BOOLE-DEUSTO

A new approach to educational software for logic analysis and design

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What is BOOLE-DEUSTO?

- Software package capable of analysis and design of combinational circuits and finite state machines.
- Intended for use in introductory Digital Electronics courses in Engineering studies.

"A new approach to educational software for logic analysis and design”
University of Deusto
Pedagogical Justification

- Professional software: OrCAD, ISE, Xilinx, ...
  - Good for professional applications and complex projects
  - Not adequate as teaching tools for beginners
  - Difficult to use, expensive, focus on results

- BOOLE-DEUSTO
  - Designed from the start as a teaching tool
  - Most of its features can be found in professional applications, however...
  - Easy to use, free, focus on methodology

Features

- **Combinational Systems**
  - Truth Table
  - Boolean Expression
  - Canonical Forms
  - Minimized Expressions
  - NAND/NOR Expressions
  - Circuit Logic
  - Veitch-Karnaugh Diagrams
  - Veitch-Karnaugh Learning Mode

- **Finite State Machines**
  - Moore-Mealy’s Diagrams
  - FSM verification
  - Tables and Minimized Expressions
  - J-K and D Circuit Logic
  - State Minimization
  - Moore <-> Mealy Conversion
  - Interactive and batch simulations

- **Program-wide features**
  - Code generation
  - Save and load systems to/from disk
  - Associate text with a system
  - Print systems in their various representations
Teaching Experience (I)

- BOOLE-DEUSTO has been used in Deusto since 1996.
- Both students and teachers are satisfied with BOOLE's performance as a teaching tool.
- Survey carried out this year:
  - Students regard it as a powerful and pedagogical tool.
  - Students admit they don't use it as regularly as they should.

Teaching Experience (II)

<table>
<thead>
<tr>
<th>Question</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevance as a teaching aid</td>
<td></td>
</tr>
<tr>
<td>If BOOLE-DEUSTO is pedagogical?</td>
<td>3.9</td>
</tr>
<tr>
<td>If it is used to document exercises?</td>
<td>3.5</td>
</tr>
<tr>
<td>Has it fulfilled your needs as a student?</td>
<td>3.5</td>
</tr>
<tr>
<td>Should the use of BOOLE-DEUSTO and similar software packages be encouraged?</td>
<td>3.9</td>
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<tr>
<td>Features</td>
<td></td>
</tr>
<tr>
<td>If BOOLE-DEUSTO is effective?</td>
<td>3.2</td>
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<tr>
<td>If it is user-friendly</td>
<td>4.1</td>
</tr>
<tr>
<td>If BOOLE-DEUSTO is effective at showing the results of an operation?</td>
<td>3.5</td>
</tr>
<tr>
<td>Does BOOLE-DEUSTO generate correct results?</td>
<td>4.8</td>
</tr>
<tr>
<td>If it is easy to install?</td>
<td>4.8</td>
</tr>
<tr>
<td>Relevance for current course</td>
<td></td>
</tr>
<tr>
<td>Has BOOLE-DEUSTO been useful to you in this course?</td>
<td>2.8</td>
</tr>
<tr>
<td>Has BOOLE-DEUSTO been useful to perform boolean minimization?</td>
<td>2.8</td>
</tr>
<tr>
<td>Has BOOLE-DEUSTO been useful to work with FSM?</td>
<td>3.2</td>
</tr>
<tr>
<td>Have you used BOOLE-DEUSTO regularly during this course?</td>
<td>2.2</td>
</tr>
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Demonstration

Conclusions

- BOOLE-DEUSTO is a complete and didactic, and even professional environment for bit-level analysis and design of combinational and sequential digital systems.
- Its pedagogical focus, centered on methodology instead of results, makes it an ideal teaching aid in Digital Electronics courses.
- BOOLE-DEUSTO's development is frozen. Adding more features would make it stray from the pedagogical realm to the professional realm.
Questions?

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