
Welcome!

University Track (a.m.)

DSPS Fest 2000

Date: Wednesday, August 2, 2000
Time: 9:00 a.m. - 12:00 p.m.
Moderator: Maria Ho - Marketing Manager
DSP Hearing Processor

- **9:00** "Welcome and Introduction to DSPS FEST 2000!"
  Maria Ho; Texas Instruments
- **9:15** "DSP University Program Update"
  Christina Peterson, Torrence Robinson; Texas Instruments
- **10:15** ***BREAK***
- **10:30** "The INFINITY Project--Engineering and Technology Education for the Next Century"
  Geoffrey Orsak; Southern Methodist University
  Torrence Robinson; Texas Instruments
- **11:00** "DSP Development Tools Update"
  John Echard; Texas Instruments

DSPS Fest 2000

University Track (p.m.)

Date: Wednesday, August 2, 2000
Time: 2:00 p.m. - 5:30 p.m.
Moderator: Maria Ho - Marketing Manager DSP Hearing Processor

- **2:00** "Teaching DSP with VAB"
  Jim Zachman; Hyperception
- **2:20** "DSPs in Teaching Design of Embedded Systems"
  Anita Flynn; UC-Berkeley
- **2:40** "Advanced DSP for Undergraduates at a Small University"
  David J. Waldo; Oklahoma Christian University
- **3:00** "Simulating the 62xx Pipeline for Teaching Computer Architecture"
  Oscar Yanez; UAM Iztapalapa, Mexico
- **3:20** ***BREAK***
- **3:30** "Rapid Development of High-Quality Customizable and Adaptable Software for DSP's"
  Farokh B. Bastani; University of Texas - Dallas
- **3:50** "Teaching Real-Time Beamforming with the C6211 DSK and Matlab"
  Michael G. Morrow; U.S. Naval Academy
- **4:10** "Effective Use of Projects in DSP Laboratory Instruction"
  Mike Kramer; University of Illinois
- **4:30** "Migrating an Academic DSP Lab from the TMS320C30 to the TMS320C67"
  Keith Hoover; Rose-Hulman Institute of Technology
- **4:50** "C6x-Based Digital Signal Processing: A System Design Approach"
  Nasser Kehtarnavaz; Texas A&M University

DSPS Fest 2000

Wireless Applications Symposium

Date: Thursday, August 3, 2000
Time: 8:30 a.m. - 12:00 p.m.
Moderator: Alan Gatherer Ph.D. - SMTS and Manager
Wireless Algorithm & Architecture Development, TI DSPS R&D Center

- **8:30** "Application of TMS320C6400 in 3G Wireless Infrastructure Transceiver (BTS)"
  Tom Horner, Jelena Nikolic-Popovic; Texas Instruments
- **8:55** "1Xtreme"
  Giri Mandyam;Nokia
- **9:20** "Smart Antenna for Handsets"
  Raqibul Mostafa; Virginia Tech
- **9:45** "Real-Time DSP Multiprocessor Implementation for Future Wireless Base-Station Receivers"
  Bryan Jones, Sridhar Rajagopal Joe Cavallaro; Rice University
- **10:10** ***BREAK***
- **10:20** "Implementation of a Smart Antenna Test-bed for a Wide-band CDMA Mobile Channel"
  Seungwon Choi and Heung Jae Im; Hanyang University, Korea
- **10:45** "Software Radio"
  Carl Panasik; Texas Instruments
- **11:10** "An Investigation of Fixed Point DSP Implementation of Symbol Timing Synchronization for Continuous Phase Modulation"
  J. V. Krogmeier; Purdue University
- **11:35** "A TMS320C6701/FPGA Based Frequency Selective RF Channel Simulator Using IF Sampling"
  Jeff Papenfuss, Mark Wickert; University of Colorado

Digital Control Systems Applications Symposium

DSPS Fest 2000

Date: Thursday, August 3, 2000
Time: 8:30 a.m. - 12:00 p.m.
Moderator: Zhenyu Yu, Ph.D. - MGTS
DSP Digital Control Systems Applications

- **8:30** "Introduction to Digital Control Systems Applications Symposium"
- **8:45** "A DSP-Based Switching Amplifier for Capacitive Loads"
  John Murray; State University of New York at Stony Brook
- **9:05** "Advanced DSP Based Single Phase Power Factor Correction Approach"
  Susilo U. Sulistijo, Prasad N. Enjeti; Texas A&M University
- **9:25** "Implementation of Neural Networks to aid Switched Reluctance Motor Control on the TMS320C6701"
  S.S.Ramamurthy, J.C.Balda; University of Arkansas
- **9:45** "Stator Fault Detector for AC Motors Based on the TMS320F243 DSP Controller"
  Bin Huo and Andrzej M. Trzynadlowski; University of Nevada
- **10:05** ***BREAK***
- **10:25** "A DSP-Based Torque Monitor for Induction Motors"
  Cristian Lascu and Andrzej M. Trzynadlowski; University of Nevada
- **10:45** "Implementing Rotor Field Orientated Control and Direct Torque Control of Five-Phase Induction Motor Using TMS320C32 DSP"
  Huangsheng Xu, Hamid A. Toliyat; Texas A&M University
- **11:05** "Odyssée: A New Kinetic Actuator for Use in the Home Entertainment Environment"
  Bruno Paillard, Pierre Vittecoq Raymond Panneton Université de Sherbrooke,Canada;Philippe Roy D-BOX AUDIO INC; Jacques Turcotte SMIS R&D
- **11:25** "Controller Design for an Autonomous Wall-climbing Micro-robot Based on TMS320LF2407 DSP Chip"
  Ning Xi, Jizhong Xiao; Michigan State University

DSPS Fest 2000

Audio Applications Symposium

Date: Thursday, August 3, 2000
Time: 2:00 p.m. - 5:00 p.m.
Moderator: Randy Cole, Ph.D. - Chief Technology Officer and Manager
Internet Audio Business, TI DSPS R&D Center

- **2:00** **"Real-time Full Periphonic Soundfield Manipulation using a Texas Instruments TMS320C6x DSP"**
  Iain Paterson-Stephens, Bruce Wiggins and Pieter Schillebeeckx; University of Derby, UK
- **2:25** **"How TI is Playing in the Internet Audio Market"**
  Chris Schairbaum; Texas Instruments
- **2:50** **"Active Noise Control Systems with the TMS320 Family"**
  Sen M. Kuo; Northern Illinois University
- **3:15** ***BREAK***
- **3:35** **"An Advanced DSP Architecture for Real-time Audio Decoding"**
  Ajay Gupta, G. Krishnakumar G and Prabindh Sundareson; Texas Instruments
- **4:00** **"3D Audio Processing for Elevated Speakers Using the TI C62 EVM Board"**
  Woon-Seng Gan, See-Ee Tan and Meng-Hwa Er; Nanyang Technological University - Singapore
- **4:25** **"Real-time DSP Software Design for a Portable MP3 Player on a Texas Instruments TMS320C54x DSP using DSP/BIOS"**
  Mathew George, Jr. (Joe), Jack Greenbaum, and Mark Nadeski, TI-Houston
- **4:50** **"Audio Applications Symposium Wrap Up/Q&A's"**
  Randy Cole, Texas Instruments

Broadband Access Applications Symposium

DSPS Fest 2000

Date: Friday, August 4, 2000
Time: 8:30 a.m. - 12:00 p.m.
Moderator: Mike Polley Ph.D. - SMTS and Manager
Broadband Wireless Access Branch , TI DSPS R&D Center

- **8:30** "Introduction to Broadband Access Applications Symposium"
- **8:35** "Network Traffic and Load Estimation/Prediction Implemented on a TI-DSP System"
  Salam, Yu, and Waheed; Michigan State University
- **9:00** "Flexible Chipset Architectures for TI's ADSL Modems"
  Mansoor Chishtie; Texas Instruments
- **9:25** "An Efficient Power-reduction Technique for DSL Modems using Constellation Shaping"
  Henry Kwok and Doug Jones; University of Illinois at Urbana-Champaign
- **9:50** ***BREAK***
- **10:20** "Fixed-base Broadband Wireless Access - The Next Fat Pipe into the Home"
  Mike Polley; Texas Instruments
- **10:45** "A Real-Time Resource Allocation Scheme for Broadband Access"
  Nagarajan and Zhou; Georgia Institute of Technology.
- **11:10** "Extending TI's Leadership in Wireless into Optical Networking"
  Jose Melendez, Robert Keller, and Matt Harrison; Texas Instruments
- **11:35** "High Performance, High Speed Wireless Local Area Networks (WLAN) in the 2.4GHz Band"
  Matthew Shoemake; Alantro Communications

DSPS Fest 2000

Video/Imaging Applications Symposium

Date: Friday, August 4, 2000
Time: 2:00 p.m. - 5:00 p.m.
Moderator: Bruce Flinchbaugh, Ph.D. - DMTS and Manager Vision Systems, TI DSPS R&D Center

- **2:00** "Introduction to Video/Imaging Applications Symposium"
- **2:10** "Recognition of Number Plates and Fingerprints using the C6x"
  David Humphrey; Cambridge Neurodynamics Limited - UK
- **2:30** "Autonomous Video Feedback Controlled Surveillance using an Embedded DSP System"
  Edward Chung, Pat Flaherty; Rochester Institute of Technology
- **2:50** "PCI Controller with C6x HPI/DMA Interface for Image Processing Board"
  Sung Man Park, Chan Mo Kim, and Yong Beom Cho; Konkuk University - Korea
- **3:10** "A Low Bandwidth Internet Camera Using TMS320C62xx"
  Tim Simerly; Ivex Corporation

- **3:30** ***Break***

- **3:40** "DLP (Digital Light Processing) Cinema"
  Ed Nelson; Texas Instruments
- **4:00** "Hardware Requirements of 3D Imaging Systems"
  Charles T. Johnson-Bey, Otsebele Nare, and Craig Scott; Morgan State University
- **4:20** "Image and Video Applications Using TI DSPs"
  Edward J. Delp; Purdue University
- **4:40** "Optimization of a Baseline H.263 Video Encoder on the TMS320C6x"
  H. Sheikh, S. Banerjee, B.L. Evans, and A.C. Bovik; The University of Texas at Austin

Biomedical Applications Symposium

DSPS Fest 2000

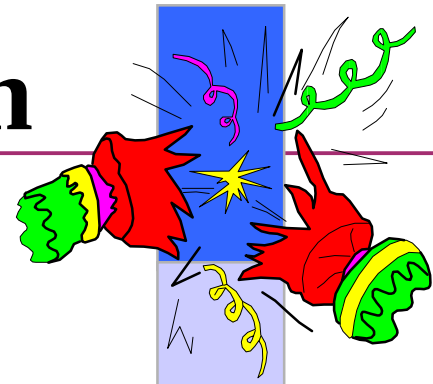
Date: Friday, August 4, 2000
Time: 2:00 p.m. - 5:00 p.m.
Moderator: Mhamed Ibnabdeljalil, Ph.D.
Worldwide Strategic Marketing

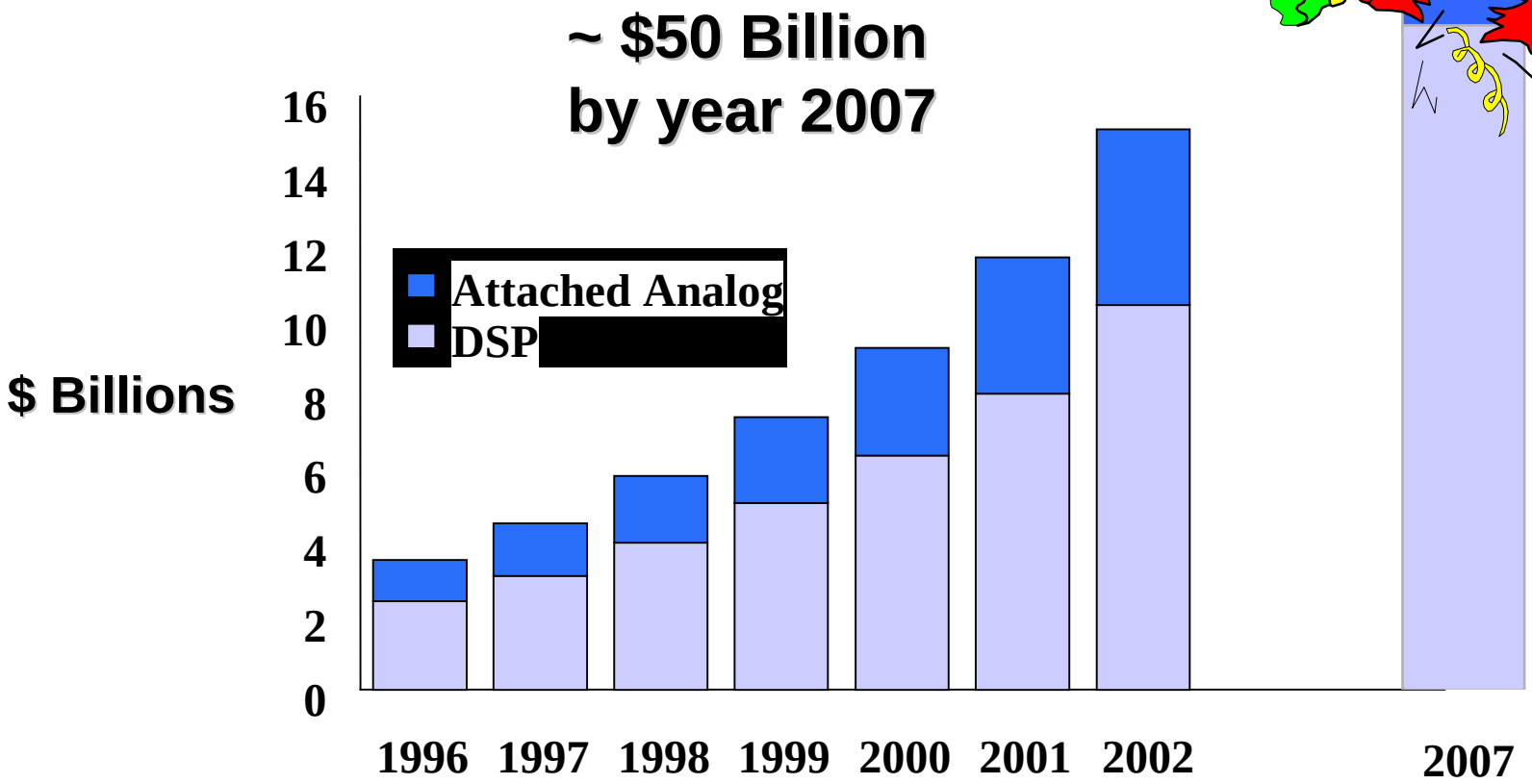
- **2:00** "New DSP's Tackle Medical Ultrasound Beamforming"
  R. H. Hosking; Pentek
- **2:25** "Real-time Image Processing Strategies for Retinal Implants"
  James D Weiland; Johns Hopkins University
- **2:50** "Pocket Utrasound"
  Mir A Imran; Novasonics Corporation
- **3:15** "Energy profiling of DSP Applications: A Case Study of an Intelligent ECG monitor"
  Jejan Raskovic; University of Alabama
- **3:40** ***BREAK***
- **3:50** "Real-time Implementation of Frequency-domain Beamformer on TI C62x EVM"
  Mark Elledge; University of Illinois
- **4:15** "Automatic Detection of Emergency vehicles for Hearing Impaired Drivers"
  Sung-won Park; Texas A&M University
- **4:40** "Development of a Low-Cost Hearing Processor"
  Neeraj Magotra; Texas Instruments

Agenda

- University Program Education & Labs Overview
- TI DSP & Analog Challenge
- University Research Program

DSP Market Growth

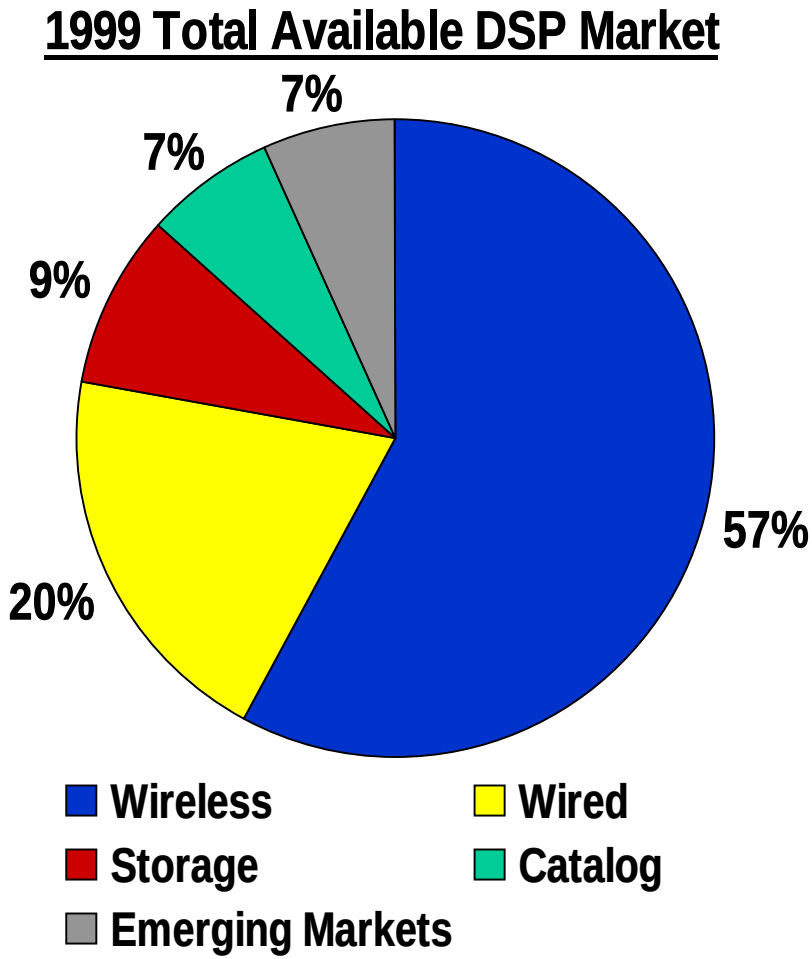




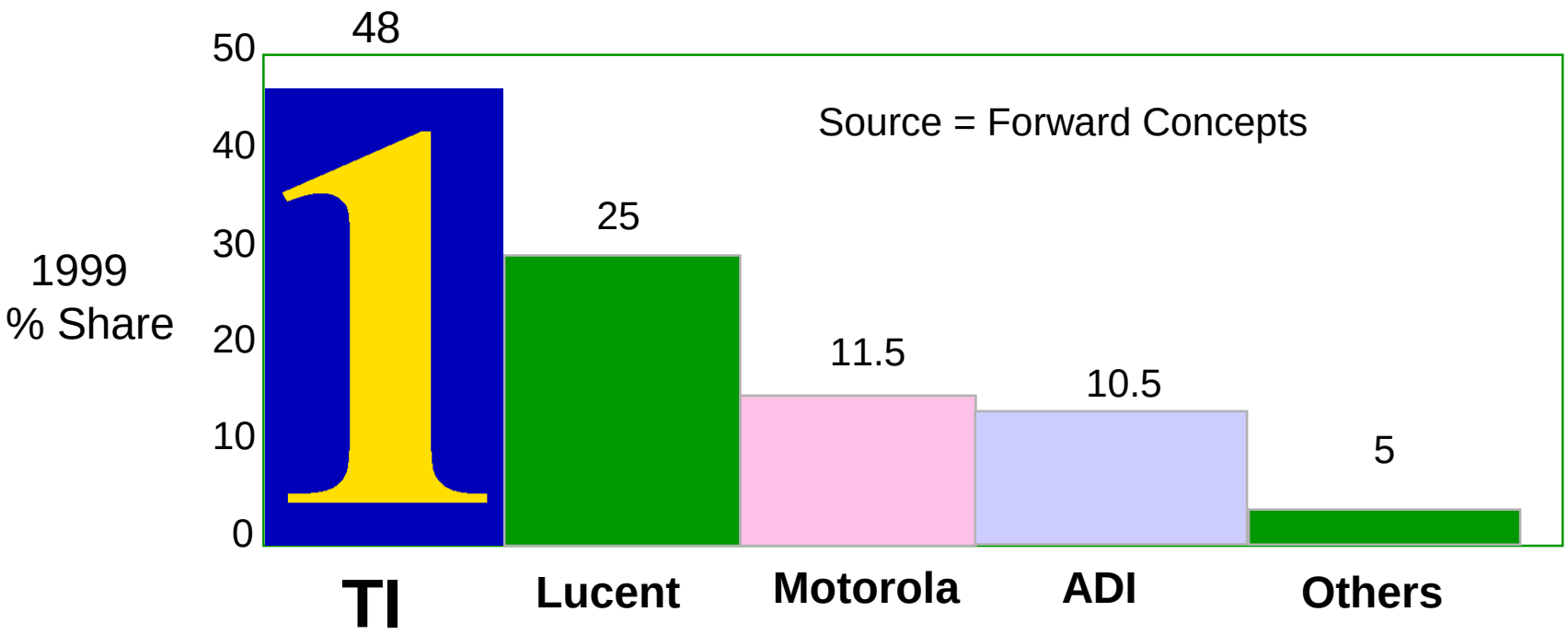
- DSP Market is exploding
- Demand for DSP-trained engineers is going up

Wide Reach of DSP Applications

- DSP in growing number of areas
  - Wired
    - Datacom equipments
  - Emerging Markets
    - Digital Control Systems
    - Internet Audio
    - Printers
    - DVD
    - Internet Phone
    - Digital Hearing Processors
    - Digital Radio
    - Network & Digital Cameras
    - Powerline Networking



TI DSP Market Position



- Also # 1 in Analog SC (Dataquest)
- Largest software Installed base with over 50,000 programmers
- Industry's biggest and best Value Web
- Company focus is DSP Solutions

Worldwide TI DSP Labs

- Over 900 TI DSP educational la
  worldwide
- Over 10,000 TI DSP literate engin
  graduated from universities aroun nd
  in 1999
- Over 100 new TI DSP labs set up in 1999
- Over 100 current TI DSP labs upgraded their tools in 1999

Resources for Getting Started

DSPS Fest 2000

- DSP University Program Home Page
  (http://www.ti.com/sc/university)
- Development Tools
  (http://www.ti.com/sc/docs/general/dsp/programs/labtools.htm)
  - DSP Starter Kits (DSKs)
  - Evaluation Modules (EVMs)
  - Code Composer Studio
  - Visual Application Builder (VAB)
- Training
  - Discount Workshops (U.S. and Canada only)
    (http://www.ti.com/sc/docs/general/dsp/programs/amtrng.htm)
  - One-day DSK Workshops
  - Seminars

Resources for Getting Started

DSPS Fest 2000

- Lecture/Lab Materials
  - Textbooks
    (http://www.ti.com/sc/docs/general/dsp/programs/booklist.htm)
  - Workshop Materials
    (http://www.ti.com/sc/docs/general/dsp/programs/workshop.htm)
  - DSP Teaching Kits (DTKs)
    (http://www.ti.com/sc/docs/general/dsp/programs/tkits.htm)
  - "Educator's Information Exchange"
    (http://www.ti.com/sc/docs/general/dsp/programs/shareware/index.htm)
    - Demo programs
    - Lecture slides/notes
    - Lab Exercises
    - Submit your materials!
    - Formal announcement in email newsletter

DSP Teaching Kits

C5000 DTK	C3x DTK
Instructor's Guide • DSP Theory • C5000 architecture	Instructor's Guide • DSP Theory
CD-ROM Based • Editable Files	Printed Instructor & Student Guides and Transparencies
Demo programs available via web	Demo programs included on disk
No textbook	"A Simple Approach to Digital Signal Processing"
C5000 Assembly Language Tutorials	
C5402 DSK + DSK-specific Code Composer Studio	C3x DSK + Assembler/Linker, Code Explorer Debugger
$295 – TMDX3200154	$199 – TMDS3200130

Resources for Getting Started

DSPS Fest 2000

- Tool Purchasing
  - Discount prices
    (http://www.ti.com/sc/docs/general/dsp/programs/toolweb.htm)
  - Ordering
    - More info coming . . . See future email newsletters
- Donations
  - Free Matching Software Tools (U.S./Canada only)
    (http://www.ti.com/sc/docs/general/dsp/programs/amsoft.htm)
  - Donation Request Form (U.S./Canada only)
    (http://www.ti.com/sc/docs/general/dsp/programs/donate.htm)

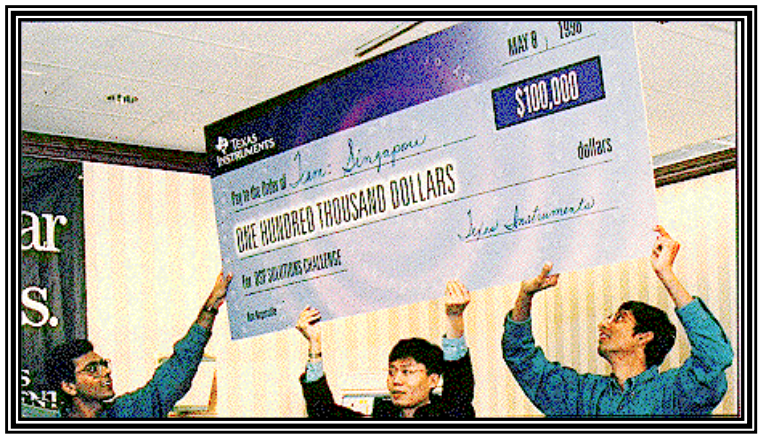
TI DSP and Analog Challenge™ 2000

"Being Creative Can be a Good Thing"

The History

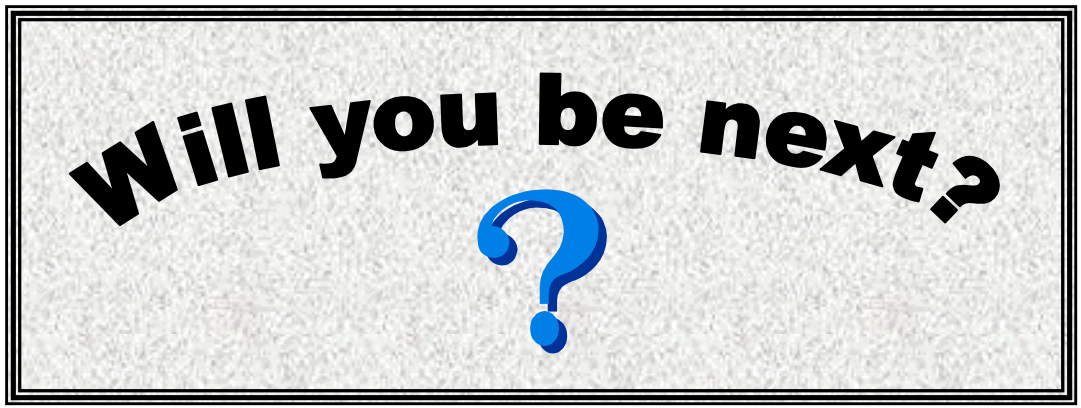
- The LARGEST cash award for a student DSP design competition!
- Competition
  - 1995
    - 230 entries, 26 countries, 700 students
  - 1997
    - 273 entries, 26 countries, 800 students
- Media coverage
  - Over 38 million impressions (CNN, Discovery Channel, China TV, Brazilian Cable, Singapore TV, EE Times, Washington Post, Strait Times (SGP), India Abroad….)

Past Winners



The NTU team celebrates after they were awarded the grand prize at ICASSP ‘96.

The Perugia team celebrates after they were awarded the grand prize at ICASSP ‘98.



University “X” celebrates after they were awarded the $$$ grand prize!!

The Award

$15K
for advising professor!!

$100,000
Grand Prize

$10,000
Finalist
(Americas)

$10,000
Finalist
(Europe)

$10,000
Finalist
(Asia/Japan)

$1K $1K $1K $1K $1K $1K $1K $1K $1K $1K $1K $1K $1K $1K $1K

(15) $1,000 Semi-finalist Awards*

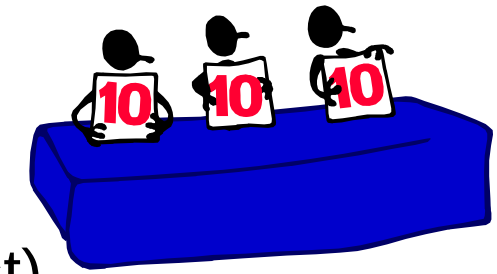
* Number of regional awards proportional to number of projects received within region.

What you'll need to enter

- Team of five or fewer students + advising professor
  - Must be a full-time student
- A completed entry form
  - **www.ti.com/sc/dspchallenge**
- An original design based on a TI DSP

  (TI Analog product use is strongly encouraged)
- Contest Period: Jan 1, 2000 - April 30, 2001
  - *Extended* Entry form deadline: Dec 31, 2000
  - *Extended* Project deadline: April 30, 2001

How Contest Designs are Judged

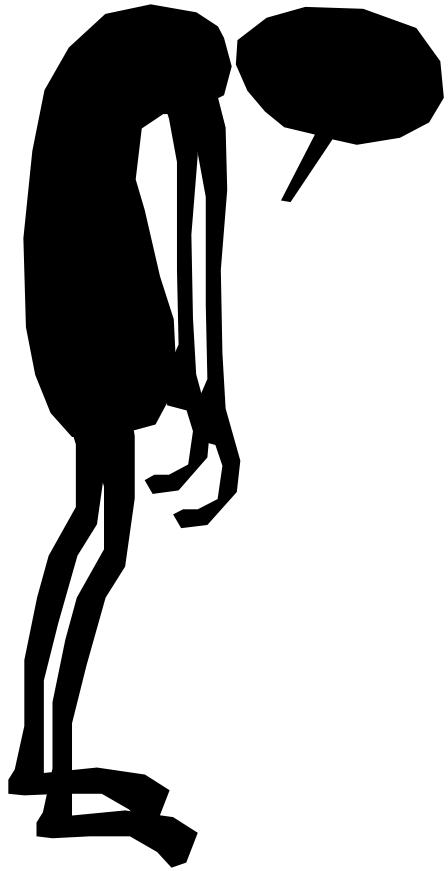


- Awards based on two criteria:
  - Merit of design (1-10, 10 being highest)
    - inventiveness; practicality and repeatability; difficulty; completeness; professionalism; relevance to solution statement in abstract and functionality of HW/SW design--Does it work?
  - Educational Level
    - 10 points per undergraduate team member
    - 8 points per masters candidate team member
    - 6 points per Ph.D. candidate team member
  - Total Score = Merit score * Educational Level

Implementation Suggestions

- Organize at the departmental level
- Give course credit
  - Incorporate into existing courses
    - Capstone design projects
    - Real-time DSP labs
  - Extend current R&D projects
- Involve engineering organizations
  - IEEE, SWE, NSBE, SHPE

Don’t let this be you!

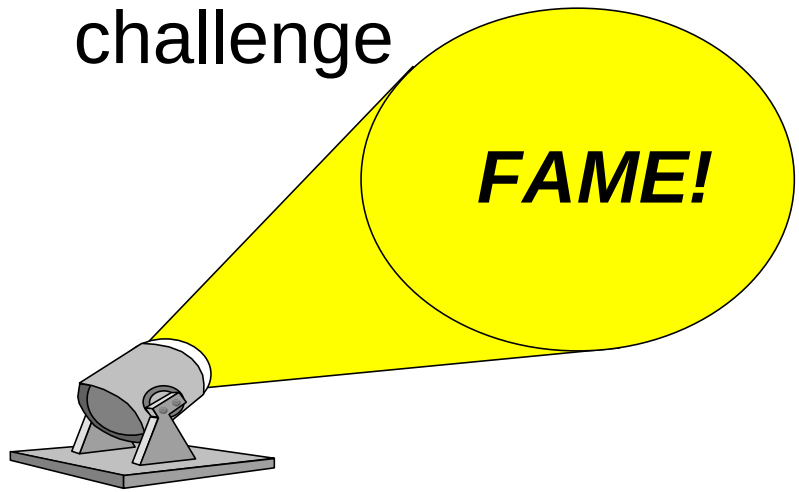


Decided not to enter TI DSP Challenge ‘97

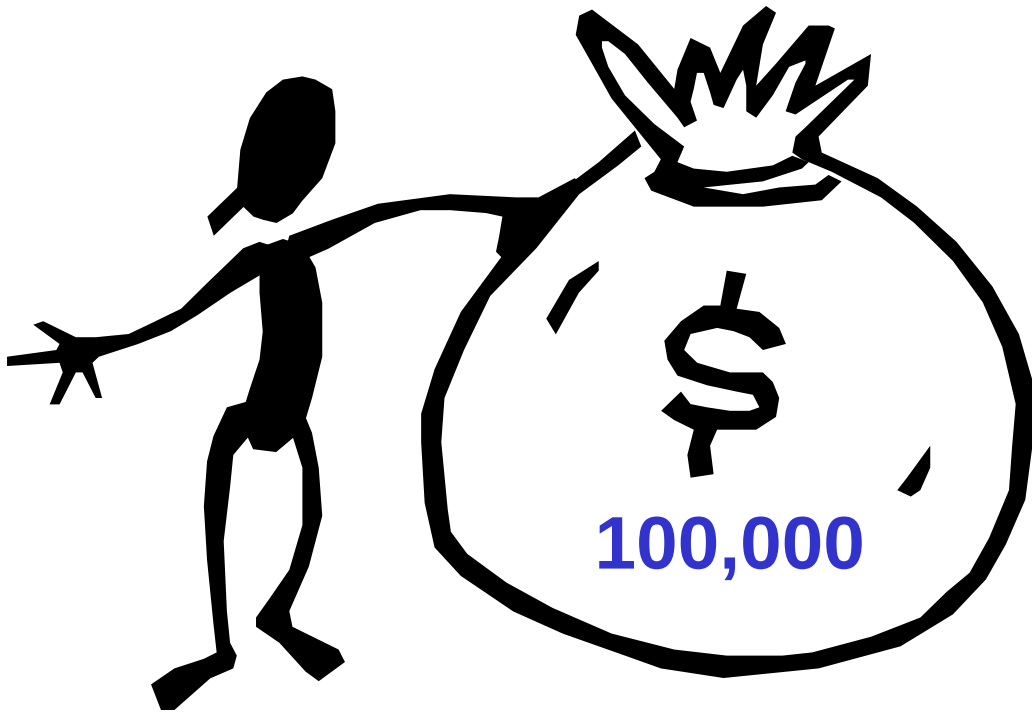
Start Organizing Your Team Now!

WIN, Just by Participating

- Hands-on design experience
- Develop application expertise
- Technological challenge



DO IT FOR THE M-O-N-E-Y!!!



TI DSP University Research Program

- A multi-million dollar investment in research at universities worldwide focused on applications for high performance digital signal processors (DSPs).

www.ti.com/sc/univfund

Criteria

- Support projects that:
  - Develop new SW apps using TI DSPs
  - Deliver high performance SW implementations of existing algorithms
  - Propose new DSP algorithms
- Research must be a DSP-based app on TMS320 architecture and eXpressDSP™ compliant

- PI must be a Univ faculty member
- Univ must have an accredited Engr or CS program (e.g. Accreditation Board for Engineering Technology (ABET) in the US, equiv int'l board)
- Univ must have an established DSP program

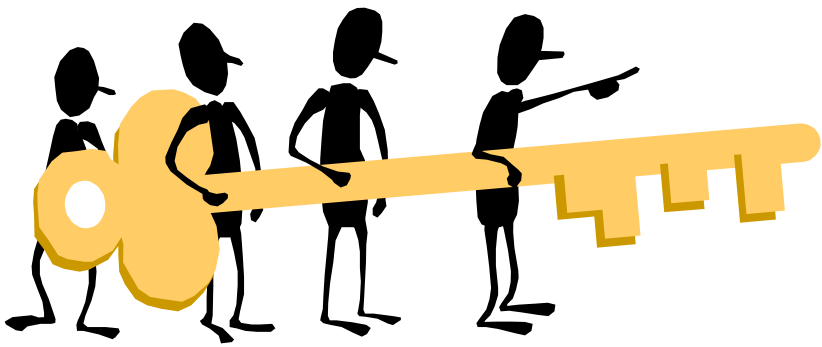
- Program Initiated: 1997
  Phase III: 1Q01
  Submit abstracts NOW

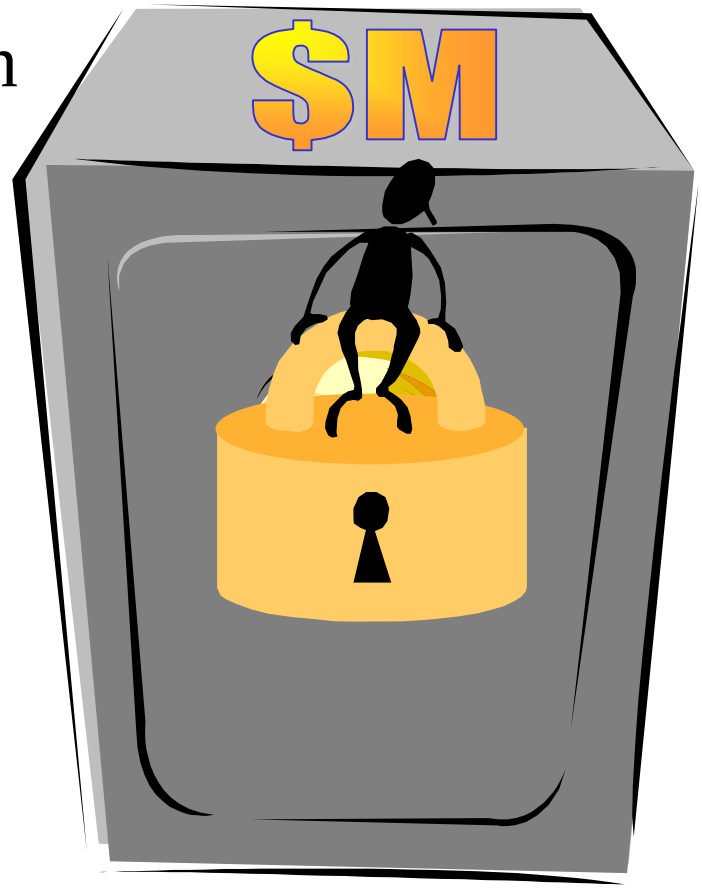
- Review Process: Committee of TI tech and business development staff

www.ti.com/sc/univfund

DSP Univ Research Program

Keys to *successful* participation in the DSP University Research Program



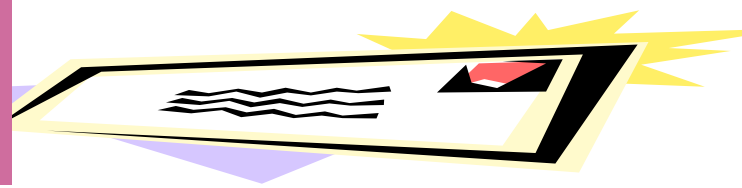


www.ti.com/sc/univfund

Focused Application Areas

DSPS Fest 2000

- Digital Radio
- Internet Audio
- Cable Broadband
- Personal Medical
  - Hearing Processors
- Wireless Comm



Stretch the Envelope

TI DSP Algorithm Standard Compliant

Statistics

DSPS Fest 2000

Funded Projects

Control
- SR Motors
- Brushless DC
- Induction motor
- HDD

Communications
- Turbo codes
- Broadband
- Cryptography
- Smart Antenna

Funded Projects

Audio
- Digital microphone array

Medical Imaging

Miscellaneous
- Java internet terminal
- Compiler efficiency

Competitive Program

- 315+ Abstracts Received
- 24 Projects Funded (8%)
- Grant Range ($18 - 250K); $100K/yr
- Term < 3 yrs; 1.5yrs

Video/Imaging
- 3D image reconstruction
- Digital watermark
- Video encoding/ compositing
- Low-bitrate wireless video
- Multimedia Algorithms

www.ti.com/sc/univfund

Summary

DSPS Fest 2000

IS

New DSP SW Applications

Supporting eXpressDSP™ and the TMS320 DSP Algorithm Standard

Next wave

Worldwide

IS NOT

University Donation Program or DSP Educational Assistance

New architecture development

www.ti.com/sc/univfund

Call to Action

- Start a real-time DSP lab using TI tools!
- Submit your teaching materials for posting to the “Educator’s Information Exchange”
- Facilitate organization of DSP Challenge teams
- Submit research program abstracts

Who to Contact

- URL: http://www.ti.com/sc/university
- Regional Program Contacts:
  - U.S. & Canada: Christina Peterson (cpeterson1@ti.com) Torrence Robinson (t-robinson4@ti.com)
  - Mexico: Sylvain Martini (s-martini@ti.com)
  - South America: Steve Bakota (s-bakota@ti.com)
  - Europe & Middle East: European Product Information Center (E-PIC) (epic@ti.com)
  - India: Sanjeev Das Mohapatra (sanjeev@ti.com)
  - Asia & Australia: Jenny Huang (jhyc@ti.com)
  - Japan: Nori Kitagawa (kita3@ti.com)