

The Electronic Design Automation (EDA) Lab

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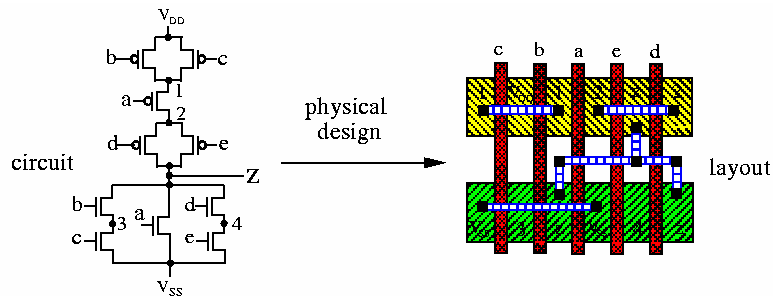
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Research Focuses

- Electronic design automation
 - Physical design for nanometer ICs
 - Design for manufacturing

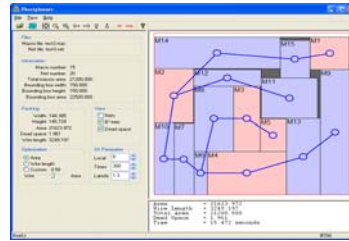
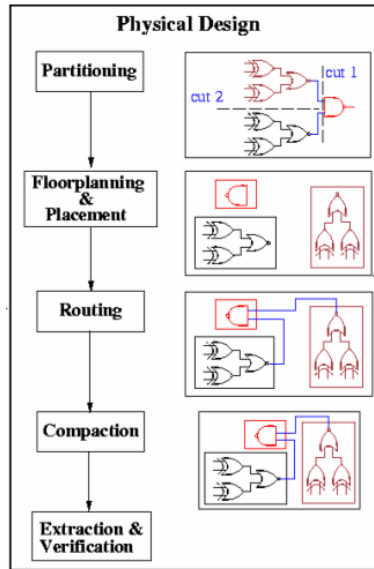


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Physical Design Flow



B*-tree based floorplanning system



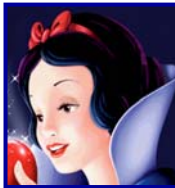
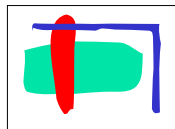
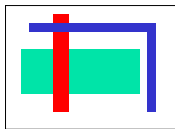
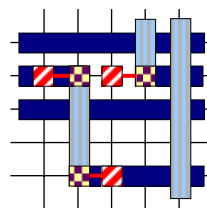
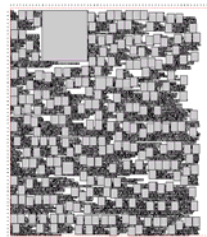
Timing, signal integrity, and antenna-driven routing systems

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Research Topics



- **Large-scale system design**
- **Signal and power Integrity**
 - Crosstalk
 - IR drop
 - Low power
- **Manufacturability**
 - Process variation
 - Double via
 - Optical proximity correction (OPC)
 - CMP
- **Reliability**
 - Process antenna effect
 - Electromigration (EM)
 - Thermal issues

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People

- **Current: 9 M.S., 12 Ph.D. students (+4 碩士專班)**
- **Alumni/Alumnae: 4 Ph.D., 37 M.S. graduates**
 - 2006 電子所EDA組首屆碩一、博一學年成績第一、二名
 - 2005 電子所EDA組首屆碩士甄試入學第一、二、三名
 - 2005 電子所EDA組首屆博士班直升第一名(全電機學群第一名)及入學考試第一名
 - 2004 電子所ICS組博士班直升第一、二名 (全電機學群第一、二名)
 - 2003和2004 電機所CS組碩士甄試入學第一名
 - 2002 電子所ICS組碩士班入學考試第一名



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Domestic Honors

- 國科會「研究計劃第一級主持費」(formerly 傑出研究獎)(2005, 2006)
- 旺宏電子青年教授講座(2005)
- 國科會吳大猷紀念獎(2004)
- 台灣大學教學優良獎(2004, 2006)
- 台灣大學首屆研究成就獎(現今「傅斯年獎」)(2004)
- 教育部 IC/CAD Contest (2002, 2003, 2005 囊括前三名大獎, 2004, 2006 獲各大獎)
- 思源科技教育基金會DAC/ICCAD論文獎(2003, 2004, 2005, 2006)
- 科林論文獎(Lam Thesis Award)(2002, 2003, 2005)
- 資訊學會博士論文獎(2002)
- 沈文仁教授年度論文獎(2002首屆)
- 電機工程學會青年論文獎(1998, 2002, 2005)
- 國科會碩士論文獎(2002首屆)
- Highest Scores at the VLSI Design/CAD Symposia (2001, 2002)
- Best Student Paper Award at the VLSI Design/CAD Symposium (2000)

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Domestic IC/CAD Contest

- Is the most important CAD contest in Taiwan
 - Hosted by the Ministry of Education
- Our lab won 24 awards (38% of the total awards) in recent 5 years
 - Received 7 1st prizes (50% of the 1st prizes)

Year	2002	2003	2004	2005	2006	Total
# of Awards	12	13	15	12	12	64
NTU-EDA Lab	4	6	4	6	4	24
Percentage	33%	46%	27%	50%	33%	38%
# of 1st Prizes	3	2	3	3	3	14
NTU-EDA Lab	2	1	1	2	1	7
Percentage	67%	50%	33%	67%	33%	50%

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International Honors

- **ACM ISPD International Placement Contest, 3rd Place (2006); 1st Place (ICCAD-2006)**
- **ACM/IEEE DAC Best Paper Nomination (2005)**
- **ACM/IEEE ASP-DAC Best Paper Nomination (2004)**
- **ACM/SIGDA University Booth Show (2003, 2004, 2005)**
- **ACM Trans. DAES Best Paper Nomination (2003)**
- **IEEE/ACM ICCAD Best Paper Nomination (2002)**
- **IEEE ICCD CAD Best Paper Nomination (2001)**
- **ACM/IEEE DAC Best Paper Nominations (2000)**
- **EE Time Citation (1999)**
- **ACM FPGA Highest Score (1996)**
- **IEEE ICCD Best Paper Award (1995)**

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Publication Summary

- Published the most DAC/ICCAD papers in Asia (19 papers) in the past 7 years (Japan's best: 4 papers)
- Received ACM/IEEE best paper nomination (BPN) every year in 2000-2005
- Publish DAC papers 8 years in a row; Asia's longest history (1999-2006)
- Published 22 IEEE/ACM Transactions + 52 IEEE/ACM conference papers in the recent 5 years

Year	Japan	Taiwan*	EDA Lab
2000 (DAC+ICCAD)	5	5	2
2001 (DAC+ICCAD)	6	3	1
2002 (DAC+ICCAD)	4	2	2
2003 (DAC+ICCAD)	5	4	2
2004 (DAC+ICCAD)	4	5	2
2005 (DAC + ICCAD)	6	8	4
2006 (DAC + ICCAD)	7	20	6
Total	37	47	19

* Consider first authors only

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International Community Service

- Currently serve on **ACM/SIGDA Physical Design Technical Committee**
- Currently serve on 10 ACM/IEEE TPC's, including 5 TPC's of the most important conferences in EDA/physical design
 - IEEE/ACM Int. Conf. Computer-Aided Design (ICCAD)
 - ACM/IEEE Design Automation Conference (DAC)
 - ACM/IEEE ASP-DAC (Topic Chair)
 - ACM/IEEE Design Automation and Test Conf. in Europe (DATE)
 - ACM Int. Symp. Physical Design (ISPD)



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Sponsors

- **Current Sponsors:**
 - 12 projects, 6 from industry
 - NSC (國科會), Quanta (廣達), SpringSoft (思源), RealTek (瑞昱), TSMC * 2 (台積電 * 2), UMC (聯電)
 - Budget: 9+ Million NTD per year
- **Past Sponsors**
 - Arcadia, Faraday (智原), Intel, MediaTek (聯發科), MOE, NSC (國科會), SpringSoft (思源)



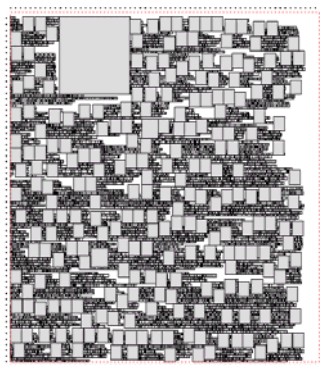
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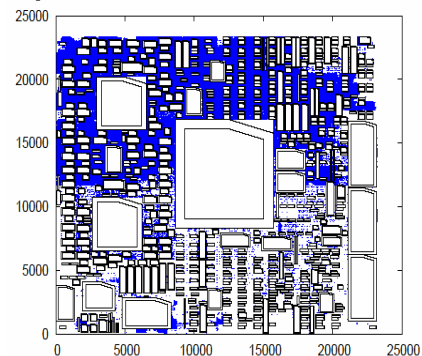
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Projects with MediaTek & RealTek

- **Large-scale mixed cells/macros placement (ICCAD-06)**
 - Two million cells + 500 macros



adapte3 HPWL= 2.731e+08, #Cells= 451650, #Nets= 466295



Large-scale mixed size placement

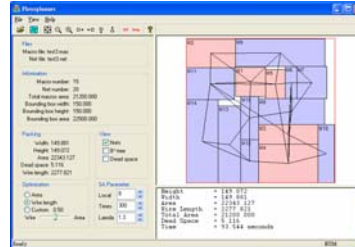
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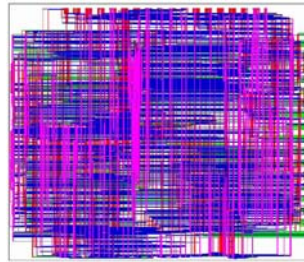
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Projects with SpringSoft (Novas)

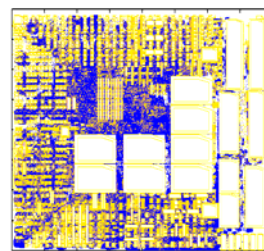
- Floorplanning (ISPD-05, ICCAD-05)
- Placement
- Gridless routing (ASPDAC-05)
- Statistical design



Floorplanning



Gridless routing



Placement

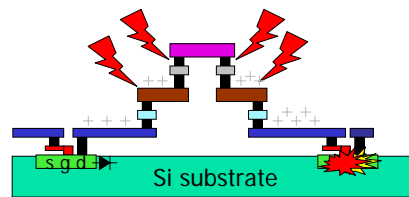
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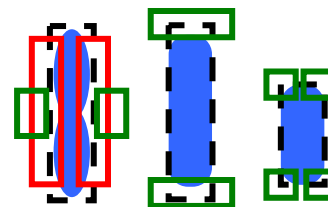
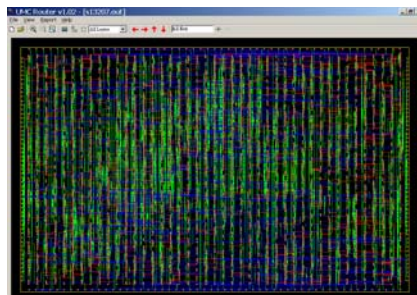
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Current Project with UMC

- Routing considering nanometer electrical effects (2004—2007; DAC-05)
 - Signal integrity, antenna effect, redundant via, OPC, PSM



Routing for antenna avoidance



Routing for OPC

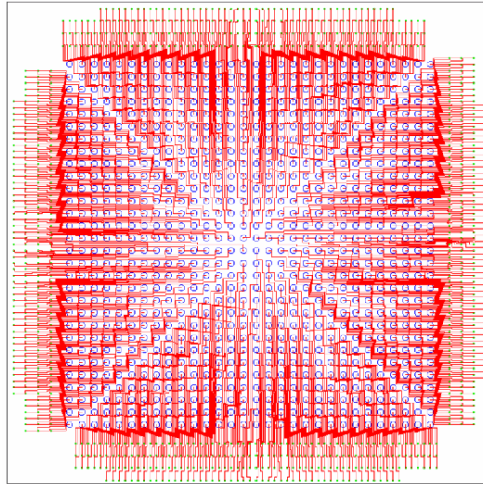
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Current Project with Faraday

- **Routing for flip-chip design (ICCAD-05)**



Flip-chip routing

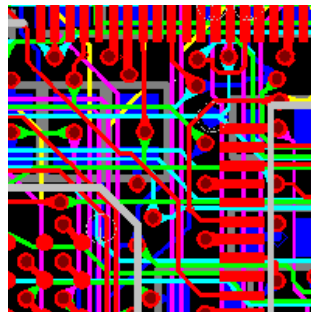
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Current Project with Quanta

- **PCB design environment (2004-2007)**
 - Joint project with Profs. S.-Y. Kuo and J.-L. Huang
 - Design rule checking
 - PCB routing & X-architecture routing (DAC-05)



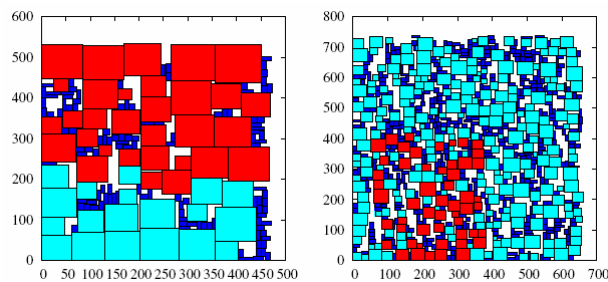
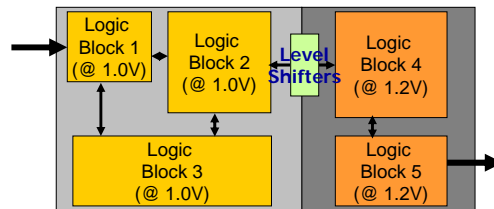
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Current Project with TSMC: Voltage Island

- Voltage partitioning & floorplanning for power and performance optimization



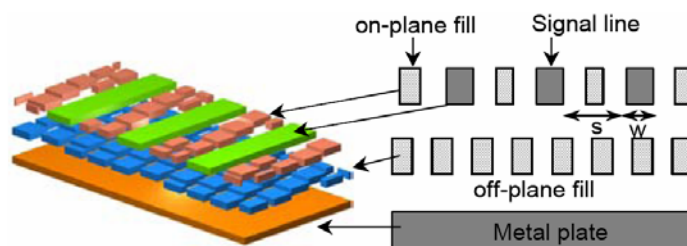
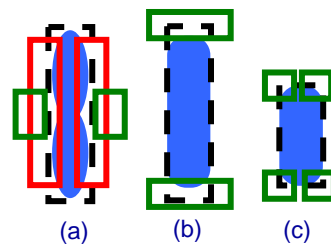
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Project with TSMC: Design for Manufacturing

- Design for manufacturing: CMP, OPC, Assisted Features

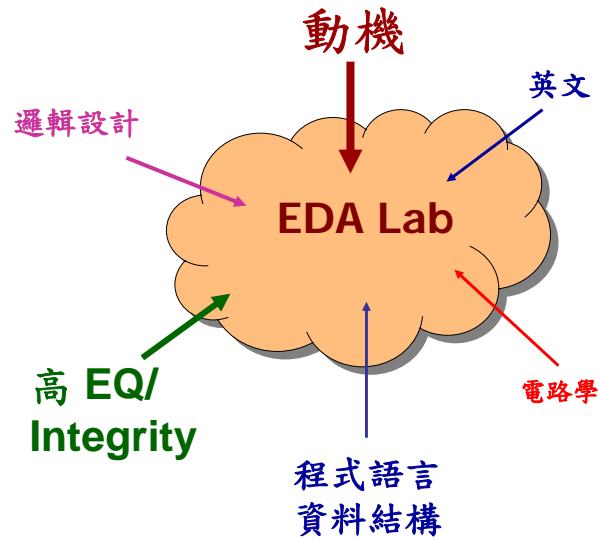


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我適合加入EDA實驗室嗎??



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Thank You for Your Attention!

Contact 張耀文 at

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