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www.hyperception.com   *The Leader in DSP*

VAB™
for teaching DSP

TI Third Party Network Member
DSP
TEXAS INSTRUMENTS

eXpressDSP™ Compliant
DSP
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VAB™

**Interactive Graphical Design Software
for use in teaching DSP at entry levels**

2 August, 2000

Hyperception, Inc.

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What is DSP and why teach it now?

- ◆ Digital Signal Processing or Digital Signal Processor?
- ◆ DSP is not new, some say over 100 years old, but at least from WWII or 60's - so...
  - ◆ Why teach at high school now (all of a sudden)?
  - ◆ Difference is in area of real-time!
  - ◆ This difference is fundamental to many exciting new products and technology
    - ◆ cell phones
    - ◆ internet, image, video products (digital cameras, camcorders), MP3 players
    - ◆ Instrumentation (virtual, real)

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What is DSP and why teach it now?

- ◆ Relevance to Society
- ◆ Relevance to Industry
- ◆ Excitement Factor of DSP, encouraging larger numbers of interested technical students
- ◆ High Paying Jobs

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What is the VAB™?

- ◆ VAB represents a new paradigm for using DSP
  - ◆ Real-time applications with programmable DSP's
  - ◆ PC-based applications, simulations, etc.
- ◆ VAB is highly efficient and more abstract - lets students get their hands on real-world applications
- ◆ Very low-cost vehicle for introducing new audiences to DSP (less than most engineering books)
- ◆ VAB is an easy-to-use Real-time DSP environment supporting many TI DSP's & DSP Boards
  (including low-cost DSK's and EVMs)
- ◆ VAB is an exciting new way to teach/learn DSP!

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Why is the VAB important?

- Encourage more students to take an active interest in learning about DSP's and related products
- Allow DSP to be taught earlier to a younger audience
- Allow more teaching time to be spent on concept and real-world, less on tools
- Get quick analysis of many technical-related study areas
- Gets students interested in technology areas that are very fruitful for future high-paying jobs

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Important VAB Distinctions

- ◆ Was designed especially for Windows (95/98/NT/2000)
- ◆ Single product with an Inherent graphical interface
  - ◆ look and feel inline with current popular software
  - ◆ Lowers learning curves
- ◆ Supports Real-time DSP <u>Directly</u>
  - ◆ Can run directly on real-world DSP chips
  - ◆ Student does not need to use/learn Assembler, C Compiler, Debugger, etc.
- ◆ Direct support of live audio, video using low-cost HW
- ◆ Modular Open Software Architecture for expansion

Real-time DSP Support

- ◆ Allows direct use of real-time DSP

- ◆ Supports many low-cost DSP target hardware

- ◆ Allows for real-time without requiring any textual source

  - ◆ No need for student to learn (or even see) other development tools

  - ◆ No learning curve for compilers, debuggers, etc., since none are needed

- ◆ Excitement factor increases with real-time design

- ◆ Students learn directly how DSP can do things like MP3 players, Internet Modems, Digital Cameras, etc.

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Strong Reasons to Consider VAB

- ◆ Ease of Use, Relative Fit for intended Audience
- ◆ Flexibility
- ◆ Reliability
- ◆ Support
- ◆ Future Growth/Expansion
- ◆ Cost

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Ease of Use, Fit for intended audience

- ◆ Single Coherent Package
- ◆ Inherently Graphical, graphical nature appeals to high school students
- ◆ <u>Live</u>, <u>Interactive</u> approach to teaching/learning
- ◆ Canned Worksheets (which may be e-mailed, downloaded, etc) similar to documents in a word processor
- ◆ Standard Windows Interface
- ◆ Ability to support equation-oriented input, file-based input, and other traditional data input methods, including data from other programs

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Flexibility

- ◆ Math

- ◆ Image Processing

- ◆ Internet, Entertainment
  - ◆ Music
  - ◆ Video

- ◆ Instrumentation
  - ◆ Time, Frequency domain analysis

- ◆ DSP (traditional apps like telecom, etc)
  - ◆ PC-based (simulation)
  - ◆ DSP-based (real-time)

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Reliability

- Based on over a decade of specific engineering on Graphical-based DSP software for Windows
- Specifically, Version 4.1 of RIDE was used as base starting point
- Hyperception's software has been used by thousands
- Leverages over 15 years of experience in dealing with people 'new' to DSP
- VAB was co-designed from a partnership of Texas Instruments, market leader in DSP devices, and Hyperception

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Support

- Basic mechanism for VAB is modular, component-based; therefore an ideal platform for in-field support
- Hyperception has already deployed a complete web site devoted to VAB
- VAB Web site
  - downloads of new components, new drivers
  - downloads of new worksheets, applications
  - downloads of training materials, course notes, etc.
- Have internet means of in-field support for remote technical support

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Future Growth

- ◆ VAB is based on an Open Software Architecture
  - ◆ New components can be created using a standard Microsoft C/C++ compiler
  - ◆ May be made by end user (even students), 3rd parties, staff, or Hyperception
- ◆ Although well over 500 components exist now, very easy to add new components
- ◆ Support for TMS320C2xx, C30, C31, C32, C4x, C54x, C62x, C67x already, but always adding latest DSP's
- ◆ Just change driver to accomplish different real-time DSP target board; this allows VAB to <u>stay current</u>!

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Cost

- ◆ Low cost pricing options
  - ◆ students purchase via bookstore as required 'text'
  - ◆ site license of software
  - ◆ site license of software/hardware bundled kits
- ◆ Was Derived from $4000 Software with over a decade of engineering
- ◆ Supports low-cost Real-time DSP Hardware (DSKs, EVMs, other 3rd party DSP boards)
- ◆ Can Support standard PC hardware such as sound cards, low-cost (<$50) PC-based Color Video Cameras

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VAB for TI DSP University Program

- ◆ Texas Instruments needed DSP Software to allow teaching to an earlier audience
- ◆ Had important requirements
  - ◆ Addressing a younger, less experienced set of students
  - ◆ Reduce the Learning Curve and the Cost
  - ◆ Mature, Robust Technology
  - ◆ Ability to see real-time DSP
  - ◆ Software to Create Interest, Excitement in DSP
- ◆ Texas Instruments worked with Hyperception to create VAB for their DSP University Program

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VAB™ Summary

- VAB was designed especially for Education

- Hyperception has put much effort into addressing Academic Needs via the VAB

- VAB represents a new point in terms of efficiency, ease of use, and cost

- TI and Hyperception have partnered together to create an easy-to-learn/use direct real-time educational tool to support TI's low-cost DSP hardware (DSK's, EVM's)

- Hyperception views education as an important market, has committed good resources to VAB

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VAB Demonstrations

- ◆ **Basic Math**
- ◆ **Real-time DSP Processing**
  - ◆ Speech
  - ◆ Modems
  - ◆ Music
- ◆ **PC-based Processing**
  - ◆ Speech Processing
  - ◆ Image Processing, Machine Vision, Fractals
  - ◆ Live Video Processing
- ◆ **Instrumentation**