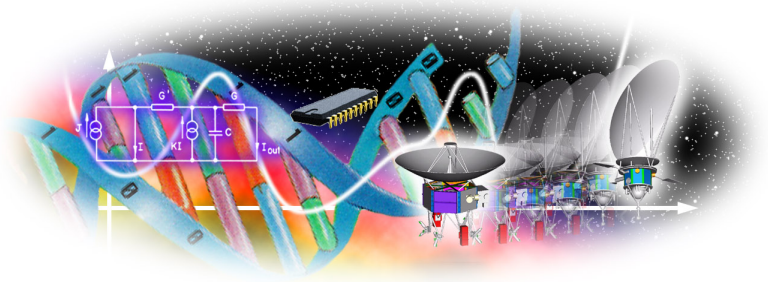
2010 NASA/ESA Conference on Adaptive Hardware and Systems



June 15 – 18, 2010
Anaheim Convention Center
Anaheim, California, USA

Organized by
NASA Jet Propulsion Laboratory (JPL), European Space Agency (ESA),
University of Edinburgh, UK

Supported by
Society for Adaptive and Evolvable Hardware and Systems (ADEVO)
Bio-Inspired Technologies and Systems (BITS),-JPL
European Centre for Secure Information and Systems (ECSIS)
IEEE Circuits and Systems Society (IEEE-CAS)
ACM Special Interest Group on Design Automation (ACM-SIGDA)

General Chair
Tughrul Arslan, *University of Edinburgh*

Vice General Chairs
David Merodio, *European Space Agency (ESA), Netherlands*
Didier Keymeulen, *Jet Propulsion Laboratory, USA*

TUESDAY, JUNE 15, 2010	
TUTORIALS **Chair: Khaled Benkrid, University of Edinburgh, UK** ***Room 205AB***	
8:30 - 10:15	**DAC Keynote: From Contract to Collaboration: Delivering a New Approach to Foundry** ***Douglas Grose*** ***GLOBALFOUNDRIES, Sunnyvale, CA*** ***Ballroom ABC***
10:30 - 11:15	**Tutorial 1: Issues for space flight electronics** *Allan Johnston* *Jet Propulsion Laboratory (JPL), USA*
11:15 - 12:15	**Tutorial 2: How Much Can I Trust the IC and Hardware?** Farinaz Koushanfar, Rice University, USA Jim Plusquellic, University of New Mexico, USA Mohammad Tehranipoor, University of Connecticut, USA
12:15 - 14:00	**LUNCH (*on your own*) and DAC Exhibition**
14:00- 17:00	**Tutorial 3: Adaptive Power Management Architecture Design and Verification** *Bhanu Kapoor (Mimasic)* *Prapanna Tiwari (Synopsys)*
17:00 - 17:30	**BREAK** ***Room 206A***
17:30 - 18:30	**Tutorial 4: Adaptive Low Power and Energy Efficient System Design Techniques** *Naehyuck Chang, Seoul National University, Korea* *Sachin Sapatnekar, University of Minnesota, USA* *Lin Yuan, Synopsys, USA*
20:00 - 23:00	**DAC Party** Anaheim Hilton, California Ballroom (for DAC Exhibition registrants only)

DAY 1 - WEDNESDAY, JUNE 16, 2010 *Day Chair: Didier Keymeulen, JPL, USA* Room 205AB	
08:45 - 09:00	**Welcome Address and Organisational Remarks** **Tughrul Arslan, University of Edinburgh, UK** **Didier Keymeulen, JPL, USA**
09:00 - 09:45	**Invited Keynote Address: Mars Phoenix Mission, and future exploration** **Barry Goldstein** **Autonomous Systems Division, Jet Propulsion Laboratory, USA** ***Chair: Adrian Stoica, Jet Propulsion Laboratory, USA***
	Session A: Adaptive Systems for Space applications I **Chair: Tughrul Arslan, University of Edinburgh, UK**
09:50 - 10:10	**Architecture Verification of the SoCWire NoC Approach for Safe Dynamic Partial Reconfiguration in Space Applications** *Björn Osterloh, Harald Michalik, Björn Fiethe, Frank Bubenhagen* *IDA TU Braunschweig, Germany*
10:10 - 10:30	**Vision Based Navigation for Autonomous Space Exploration** *G. Flandin, B. Polle, J. Lheritier, P. Vidal* *EADS ASTRIUM, France*
10:30 - 10:50	**Design and Implemenation of a Rdiation Tolerant On-Board Computer for Science Technology Satellite-3** *Dong-Soo Kang [1], Kyoung-Son Jhang [1], Dae-Soo Oh [2]* *[1] ChungNam National University, Korea* *[2] Satellite Technology Research Center, KAIST, Korea*
10:50 - 11:10	**On DESTINY Instrument Electrical and Electronics Subsystem Framework** *Semion Kizhner [1], Dominic J. Benford [1], Tod R. Lauer [2]* *[1]National Aeronautics and Space Administration, Goddard Space Flight Center* *[2] National Optical Astronomy Observatory*
11:10 - 11:30	**BREAK** ***Room 206A***
11:30 - 12:30	**DAC Keynote** **Echoes of DAC's Past: From Prediction to Realization, and Watts Next?** *Bernard Meyerson - IBM Corp., Yorktown Hts., NY* *Ballroom ABC*
12:30 - 13:40	**LUNCH (*on your own with voucher provided*) and DAC Exhibition**

	Session B. Reconfigurable computing including multi core architectures **Chair: Khaled Benkrid, University of Edinburgh, UK**
13:40 - 14:00	**Reconfigurable Machine Vision Systems Using FPGAS** *Carlos Villalpando, Raphael Some* *Jet Propulsion Laboratory, USA*
14:00 - 14:20	**Adaptive Multicore Scheduling for the LTE Uplink** *Maxime Pelcat [1] , Jean-Francois Nezan [1] , Slaheddine Aridhi [2]* *[1] IETR, France* *[2] Texas Instruments, France*
	Session C. Built-in self-test and self-repair **Chair: Andy M Tyrrell, University of York, UK**
14:20 - 14:40	**Bio-Inspired Bit Slice Processors with Self-Test and Self-Repair Mechanisms** *Andre Stauffer [1] , Joel Rossier [2]* *[1] Ecole polytechnique federale de Lausanne (EPFL), Switzerland* *[2] Haute Ecole d'Ingenierie et de Gestion (HEIG-VD), Switzerland*
14:40 - 15:00	**System Level Self-Healing for Parametric Yield and Reliability Improvement under Power Bound** *S. Narasimhan [1] , S. Paul [1] , R.S. Chakraborty [1] , F. Wolff [1] , C. Papachristou [1] , D. J. Weyer [2] , and S. Bhunia [1]* *[1] Case Western Reserve University, USA* *[2] Rockwell Automation, Cleveland, OH, USA*
15:00 - 15:20	**Low Overhead Soft Error Detection and Correction Scheme for Reconfigurable Pipelined Data Paths** *Sohan Purohit, Sai Rahul Chalamalasetti, Martin Margala* *University of Massachusetts Lowell, USA*
15:20 - 15:40	**Error-Detecting/Correcting-Code Based Robust Nanoelectronic Circuits** *Bao Liu* *The University of Texas at San Antonio, USA*
15:40 - 16:00	**BREAK** ***Room 206A***
	Session D. Special session on Enabling Advanced Spacecraft Capabilities through Adaptive Hardware Architecture **Chair: Michael Newell, Jet Propulsion Laboratory, USA**
16:00 - 16:20	**A Mission Concept Study on Flying a Hyperspectral Imager on a CubeSat** *Dhack Muthulingam [1] , Paula J. Pingree [2]* *[1] Stanford University, USA* *[2] Jet Propulsion Laboratory, California Institute of Technology, USA*

16:20 - 16:40	**iBoard: A highly-capable, high-performance, Reconfigurable FPGA-based Platform** *Yutao He, Mohammad Ashtijou* *Jet Propulsion Laboratory, California Institute of Technology, USA*
16:40 - 17:00	**Wireless Intra-Spacecraft Communication: the Benefits and the Challenges** William Zheng[1], John Armstrong[2] [1]Jet Propulsion Laboratory, California Institute of Technology, USA [2]PROBE Science Inc., USA
17:00 - 17:20	**Adaptive Embedded System applied to Tunable Laser Spectrometers for Space Flight Applications** *Gregory Flesch, Didier Keymeulen* *Jet Propulsion Laboratory, California Institute of Technology, USA*
17:20 - 17:40	**Rapid Development of Space Applications with Responsive Digital Electronics Board and LabVIEW FPGA** *Brett McMickell [1] , Thom Kreider [1] , PJ Tanzillo [2] , Kosta Ilic [2]* *[1] Honeywell Engineering and Technology, USA* *[2] National Instruments, USA*
17:40 - 18:00	**LabVIEW™: A Graphical System Design Environment for Adaptive Hardware/Software Systems** *Guoqiang Wang, Hugo Andrade* *National Instruments Corporation, USA*
18:00 - 21:00	**Reception and Posters** **Room 206A** **Chairs: Ahmet Erdogan and Tughrul Arslan, University of Edinburgh, UK**
Poster 1	**Recovery method for a turn-off failure mode of a laser array on an ORGA** *Daisaku Seto, Minoru Watanabe* *Shizuoka University, Japan*
Poster 2	**A Formal Model for Specification and Optimization of Flexible Communication Systems** *Jiong Ou [1], Farooq Muhammad [2], Jan Haase [3], Christoph Grimm [3]* *[1]Vienna University of Technology, China* *[2]Vienna University of Technology, Pakistan* *[3]Vienna University of Techology, Germany*
Poster 3	**Adaptive Algorithm for Reconfigurable Analog-to-Digital Converter** *Zulhakimi Razak, Ahmet Erdogan, Tughrul Arslan* *University of Edinburgh, UK*
Poster 4	**Balancing Exploration and Exploitation in an Adaptive Three-Dimensional Cellular Genetic Algorithm via a Probabilistic Selection Operator** *Asma Al-Naqi, Ahmet Erdogan, Tughrul Arslan* *University of Edinburgh, UK*

Poster 5	**Thermal-aware fault-tolerant system design with coarse-grained reconfigurable array architecture** *Ganghee Lee, Kiyoung Choi* *Seoul National University, Korea*
Poster 6	**Calibrating a predictive cache emulator for SoC design** *Stéphane Mancini [1], Lionel Pierrefeu [1], Zahir Larabi [2], Yves Mathieu [2]* *[1]CNRS/GIPSA-Lab, France* *[2]Telecom ParisTech, France*
Poster 7	**Formal modelling of a robust Wireless Sensor Network routing protocol** *Kashif Saghar, William Henderson, David Kendall, Ahmed Bouridane* *Northumbria University, UK*
Poster 8	**Environment-Based Measurement Planning For Autonomous RTLS Configuration** *Thorsten Edelhäußer [1], Mateusz Janiak [2], Gabriella Kókai [3]* *[1]University of Erlangen-Nuremberg, Germany* *[2]Silesian University of Technology, Poland* *[3]Fraunhofer Institute for Integrated Circuits, Germany*
Poster 9	**A Fault-Tolerant System-on-Programmable-Chip Based on Domain-Partition and Blind Reconfiguration** *Li Hong Shang[1], Mi Zhou[1], Yu Hu[2]* *[1]Beihang University, China* *[2]Chinese Academy of Sciences, China*
Poster 10	**An acceleration method of optical reconfigurations using analog configuration contexts** Yuji Aoyama, Minoru Watanabe Shizuoka University, Japan
Poster 11	**Auto-Reconfiguration on Self-organized Intelligent Platform** *Kevin Cheng[1], Ali Akbar Zarezadeh[1], Felix Muhlbauer[1],Camel Tanougast[2], Christophe Bobda[1]* *[1]University Potsdam, Germany* *[2]University Paul Verlaine of Metz, France*
Poster 12	**An Adaptive Communications Module for On-board Computers of Satellites** *Eduardo Bezerra [1], Gabriel Almeida [2],Luciano Azevedo [3], Cristiano Ferreira [3]* *[1]UFSC, Brazil* *[2]LIRMM, France* *[3]PUCRS, Brazil*
Poster 13	**Novel Bio-Inspired Self-Test Technique for Evolvable Fault Tolerant Hardware Systems** *Mohammad Samie, Gabriel Dragffy, Tony Pipe* *UWE University, UK*

Poster 14	**A Fuzzy Logic Based Dynamic Reconfiguration Scheme for Optimal Energy and Throughput in Symmetric Chip Multiprocessors** *Muhammad Yasir Qadri, Klaus D. McDonald-Maier* *University of Essex, UK*
Poster 15	**FPGA Implementation of an Efficient High-Throughput Sphere Decoder for MIMO Systems Based on the Smallest Singular Value Threshold** *Xiang Wu, John S. Thompson* *University of Edinburgh, UK*
Poster 16	**Efficient Analog Architectures for DCT Processing** *Surya Prakash Noolu, M. Shojaei Baghini, Rajbabu Velmurugan* *Indian Institute of Technology Bombay, India*
Poster 17	**Similarity Transformation-based Method for Cross-Coupling Effect of Parameters** *HJ Kadim* *LJMU, UK*
Poster 18	**Design of analog field programmable RC oscillator using a floating-gate PFET** *Garima Kapur, C.M. Markan* *Dayalbagh Educational Institute, India*
Poster 19	**A High Resolution, Low Frequency DAC for Space Applications** *George Tsiligiannis [1] , Kostas Makris [1] , Tasos Lambaounas [1] , Dimosthenis Fragopoulos [1] , Panagiotis Anagnostopoulos [1] , Constantin Papadas [1] , Jean-Pierre Schoellkopf [2] , Boris Glass [3]* *[1] I.S.D.S.A., Greece* *[2] ASTUS, France* *[3] European Space Research and Technology Center, The Netherlands*

DAY 2 - THURSDAY, JUNE 17, 2010 *Day Chair: David Merodio Codinachs, ESA, Netherlands* Room 205AB	
09:00 - 09:45	**Invited Keynote Address: Needs for adaptive hardware in Space Robotics at ESA** **Gianfranco Visentin** **Head of the Robotics and Automation Section, European Space Agency (ESA), Netherlands** ***Chair: David Merodio Codinachs, ESA, Netherlands***
	Session E. Adaptive Systems for Space applications II **Chair: Umeshkumar Patel, Goddard Space Flight Center, USA**
09:50 - 10:10	**A Formal Approach to Self-configurable Swarm-based Space-exploration Systems** *Emil Vassev [1] , Mike Hinchey [2] , Paddy Nixon [1]* *[1] University College Dublin, Ireland* *[2] University of Limerick, Ireland*
10:10 - 10:30	**Reliability Estimation and Experimental Results of a Self-Healing Asynchronous Circuit: A Case Study** *Thomas Panhofer, Werner Friesenbichler, Andreas Steininger* *Vienna University of Technology, Austria*
	Session F. Hardware for adaptive signal processing **Chair: Yutao He, Jet Propulsion Laboratory, USA**
10:30 - 10:50	**R3TOS: A Reliable Reconfigurable Real-Time Operating System** *Xabier Iturbe [1,2] , Khaled Benkrid [1] , Ahmet T. Erdogan [1] , Tughrul Arslan [1] , Mikel Azkarate [2] , Imanol Martinez [2] and Antonio Perez [2]* *[1] University of Edinburgh, UK* *[2] IKERLAN-IK4 Research Alliance, Spain*
10:50 - 11:10	**An Adaptable Low Density Parity Check (LDPC) Engine for Space Based Communication Systems** *Gregory M. Striemer and Ali Akoglu* *University of Arizona, USA*
11:10 - 11:30	**BREAK** ***Room 206A***
11:30 - 12:30	**DAC Keynote - Designing the Motorola Droid** *Iqbal Arshad - Motorola, Inc., Libertyville, IL* *Ballroom ABC*
12:30 - 13:40	**LUNCH (on your own with voucher provided) and DAC Exhibition**

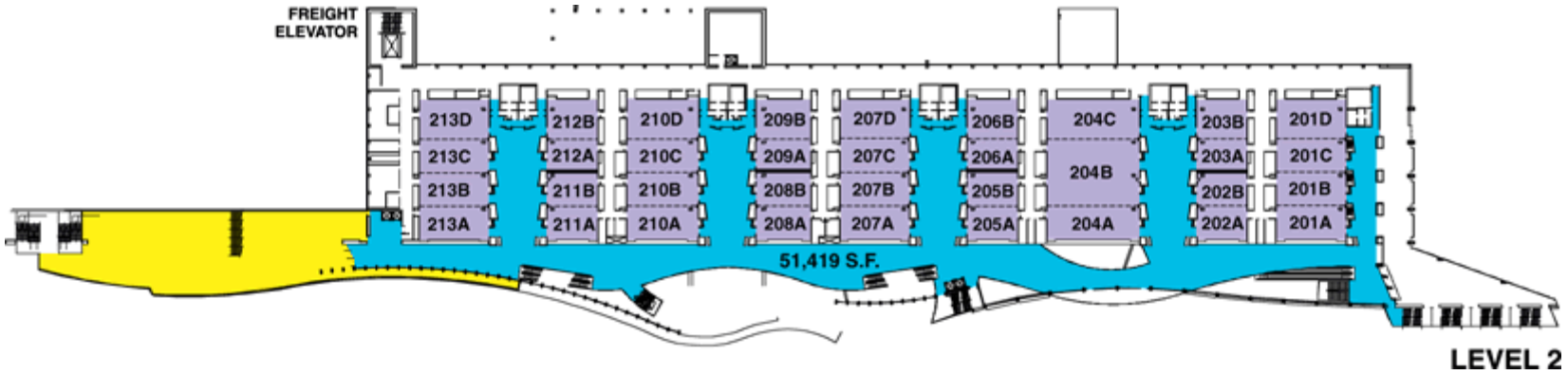
13:40 - 14:00	**Performance and Area Efficient Transpose Memory Architecture for High Throughput Adaptive Signal Processing Systems** *Mohamed El-Hadedy [1] , Sohan Purohit [2] , Martin Margala [2] , Svein J. Knapskog [1]* *[1] Norwegian National Technical University, Norway* *[2] University of Massachusetts Lowell, USA*
14:00 - 14:20	**A High-Throughput, Adaptive FFT Architecture for FPGA-Based Space-Borne Data Processors** *Kayla Nguyen, Jason Zheng, Yutao He and Biren Shah* *Jet Propulsion Laboratory, California Institute of Technology, USA*
14:20 - 14:40	**Locating Rate Adaption by Evaluating Movement Specific Parameters** *Matthias Brugger, Ferdinand Kemeth* *Fraunhofer Institute for Integrated Circuits, Germany*
	Session G. Special session on Adaptive, Reconfigurable and Self-aware Computing Architectures **Chair: Giovanni Beltrame, École Polytechnique de Montréal, Canada**
14:40 - 15:00	**An Emerging Adaptive Architecture and Compilation Techniques** *Yong-Kyu Jung* *Gannon University, USA*
15:00 - 15:20	**SDVM^R -Managing Heterogeneity in Space and Time on Multicore SoCs** Andreas Hofmann[1], Klaus Waldschmidt[1], Jan Haase[2] [1]J.W. Goethe-University, Germany [2]Vienna University of Technology, Austria
15:20 - 15:40	**Enabling Technologies For Self-Aware Adaptive Systems (Invited)** *Marco D. Santambrogio [1,2] ,Henry Hoffmann [1] , Jonathan Eastep [1] , Jason E. Miller [1] , and Anant Agarwal [1]* *[1] Massachusetts Institute of Technology, USA* *[2] Politecnico di Milano, Italy*
15:40 - 16:00	**BREAK** ***Room 206A***

	Session H. Adaptive image and data compression **Chair: Wael Adi, Technical University of Braunschweig, Germany**
16:00 - 16:20	**HTPCP: GNSS-R multi-channel correlation waveforms post-processing solution for GOLD-RTR Instrument** *Guo Yi [1,2] , David Atienza [3] , Antonio Rius [1] , Serni Rib´o [1] , Carles Ferrer [2,4]* *[1] Institut de Ci`encies de l'Espai (IEEC-CSIC), Spain* *[2] Departament de Microelectr`onica i Sistemes Electr`onics (IEEC-UAB), Spain* *[3] Embedded Systems Laboratory (ESL), EPFL, Switzerland* *[4] Institut de Microelectr`onica de Barcelona (CNM-CSIC), Spain*
16:20 - 16:40	**Hardware Implementation of the FAPEC Lossless Data Compressor for Space** *Alberto G. Villafranca [1,2] , Shan Mignot [3] , Jordi Portell [1,4] , and Enrique García-Berro [1,2]* *[1] Institut d'Estudis Espacials de Catalunya, Spain* *[2] Universitat Politècnica de Catalunya, Spain* *[3] Observatoire de Paris, France* *[4] Universitat de Barcelona, Spain*
16:40 - 17:00	**Evolutionary design and optimization of Wavelet Transforms for image compression in embedded systems** *Ruben Salvador [1] , Felix Moreno [1] , Teresa Riesgo [1] , Lukas Sekanina [2]* *[1] Universidad Politecnica de Madrid, Spain* *[2] Brno University of Technology, Czech Republic*

19:00 - 23:00	**Conference Dinner and Prize Awards** **Roy's Anaheim** **321 W. Katella Ave, Anaheim, CA, 92802** **T: (714) 776-769** **http://www.roysrestaurant.com/locations/CA/anaheim.asp**

DAY 3 - FRIDAY, JUNE 18, 2010 *Day Chair: Ahmet Erdogan, University of Edinburgh, UK* **Room 205AB**	
09:00 - 09:45	**Invited Keynote Address: GPUs Really Can Fly…** **Michael Shebanow** **Principal Research Scientist, NVIDIA, USA** ***Chair: Tughrul Arslan, University of Edinburgh, UK***
09:50 - 11:10	**PANEL** **Architectures and design in the context of future adaptive hardware solutions** Organisers: Sri Katkoori, University of South Florida, and Adrian Stoica, JPL, USA Moderator: Adrian Stoica, JPL, USA
11:10 - 11:30	**BREAK** ***Room 206A***
	Session I. Evolvable hardware **Chair: Tughrul Arslan, University of Edinburgh, UK**
11:30 - 11:50	**Use of a Multi-Objective Fitness Function to Improve Cartesian Genetic Programming Circuits** *James Hilder, James A. Walker, Andy Tyrrell* *University of York, UK*
11:50 - 12:10	**Automated synthesis of 8-Output Voltage Distributor using Incremental Evolution** *Yerbol Sapargaliyev, Tatana G. Kalganova* *Brunel University, UK*
12:10 - 12:30	**Evolvable Hardware Security Architectures** *Wael Adi [1] , Khaled Benkrid [2]* *[1] Technical University of Braunschweig, Germany* *[2] University of Edinburgh, UK*
12:30 - 14:00	**LUNCH (on your own with voucher provided)**
	Session J. Adaptive antennas **Chair: Didier Keymeulen, Jet Propulsion Laboratory, USA**
14:00 - 14:20	**Adaptive Phase Synchronization in Distributed Digital Arrays** *D. C. Jenn [1] , Tsai Yen-Chang [2] , Ji Heon Ryu [3] , R. Broadston [1]* *[1] Naval Postgraduate School, Monterey, CA, USA* *[2] Agency for Defense Development, Deajeon, Korea* *[3] Republic of China Navy, China*

14:20 - 14:40	**An Adaptive SIW Filter and Dual-Linearly Polarized Patch Antenna using Vertically-Orientated Fluidic Material Perturbations** *Joel D. Barrera and Gregory H. Huff* *Texas A&M University, USA*
14:40 - 15:00	**Adaptive Optimal Radiation Pattern for Linear Antenna Arrays by Phase-Only Perturbations using Particle Swarm Optimization** *Virgilio Zuniga, Ahmet T. Erdogan, Tughrul Arslan* *University of Edinburgh, UK*
15:00 - 15:20	**BREAK** ***Room 206A***
	Session K. Special session on Adaptive Techniques for Security and Trust in Hardware Design **Chair: David Merodio Codinachs, ESA, Netherlands**
15:20 - 15:40	**Reliability Based Trojans effected by HCI and NBTI defects** *Y. Shiyanovskii [1] , F. Wolff [1] , A. Rajendran [1] , C. Papachristou [1] , D. Weyer [2] , W. Clay [2]* *[1] Case Western Reserve University, USA* *[2] Rockwell Automation, USA*
15:40 - 16:00	**Embedded System Protection Technique from Software Corruption** *Francis Wolff [1] , Chris Papachristou [1] , Daniel Weyer [2] , William Clay2* *[1] Case Western Reserve University, USA* *[2] Rockwell Automation, USA*
16:00 - 16:20	**Ultimate Design Security in self-Reconfiguring Environment** *Wael Adi [1] , Khaled Benkrid [2]* *[1] Technical University of Braunschweig, Germany* *[2] University of Edinburgh, UK*
16:20 - 16:40	**Concluding Remarks**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LEVEL 2

Google maps

Anaheim Convention Center to Roy's ...

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End **Roy's Restaurant - Hawaiian Fusion Restaurant**
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(714) 776-7697

When 6/17/10 after 6:00pm

Duration 11 mins total

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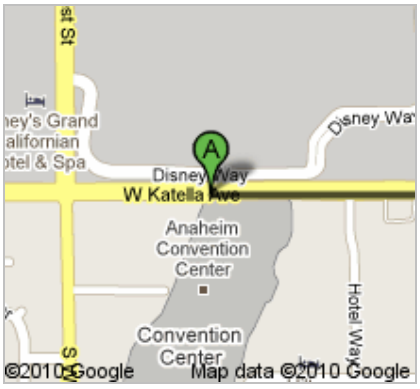

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Walk to 321 West Katella Avenue, Anaheim, CA 92802 — About 11 mins

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1.	Head east on W Katella Ave toward Hotel Way	0.3 mi
2.	Turn left at S Harbor Blvd	46 ft
3.	Turn right at W Katella Ave	0.2 mi

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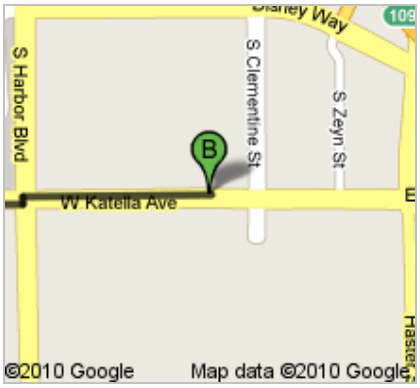

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