RASET



A NEW FOOT STEP

Author : Dr. Karthikeyan Chittayil, Professor DEC



The term "wireless communication" generally brings to mind, for most people, the communication systems involving electromagnetic waves. It is rarely that anyone thinks of sound waves as a means of wireless communication, although that is the primary means of communication that we are blessed with. The main limitation with sound is that it gets attenuated fast in air. But sound is the principal means of communication used underwater by animals and it has been used also by humans for almost a century, since electromagnetic waves do not propagate well underwater. Yet, this use is not so well known, as the main users of underwater sound are scientists concerned with ocean explorations and naval personnel involved in SONAR application. It is a matter worth recognition that study of sound waves or acoustics can give us significant insight into most phenomena associated with wireless propagation viz. reflection, refraction and diffraction as well as scattering and attenuation.

Room acoustics is an area where some of the basic principles of wireless communication can be easily simulated in a small laboratory. The ideas of signal spreading and attenuation, multi-path spreading and effects and fading etc. can be simulated and studied. With this purpose in view, the Department has planned to set up an Acoustics Laboratory in the near future

A MEASUREMENT STUDY OF TIME-SCALED 802.11A WAVEFORMS OVER THE MOBILE- TO- MOBILE VEHICULAR CHANNEL AT 5.9 GHZ

Author : Asha Panicker Associate Professor DEC



The effects of the mobile vehicle to vehicle (V2V) channel is analyzed on scaled versions of the current IEEE 802.11a standard to investigate how readily it can be applied to vehicular networks. In particular, measured parameters for the V2V channel at 5.9 GHz in suburban, highway, and rural environments are studied in the context of critical parameters for OFDM. Actual performance of scaled OFDM waveforms with bandwidths of 20 MHz (Bandwidth of IEEE 802.11a), 10 MHz (Bandwidth of the draft IEEE 802.11p), and 5 MHz (halved bandwidth of IEEE 802.11p) are described and interpreted in light of the channel parameters. At 20 MHz the guard interval is not long enough, while at 5 MHz errors increase from lack of channel stationarity over the packet duration. For these choices of the scaled 802.11a OFDM waveform, 10 MHz appears to be the best choice.

As quoted in TOPICS IN AUTOMOTIVE NETWORKING (IEEE Communications magazine, May 2008)

PUBLIC KEY ACCELERATOR FOR ACHIEVING HIGH PERFORMANCE

Author : Pramod Govindan Senior Lecturer DEC



The performance of cryptographic algorithms is very poor with software implementations. Hardware implementation gives much more performance compared to software implementation. Also this off-loads the main processor in the system from running these algorithms. Public Key Accelerator is a hardware implementation which performs "modular exponentiation" which is represented mathematically as $g^x \text{ mod } p$ function for Programmed Bit Sizes of g , x & p . Maximum size of p is 4096 bits and that of x is 2048 bits. This is used to perform Diffie-Hellman (DH) operation, RSA encryption/decryption and DSA signing/verification. These implementations are efficiently used in Network Security Processor developed for use in VPN/Firewall Appliances, VPN enabled equipment, routers and bridges. The most time consuming operation in DH, RSA & DSA algorithms is modular exponentiation ($g^x \text{ mod } p$) of long integers. Repeated Square and Multiply Algorithm is used for modular exponentiation. Main part of modular exponentiation is modular multiplication. Multiple Word Radix-2 Montgomery Multiplication Algorithm is used for modular multiplication. Compared to software implementations, the performance is about 50 times with this hardware implementation, for a 2048 bit exponent.

DIGITAL AUDIO WATERMARKING

Author : Harsha A Lecturer DEC



Digital watermarking is a technology which allows a secret message to be hidden in a computer file, without the detection of the user. Watermark information is predominantly used to identify the creator of a digital file, i.e. a picture, a song, or text. Digital audio watermarking involves the concealment of data within a discrete audio file. Intellectual property protection is currently the main driving force behind research in this area. To combat online music piracy, a digital watermark could be added to all recording prior to release, signifying not only the author of the work, but the user who has purchased a legitimate copy. Newer operating systems equipped with digital rights management software (DRM) will extract the watermark from audio files prior to playing them on the system. The DRM software will ensure that the user has paid for the song by comparing the watermark to the existing purchased licenses on the system.

IMPROVING CHIP PERFORMANCE THROUGH STRAINED SILICON

Author: Sheeba kumari M Lecturer DEC

Strained silicon is a process to raise drive current in CMOS transistors, enabling them to switch between on-off states faster, creating a higher frequency of operation. This increases the chip speed. The silicon atoms are stretched beyond their normal interatomic distance. The speed of current flow depends on the crystal structure of silicon. Inside the silicon lattice, the electrons around each atom form patterns of energy states called orbitals. These states merge to form a continuous band that allows electrons and "holes" to move through the lattice. The orientation of the orbitals is important. Each atom has six lobe-shaped orbitals: two in the direction of electron flow and four that are perpendicular to it. All 6 orbitals in Silicon have the same energy so there is no preferred direction of flow. But stretching the lattice decreases the energy of the two orbitals in that direction, letting electrons flow more easily along the aligned orbitals. Similarly, squeezing the lattice lets positive charges to flow more easily. When silicon is deposited on top of a substrate Silicon Germanium (SiGe) with atoms spaced farther apart, the atoms in silicon stretch to line up with the atoms beneath, "straining" the silicon. Another method to stretch the silicon lattice is to deposit a film of silicon nitride over the whole transistor at high temperature. Because silicon nitride contracts less than silicon as it cools, it locks the silicon lattice beneath it in place with a wider spacing than it would normally adopt. This improves electron conduction by 10 percent, improving the chip performance. Strained silicon technology can also be combined with lower-power transistors, high-speed copper interconnects, and high k dielectric materials such as Hafnium dioxide in the 90nm to 45nm technology.



CHARGING TO INFINITY



The inaugural ceremony for the association activities for the year 2008 - 2009 was held on 09/08/2008 from 1.30 -3.30 pm at Chavara hall. **Mr. Unnikrishnan**, Scientist G NPOL, presided over the event. The main programs for the ceremony were, Ranga pooja by S7 students, talk by the Chief Guest on contemporary Electronics topics, talk by Srijith K S7 ECE, report on the **Miniproject Exhibition** conducted on 11th July 2008 and prize distribution. The senior teachers of the department were facilitated.

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The Electronauts Association has planned to take the first steps towards strengthening the group activities. Following are the milestones we would like to achieve by the end of this semester:

- * Release of magazine citing the technical works and contributions of the teachers and students of our department
- * Gearing up the students of S4 to develop a micro-project in order get them trained for doing the mini project in S6
- * Putting up charts on notice board with news, pictures and information with regard to development in the field of Electronics and Communication and updating them time to time



Donia Ann Jose of 2004-08 batch has secured the second rank in the M G University B.Tech Examination. The Dept. of ECE would like to commend her sincere hard work and dedication which has brought this honour to the department as well as the college. The department would like to congratulate her on her outstanding performance and wish her a very bright and successful future.

MINIPROJECT EXPO WINNERS



"Vehicle Automation Using Local Interconnect Network Protocol(LIN)" : David Sajan Mangalam & Rafsal K R.

LIN is a new communication protocol designed to operate in distributed electronic systems. Its primary usage will be as a low cost network connecting simpler components such as sensors and various other electro-mechanical devices. The LIN specification covers the transmission protocol, transmission medium and interface. The main purpose of the development and standardization of LIN is to have a low cost embedded control. This project describes and investigates the possibilities and the advantages of using LIN as a multiplexed electrical system in modern vehicles.

"Hardware Implementation of Discrete Cosine Transform" : Bijosh C Issac and Joe Kurian

"Hardware Implementation of Linear Discrete Convolution": Lijo Maunel and Vivek Santhosh

"Hardware Implementation of Fast Multiplication" : Anna Mary Mathew and Anisha Natarajan

A field-programmable gate array is a semiconductor device containing programmable logic components called "logic blocks" and programmable interconnects. Logic blocks can be programmed to perform the function of basic logic gates such as AND, OR, XOR or more complex combinational functions such as decoders or mathematical functions. A hierarchy of programmable interconnects allows logic blocks to be interconnected as needed by the designer. Logic blocks and interconnects can be programmed by the customer or designer, after the FPGA is manufactured, to implement any logical function—hence the name "field-programmable". The three projects were coded in Verilog and implemented on a Xilinx Spartan 3 FPGA.

ELECTRO PUZZLE



ACROSS

2. Significant contribution in EMT
3. Unidirectional current conduction device
4. Computer architecture
5. parallel processing
7. protection from high power devices
9. Hierarchy theory
12. Motor used in robotics
15. Sampling
16. Non-Zero vector, Changes length but not direction (matrix)
17. Highest occupied level of electrons in Quantum Mechanics
19. 3pin bistable switch
20. High speed semiconductor device

DOWN

1. Fabrication material.
6. High frequency oscillator
8. Sustained oscillator
10. Linear programming method
11. Fast multiplication
13. Output without giving input
14. Power flow of EM Wave
18. Basic building blocks sequential circuits

"SYMBOL CORNER"

Identify the electronic device whose symbol is shown below. Submit the answer and get attractive prizes.



Answers in the next issue