needs.nanohub.org
The NEEDS online gateway
Berkeley, MIT, Purdue, Stanford

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NEEDS.nanohub.org

Nano-Engineered Electronic Device Simulation Node

NEEDS has a vision for a new era of electronics that couples the power of billion-transistor CMOS technology with the new capabilities of emerging nanodevices and a charter to create high-quality models and a complete development environment that enables a community of compact model developers.


NEEDS > 35,000 users

Over 1.4 million annual nanoHUB.org visitors

Leveraging nanoHUB
Publishing compact model with NEEDS

<table>
<thead>
<tr>
<th>Description</th>
<th>Content</th>
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<tbody>
<tr>
<td>Title</td>
<td>Source code</td>
</tr>
<tr>
<td>Version</td>
<td>Circuit simulation benchmark</td>
</tr>
<tr>
<td>Synopsis</td>
<td>Parameter sets/extractor</td>
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<tr>
<td>Abstract</td>
<td>Manual</td>
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<td>References</td>
<td>Other files</td>
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**NEEDS Modified CMC License**

**Authors**

**Tags**

**NEEDS list of compact models**
Publishing compact model with NEEDS

Version control and access

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<tr>
<th>Versions</th>
<th>Released</th>
<th>DOI Handle</th>
<th>Status</th>
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Wishlist

Questions

Citations

Update tracking

Upcoming features:
- Bug report
- Detailed user usage
Compact model publication platform

1. Start by initiating a project.
2. Build a CM publication
   - VALint: Automatic background VALint check and onscreen feedback to the author
3. Review by NEEDS curator
4. Publish on nanoHUB

- Submit
- Reject
- approve
ValInt

CMC Recommended Practices

- NEEDS license checking
- compiling errors checking
- Check
- Edit
- Pretty printing

VALint development

Prototype: VAChecker 0.1 (late 2014)
- Based on ADMS
- Check for single Verilog-A file only.
- Simple text based output

VALint BETA 0.2 (since Sep. 1st, 2015)
- Support models with multiple Verilog-A files.
- Text editor interface with VALint integrated.
- To be an integrated part of NEEDS publication curation.

Feedback:
- Unable to upload proprietary compact models to nanoHUB
- Difficult to install because ADMS depend on legacy software
- Many missing rules/recommended practices that are not supported by ADMS

VALint BETA 0.3 (since April 18th, 2016)
VALint development

VALint BETA 0.3 (since April 18th, 2016)

• Complete rewrite based on
  • VAPP engine developed by Berkeley team
  • Qt based interface
• Octave compatible.
• Addressed many issues reported in version 0.2

https://nanohub.org/tools/vachecker
Uncertainty quantification with compact models

1. Uncertainty propagation

2. Parameter fitting with uncertainties

Adapting UQ developed by PRISM program at Purdue for compact models
Summary

• VALint
  • Industrial strength models
  • Cross platform installation scripts
• Model exerciser
  • MAPP
• Uncertainty quantification
• Model deployment and curation