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Featuring Dr Zheng Yuanqing & Dr Guan Nan

SMART COMPUTING Drives Innovation
Interview with Dr Zheng Yuanqing

Could you share with us your education background?

I received my Bachelor of Science (B.S.) degree in Electronic Information Science and Technology, and my Master of Engineering (M.E.) degree in Communication and information System both from Beijing Normal University in 2007 and 2010 respectively. I obtained my PhD degree in Computer Science from Nanyang Technological University, Singapore, in 2014. After I obtained the PhD degree, I am so fortunate to continue my academic career as an Assistant Professor with COMP in PolyU.

Your recent research is focused on human-centered computing, mobile and network computing, wireless networks, and RFID systems. Please tell us why you are devoted to these areas? Please share insights or major trends in these topic areas.

My research interest spans across many areas related to computing and networking. The long-term goal of my research is to deepen and broaden the way that we can sense the physical world, based on which we can perform insightful data analytics and provide human-centered services for the better society and the world. I am now particularly interested in the research issues emerging from real applications and practical deployments. Theoretical abstraction is applied to guide the system development which is validated and tested in real applications. In such a way, theory and practice benefit each other.
RFID systems are widely used in Hong Kong and all over the world. RFID tags without a battery can harvest energy from readers and backscatter the reader signals to communicate with readers. RFID tags can be attached to the objects of interest, which extends the instrumenting to real things in our daily life, making them identifiable and reachable within the IoT framework. The most recent computational RFID tags integrate sensing components and can perform battery-free sensing. My research develops the basic theories and designs practical protocols to improve the operational efficiency of the most basic and key operations in RFID systems such as logistics and item tracking. The scalability of large-scale applications with hundreds or thousands of tags has been the major concerns in the research. My recent study investigates the possibility of PHY layer parallelization so that multiple tags can be read at the same time.

The high penetration of smartphones makes it possible to outsource the urban information acquisition to everybody, who is both information providers and information consumers. Such a crowdsensing paradigm is transforming the traditional way of urban information acquisition and analytics. My research targets at developing methodologies and techniques with smartphone based sensing to support those innovative applications. In particular, I have been exploring holistic approaches throughout the information chain from frontend smartphone sensing to the backend data fusion and analytics to provide human-centered services. Our previous work leverages participatory efforts of bus riders’ mobile phones for bus arrival time prediction. Another work enables users to easily deploy indoor navigation services and attract more customers.

The persuasive and ubiquitous availability of wearable devices will expand the sensing spectrum and deepen our understanding about ourselves, enrich awareness of our present physical and mental states, and improve the betterment of mankind in the future. I would like to seize this opportunity and devote myself to the promising and meaningful research areas.
What is your career plan for the next five years?

As a junior faculty member, the top priority in research is to publish high-quality papers and write research proposals. Fortunately, I believe that my research topics are interesting and important, and I feel blessed to work with excellent collaborators and talented students and enjoy the process of doing exciting research. In the next five years, I will continue to work in the areas of human-centered computing and the related areas.

Learning and Teaching are very important for a teacher. It is my privilege to have the opportunity to learn and share my learning experience with students. I am very grateful that many colleagues shared their invaluable experiences with me and recommended great books for personal improvement and professional skills. Reading books is an important learning process and now it becomes a new habit of mine. “The Power of Now: A Guide to Spiritual Enlightenment” by Eckhart Tolle recommended by Prof Cao is really a deeply insightful book. The book is thoughtfully and beautifully written, and provides simple and practical tips that we can apply and improve the quality of our life. Preparing for a new course is also an interesting learning experience and allows me to refresh my knowledge in a particular area.

Services for both the academic community and local community are very important. I have been actively serving the academic community as reviewers for top journals and program committee members for conferences. In the next five years, I will continue to serve the academic community and participate in conferences. Meanwhile, I will get to know more about local communities and try to serve the ones in need.
What gives you the greatest satisfaction in your work?

My greatest satisfaction in my work comes from learning new things, solving problems, and getting new experiences. My PhD advisor, Dr Mo Li, told me that “Our entire life is a lifetime study”. It’s very important to stay humble and hunger to learn new knowledge and skills. I am very grateful that our department provides such a great environment and platform for junior faculty members to learn and develop into excellent researchers and teachers. Solving challenging research problems in innovative ways makes me feel excited. In our life, we face all kinds of problems and it feels great if we can somehow solve some of them. Although it may require hard work and efforts, when I find solutions, I get the greatest satisfaction in my work.

You actively serve as reviewers for top journals and conferences, how the experiences have benefited you?

I received lots of great comments and suggestions from reviewers of journals and conferences which helped me to improve my research. Thus, I appreciate the opportunities to serve as reviewers and contribute back to the academic community. As reviewers for top journals, I have the opportunity to ask the questions I am interested in and get feedbacks directly from authors. Being conference reviewers, I can review the latest research results and learn the most recent advances in my research areas. The experiences are very helpful for a researcher to participate in the academic community and know more about the current research trends and hot topics.

How do you describe your relationship with your students?

I regard my students as my friends and it feels great to be with my students. I am very happy when I share my learning experiences with my students. I encourage students to ask questions in class and after class. As the students have different backgrounds, it’s great to interact with them and know more about how they approach a problem from different perspectives. As such, I always try my best to be a careful and mindful listener when I interact with my students. I also encourage research students to explore new ideas and discover their own strengths and share my lessons learned.
Interview with Dr Guan Nan

Could you share your education background?

I received my Bachelor and Master Degree both in Computer Science from Northeastern University, China, in 2003 and 2006 respectively. From 2006 to 2008, I worked as a research assistant in Northeastern University, China and Hong Kong University of Science and Technology (HKUST), after which I started my PhD study in 2008 in Uppsala University, Sweden, under the supervision of Prof. Wang Yi. I got my PhD degree in 2013, and went back to Northeastern University, China to work as a faculty member there, until joining PolyU in December 2015.

What are your research interests? What inspired you to start working in these areas?

My major research interest is real-time system design on multi-core architectures. I started to learn the basics of real-time systems during my master study, during which I participated in an industrial project to develop an embedded system to monitor the status of a rotating machine. I learned a classical real-time locking protocol from textbooks and implemented it in our system, which greatly improves the real-time performance of our system. I was truly fascinated that one can solve complex design problems in such an elegantly way using mathematics rather than awkwardly tuning the codes.

I started looking into multi-core issues in real-time systems in 2007, when I worked as a research assistant in HKUST. However, back to then I was not completely sure whether there is a real requirement of multi-core processors in real-
is already an outdated topic since people have been working on it for so many years. My answer is "clearly not". Real-time software techniques has developed during the last decade. However, the development speed of software techniques largely lags behind the evolution of multi-core hardware. The gap between real-time software techniques and the processing capacity provided by multi-core hardware is much larger than ten years ago. If a problem is important yet not solved, it will never be outdated.

What is your view about applying research to industries and benefit them?

In computer science, research should be applied to industry ultimately. However, it is a tricky question of how far one should go before looking back and connect all the dots. Computer science covers a wide range of subjects. Some of them are very fundamental and theoretical, and some of them are highly applicable. Therefore, a researcher needs to carefully balance the theoretical depth of the research work and the application to industries.
You gained your PhD from Uppsala University, Sweden. Did you get any experience from there which benefits your whole career path? Please elaborate.

The five years I spent in Uppsala was extremely valuable to my research career. I was very lucky to work under the supervision of Prof. Wang Yi, who gave me large freedom to define my own research direction. Therefore, unlike many other PhD students who dedicated to a particular problem, I had the chance to work on several very different topics. This is very helpful to my research work integrating insights and techniques across different domains.

I found it an interesting comparison between Sweden and Hong Kong, both of which are very creative societies, but in a very different way. Comparing to Hong Kong, the pace of life in Sweden is much slower. One may get the impression that Swedish people spend much more time in enjoying life than working. However, Sweden produced many famous high-tech companies, such as Ericsson, ABB, SAAB, Electrolux, SKF, Hasselblad, AstraZeneca, Scania among many others, although it is a small country with only about 9 million populations (20% more than Hong Kong). It will be a very big topic to thoroughly discuss how Swedish people keep high creativity with a relatively slower rhythm of life, but it is generally agreed that the relaxed atmosphere of the Sweden society is one of the secrets. In such a relaxed environment, most people have the freedom and resource to pursue their own interests. Since research work is a creative activity, it is important to balance hard working and a relaxed atmosphere to stimulate our interests and potential to be creative.

Finally, the education system, especially the PhD education system in Sweden is very closely connected to the industry. Apart from various projects funded by industry, there are a considerable amount of industry PhD students in universities, who are paid by and do research for their employers. Therefore, the requirement of industry can be efficiently reflected into university research activities. During the 5 years I stayed in Uppsala, I participated in various interaction activities between the university and companies, and learned many more successful and unsuccessful stories regarding the cooperation between academia and industry. These experiences help me to better understand the relationship between research and industry application.
What is the most challenging part of being a teacher? How do you overcome it?

Before joining PolyU, I taught the course “computing theory” to second-year undergraduate students in Northeastern University. After a couple of lectures, students complained that this was a “very boring” course since they didn’t see why learning the theory of automata will help them to write better programs. I realized that the students are wasting their time if they were not motivated. However, there is no easy way for them to understand the significance of the course, since the contents are very abstract and the students lack background knowledges to see the big picture. Therefore, after counselling with teaching office of the department, I decided to spend a whole lecture (4 hours) to explain to the students what they may get out of the course, and try to convince them that the training they received in this course will be critical for them to become an real IT expert rather than merely a coder.

Although the course “computing theory” may be an extreme case, I think it is a general challenge of how to motivate students to learn something before the students can realize its importance by themselves. As soon as the students are motivated to learn things, teaching is not a burden, but a joy.

What gives you the greatest satisfaction in work?

Research is probably the best work for people with strong curiosity. All the hard work is paid back by the great pleasure of seeing through a difficult problem, which is really amazing. Although this does not happen very often, it indeed motivates me to devote myself to new challenges and enjoy the procedure of solving them. Many people cannot understand how researchers can keep working until midnight from day to day. Actually, this is not much different from the reason of why people following a TV series and sitting in the sofa until midnight: we are curious about the end of the story.