

MSE History – A Forum for Microelectronic Systems Educators

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The Stage:



of devices -
ULSI



System
complexity



Time-to-
market



power

HDL
Synthesis

Place-and-
route

Layout/
LVS/DRC

SoC

Deep
submicron

MCM

The Players:

ideas
challenges 1997 solutions

teaching resources



Don Bouldin

**IEEE International
Conference on
Microelectronic Systems
Education - MSE**

MSE

Microelectronic Systems
Education

'97, '99, '01,
'03, '05, '07,
'09, '11, '13,
'15, '17

EWME

European Workshop on
Microelectronic Education

'96, '98, '00,
'02, '04, '06,
'10, '12, '14,
'16, '18

Inaugural Year – Focus on CAD Tools

Verilog
Synthesis:
Cadence



Place-and-
route:
Advant!

HDL
Synthesis:
Synopsis

Focus on
verification

Layout/DRC
/LVS:
Mentor
Graphics

Simulation:
Different for analog
versus digital

Mixed Mode:
????

Most Common Topics

- What CAD tools do you use?
- What platform are you running them on? PC ? Workstation? Network-based?
- Public domain CAD tools vs. professional CAD tools?
- What is your overall design flow?
- How do you integrate new technology? New industrial needs?

Do any of these questions sound familiar???

Coming Together

cādence™

XILINX®

faculty

MSE

CAD tool
companies

Mentor
Graphics®

HDL
Synthesis

Place-and-
route

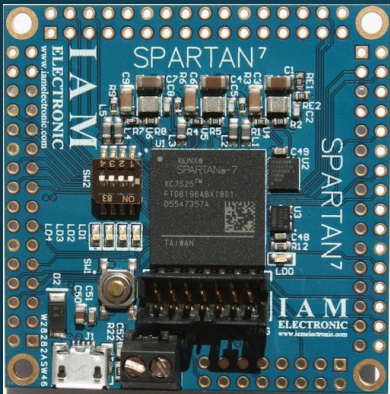
Layout/DRC/
LVS

simulation

Shared resources
Process flows, teaching
materials, layouts

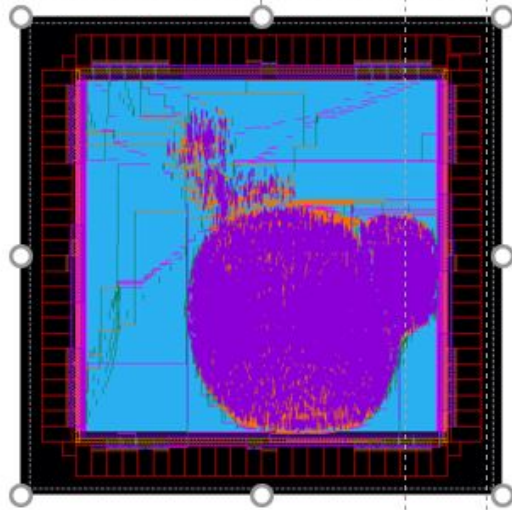
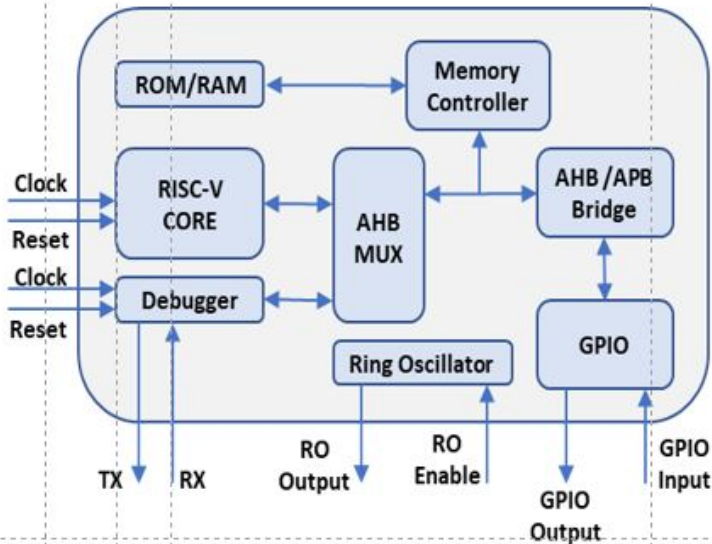
Faculty Shared...

- Unique challenges teaching
 - SoC
 - Mixed-Signal
 - Testing and Verification
 - FPGAs
 - Embedded Systems
 - Multi-Core
 - Hardware-Software Co-Design
 - Nanotechnology
- Relationships between academia, industry, and government
- Novel Courses and Curricula
- Designs of hardware used in labs
- Project Ideas



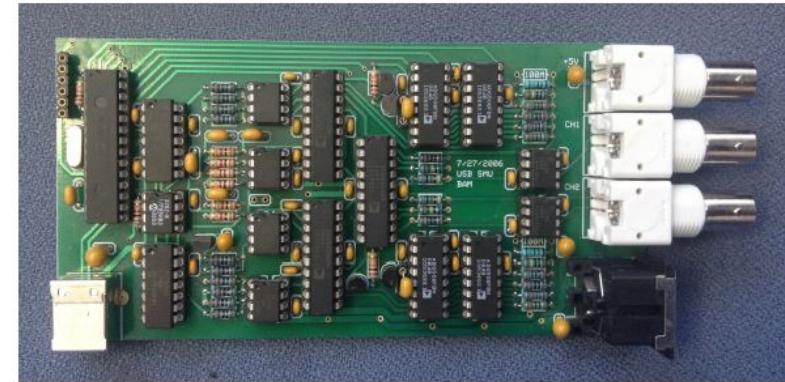
Isn't Verilog just like writing code??

August 2018 tape-out, packaged chips expected July 2019



Features:

- 2 channels, SV/MI or SI/MV functions
- 3 voltage ranges: $\pm 10\text{ V}$, $\pm 4\text{ V}$, $\pm 2\text{ V}$
- 6 current ranges: $\pm 20\text{ mA}$, $\pm 2\text{ mA}$, ..., $\pm 2\text{ }\mu\text{A}$, $\pm 200\text{ nA}$
- Accuracy: 1%
- Resolution: 13 bits (source), 12 bits (measure), 1 nA (current)
- Speed: 60 readings/second
- Software: Matlab GUIs, Matlab and Python APIs



DIY 2 Channel SMU

System on a Chip Design

Introduce Education Research

Course, Curriculum,
Laboratory
Improvement



Transforming Undergraduate
Education in Science,
Technology, Engineering, and
Mathematics

MSE

- Provided workshops on education research methods
- Increased education research requirement of accepted papers

Purpose

- Validate education methods in papers
- Improve chances for faculty to publish their ideas in education journals

The Decline

- **2011** – number of submissions and attendees began to decline
- **2017** – number was small enough that it was not financially feasible to continue as a stand-alone conference
- **2019** -Merged with a technical conference, GLSVLSI, as an education track
- Number of submissions and attendees has been repeatedly low
 - Lost the community spirit from the stand-alone conference

Position

- We need a forum for microelectronic educators, industry, and government to gather, share **ideas**, **resources**, and **challenges** so that we can learn from one another

Does a regular forum make sense?

If so, what should it look like?

- Conference? Workshop? On-line? Face-to-face? Special track in a larger technical conference? Education conference? Other ideas?

Should we drop the emphasis on education research?

What other barriers exist that prevent participation?

Questions for me?