IEEE CASS Seasonal School on

Physical Design Automation

Porto Alegre, Brazil - July 31 - August 5, 2017

Universidade Federal do Rio Grande do Sul
Instituto de Informática

www.inf.ufrgs.br/cass/pda/

1   IEEE CASS Seasonal School on Physical Design Automation

The **2017 Seasonal School on Physical Design Automation** offered a set of talks on key topics of physical design for integrated circuits in modern and upcoming technologies. It represented current and future challenges that are faced by industry and academia for the implementation of ever more complex circuits and systems. It was promoted a discussion on hot topics and covered fundamental algorithms and computational methods in the area, so that the attendance could leverage their comprehension and capabilities, while also attracting new students and researchers to the right problems. The courses were given by prominent international researchers with extensive expertise in their fields as well some shorter presentations done by local researches. The courses done by invited speakers were given in 2h40m, in two parts of 1h20m. Most of short courses took about 45 minutes each.

The main topics covered by the school included:
- Global and Detailed placement
- Gate sizing
- Routing and routability
- Tools for 3D architectures
- Layout manufacturability
- Machine Learning for EDA
- Layout Design Automation

Speakers:

William Swartz, TimberWolf Systems and UT Dallas, USA
Andrew Kahng, UC San Diego, USA
Laleh Behjat, Univ. Calgary, Canada
Patrick Madden - SUNY Binghamton, USA
Ulrich Brenner University of Bonn, Germany
Evangeline Young, Chinese University of Hong Kong
Mark Po-Hung Lin, National Chung Cheng University, Chiayi, Taiwan
Patrick Groeneveld, Formerly Synopsys, USA

Local Speakers:

Marcelo Johann, UFRGS, Brazil
José Güntzel, UFSC, Brazil
Renan Netto, UFSC, Brazil
André Reis, UFRGS, Brazil
Ricardo Reis, UFRGS, Brazil
Mateus Fogaça and Jucemar Monteiro, UFRGS, Brazil

2 Seasonal School Program

	Monday - July 31	Tuesday - Aug 1	Wednesday- Aug 2	Thursday - Aug 3	Friday - Aug 4
9:00am to 10:20am		LaLeh Behjat (Univ. Calgary)	LaLeh Behjat part 2	Evangeline Young (CUHK)	Patrick Groeneveld (formerly Synopsys)
10:20am		coffee break	coffee break	coffee break	coffee break
10:50am to 12:10pm		Mark Lin (NCCU)	Mark Lin part 2	Evangeline Young part 2	Patrick Groeneveld part 2
12:10pm		lunch	lunch	lunch	lunch
1:20pm	Opening				
1:40pm to 3:10pm	William Swartz (TimberWolf/UTDallas)	Ulrich Brenner (Univ. Bonn)	Andrew Kahng - I (UCSD)	Andrew Kahng - II	Ricardo Reis (UFRGS) Marcelo Johann (UFRGS)
3:10pm	coffee break	coffee break	coffee break	coffee break & poster session	coffee break
3:30pm to 4:40pm	William Swartz part 2	Ulrich Brenner part 2	Patrick Madden (SUNY Binghamton)	4:00pm to 5:30pm IEEE Design&Test RoundTable	Patrick Madden part 2
4:40pm to 5:30pm	José Güntzel (UFSC) Renan Netto (UFSC)	André Reis (UFRGS)	Rsyn Team (UFRGS)		4:40pm Closing
5:40pm	pkt show Vinícius Santin and welcome reception		technology interactive music jam session	7:00pm Dinner	

Mon 1:40pm	William Swartz	It is all in the details of routing
Tue 9:00am	Laleh Behjat	Optimization Methods for CAD Tools
Tue 10:50am	Mark Lin	Layout Synthesis for Analog, Mixed-Signal, and RF Integrated Circuits
Tue 1:40pm	Ulrich Brenner	Placement and legalization
Wed 1:40pm	Andrew Kahng - I	On Evaluation Methodology, Platforms and Standards for PD Research
Thu 1:40pm	Andrew Kahng - II	Machine Learning in Physical Design
Wed 3:30pm	Patrick Madden	Local Optimization for Physical Design
Thu 9:00am	Evangeline Young	Placement and Routing Towards Manufacturability
Fri 9:00am	Patrick Groeneveld	Design closure: efficiently meeting relevant constraints in an IC design flow

Mon 4:40pm	José Güntzel	Exploiting Flow Conservation Conditions for Effective Timing-Driven Layer Assignment
Mon 5:05pm	Renan Netto	Applying Game Development Design Patterns to Physical Design Automation
Tue 4:40pm	André Reis	Bringing Technology Information into Early Steps of Logic Synthesis
Wed 4:40pm	Rsyn Team	Rsyn - A framework for Physical Design Research and Education
Fri 1:40pm	Ricardo Reis	Using Network of Transistors to Reduce Power and to Improve Routing
Fri 2:25pm	Marcelo Johann	Discrete Gate Sizing by Lagrangian Relaxation and ISPD Contests

3 IEEE Design & Test Roundtable

It was organized on Thursday Afternoon an IEEE Design &Test Roundtable related to Challenges on Physical Design Automation. A transcript of the roundtable will be published in the IEEE Design & Test Magazine. The participants of the roundtable were: William Swartz, Andrew Kahng,   Laleh Behjat, Patrick Madden, Ulrich Brenner, Evangeline Young, Mark Po-Hung Lin, Patrick Groeneveld, and Ricardo Reis.

4 Physical Design Automation Book

Associated to the school, a book is being organized, for which every speaker was invited to write a chapter, based on the presented slides with comments. The book will be published by Rivers Published in the series of books with CASS.

5 Organization

General Chair: Ricardo Reis, UFRGS, Brazil
Program Chairs: Patrick Madden, SUNY Binghamton, USA
                 Marcelo Johann, UFRGS, Brazil
Poster Session Chair: Jucemar Monteiro, UFRGS
Finance Chair: José Rodrigo Azambuja, UFRGS
Local Organization Committee:
                 Mateus Fogaça, UFRGS (chair)
                 Jody Matos, UFRGS
                 Augusto Neutzling, UFRGS
                 Julia Puget, UFRGS
CASS Liaison: Ricardo Reis, UFRGS
CEDA Liaison: José Guntzel, UFSC

6   Outcomes of the School

The organization of an International state-of-art seasonal school will improve the visibility of IEEE CASS Society in the Region, as well will approach the local community with top researches coming from abroad. The modern technologies for the realization of circuits and systems demands new and powerful physical design automation tools that can cope of the complexity of modern physical design. The region is the main one in Brazil when we observe the research work in Electronic Design Automation. So, it will be a great opportunity to increase the contact of this community with the top international community on EDA. So, this event will benefit students and researches In EDA in all region (Brazil and South American countries). We are looking for travel grants for student coming from other locations.

7   Attendance

The number of participants was 130.

8   Student travel grant

ACM SIGDA provided US$5000 for student travel grants.

9   Lunch arrangements for the students

The students were able to use the University Restaurant in the neighbourhood of the event location that will cost less than R$2,00 (about US$ 0.6) per lunch or dinner.

10   Location

The university (UFRGS) will offer the auditorium and other spaces (like poster presentation and coffee breaks location) without costs, as well the slide projectors, wifi and other needed infrastructure. The Informatics Institute of UFRGS has excellent facilities like conference rooms, including teleconferencing, wifi and

multimedia projectors. Many conferences, meetings and schools have being hosted there with easy access by public transportation and in place cafeterias, restaurants and University restaurants for students.

11   Financial Sponsoring

The seasonal school got financial support from IEEE CASS and IEEE CEDA, as well a support from ACM SIGDA to provide travel grants to students. Cadence also provided a financial support.

12   Sponsors

Main Sponsor: IEEE Circuits and Systems Society
Co-Sponsors: IEEE CEDA
                      ACM SIGDA
                      SBC - Brazilian Computer Society
                      SBMicro - Brazilian Microelectronics Society

Industrial Supporters:
                      Cadence

13   Some Photos

Photo with some of participants done at the end of the event

IEEE Design & Test Roundtable

Social Event: Jam Session with some of the Speakers

Andrew Kahng Talk

Patrick Madden Talk

14   Final Comments

The Seasonal school on Physical Design Automation was a great success and a second
edition will happen from July 16 to 20, 2018, National Chung Cheng University,
Chaiyi, Taiwan.

The 2nd IEEE/ACM International Seasonal School on
Physical Design Automation
July 16 ~ 20, 2018, National Chung Cheng University, Chaiyi, Taiwan

The 2018 IEEE/ACM International Seasonal School on Physical Design Automation offers 5-day lectures on key subjects related to physical design of integrated circuits (IC) in advanced technology nodes, covering not only fundamental algorithms, computational methods, and modern AI techniques, but also new challenges for the implementation of ever more complex circuits and systems. Undergraduates and postgraduates, specifically in EE/CS or other related fields, are encouraged to this program for enhancing their comprehension or capabilities and meeting the distinguished international researchers. Engineers and experts from both industry and academia are also very welcome to this program for exchanging experiences on problem formulation, algorithms, and product developments.
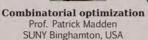
http://cad.ee.ccu.edu.tw/pda/

Day1
Mathematical optimization
Prof. Laleh Behjat
University of Calgary, Canada

Day2
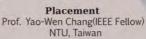**Machine learning**
Prof. Andrew Kahng (IEEE Fellow)
UC San Diego, USA

Combinatorial optimization
Prof. Patrick Madden
SUNY Binghamton, USA

Device/cell generation
Prof. Ricardo Reis
UFRGS, Brazil

Day3
Floorplanning
Prof. Martin Wong (IEEE Fellow)
UIUC, USA

Placement
Prof. Yao-Wen Chang(IEEE Fellow)
NTU, Taiwan

Day4
Routing
Prof. Bill Swartz
TTimberWolf Systems, Inc.
& UT Dallas, USA

Electromigration
Prof. Jens Lienig
TU Dresden, Germany

Day5
Manufacturability
Prof. Evangeline Young
CUHK, Hong Kong

Design closure
Dr. Patrick Groeneveld
Cadence Design Systems, Inc.,
USA

IEEE acm CAS CEDA sigda National Chung Cheng University MINISTRY OF EDUCATION TICD Taiwan IC Design Society