The Joint Research Institute in Science and Engineering by Peking University and UCLA

A Message from the Co-directors

The Joint Research Institute (JRI) in Science and Engineering between Peking University (PKU) and the University of California, Los Angeles (UCLA) made great progress in 2012. It now involves 69 faculty members from PKU and 82 faculty members from UCLA. This annual report highlights some of the collaborative research projects in a wide range of areas, from clean energy and environment, to information technologies, to biological and medical sciences. These projects led to twelve joint research publications in 2012 (listed on page 8). JRI held the Third Annual Research Symposium in May with an exciting program, and facilitated a number of faculty exchanges between PKU and UCLA. JRI continues to engage industrial partners such as AsiaInfo, Baidu, China Mobile, and Xilinx, which led to industry-funded research projects in JRI. Last, but certainly not least, student exchanges flourished. Fourteen PKU undergraduate and graduate students spent part of the 2012 academic year at UCLA as exchange students working with UCLA faculty on collaborative research. In addition, thirteen UCLA undergraduate and graduate students spent 10 weeks over the summer working in research laboratories at PKU on a wide range of projects, such as scheduling for voice over IP delivery, powered ankle prosthesis, and wireless transmission on GNU radios. A complete list is available on page 13, and their enthusiastic feedback is on page 14, and JRI’s website: www.pku-jri.ucla.edu. Finally, JRI has facilitated a pilot program for integrated BS + MS degrees between PKU and UCLA starting 2013. Details are described on page 16.

We would like to take this opportunity to thank all JRI faculty, staff, students, advisors, and industrial partners for their great support and contributions in 2012. Together, we look forward to bringing JRI new levels of success in 2013.
Joint Air Pollution Research

In the city of Beijing, one of the most populous cities in the world, with a population of over 20 million as of 2010, motor vehicle emissions presumably constitute one of the most significant sources of air pollution. To better understand the impact of traffic on air quality in Beijing, Professor Mei Zheng at the PKU’s College of Environmental Science and Engineering and Professor Yifang Zhu at the UCLA Fielding School of Public Health initiated a joint research project to address this problem. This project then attracted and inspired more researchers from other institutions in China, including Fudan University, Ocean University of China, and Chinese Academy of Sciences.

The goal of the research was to (1) monitor the air quality in Beijing, (2) estimate pedestrians’ exposure to air pollutants near busy roadways, and (3) compare commuters’ exposure to air pollutants for different transport modes. The pollutants measured included: size distribution of ultrafine particles (particulate matters with diameter less than 0.1 micrometer), total particulate number concentrations, PM2.5 (particulate matters with diameter less than 2.5 micrometer), black carbon, CO2 and CO. Integrated aerosol samplers were also collected by utilizing quartz and Teflon filters for the analysis of chemical speciation. These filters will be analyzed for volatile organic compounds (VOCs) and heavy metals.

This study was carried out December 10~24, 2011. The sampling was conducted at three sites; two stationary and one mobile. The two stationary sites included: (1) a control site situated on the PKU campus as the representative of the sites with no significant near by emission sources, and (2) a roadside site situated at a busy intersection near the PKU main campus to monitor the near road way air pollutants. The mobile site consisted of multiple daily trips via walking, riding the bus, and taking the subway trains while carrying mobile instruments. The trips covered morning and evening rush hour as well as light traffic hours in between, and were conducted by three students. In addition, the vertical distribution of air pollutant concentrations was also measured on a tower of 320 m.

This joint research project is considered a pilot project despite being quite extensive. A manuscript is being drafted for publication and a more involved project is planned for the near future which may involve multiple cities and more researchers. A web based presentation can be found here: http://prezi.com/zsx7bgypanl/ucla-fudan-pku-ou-joint-project-public/.

Mei Zheng hosted Yifang Zhu’s UCLA undergraduate student, Reagan Patterson, at PKU this summer through the JRI Summer Research Exchange. (p.13) Patterson studied “Comparison of Particle Deposition in the Respiratory Tracts of Children and Adults in LA and Beijing using Multiple-Path Particle Dosimetry Model,” in Zheng’s lab.
US-China EcoPartnership

PKU Professor Dongziao Zhang
UCLA Professor Lei He

The Clean Energy Research Center - Los Angeles (CERC-LA), located at UCLA, together with partners including PKU has been awarded a prestigious EcoPartnership by the U.S. Department of State. U.S. Secretary of State Hillary Rodham Clinton welcomed the five new U.S.-China EcoPartnerships during a signing ceremony which took place in the Diaoyutai State Guest House in Beijing, China, on May 3, 2012. U.S. Special Envoy for Climate Change Todd Stern and China’s National Development and Reform Commission (NDRC) Vice Chairman Xie Zhenhua, co-chaired the event. Also present were Science Advisor to President Obama, Dr. John Holdren, and U.S. Special Representative for Global Intergovernmental Affairs, Reta Jo Lewis.

CERC-LA, catalyzed by the 2011 JRI Symposium, was created by UCLA to tackle many of the grand challenges related to the generation, transmission, storage and management of energy. As many energy challenges are global in nature, this new center will engage the participation of a multi-disciplinary group of researchers from many different nations. The director is Professor Lei He from UCLA’s Electrical Engineering department. CERC-LA partners with China’s institutions including the National Center for Climate Change Strategy and International Cooperation (NCSC), PKU, and Fudan University. Representing UCLA at the event were Professor He and Michael Swords, Executive Director of Strategic Research Initiatives and Global Partnerships at UCLA.

This EcoPartnership will enlist a consortium of clean energy and climate change leaders from American and Chinese universities, think tanks, and the private sector to conduct joint research on smart grids, intelligent vehicles, and electric vehicles. The consortium is building a joint research laboratory on smart grid technology at PKU, that will serve as a hub for researchers and students, particularly from the U.S. The leadership of the EcoPartnership believe that this facility in Beijing will enable the students to better understand China’s low-carbon, energy development initiatives. A secondary goal of the initiative is to facilitate economic growth and clean tech sector job creation in the U.S. and China.

The United States and China signed the Framework for EcoPartnerships under the U.S.-China Ten-Year Framework for Cooperation on Energy and Environment (EcoPartnerships Framework) in Beijing in December 2008. The EcoPartnerships Framework is aimed at developing new models of mutually beneficial voluntary arrangements between a range of state, local, and private sector organizations to spur innovation, investment, and engagement on clean energy and environmental issues, including climate change.

For more on EcoPartnerships: visit: www.ecopartnerships.gov

For more on CERC-LA: visit http://cerc.ucla.edu or contact Michael Swords mswords@conet.ucla.edu

Professor Lei He (back row, second from left) with Secretary of State Hillary Rodham Clinton and fellow EcoPartnership recipients at the Signing Ceremony, Beijing, May 3, 2012
In order to improve the efficiency, as well as reducing fabrication cost, the safe, simple and scalable CZTS nanocrystal ink approach will be employed. This method depends on a CZTS ink solution that is homogeneous in environmental friendly solvents, rather than relying on explosive hydrazine as the solvent, and is air-stable, which avoids the drawbacks of precursor solutions with unstable stoichiometry when depositing films.

Based on current research, the goal of the collaboration is developing CZTS solar cells with efficiency beyond 12% using a copper zinc tin sulfide nanocrystal solution. With further exploration of the material properties of this emerging system and additional fundamental research on the phase and defect chemistry that governs its performance in devices, we anticipate that this collaboration will embody a game-changing breakthrough in the field of photovoltaic device design and future module application.

Department of Materials Science and Engineering Professor Yang Yang’s postdoc, Dr. Huanping Zhou, visited Professor Dong Wang’s group in the Department of Energy and Resources Engineering, at PKU during the summer. Wang’s student Qiao Cheng is researching in the Electrical Engineering department at UCLA this academic year through the JRI Graduate Research Exchange.
Towards Layout-Friendly High-Level Synthesis
接近布局友好的高阶合成

PKU Professor Guojie Luo
UCLA Professor Jason Cong

On March 2012 the paper "Towards layout-friendly high-level synthesis", a collaborative research paper between UCLA and PKU, was published in the International Symposium on Physical Design, one of the top symposia/conferences in the field of electronic design automation of very large-scale integrated (VLSI) circuits and systems.

The VLSI router at the very back-end of design flow has to make great efforts to obtain a routing solution that satisfies the connectivity with limited routing resources. Given a high-level design of a circuit at the very frontend of the design flow, can we tell whether we can obtain a routable solution? Can we relieve the efforts by tuning the high-level design? These remain open problems. This work made one step toward the possible solution, by analyzing the accuracy and effectiveness of different high-level routability models.

This collaboration started at the end of 2011 during Jason Cong’s visit at PKU, where Cong and Guojie Luo, an assistant professor of computer science at PKU, defined some key components in the analysis flow, which resulted in this publication.

Memory Partitioning and Scheduling Co-optimization in Behavioral Synthesis
内存分配和调度的联合优化

PKU Professor Peng Li
UCLA Professor Jason Cong

On Nov 8th 2012, PKU computer science professor Peng Li presented the paper "Memory Partitioning and Scheduling Co-optimization in Behavioral Synthesis" at the International Conference on Computer-Aided Design, the premier conference for electronic design technology. The story of the paper illustrates the benefits of the UCLA/PKU Joint Research Institute (JRI).

One of the co-authors, Yuxin Wang, a Ph.D. candidate from PKU, spent 2010-2011 academic year at UCLA supported by JRI. Wang worked with Peng Zhang, a postdoctoral researcher at UCLA, on memory partitioning in behavioral synthesis.

Behavioral synthesis can automatically transform untimed algorithmic descriptions into hardware implementations, which can significantly reduce time-to-market and design costs of modern chips with acceptable performance and power penalties. The memory partitioning technique can support multiple simultaneous memory accesses on the same array effectively by partition the array onto separate disjoint banks.

When Yuxin returned to PKU, her talk on the topic aroused a heated discussion. A new idea was generated by arranging memory accesses across the border of loop iterations. Compared to state-of-art memory partitioning and scheduling algorithm, this novel idea can effectively support arbitrary affine memory inputs, extending the applicability of memory partitioning algorithms. A virtual team formed including Yuxin, Zhang and Li. Through bi-weekly discussions and hard work from both sides, the ideas turned into a solid technical paper accepted by the ICCAD conference.

Experimental results show that on a set of real-world medical (Continued on page 6)
image processing kernels, the proposed memory partitioning and scheduling algorithm can gain speed-up, area reduction and power savings of 15.8%, 36% and 32.4% respectively, compared to the state-of-art algorithm. Two other co-authors of the paper, Guojie Luo and Tao Wang, both of PKU’s Department of Electrical Engineering and Computer Science, are also active members of JRI and guided by Professor Jason Cong, co-director of JRI.

A Phone-Based e-Health System for OSAS
用于治疗阻塞性睡眠呼吸暂停综合症（OSAS）的一款基于手机的无线电子医疗系统
PKU Professors Tao Wang, Fang Han
UCLA Professor Songwu Lu

This project is a phone-based e-health system for Obstructive Sleep Apnea Syndrome (OSAS). The smart phone device monitors a patient's health remotely, saving both patient and doctor time on testing.

OSAS is a widespread sleep-disordered breathing disease which leads to repetitive hypoxemia, hypercapnia, and interruptions of normal sleep pattern. Considering its severe negative impact on human health, long-term monitoring of OSAS is necessary. Current OSAS monitoring systems require patients stay in hospital overnight and considerable wiring between body and system. In this work, PK computer science professors Tao Wang and Fang Han, and UCLA computer science professor Songwu Lu propose a smartphone-based, wireless e-health system enabling anytime, anywhere monitoring.

Experiments and modeling show that energy efficiency is the major bottleneck for sustainable operations of this battery-driven system. On the solution side, full use can be made of the low-power mode of Bluetooth. The lifetime of the resulting OSAS system would increase by more than 50%. Ongoing work seeks a holistic approach to more a energy-efficient system.

Wireless Health
无线电子医疗
PKU Professor Anpeng Huang
UCLA Professor Majid Sarrafzadeh

Computer Science professors Anpeng Huang and Majid Sarrafzadeh developed a novel portable electrocardiogram (ECG) system named WE-CARE. This system serves cardiovascular disease patients for real-time ECG monitoring. Compared with conventional ECG system, WE-CARE can effectively reduce monitoring costs, improve diagnostic accuracy, and enlarge monitoring coverage. WE-CARE has been tested under large-group heart failure patients and passed the standard medical certificate for health diagnosis and clinic medical evidence. It integrates information technology and medical applications and is expected to change traditional heart disease treatment. Related work was published in Body Sensor Network Conference 2011.

UCLA undergraduate Tammy Chang ‘12, returned to Huang’s lab for a second summer with the 2012 JRI Summer Exchange, and submitted a joint paper to IEEE International Conference on Communications.

Sarrafzadeh and Huang presented at the IEEE 9th International Conference, May 2012, in London (p. 8).
Biological and Medical Science

High Resolution Studies of Excitable Cells

关于易兴奋细胞的高分辨率研究

PKU Professor Ming Liang Pu
UCLA Professor Nicholas Brecha

The laboratories of both Professor Nicholas Brecha, UCLA Department of Neurobiology, and Professor Ming Liang Pu, PKU Department of Biomedical Engineering, are interested in understanding the roles of different retinal cells in visual processing, and building on that understanding with the application of disease, injury, or aged models to address questions concerning changes in the visual health.

Helen Vuong, UCLA PhD candidate, is working on this collaboration and spent the summer with the 2012 JRI Summer Research Exchange at PKU. At UCLA, Vuong is in Brecha’s lab piecing together a microcircuit of cells in the inner retina, in particular, the somatostatin (SRIF)- and dopamine (DA)- containing amacrine cells, as well as the melanopsin-containing amacrine cells (iRGCs). They are examining the anatomical and physiological interactions of these cells. With the use of immunohistochemistry (IHC), calcium imaging, and transgenic mouse models, they are addressing the modulatory cross-talk between these cells and have pinpointed crucial proteins that play a role in the modulation.

While in Pu’s lab at PKU, Vuong incorporated similar techniques, in particular IHC and high-resolution confocal imaging, to view the anatomical changes of the DA-containing amacrine cells and iRGCs. More specifically, they were looking at changes in cell density, distribution, and cell-to-cell interactions in whole mount retinas of control mice at 2, 7, 11, 14, and 24 months, compared to age matched Thy-1-CFP-DBA 2/J (TCD) mice, which have been previously used as a mouse model for Glaucoma.

The collaboration between Brecha and Pu has facilitated the substantial progression of mapping important anatomical and physiological modulations between retinal cells that influence visual processing.

Plant Development Research

关于植物发展的研究

PKU Professor Hongwei Guo
UCLA Professor Chentao Lin

The on-going collaboration between Professors Chentao Lin and Hongwei Guo is aimed at understanding the molecular mechanism of gene regulation in plants using molecular genetics to study plant growth and development. Results are expected to help improve yield and both water and fertilizer use efficiency of rice and other crops in the world. The team was awarded funding from the Chinese Minister of Agriculture, and published a paper this year in Plant Physiology (p. 8 for details).

Illustration of a plant genome
Joint Publications in 2012 合作论文发表

Engineering and Applied Sciences
Jason Cong, Guojie Luo, Kalliopi Tsota, Bingjun Xiao, Optimizing Routability in Large-Scale Mixed-Size Placement, accepted by ASPDAC 2013

Physical Sciences

Biological and Medical Sciences
JRI Mini-Symposium
May 2-3, 2012

by Rebecca Kendall

The environment, aging, cardiovascular health, information technology and new materials and devices were center as leading scientists and engineers from UCLA and PKU discussed ongoing collaborative research projects at the third annual UCLA-PKU Joint Research Institute in Science and Engineering symposium, held May 2 – 3 at UCLA’s California NanoSystems Institute auditorium.

Participants started with greetings from Chancellor Gene Block during breakfast. “In an increasingly interconnected world where problems and problem-solving extend from the local to the global, the university is where innovative and internationally-oriented research, teaching and engagement can be found,” said Cindy Fan, associate vice provost of international studies and head of the UCLA International Institute, during opening remarks.

“We are committed to its role as a world-class locus for cultivating global thinkers, citizens, leaders and problem-solvers.”

Scott Waugh, UCLA’s executive vice chancellor and provost; Stephen Cheung, managing director of business and economic policy for the City of Los Angeles; and Consul Jian Zhang, from the Consulate General of the People’s Republic of China in Los Angeles also gave remarks. “I would like to extend my warm congratulations to all of you, and I hope such events can facilitate exchanges and cooperation between your two universities,” said Zhang.

Plenary talks were given by Tong Zhu, of PKU’s College of Environmental Science, who spoke on formation processes and health impacts of atmospheric pollution in Beijing and North China plain; Steven Dubinett, from UCLA’s David Geffen School of Medicine, who gave an introduction to the Center for Translational Science; Hongya Gu, deputy dean of PKU’s Department of Life Sciences, who gave a brief introduction to the PKU School of Life Sciences; and Jeff Burke, of UCLA’s School of Theater, Film and Television and UCLA’s Center for Research in Engineering, Media and Performance, who discussed named data networking and the future of civic and cultural information technology.

Additional presenters included Jing Huang, of UCLA’s molecular and medical pharmacology department, who spoke on new molecules that fight aging; XiaoDong Hu, of PKU’s physics department, who shared work on exploration and study of LED lighting systems for Mogao Caves in Dunhuang, China; Kai Lei, of PKU’s Center for Internet Research and Engineering, who discussed research and practice of content-centric networking with P2P and video streaming; and Jesus Araujo, of UCLA’s cardiology division, who spoke on cardiovascular effects of air pollution.

“It is great for the PKU-UCLA JRI to confront issues of global effect, such as sustainability, the environment and health research,” says Jason Cong, of UCLA’s Department of Computer Science, who directs JRI with Xiaoming Li, of PKU’s Department of Electrical Engineering and Computer Science. Not only does collaboration contribute to new knowledge and bettering lives of people around the world, it lays the groundwork for joint funding opportunities and is an excellent opportunity for both universities to cultivate relationships with potential graduate students.

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**Faculty Visits 教授校际访问**

**UCLA to PKU 洛杉矶加州大学至北京大学**

During spring quarter, Professor Kung Yao, UCLA electrical engineering department, took his sabbatical at PKU as a guest of JRI and Professor B. Jiao of the School of Advanced Communications, PKU. Yao discussed issues of mutual interest with Jiao, his colleagues, and students, and presented seminars at PKU and the Chinese Academy of Sciences, among other universities in China. In addition, he modified his book, “Detection and Estimation in Communication and Radar Systems,” by K. Yao, F. Lorenzelli, and C.E. Chen, to be published by Cambridge University Press in early 2013. “I had a most professionally rewarding experience...I look back on my sabbatical at PKU and other experiences in China with fond memories.”

**PKU to UCLA 北京大学至洛杉矶加州大学**

PKU Dean Dongmin Chen met with UCLA faculty and development personnel, including Electrical Engineering Professor Maxim Batalin, on May 21 to explore collaborations in spin-off and technology transfer (see p. 2 ‘Joint Incubator’).

From left, Professors Yan Zhang, William Yang, Hongya-Gu, and Bin Xia, Nov. 2012

Professor Tao Wang visited UCLA in June for academic exchanges with Jason Cong and Songwu Lu in computer science.

Guojie Luo (p.6) of computer science at PKU, spent 2 days at UCLA and Jason Cong's lab after attending the ICCAD conference in early November. Guojie joined a research meeting with Cong, post-doc Kelly Tsota, and PKU visiting student Zhao Tian to discuss the collaboration on ultra-fast FPGA placement algorithms, which will eventually push forward the application of FPGA devices for energy-efficient computing. In addition, Guojie had an extensive discussion with post-doc Peng Zhang and PhD (Continued on page 11)

Kung Yao with poster, Spring 2012

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student Bingjun Xiao on potential research topics related to physical/system-level design co-optimization. Guojie said, "The meetings and discussions during this visit opened my mind, and are likely to lead to more collaborations between PKU and UCLA. This visit also reminded me of the good old days when I was a graduate student in Prof. Cong's lab."

After attending ICCAD conference, Professor Peng Li (p.6), computer science, visited UCLA for a week. He attended the group meeting of UCLA VLSI CAD Laboratory and Center for Customizable Domain-Specific Computing directed by Cong. From the group meeting, Li witnessed firsthand how research ideas are generated from this world-renowned research group, and he has a clear impression that the students are really thinking and working very hard, focusing on innovation, and pushing the new frontier of their research areas. Li introduced his work to the group and had intensive discussion with Dr. Peng Zhang and Ph.D. candidate Bingjun Xiao, Hui Huang, Muhuan Huang from UCLA on the optimization and implementation of memory system of reconfigurable accelerators generated by behavioral synthesis. New ideas are generated from the discussion on combining data reuse and memory partitioning, which can potentially be turned into future joint publications. Li gave two survey talks on "loop initiation interval minimization in high-level synthesis." Louis-Noel Pouchet, a world-level expert on the polyhedral model, joined discussion on how to use polyhedral model to solve the problem. Li also met with Professor Songwu Lu from UCLA and brought two development boards back to his research collaborators at PKU.

Dr. Robert Damoiseaux introduces the Molecular Screening Shared Resource, housed at CNSI, on the second day of the JRI symposium, UCLA.

Interactions with Industry Partners
与企业伙伴的合作

**China Mobile**
中国移动通信集团公司

On May 18, Dr. Li-Qun Xu, chief scientist at China Mobile, visited UCLA Electrical Engineering and Computer Science Departments. Xu met with members of Majid Sarrafzadeh’s lab for a demonstration of WANDA: Weight and Activity with Blood Pressure Monitoring System.

Xu also met with Songwu Lu for an introduction to UCLA Wireless Networking Group (WING) conducting research in wireless networking, mobile systems, and network security.

Xu visited UCLA again on August 31, bringing Bill Huang, head of China Mobile Research Center. They met with Professor Mani Sri- vastava, electrical engineering, for a discussion on Center for Embedded Network Sensing (CENS), and members of Jason Cong’s computer science lab for an introduction to research in Center for Domain Specific Computing (CDSC), with emphasis on energy-efficient computing and MI applications.

Executive Vice-President of China Mobile Communications Corporation, Zhengmao Li, is a charter member of the JRI Industry Advisory Board.

**AsiaInfo Linkage**
亚信联创集团股份有限公司

James Ding, vice chair of the JRI Advisory Board, AsiaInfo founder, and Managing Director of GSR Ventures, met with various JRI members at UCLA on November 6 regarding topics for the proposed JRI Tech Transfer Incubator. Professors Songwu Lu, computer science, shared his project "A Mobile Could Based Approach to OSAS" (p.5); William Yang, psychiatry and behavioral science, shared "Identifying Novel Drugs for Brain Disorders using New Disease Models and Strategies"; Yang Yang (p.4), materials science and engineering, shared “Next generation thin film solar cell,” post-doc Peng Zhang, computer science, shared “System-level Synthesis of Programmable Systems-on-a-Chip.”

JRI thanks AsiaInfo for their continued support and pledge of $150,000 over three years.

**Xilinx, Inc.**
赛灵思公司

In March, JRI thanked Xilinx, Inc. for the final payment fulfilling their 3-year pledge to support research and student exchanges.
Student Exchange: PKU Student Researchers at UCLA

Ruixiong Zhang, now a senior in the Department of Atmospheric & Oceanic Sciences, School of Physics, PKU. Zhang worked in Professor Qinbin Li’s research group from June 22 through September 8, 2012. At UCLA Zhang worked on analyzing satellite observations of tropospheric nitrogen oxides, critical precursors for ozone. He worked closely with PhD student, Mei Gao. His analysis has provided tremendous insights into how lightning influences tropospheric ozone. “It has been an absolute pleasure having Ruixiong in my group as he is not only a wonderful person that is easy to work with but also a student with unbounded potential for an academic career in atmospheric science,” says Li.

Zhang’s advisor at PKU is Professor Jintai Lin, whom Li knows well. Li visited Lin mid-2011 during a trip to PKU, learning that Zhang is ranked among the very top of his class and has a strong interest in pursuing a PhD in atmospheric science at UCLA.


PhD student Ziqiang Zhu is doing postdoctoral research in UCLA Professor Chentao Lin’s lab after graduation from PKU. Lin collaborates with Zhu’s PKU advisor, Hongwei Guo on plant development research (p. 5).

Fourth year undergraduate Zhao Tian is in Professor Jason Cong’s computer science lab at UCLA, from Professor Tao Wang’s lab at PKU. Professor Wang collaborates with UCLA Professor Songwu Lu on e-Health and wireless hardware architecture (p. 2). Wang’s lab reciprocated by hosting a UCLA student during the 2012 JRI Summer Research Exchange.

While visiting Cong’s lab, Tian is conducting research on reconﬁgurable/customizable computing. He has been working on an academic FPGA placer. Placers are used to place millions of various circuit components on a chip, which is a major phase of FPGA ﬂow. The quality of placement has a signiﬁcant effect on the implemented circuits in many aspects such as timing and power consumption. The placement problem can be very time-consuming, especially with the scale and complexity of circuits increasing. In order to develop a highly efﬁcient placer for FPGA, we need to compare it with many other existing placers in both run-time and quality. Tian inserted the placer into a complete FPGA ﬂow from Altera Quartus II to compare it with the Quartus placer. To make results comparable, he kept other phases the same, making placers the only difference. Results showed that the placer achieved several times’ speedup and some quality improvements. Even so, further improved performance is desired. Solving a linear system Ax=b takes considerable time, so he used a parallel solver to solve it on multiple processors. Experiments have shown 2x speedup for big circuits after parallelization, while for small ones there was some overhead. Now he is trying to overcome the overhead to improve the run-time for small circuits. This work will be the topic of his bachelor’s thesis and he will keep contact with advisors at UCLA when he returns to Peking University.

During his stay here, Tian says he ﬁnds that the professors at UCLA all show great passion for research as well as teaching, which touches deeply him. “Prof. Cong is a preeminent advisor. I learned a lot from him on how to do research, such as the importance of problem formulation and reduction of new problems to known ones,” says Tian. “While I have only had three months to study, do research and live at UCLA, it is a very meaningful and unforgettable experience.”
## 2012 UCLA Student Summer Research at PKU

### 2012年洛杉矶加州大学学生赴北大暑期科研交流项目

Story by Mary Watkins at [www.grad.ucla.edu/deans/library/beijingexchange.htm](http://www.grad.ucla.edu/deans/library/beijingexchange.htm)

![UCLA students with PKU mentors and JRI co-directors, at the closing ceremony, August 30, 2012](image)

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Tammy Chang (‘11, ‘12): Because of my work with Professor Anpeng Huang at PKU last summer, I was able to boost my resume with research experience as well as have his recommendation when applying to graduate school, for which I give much credit to my acceptance into Stanford. Additionally, (this summer) we were able to submit a paper to an international communications conference…To actually live as a student in a place like Beijing not only broadens, but deepens perspective to an entirely new level.

Jonathan Chiang: The intangibles I gained through this program have broadened my understanding of the Chinese culture and will no doubt continue to impact my perspective of science at the global scale. Definitely a summer well spent!

Ian Ferguson: I would recommend this program to anyone looking to study abroad, especially in China, and experience a new culture and lifestyle… Before the program, I was wondering if I should pursue an internship instead, but I know now that nothing can replace what I have learned and experienced through the JRI program.

Matthew Hecht: The knowledge I gained in lab pales in comparison to the knowledge I gained experiencing a different culture. In the future (the research) will look really good on my resume.

Michiko Suwoto: This program let me explore a new environment and people so I can be more open in the future. Not only did I get laboratory experience, I also got to explore China! It's such an unforgettable experience.

Helen Vuong: I learned a lot about doing science in a different culture. I learned so much about my field from a different perspective… the most important knowledge I gained from the program came from my time in lab… The JRI program has opened up many doors for my graduate studies, including future collaborations and production of papers.

Steven Weiss: I was astounded by how hard my lab-mates worked, regardless of how they felt about their given tasks. Because of this, I've learned to find enjoyment in things that I don't usually appreciate. I have no doubt that this will help my academic and post-graduate career. I would recommend this program to anyone who's looking for the chance to step into someone else's shoes… Thank you a million times over for putting together this program.

Drake Williams: This program expanded my research background to a field outside of my major, an opportunity not many people get.

Dalia Zhang: The most valuable thing I gained during this program was the work ethic of my lab mates. They were there often 7 days a week, past midnight most days, and often didn't go home for months at a time. But they were like a family in the lab, and because the workplace was so enjoyable, they rarely, if ever, complained. Overall, it was an amazing, once-in-a-lifetime experience. I'm so, so grateful for the opportunity and would do it again in a heartbeat!
PKU Undergraduate Students in 2012 CSST Program at UCLA

参加2012年理工领域跨学科学者交流项目（CSST）的北京大学本科生在洛杉矶加州大学

During summer 2012, twelve PKU students were at UCLA participating in the Cross-disciplinary Scholars in Science and Technology (CSST) program. CSST seeks to strengthen international collaboration by inviting highly accomplished students to study and engage in research at UCLA and return as graduate students and researchers. On August 31, JRI hosted a welcome lunch for the group. UCLA student Ian McRae joined as well. McRae spent last summer at PKU with the 2011 JRI Summer Research Exchange.

Below is a list of this year's CSST participants from PKU. We hope they enjoyed their time at UCLA and return as graduate students and researchers.

For more on CSST, visit: www.csst.ucla.edu

<table>
<thead>
<tr>
<th>Student</th>
<th>Major</th>
<th>UCLA Mentor</th>
<th>UCLA Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhengqian Cheng</td>
<td>Physics</td>
<td>Yong Chen</td>
<td>Material Science</td>
</tr>
<tr>
<td>Yun Dai</td>
<td>Sociology</td>
<td>Tanya Stivers</td>
<td>Sociology</td>
</tr>
<tr>
<td>Yichen Du</td>
<td>Physics</td>
<td>Gerard Wong</td>
<td>Bioengineering</td>
</tr>
<tr>
<td>Bo Gu</td>
<td>Basic Medicine</td>
<td>Hua Linda Cai</td>
<td>Anesthesiology</td>
</tr>
<tr>
<td>Yanjing Li</td>
<td>Basic Medicine</td>
<td>Juan Enrique Rozengurt</td>
<td>Medicine</td>
</tr>
<tr>
<td>Zheng Li</td>
<td>Physics</td>
<td>Xiangfeng Duan</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Shaoyang Ning</td>
<td>Probability and Statistics</td>
<td>Hongquan Xu</td>
<td>Statistics</td>
</tr>
<tr>
<td>Jiasi Shen</td>
<td>Computer Science</td>
<td>Glenn Reinman</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Yang Tao</td>
<td>Life Sciences</td>
<td>Xiangdong Yang</td>
<td>Psychiatry</td>
</tr>
<tr>
<td>Ke Ye</td>
<td>Physics</td>
<td>Katsushi Arisaka</td>
<td>Physics and Astronomy</td>
</tr>
<tr>
<td>Yuxuan Ye</td>
<td>Chemistry</td>
<td>Neil Garg</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Xiang Yin</td>
<td>Life Sciences</td>
<td>Albert Lai</td>
<td>Neurology</td>
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</tbody>
</table>
New Initiatives 最新协议/项目

Education 教育

PKU/UCLA Integrated BS+MS (3+2) Program in Computer Science and Electrical Engineering
北京大学/洛杉矶加州大学理工学科本科+硕士连读 (3+2) 项目

Under this novel pilot program, selected undergraduate students in their third year at PKU would apply for graduate admission at UCLA and be admitted to UCLA as an Undergraduate Student Visitor to complete the fourth year of their PKU bachelor’s program at UCLA and simultaneously be conditionally admitted by the Graduate Division to MS program in either Computer Science or Electrical Engineering. Students who successfully obtain their bachelor’s degree from PKU and meet the conditions for the UCLA Master’s Degree program would matriculate into the Master’s program the following year. After completing the program coursework, students will receive a Master’s Degree in Computer Science or Electrical Engineering at UCLA.

The first trial for this program will be in fall 2013.

Study Plan for 3+2
3+2项目学习计划

Students admitted to this program should finish 90% of the required courses for the BS degree at PKU, and will enroll at UCLA in their 4th year, where, with the guidance of the UCLA Department, they will select courses needed to complete their BS program at PKU, complete a Bachelor’s Thesis, per PKU specifications (including passing the BS defense exam in person or via tele-conference chaired by a PKU faculty member), and will take a minimum of 12 units in courses that fulfill requirements of the MS degree at UCLA. Note that the UCLA courses can be counted toward the PKU BS degree or the UCLA MS degree, but not both.

Upon completion of the first year’s study at UCLA and the Bachelor’s Thesis, the student will receive a Bachelor’s Degree from PKU. Continued study for the Master’s at UCLA is contingent on earning the BS degree in this timeframe.
Upcoming Events and Dates 
即将开展的活动和日程表

Summer Research Exchange at PKU 2013
2013 年暑期科研交流项目
Details for the JRI Summer Research Exchange at PKU 2013 program and online application process will be available January 3 at www.pku-jri.ucla.edu/education. 
Application deadline is February 24, 2013
关于JRI 2013年暑期交流项目的详细信息和在线申请流程将于2013年1月3日发布在以下网站：www.pku-jri.ucla.edu/education. 
申请截止日期：2013年2月24日

Graduate Research Exchange at UCLA 2013-14
2013-2014年研究生、博士生科研交流项目
As part of the PKU/UCLA Joint Research Institute in Science and Engineering (JRI) agreement, each academic year UCLA may accept up to five graduate students from PKU to conduct research in UCLA labs with tuition and campus fees waived. Students must be recommended by a JRI faculty member at PKU and hosted by a JRI faculty member at UCLA. 
For information, contact UCLA’s JRI Program Coordinator, Larissa Harrison at lharrison@international.ucla.edu www.pku-jri.ucla.edu/education 
Application deadline for fall 2013 is April 15, 2013
作为北京大学-洛杉矶加州大学理工联合研究所（JRI）成立协议的一部分，每一学年洛杉矶加州大学（UCLA）将从北京大学接收最多5名研究生及博士生到UCLA的实验室进行科研学习，该学年的学费及校园费（Campus fee）将被免除。学生申请的条件必须满足其在北京大学的导师和接收其到UCLA学习的UCLA导师均为JRI成员。 
如需了解该项目的更多信息，请咨询UCLA的JRI项目协调人Larissa Harrison： lharrison@international.ucla.edu 
www.pku-jri.ucla.edu/education 
2013年秋季学期申请截止日期：2013年4月15日

‘3+2’ PKU Bachelor’s—UCLA Master’s
‘3+2’北京大学本科 - 洛杉矶加州大学硕士
The pilot program will take effect Fall Quarter, 2013. Full details for the PKU Bachelor’s degree–UCLA Master’s degree program will be on the JRI site later this month, www.pku-jri.ucla.edu/education 
Application deadline is March 31, 2013.
该项目将于2013年秋季学期开始试行。关于北京大学学士学位－洛杉矶加州大学硕士学位项目的详细信息将于本月底发布在JRI官方网站上： www.pku-jri.ucla.edu/education.

Annual Symposium 2013 年年会
JRI’s fourth Annual Symposium will be held at PKU in summer 2013. Please watch for dates.
JRI第四届年会将于2013年夏天在北京大学召开，具体日期及更多信息，敬请关注。
**NSF Funding Opportunities**

美国国家科学基金会（NSF）资助申请机会

_for collaborations, exchanges between UCLA and PKU_ 针对北京大学和洛杉矶加州大学间的合作及交流

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**Science Across Virtual Institutes (SAVI)**

Supports U.S. research communities to build long-term international collaborations (virtual institutes) with partnering countries in STEM.

Approximately $50,000-$400,000 a year for up to five years

Proposal deadline: ongoing


**Plant Genome Research Program (PGRP)**

Supports plant genome research. Proposals with international collaboration are welcome.

Proposal deadline: March 2013


**International Research Experiences for Students (IRES)**

Supports development of globally-engaged U.S. science and engineering students capable of performing in an international research environment in any funded by the NSF.

Proposal deadline: 8/20/2013


**Research Experiences for Undergraduates (REU)**

Supports projects with international dimension that encourage research participation by undergraduate students in areas funded by the NSF.

Proposal deadline: 8/28/2013


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### East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI)

Supports U.S. graduate students in sciences and engineering to work in research facilities abroad during the summer in East Asia and Pacific region. UCLA graduate students can work at PKU with JRI members through this fellowship.

$5,000 stipend, pre-departure orientation, and travel expenses.

Proposal deadline: 11/14/2013

[www.nsf.gov/eapsi](http://www.nsf.gov/eapsi)

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**Faculty in Numbers 成员数目**

<table>
<thead>
<tr>
<th>Department</th>
<th>PKU</th>
<th>UCLA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry and Molecular Engineering; Earth and Space Science; Mathematics; Physics; etc.</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td><strong>Engineering and Applied Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science; Electronics Engineering; Energy Resources Engineering; Environmental Science; Nanotechnology; etc.</td>
<td>29</td>
<td>41</td>
</tr>
<tr>
<td><strong>Biological and Medical Sciences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular, Cell &amp; Developmental Biology; Human Genetics; Neurobiology; Pharmacology; etc.</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total number of members</strong></td>
<td>69</td>
<td>82</td>
</tr>
</tbody>
</table>
JRI was founded in 2009 by co-directors Xiaoming Li (PKU) and Jason Cong (UCLA) with the intention of fostering new and existing collaborations between the two universities, to train future science and engineering leaders in a global perspective, and to secure joint funding and facilitate technology transfer of research results.

PKU, the first national, comprehensive university in China, has one of the best health science centers and is the top rated university in the country. UCLA is one of the top recipients of U.S. grants for science, medicine and engineering. UCLA’s hospital is rated “the best hospital in the west,” and its School of Engineering is the birthplace of the Internet.

JRI aims to serve both institutions as they jointly confront global concerns in science and engineering.

北京大学-洛杉矶加州大学理工联合研究所（下简称JRI）成立于2009年，由李晓明教授（北京大学）和丛京生教授（洛杉矶加州大学）担任联合主任。其成立的主要目的是为了增强两校间已有和潜在的交流，联合培养未来具有国际眼光的理工学科引领人才，申请合作科研基金，以及共同促进科研成果的技术转化。

北京大学作为中国建立的第一所综合型大学，是中国顶尖的大学之一，并且拥有国内优秀的医学院。洛杉矶加州大学（下简称UCLA）是美国科学、医学及工程学方面名列前茅的大学之一。UCLA的医院被评为“美国西部最优秀的医院”，其工程学院是互联网的诞生地。

JRI旨在为这两所顶尖学府服务，专注于其在理工学科方面前瞻性的国际化合作。

www.pku-jri.ucla.edu

UCLA
Phone: 310-206-5781
E-mail: lharrison@international.ucla.edu

PKU
Phone: 86 10-6275-4857
E-mail: ucla-jri-admin@pku.edu.cn

Want to be a part of the Joint Research Institute in Science and Engineering between UCLA and PKU? Email your CV, and/or note of interest, to lharrison@international.ucla.edu.

您是否希望加入北京大学-洛杉矶加州大学理工联合研究所？

北京大学的教授，请将您的中英文简历和您所感兴趣的领域发送至ucla-jri-admin@pku.edu.cn.