VisSim/CommDSP
Rapid Prototyping Software:
Communication System to TI DSPs

Arun Mulpur, Ph.D.,
Director of Product Engineering and Technical Services

Visual Solutions, Inc.
www.vissim.com
Outline

• About VSI
• System to DSP
• Markets and Applications
• Control System to TI DSP: DEMO
• Communication System to TI DSP: DEMO
About VSI

• Founded in 1989 by Peter Darnell
• VisSim developed in collaboration with United Technologies (FCS 1991)
• Over 12,500 licenses worldwide
• Growing & profitable
• Entered OEM Agreement with I-Logix 1997
• 1999 Readers’ Choice Award: Control Magazine
Mission & Strategy

Provide easy-to-use, powerful & affordable

- Modeling, Simulation & Control
- Communication System Design

Rapid Prototyping Software Solutions for...

End Users

Technology Partners (OEM’s)

System Design (I-Logix)
Entry Level M&S Tools
System to DSP/RTOS (TI)
Communication System Design
System to DSP: Rapid Prototyping Software

- Ease-of-use
- Quality and efficiency of C-Code (e.g., small footprint)
- Level of procedure automation
- Level of hardware integration
- Algorithm packaging and delivery
- Support of target DSP / RTOS
System to DSP: VisSim

Model & Simulate the System

Automatic C Code Generation

Automatically Compile - Link - Download to DSP

Debug - Validate & Optimize

= Validated Code
System to DSP:
VisSim ↔ TI DSP Integration

- VisSim/COMM
  Communication System
- VisSim/DSP
  Control System
- VisSim/SIGPRO (Q3)
  Signal Processing Applications
System to DSP:
VisSim ↔ Code Composer Studio

- VisSim/COMM
  Communication System

- VisSim/DSP
  Control System

- VisSim/SIGPRO (Q3)
  Signal Processing Applications

CCS
System to DSP:
VisSim ⇔ Code Composer Studio

- The DSP solution for the customer is not just the DSP hardware or the software tools but an integrated hardware-software solution (the system)
- Code Composer is the IDE. VisSim & VisSim/Comm provide the System to Code Composer Studio “funnel”
System to DSP:
VisSim ⇔ Code Composer Studio

- Reuse Code - Block
- Control/Communication System (VisSim)
- Auto C Code
- Code Composer
- Optimize/debug
- Validated C Code
- DSP
  - A/D:D/A
System to DSP:
VisSim ↔ RTOS

- Set System Priorities
- Control/Communication System (VisSim)
- Auto C Code
- RTOS (SPOX?)
- DSP
  - A/D: D/A
- Retain VisSim
  - Graphical Interface
  - Dynamic Parameters
System to DSP: Algorithm Packaging & Delivery Solution

• MatLab Integration
  – Allows seamless integration between VisSim and MatLab
  – MatLab READ & WRITE blocks
  – IMPORT .m or .MAT files - data or system specifications
  – MatLab SCRIPTING
  – VisSim/MatLab Compiler (Product Option)

• DLL Wizard
  – Automatic compilation of user-written C-Code into custom VisSim blocks from MS VC/C++ v.5.0+

• VisSim Viewer
  – Free Run-Time version of VisSim
### Markets & Applications

<table>
<thead>
<tr>
<th>C S D</th>
<th>HVAC</th>
<th>Motion Control</th>
<th>Process Control</th>
<th>6DOF - Aerospace</th>
<th>Transportation</th>
<th>Power &amp; Gas</th>
<th>Turbine</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM</td>
<td>Satellite</td>
<td>Cellular / PCS</td>
<td>Wireless</td>
<td>Modem Design</td>
<td>General</td>
<td>System Level RF Design</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL MODELING & SIMULATION**

**SIGNAL PROCESSING**
Markets & Applications: Product Benefits

- Faster design time, fewer design iterations and fewer prototypes = FASTER TIME to MARKET

- Simulations are easy & powerful = Engineers simulate more= PRODUCT MEETS DESIGN INTENT

- Self-documenting designs, ease of integration of existing algorithms, automatic code generation = LOWER DESIGN & PROTOTYPE COSTS - INHERENT REUSE of IP
Markets and Applications:
VisSim ⇔ TI DSP Integration

- VisSim/COMM
  Communication System

- VisSim/DSP
  Control System

- VisSim/SIGPRO (Q3)
  Signal Processing Applications
Markets and Applications: 
VisSim/DSP @ HR Textron

- Rapid prototyping of hydraulic actuator systems on military aircraft
- Four control loops simultaneously on a C31 (PC31 from Innovative Integration)
- Automatic support of Analog / Digital I/O and VisSim/DSP interface critical for success
- Did NOT modify a single line of generated code
Markets and Applications:
VisSim/DSP @ GEC Marconi (UK)

- Advanced engine controls on the European Joint Strike Fighter
- Engine thrust vectoring control in the TBSN (Three Bearing Swivel Nozzle) on a C32 (PC32 from Innovative Integration)
- Ability to model complex systems, ease-of-use, tight integration with target DSP critical
- Did NOT modify a single line of generated code
Markets and Applications:
VisSim/SIGPRO @ LMT (Sweden)

- Lidköping Machine Tools (LMT)
  - an SKF company
  - world’s largest precision grinding machines supplier
- Design and prototype advanced closed-loop adaptive filters and control activation modules
- Support of advanced DSP functions as blocks; extreme ease-of-use (prototype in 3 days!)
- Did NOT modify a single line of generated code
Markets and Applications:  
VisSim/Comm @ Ericsson (USA)

- Communication System Design: Ericsson

"Using VisSim/Comm, we designed a new modulation synthesizer much faster than if we had followed the conventional hardware prototype cycle for proof-of-concept.

We were able to validate our approach in a matter of days as opposed to the several weeks required to design, assemble and test a breadboard."

*Charles Gore, R & D Engineer*
Communication System to DSP:
VisSim/CommDSP ⇔ TI DSP

• DEMO