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Featuring
DR ZILI SHAO & DR MAGGIE LI

We drive innovation through
SMART COMPUTING
MY BIGGEST SATISFACTION FROM MY WORK IS TO APPLY MY RESEARCH TO IMPROVE PEOPLE’S DAILY LIVES.

B: Could you tell us the background on your education?

Z: I did my undergraduate study at the University of Electronic Science and Technology of China in Chengdu. My major was Electronic and Mechanical Engineering and I obtained my master’s degree in this discipline. In 2000, I received a scholarship for my Ph.D. study in the USA, so I switched my major to computer science due to my strong interest in this area. After I obtained my Ph.D. degree in 2005, I got my first job at COMP in PolyU as an Assistant Professor.

B: We learn that your research areas lie in embedded software and systems, real-time systems, and related industrial applications. Could you elaborate a bit more on them?

Z: Embedded systems are everywhere now. In our research, we attempt to combine embedded systems with cloud computing, internet of things and pervasive computing. Particularly, we focus on two fields. One is on mobile virtualization. With the wider use of tablets and smartphones nowadays, the trend is that mobile devices are merging with desktop computers. For example, BYOD (Bring Your Own Device) and mobile cloud become more and more popular. Thus, mobile virtualization that can enable multiple operating systems to run on one mobile device will play an increasingly important role. Also, security and privacy are becoming the most serious problems of smartphones. And mobile virtualization provides a promising solution by isolating different operating systems. Indeed there are many challenges in mobile virtualization. Since mobile devices are resource constrained with limited computing power, energy budget, memory or storage capacity, new techniques are needed to make mobile virtualization work faster, more power-efficient and more adaptive to mobile environments. Since we have already worked on storage and memory optimization for embedded systems for many years, we will integrate our previous research results into this new field.

Another field we are interested in is cloud computing and our focus is on energy optimization. In cloud computing, energy budget becomes one of the greatest challenges. So, we will utilize our previous studies in low power optimization for embedded systems. Basically, we will target on ARM-server-based energy optimizations. We hope we can build an ARM-server-based cloud computing system to study not only how to optimize energy, but also how to deal
with mobile virtualization and mobile migration by integrating our mobile virtualization research into it.

**B:** What gives you the biggest satisfaction while working on them, and could you name one of your achievements in your projects in these areas?

**Z:** I like programming, so my biggest satisfaction arises from designing and building computing systems that can help to improve our daily lives. Our research aims at developing different platforms and conducting innovative research to solve the real problems. I also enjoy teaching. So, I hope I can build systems that can be applied to my teaching. When my students use those systems to acquire new knowledge, I feel very happy and satisfied. Therefore, I think that is why I chose education as my career: I can undertake fascinating research and enjoy teaching students at the same time.

We have had several achievements on research. One of them is an ITF project on storage optimization in embedded systems like smartphones. In smartphones and tablets, videos, pictures or other data are stored in NAND flash such as SD Cards and SSD (Solid State Drives). In this project, our research centers on reducing memory cost without affecting time performance. As the smartphone market is very competitive now, reducing manufacturing cost is extremely important. After we finished this project, several companies approached us and showed very keen interests in our new technique.

**WITH SUBSTANTIAL SUPPORT FROM THE DEPARTMENT, I CAN STRIKE A BALANCE BETWEEN RESEARCH AND TEACHING.**

**B:** Are there concrete plans or industrial collaboration already in place which applies your research to industries and businesses practically?

**Z:** We always proactively work with the industry. Right now, we are working with ASTRI for a consultancy project in which they will adopt our memory caching technique to their SSD platform. Meanwhile, we are discussing with Samsung for applying memory optimization to their smartphones. We will also collaborate with companies in Shenzhen based on our previous ITF projects and will be very grateful if they can employ our research outcomes to their products.

![participating in the COMP’s Christmas Party 2013](image)

**B:** Could you name some difficulties/difficult occasions that you might have encountered while working on your research? What were your measures taken to overcome them?

**Z:** When I first came to PolyU, I did encounter some difficulties as the local environment was different from that in my hometown. I am very appreciative of the considerable support I received from the department. Everything was smooth in a very short period of time, and I eventually became more confident in both research and teaching.

![attending The 2005 IFIP International Conference on Embedded and Ubiquitous Computing](image)

We also attended the World Embedded Software Contest 2010 and showcased our project on NAND flash research. The project was related to how to reuse the discarded NAND flash devices. Finally, one of our undergraduate students got an award of distinction in that contest and then he pursued his Ph.D. study in the University of Toronto after graduation from PolyU.
B: Given that Computing is such a dynamic area, have you considered to move into new research areas?

Z: Starting from 2010, we have been working on embedded storage, particularly on how to manage NAND flash storage devices. In terms of publications, we are very productive. Although our team has only three Ph.D. students, we have already published more than 20 papers in top conferences and high-quality journals. Since this is just a very small area, we think its impact may not be very impressive. Thus we planned to move into some new research areas, such as mobile virtualization. Our idea is to develop optimization technique to support virtualization for mobile devices like smartphones and tablets. Also, we can combine virtualization technology with internet of things and smart objects. Another area deserves further investigation is cloud computing. We planned to optimize energy consumption for the ARM servers. I think those areas are relatively new. Of course, we are also thinking of big data by how to combine our research in embedded systems with big data.

**I ENDEAVOUR TO PROVIDE PRACTICE TO MY STUDENTS AND FOSTER THEM TO INTERACT WITH HARDWARE IN EMBEDDED SYSTEMS AT MY LAB.**

B: What is your research plan for the next five years?

Z: In the next five years, we will conduct research in two areas. One is mobile systems which focuses on mobile virtualization on smart mobile devices, such as smartphones, tablets, and so on. Our plan is first to build a mobile virtualization platform and then develop various optimization techniques in terms of memory and storage. Cloud computing related to ARM servers is another research focus that we will work on. We plan to develop an ARM-server-based cloud system that can be part of our departmental cloud system. Based on this platform, we can provide cloud services and undertake three kinds of research: energy optimization, interaction between cloud and mobile devices, and cloud storage.

B: Now, you have also taken up roles in department teaching and learning development. What do you think about the relationship between research and teaching? Please share your insight.

Z: I think research and teaching can be combined together, specifically we are concerned how our research findings inform teaching. Our students learn a lot of concepts from lessons, but they do not have many chances to practice. In our lab, we offer these chances to them so they can interact with hardware in embedded systems.
Interview with DR MAGGIE LI

Dr Maggie Li joined the Department of Computing (COMP) in 2001 after getting her Ph.D. and working as a Postdoctoral Fellow in The Chinese University of Hong Kong. Her research interests embrace information retrieval and extraction, natural language processing, as well as temporal information processing and reasoning. She is currently working on social media (e.g. Twitter) mining.

Dr Maggie Li (M) Interviewer: Vienna Lam (V)

I APPRECIATE THE INSPIRATIONS GIVEN BY MY PH.D. SUPERVISOR FOR MY RESEARCH DIRECTION AND SUPERVisory STYLE.

V: Could you highlight your education background?

M: I received my Bachelor’s Degree and MPhil from Tianjin University. The forerunner of Tianjin University was Peiyang University, which was the first university in China. Originally, I planned to pursue a Ph.D. in the US; however, I was concerned about the financial situation in the US and my family matters at that time, so I decided to study in Hong Kong. As there were not many Hong Kong universities offering my major – systems engineering, I chose to study at the Department of Systems Engineering and Engineering Management of The Chinese University of Hong Kong (CUHK) and finally obtained the Ph.D. there. After my Ph.D. study, I stayed at CUHK for three years working as a Postdoctoral Fellow. Then I joined COMP as a Lecturer in 2001. And I have to say I am so fortunate that I am now a tenure-track faculty at COMP.

V: Could you name a person/a few people or any incident that inspired you to start your research in these areas?

M: I was inspired by my Ph.D. supervisor Prof. Lum Yu Sun Vincent to start my research on natural language processing. Prof. Lum had worked for IBM for over twenty years before he joined CUHK as the founding Chairman of the Department of Systems Engineering and Engineering Management. With his expertise in database management systems and information retrieval, he suggested me to try working on natural language processing, more specifically using input text as a query for searching the database other than using the conventional structural query language – a new trend at that time. As there were not many researchers working on natural language query in Hong Kong at that time, I found it difficult yet challenging. Although Prof. Lum was not working on the natural language processing area and could not provide me with concrete recommendations, he encouraged me to read more in order to explore relevant research topics. We also had regular meetings every week to review my progress.

I benefited and learnt a lot from Prof. Lum not only because he was a nice supervisor who didn’t give me any pressure on my research study, but also I am now employing his supervisory style to supervise my students.
I TAKE PRIDE IN MY TEAM’S PIONEER WORK ON THE SUMMARIZATION OF TWITTER INFORMATION.

V: One of your latest focuses is social media analysis. Could you describe the challenges, trend/development in this area and how will you consider yourself/your work outstanding among other fellow scientists?

M: The rise of social media analysis provides researchers like me with many opportunities. However, opportunities go hand in hand with challenges. The ever-changing and noisy nature of the data coupled with its vast quantities poses great challenges to social media analysis. Nowadays, people are free to express their feelings and opinions in various online platforms, generating a huge amount of data. Because the data is so big, we need advanced technologies to extract the meaningful data, in order to save the users' time in retrieving the information they need. The data also changes every day, for example, people's feelings and opinions change rapidly. In addition, it becomes noisy when people use informal English to express their feelings online. Therefore, how to make the big data easier to be predicted and examined is definitely a predicament to our social media analysis.

Apart from the data itself, the people who generate the data are playing an increasingly important role in examining social media. So in recent years we have seen an increasing trend towards the study of Human-data Interaction (HDI). HDI is concerned with interaction between humans and large, rich personal datasets. It is an interesting topic that deserves further investigation.

Regarding my research work, my team is probably a pioneer in examining Twitter summarization. Although we have yet had very outstanding publications, we’re confident that we will have them very soon. One of my research students Ms Chen Chengyao is working on a new social media analysis topic – how people influence others and how to measure their influences. We trust it won’t take too long before we can produce some wonderful and high impact outputs.

BEING POSITIVE AND OPTIMISTIC CAN EMPOWER ME TO OVERCOME ANY DIFFICULTIES.

V: Could you name some difficult occasions that you might have encountered while working on your research? What were your measures taken to overcome them?

M: I did encounter some difficult occasions during my career. In 2011, my team participated in a prestigious competition called the Text Retrieval Conference in which we were given a blog retrieval task. We had to retrieve relevant Web blogs to examine whether the blogs included opinions or not within a specific timeframe. In the following year, we also attended the same conference that we were challenged by a twitter task. The results in these two occasions were not encouraging as we were unable to process the given datasets effectively with our available equipment.

- enjoys travelling around

From these experiences, I realize that adopting a positive and optimistic attitude is the best approach to overcome any difficult situations. For example, my first days working on a new research area – social media analysis brought challenges to me. Yet I regarded this as an opportunity to learn new knowledge, so I’ve spent a considerable amount of time exploring the key issues in this area. Now working on social media analysis gives me enjoyment.
I AM MORE DELIGHTED TO SEE MY STUDENTS DO WELL THAN MYSELF ACHIEVE ANYTHING.

V: What gives you the strongest sense of achievement in your work?

M: Actually I think if we have spent time and efforts on something, we will have a sense of achievement when there are some positive results, no matter the outcomes are great or trivial ones. The meaning of achievement varies at different stages of my life. Previously, my sense of achievement came from academic recognition. For example when I published a paper in a top conference for the first time, I was very happy. But now, I feel a sense of achievement from being a teacher and a supervisor. I’m delighted when my students treat me like their friends, send me thank-you cards, and come back to take photos with me after their graduations. This sense of achievement becomes stronger when my students succeed in their studies and accomplish their goals. That I particularly feel proud of my students for the fruitful experience in teaching and supervision may be attributed to my family background with most members being a teacher.

EXTENDING MY RESEARCH FOCUS TO HUMAN INTERACTIONS WITH BIG DATA IS CHALLENGING YET REWARDING.

V: Do you have any new plan in your work?

M: Yes, definitely. Apart from continually working on social media analysis, I will put more emphasis on social network’s influence on people. My previous work on information summarization primarily focused on the information itself. As the impact of social network on people is wide-ranging and pervasive, I begin investigating this interesting topic. Thus my research interest in the future will focus on recommendation, which is about recommending products to people based on consumer interests, consumer behaviors and so on.

V: How do you consider department’s focused strategic areas? Are they aligned with your interests?

M: I think our department’s focused strategic areas: human-centered computing and big data analytics are cutting-edge. Taking big data analytics as an example, we did not have such a large amount of data in the past but it’s the current trend to examine these voluminous data and then make the best use of them to improve our daily lives.

I am particularly proud that my current research interests are in line with the department’s focused strategic areas. My research team deals with big data as well as studies its interactions with human beings. Because of these alignments, I am quite confident to continue working on these areas.

I ENJOY BUILDING A GOOD RAPPORT WITH MY STUDENTS.

V: You have supervised a lot of students during the years. How will you describe your teaching and supervisory style, and your relationship with your students?

M: As I have said before, my supervisory style was greatly influenced by my Ph.D. supervisor Prof. Vincent Lum. My teaching and supervisory principle is never push students but motivate them. I devote myself to inspire my students to set up their goals, discover their strengths and weaknesses as well as help them to improve themselves, thereby unleashing their full potentials.

As I treat my students as my friends, I have a very close relationship with them. I am generally the first person whom they approach if they encounter any difficulties. I have also built a strong network with them for not a short period of time, we still discuss about any new research issues even they have graduated and left the department. This network is being extended with more new students joining, which can provide them with abundant opportunities to exchange their ideas and experiences.

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