




# Three-day Workshop on Digital Signal Processing and Embedded Systems

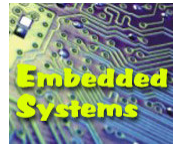
August 18-20, 2008



**Venue:**  
VNR VJIIET Campus  
Hyderabad  
Bachupally, Kukatpally  
Hyderabad 500072  
[www.vnrvjiet.ac.in](http://www.vnrvjiet.ac.in)

Conducted by VLSI Society of India  
  
<http://vlsi-india.org/vsi>  
Organized by VSI Hyderabad Chapter

In Cooperation with VNR VJIIET and  
CDAC Hyderabad  
 



## Workshop Goals

Digital Signal Processors and embedded systems have revolutionized the way we live today. We use a myriad of mobile devices today, all of which embed a large number of DSP and Microcontrollers. The workshop is intended to provide a closer look at the world of DSP and embedded systems. Design challenges and applications will be highlighted. The workshop is suitable for working professionals, faculty, and students who wish to learn about recent developments in DSP and Embedded Systems. The workshop will include invited talks and demonstrations.

## Registration

A limited number of registrations is available. Write to the **Seminar co-coordinators**, VNRVJIIET, Hyderabad with your intention to participate and after you receive an e-mail confirmation, please use the enclosed registration form and send it filled along with the payment to the following address.

## Workshop on DSP and Embedded Systems

**Prof. N. Balaji**  
ECE Dept, VNRVJIIET  
Bachupally, Kukatpally  
Hyderabad 500072

## Contact information:

**Mr. N. Balaji**  
narayanamb@rediffmail.com, 09848115663  
**Mrs.S.Roji Marjorie**  
roji\_marjorie@yahoo.co.in, 09866324881

## Venue

The VNR Vignana Jyothi Institute of Engineering and Technology (VNRVJIIET) is located near Bachupally Village, Ranga Reddy District, about 8 km. from Miyapur junction along the inner ring road, and is about 8 km from JNTU College of Engineering, Kukatpally via Pragathi Nagar. Participants can avail College Bus Facility free of charge.

For the convenience of participants, arrangements have been made with the A.P. State Road Transport Corporation to run more than 10 exclusive buses to the Institute from Kukatpally as per the following timings.

Kukatpally Campus  
to  
to  
Campus Kukatpally



Five buses 9:00 to 9:15 AM 4:00 PM

One bus shuttle service is present between campus and JNTU every hour after 4PM until 8PM. For the convenience of the students who wish to utilize the Library and Sports facilities in the Campus, out of the 10 exclusive buses, two buses are being run as LADIES SPECIALS.

## Program Chairs

**Dr. C.P. Ravikumar**, Texas Instruments India  
**Dr. C.D.Naidu**, VNRVJIIET, Hyderabad  
**Dr. Sarat Chandra Babu**, CDAC Hyderabad

## Local Coordination Committee

**Mr. N. Balaji**, VNRVJIIET  
**Mrs. S. Roji Marjorie**, VNRVJIIET  
**Mr. M.V. Nageswara Rao**, CDAC Hyderabad

## Faculty

**N. Balaji**, VNRVJIIET  
**Prohor Choudhury**, Texas Instruments India  
**Gurjit Singh Gill**, Gill Instruments  
**Sreeram Mohan**, Cranes Software  
**Bharat Pathak**, Arithos Designs  
**Vatsalya Prasad**, ARM Embedded Technologies  
**Mahesh U. Patil**, CDAC Hyderabad  
**C.P. Ravikumar**, Texas Instruments India  
**Vinod Geo Thomas**, Cranes Software

The registration fee includes registration material, lunch and coffee on all days.

The course fee should be sent to the coordinators by **Demand Draft** in favour of **VSI Chapter-VNRVJIIET**, payable at Hyderabad along with the registration Form.

## Registration Fee:

(Accommodation is available on request at nominal charges. Please contact the coordinators)

Before July 25 Category	Members of VSI/IEEE/IETE	Others
Students	Rs 500/=	Rs 750/=
Faculty Member	Rs 1000/-	Rs 1500/-
Working Professionals	Rs 1200/-	Rs 1700/-
After July 25		
Students	Rs 1000/=	Rs 1250/=
Faculty Member	Rs 1500/-	Rs 2000/-
Working Professionals	Rs 1700/-	Rs 2200/-
Registrations after July 25, and on-the-spot registration are subject to availability		

## Bus Timings

**From Koti** at 7.30AM, reaching the institute at 8.40AM, Via Lakdi-ka-pool, Ameerpet, ESI, Erragaddda, Kukatpally, JNTUC and Miyapur Junction.

**From Secunderabad** at 7.30AM, reaching the Institute at 8.40AM, Via Secunderabad Railway Station (Reservation Complex), Bowenpally, Balanagar, Kukatpally, KBHB, JNTUC and Pragathi Nagar.

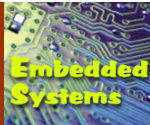


## Workshop Program

Aug 18	<p>09.00 – 09.30 AM <b>Registration</b></p> <p>09.30 – 10.30 AM <b>Inauguration and Introductions</b> <i>DSP and Embedded Systems – The Next Frontier</i></p> <p>11.00 – 01.00 PM <b>C.P. Ravikumar</b>, Texas Instruments</p>	<p>02.00 – 03.30 PM <b>Tutorial: A step-by-step approach to FIR design and implementation - a hardware perspective</b> <b>Bharat Pathak</b>, Arithos Designs</p> <p>04.00 – 05.30 PM <b>Tutorial continues</b></p>
Aug 19	<p>09.00 – 09.30 AM <b>Registration</b> <i>Introduction to OMAP (Open Media Application Platform) Processor</i></p> <p>09.30 – 10.30 AM <b>N.Balaji</b>, VNR VJIET</p> <p>11.00 – 01.00 PM <i>Digital Signal Controllers – Architectures and Applications</i> <b>Prohor Choudhury</b>, Texas Instruments India</p>	<p>02.00 – 03.00 PM <b>Digital Signal Processors in Video Applications</b> <b>Vinod Geo Thomas</b>, Cranes Software International</p> <p>03.30 – 05.30 PM <b>FPGAs in DSP and Embedded Systems Design.</b> <b>Sreeram Mohan</b>, Cranes Software International. <i>A Demonstration Booth of DSP Products is planned</i></p>
Aug 20	<p>09.00 – 09.30 AM <b>Registration</b></p> <p>09.30 – 10.30 AM <b>Codecs and Processors - You Can't Select One without the other</b> <b>Vatsalya Prasad</b>, ARM Embedded Technologies</p> <p>11.00 – 01.00 PM <b>Embedded Systems for Low Power Wireless Applications.</b> <b>Gurjeet Singh Gill</b>, Gill Instruments</p>	<p>02.00 – 03.30 PM <b>Tutorial: Real-time Operating Systems for Embedded Systems.</b> <b>Mahesh U.Patil</b>, CDAC Hyderabad</p> <p>04.00 – 05.30 PM <b>Tutorial Continues</b></p> <p>05.30 – 06.00 PM <b>Feedback and Distribution of Certificates</b></p>

### About the faculty

#### Embedded Systems



#### Digital Signal Processing



#### Embedded Systems for Low Power Wireless Applications

**Gurjit Singh Gill** is the Director /Design Head, at Gill Instruments Bangalore, a third-party company of Texas Instruments. He has 7+ years of work experience in the field of embedded systems. He has worked as an Embedded Design Engineer for several companies. He presented a keynote speech, *Embedded system design using MSP430* and conducted tutorials on *Single chip Filter*, at the *Texas Instruments Developer conference* during 2004-2005. He has worked on wireless Acoustic sensors using MSP430 for Fire Alarm system, implementing Filter algorithm and echo cancellation techniques. He has designed one of the first development tools to support Acoustic sensor interface that employed the on board microphone and low power amplifier with wire/wireless interface. Currently he is working on TCP/ IP, USB and wireless protocols.

#### Introduction to OMAP (Open Media Application Platform) Processor

**Mr.N.Balaji** is an Associate Professor at the E.C.E Dept. VNR VJIET. He has over 11 years of teaching experience. His areas of research include Radar signal Processing, VLSI and Embedded Systems.

**Abstract:** *OMAP5912 is a highly integrated hardware and software platform, designed to meet the application processing needs of next-generation embedded devices. The OMAP platform enables OEMs and ODMs to quickly bring to market devices featuring rich user interfaces, high processing performance, and long battery life through the maximum flexibility of a fully integrated mixed processor solution. The dual-core architecture provides benefits of both DSP and reduced instruction set computer (RISC) technologies, incorporating a TMS320C55x DSP core and a high-performance ARM926EJ-S ARM Core. The OMAP5912 is a powerful processor with wide range applications like Mobile Communications, WAN 802.11, Bluetooth, GSM, GPRS, EDGE, CDMA, Video and Image Processing, Advanced Speech Applications.*

#### Codecs and Processors - You Can't Select One without the other

**Vatsalya Prasad**, Senior Design Engineer at ARM India working in the Media Processing Division. Focus areas are video, image and audio algorithm on ARM architectures. He has made contributions to OpenMAX DL (Enabling rapid codec portability - [www.khronos.org/openmax](http://www.khronos.org/openmax)), developed and optimized libraries for v6 and v7 ARM architectures that are used for a wide range of accelerated codec functionality such as MPEG-4, H.264, MP3, AAC and JPEG.

**Abstract:** *When it comes to efficiency for multimedia devices handling video, images, audio, and graphics, the underlying architecture and the choice of the software that will be running on this architecture are key. There are many design options for the system architect and these decisions have a huge impact on device power consumption, area, and performance. But what about the impact of the CODEC that is running on the architecture? This session illustrates how CODECs are complimentary to the processor and that you cannot choose one without seriously thinking about the other.*

#### DSP and Embedded Systems – The Next Frontier



**C.P. Ravikumar** directs the University Program for Texas Instruments, India. He is also the secretary of the VLSI Society of India since 2003. More details about him can be found at <http://cpravikumar.tripod.com>

**Abstract:** *The talk will provide an overview of the evolution of Digital Signal Processors and the signal chain in an embedded system. We will examine some of the recent developments where digital signal processors and microcontrollers are being employed along with wireless technologies to create many interesting applications. The challenges of developing such systems will be highlighted.*

#### Digital Signal Processors in Video Applications



**Vinod Geo Thomas** is a Senior Software Engineer at Cranes Software International Ltd. He completed his M.Tech in Telematics & Signal Processing from NIT (Rourkela). His focus area is a speech/audio algorithm on TMS320C6000 architectures. In his professional experience of over 5 years, he has conducted numerous trainings on TI processors and speech applications for corporate and academia.

*Today's demanding consumer video applications often require the high performance of system-on-a-chip (SoC) integration. Fortunately, a new type of SoC processor has appeared that integrates high-performance and programmable cores, together with the essential memory and peripherals for building a wide range of consumer video systems.*

*An example of such an SoC video processing platform is DaVinci technology from Texas Instruments. The underlying DaVinci hardware has been designed specifically to support video systems, not only serving to reduce board space and component counts, but also to eliminate much of the low-level software development required to integrate a complex system. DaVinci processors consist of scalable, programmable processors, including DSP-based digital media processors, ARM processors and DSP-based systems-on-chips (SoCs), which include accelerators and peripherals. It enables original equipment manufacturers (OEMs) to more easily and quickly develop a range of innovative, cost efficient digital video products, transforming the way consumers experience digital video. DaVinci technology will accelerate the pace of innovation and expand the market for digital video applications.*

*In this session we shall look into the roadmap of TI DaVinci, focus on their latest versions and describe the various hardware and software tools available for them.*

## Tutorial: Real-time Operating Systems for Embedded Systems



**Mahesh Patil** is a Project Leader for the National Ubiquitous Computing Research Centre, established at C-DAC, Hyderabad. His research interests include Model Based Design of Ubiquitous Computing Systems, Wireless Sensor Networks, Protocol Design and Open Source Real Time and Embedded Operating Systems. He was instrumental in setting the Wireless Sensor Networks Application Research and Development Lab (WISARDLab) at C-DAC, Hyderabad and is presently implementing a productivity tool for WSN application development.

**Abstract:** Real Time Operating Systems (RTOS) are building blocks for most of the real time embedded applications today. This talk would put forth the differences in features of RTOSs, as contrasted with the General Purpose Operating Systems. The tutorial would also present various scheduling schemes for real time tasks and discuss schedulability analysis on a given set of specifications for real time tasks. We would also look into performance metrics of RTOSs.

## Digital Signal Controllers – Architectures and Applications



**Prohor Choudhury** is an application engineer at Texas Instruments India working in the Advanced Embedded Controllers Business Unit.

**Abstract:** The requirement for high-end controllers is growing. This talk will explain how Digital Signal Controllers can provide the right solution for a range of control applications. In particular, we will discuss the Texas Instruments C28x DSP Family of devices. All the architectural aspects of the C28X DSP core, such as the bus system, register and instruction set, pipeline, interrupt etc will be covered. The later part of the talk will focus on the architectural features of the peripherals around the C28X DSP core, which are integrated together to build a family of System-on-Chip devices.

### Tutorial: A step-by-step approach to FIR design and implementation - a hardware perspective



**Bharat Pathak** obtained an M.Tech from IIT Mumbai (Microelectronics, 1996) and has over twelve years of industry experience in leading semiconductor companies such as Texas Instruments, Marvell Semiconductor, National Semiconductor, and Genesis Microchip in the areas of signal processing, digital video encoding and decoding, image/video processing algorithms modeling and hardware implementation. He has worked extensively on various video/ image-processing algorithms like noise reduction, de-interlacing, image scaling, color quantization. He has designed and implemented various kinds of digital filters, including FIR, IIR, and multirate filters for data path processing. He holds one US patent and 5 others that are pending in USPTO. He has received several recognitions for technical innovation. He is presently with a startup company (Arithos). He has offered trainings on various aspects of Digital Signal Processing and Digital Image Processing.

**Abstract:** Many of the DSP algorithms are implemented using fixed point digital signal processors. Filters are one of the most common modules found on the DSP datapaths. In this tutorial we illustrate the process of designing filters from frequency domain specifications, performing coefficient quantization, performing structural quantization and listing standard tests that are needed to validate the design.

### FPGAs in DSP and Embedded Systems Design

**Sreeram Mohan** is a technical support engineer in Cranes Software India (Bangalore).

**Abstract:** The talk is organized to introduce the crowd to the usage of FPGAs in DSP or Embedded Systems design. The talk will focus on using a SW/HW co-design approach to design promising embedded systems. The crowd will be introduced to Sundance Tools basically a DSP/FPGA co-design hardware as well as the Microtronix FPGA development platform embedded systems design.

