

My recent visit of higher education institutions in the UK

(July 13-21, 2010)

Yonhua (Tommy) Tzeng

Professor and Dean

Department of Electrical Engineering
College of Electrical Engineering and Computer Science
National Cheng Kung University
Tainan, Taiwan

tzengyo@mail.ncku.edu.tw

[August 3, 2010]

This article first appeared in EECS NCKU

Visit of Higher Education Institutions in the UK - Part 2 :

5. University of Edinburgh
6. University of Glasgow
7. University of Southampton
8. University of Bath

Dear Colleagues and Friends:

Since the inception of Oxford University, United Kingdom has had more than eight hundred years of experiences in the development of higher education. Numerous historically famous scientists, writers and politicians have been educated by universities in the UK.

In 1991, I spent six months as a visiting scholar in the Cavendish Laboratories at University of Cambridge, which is jointly called "Oxbridge" with Oxford University, and exposed myself to world leading research environments. During those six months, I got the chance to work hand-in-hand with pioneering scientists from around the world and enjoyed inspiration from

transformative and interruptive research undertaken in the university. Nineteen years later, I had the second chance for an extended visit of the higher education in the UK. On July 13-21, 2010, I joined a delegation from seven top universities in Taiwan led by President Lee of National Taiwan University and Director General Chang of International Affairs, National Science Council and spent ten days visiting Royal Society, Research Councils UK, Higher Education Funding Council for England, and seven top universities in the UK.



Shown in the photo taken after the Taiwan-UK Forum are (from left to right) Dean of College of Electrical Engineering and Computer Science, Professor Tzeng, NCKU, President Steve Smith of UUK, and Dean of R&D Professor Chern, NTU.

It was mid of July, the week of summer graduation for many universities in the UK. High level administrators in universities were busy with many graduation ceremonies they had to attend. We were fortunate to have the assistance by staff of the National Science Council, Taiwan, Office of R&D, National Taiwan University, British Council Taipei, Taipei Representatives in London, and Universities UK to arrange for a formal visit of these institutions.

The main missions of the Taiwan delegation were (i) to understand the national level and university level higher education organizations, and their assessment strategies and funding structures, and (ii) to visit with enthusiastic, friendly and influential academic administrators and scholars in UK's top universities. Our goal is to effectively promote Taiwan-UK collaboration on all fronts, especially in high impact research.

By appointment of President Lai, I joined the delegation in representation of NCKU, visited these higher education institutions and met with nearly one hundred high level administrators, distinguished scholars as well as students from Taiwan who were studying in the UK.

UK is historically a highly internationalized country based on its global colonial history. In modern economy, it still plays a pivotal role in international financing and trading. Regarding the internationalization of academics, I was most impressed by a report I read when I visited Research Councils UK, which stated that more than half of publications in the UK were involved in foreign coauthors and those publications with foreign coauthors on average created 50% higher impact in terms of citations. This is further confirmed by very comfortable hospitality we experienced and the eagerness of our hosting delegations in pursuing collaboration with researchers in Taiwan.

Before we concluded the ten-day visit, a Taiwan-UK Forum was held in London. High level academic representatives from nearly twenty research intensive universities, besides those ten institutions we visited, attended the Forum. The Forum was jointly hosted by President of Universities UK, an alliance of 133 universities in the UK and President of National Taiwan University, the leader of the alliance of eleven top universities in Taiwan.

Participants of the Forum listened to keynote speeches about research programs and opportunities of collaboration in Taiwan and the UK. Each delegate from Taiwan also introduced the uniqueness and strengths of the university he/ she represented in Taiwan. A subsequent session of active discussion and exchange of experiences in international collaboration facilitated the brainstorming among Forum participants and Taiwan delegates in creative ideas of promoting collaboration.

During the ten-day intensive dialogues with our hosting delegations, participants of the Taiwan-UK Forum, and Taiwanese students who studied in the UK, a lot has been learned about academic research, education, and involvements of universities in society and economy in the UK. The degree awarding educational system in the UK is quite different from that in Taiwan. From what I learned from discussion with students from Taiwan who were currently studying in the UK, too much emphasis in grade points as the major means of assessing student performance hinders the imagination and creativity of students in Taiwan and their potential for transformative and interruptive research accomplishments.

The college education in the UK emphasizes mainly on specialties students choose. Usually, it takes only three years for a student to earn a Bachelor's degree. During this period of time, students take mainly courses relevant to their specialties. Master degrees and Ph.D. degrees usually take one year and three to three and half years to complete, respectively. Master degree is not required for a person to earn a Ph.D. degree. Students can study towards Ph.D. degrees directly after completing their Bachelor's degrees.

During the period of working on a Ph.D. degree, there is usually no credit hour requirement for course taking. Examinations are optional depending on individual Ph.D. programs and often decided by student advisors. In disciplines related to science and engineering, usually, the Ph.D. education is divided into two stages i.e. MPhil and Ph.D. stages. The MPhil stage is similar to the Master Degree program and takes about one year and half to complete. During this first stage, students usually have to submit two or more reports and pass some oral examinations as required by each individual department. If a student passes this stage, he/she will become a formal Ph.D. student. If a student fails this stage, he/she might be offered a Master Degree or a certificate for equivalent courses.

UK's pre-college education is very diversified with an aim at holistic education. Report submission is more emphasized than written examinations. This allows the freedom for students to explore their real interest. Only those who wish to and need to receive higher education will compete to get admission to universities of their choices. The competition in entering top universities is very tough.

Students in the UK take 13 years of education before college compared to 12 years of education in Taiwan. In other words, the college freshman year in Taiwan is actually spent in the last year of pre-college "high school".

The pre-college education system in the UK gives college students with extensive cultivation in humanity before they enter universities. University education provides them with room for unlimited imagination and creativity, which often were inspired through interactions with people in different disciplines.

For a country with a population about 2.5 times that of Taiwan, there are less universities in the UK (about 130) than what we have in Taiwan (about 160). Only few universities in the UK are private. Almost all universities receive most of their resources (typically 60% or more) from the government funding agencies. A basic fund based on the number of enrolled students plus a highly competitive block fund based on nonlinear merit and subject based weighting factors for each researcher received from the government by each university. Highly competitive research grants for individual projects from within the UK and the European Union Framework Programs play an important role in the freedom of creative academic research.

For example, a researcher who is assessed to be "world leading" in research receives a weighting factor of "seven." A researcher who is assessed to have missed the basic national standards receives a weighting factor of "zero." Therefore, top ten percent of the universities receive the majority of the competitive block fund. Despite the fact that universities rely heavily on government funds, every university in the UK is autonomous financially and academically. UK is one example for scholars in Taiwan to learn when discussing about autonomous universities.

Global challenges, internationalization, interdisciplinary research, student employability, interactions with and technology transfer to industries are among emphases often stated in pride by universities we visited. Every university has its proud historical accomplishments and renowned figures as well as unique world leading on-going research projects.

In the following eight reports, I have tried to summarize information I collected, impression I received, as well as miscellaneous issues I observed during my visit. I also included contact information for people I met. They all are eager to pursue collaboration with outstanding researchers in Taiwan.

I hope that these reports can help team up people of common interest in Taiwan and in the UK to pursue collaborative research and education. If there is anything that I can help further in this regard, please feel free to let me know. You are very welcome to contact directly our hosting delegations in the UK as well as university

representatives from all over the UK whom we met in the Taiwan-UK Forum.

Sincerely,

Yonhua Tzeng

University Chair Professor and Dean

Institute of Microelectronics

College of Electrical Engineering and Computer Science

National Cheng Kung University

Tainan, Taiwan

tzengyo@mail.ncku.edu.tw, tzengyo@gmail.com

Design & Layout : Ivan Tarn, The Banyan Editorial Office

Copyright 2010 National Cheng Kung University

University of Edinburgh : Visit by Taiwan Top Universities R&D Delegation

Yonhua (Tommy) Tzeng

Professor and Dean

Department of Electrical Engineering

College of Electrical Engineering and Computer Science

National Cheng Kung University

Tainan, Taiwan

tzengyo@mail.ncku.edu.tw

[July 16, 2010]

This article first appeared in EECS NCKU

Hosting Representatives of University of Edinburgh:

1. Professor Stephen Hillier, Vice Principal International (s.hillier@ed.ac.uk).
2. Professor Jeremy Bradshaw, Postgraduate Director and Dean International, College of Medicine & Veterinary Medicine (j.bradshaw@ed.ac.uk; www.ed.ac.uk/.../home).
3. Professor Ian Bryden, School of Engineering, Research into Renewable Energy at Edinburgh
4. Dr. Bernard Ramsahoye, Stem Cell Research
5. Dr. Pei-Jung Chung, Institute of Digital Communication, School of Engineering and Electronics, Green Communications (p.chung@ed.ac.uk).
6. Dr. Yun-Heh Chen-Burger, Research Fellow, Artificial Intelligence Applications Institute, School of Informatics (jessicac@inf.ed.ac.uk; www.aii.ed.ac.uk).

Member (among four members) of the Scottish Parliament attending a dinner banquet:

1. Iain Smith MSP (Member of the Scottish Parliament, North East Fife, iain@iainsmith.org; www.iainsmith.org).

Taipei Representative Office in the UK, Edinburgh Office:

1. Mr. Steven Reyyuan Chu, Director General, reyyuanchu@gmail.com
2. Mr. Daniel S.T. Kuo, Director, Daniel.troedi@gmail.com
3. Ms. Selena C.H. Chang, Assistant Director, chchang01@mofa.gov.tw

Taiwan Delegation:

1. Prof. Si-Chen Lee, President of NTU (sclee@cc.ee.ntu.edu.tw)
2. Prof. Ching-Ray Chang, Director General, Department of International Cooperation, National Science Council, Taiwan (crchang@nsc.gov.tw)
3. Ms. Cheng-Tung Tao, Program Director, Department of International Cooperation, NSC (cttao@nsc.gov.tw)
4. Prof. Ji-Wang Chern, Dean of R&D, NTU (jwchern@ntu.edu.tw)
5. Prof. Chao-Tsen Chen, Group Leader of Strategic Planning, Office of R&D, NTU (chenct@ntu.edu.tw)
6. Prof. Yonhua Tzeng, Dean of College of Electrical Engineering and Computer Science, National Cheng Kung University (tzengyo@mail.ncku.edu.tw, tzengyo@gmail.com)
7. Prof. Yeng-Horng Perng, Vice President, National Taiwan University of Science and Technology (vpresident@mail.ntust.edu.tw)
8. Prof. Chen-Yi Lee, Dean of R&D, NCTU (cylee@faculty.nctu.edu.tw)

9. Prof. Tsun-Yee Chiu, Dean of R&D, National Chang Gung University (dtychiu@mail.cgu.edu.tw)
10. Prof. Yen-Hsyang Chu, Dean of R&D, NCU (yhchu@jupiter.ss.ncu.edu.tw)
11. Prof. Chuan-Mu Chen, Dean of R&D, NCHU (chchen1@dragon.nchu.edu.tw)
12. Mr. Hsin-Yuan Lai, Director Programme, Council Taipei
13. Ms. Pei-Yi Chen, Assistant Director Education Promotion, British Council Taipei
14. Mr. Ching-An Chuang, Assistant Director, Taipei Representative Office in the UK

Taiwanese delegation of Research and Development from seven top universities arrived at University of Edinburgh (<http://www.ed.ac.uk/home>) at around 2pm on July 16, 2010 by a bus departing from University of Glasgow and was greeted by Professor Stephen Hillier, Vice Principal International. University Edinburgh was established in 1583 with 27,000 students, among them 7,000 are from 140 foreign countries. The University campuses scattered in several places in the east side of Scotland. It has three Colleges, Humanity and Social Sciences (the largest with 11 Schools), Science and Engineering (7 Schools), and Medicine and Veterinary Medicine (the smallest with 4 Schools). THE World University Ranking ranked University of Edinburgh 23rd in 2008 and 20th in 2009. Shanghai Jiao Tong University World University Ranking ranks the University 53rd in 2009. Among its strengths, Life and Agriculture Sciences (LIFE) ranks 35th in the world, Physics 51-77, Computer Science: 52-75th, Life Sciences and Biomedicine 34th, Social Sciences 48th, and Arts and Humanities 24th.

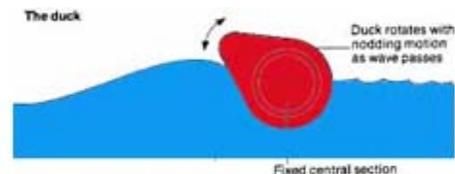
Among UK universities, the University has strengths in the following disciplines: Pharmacology & Pharmacy: UK 1st, Nursing: UK 1st, Veterinary: UK 3rd, Computer Science: UK 4th, Accounting: UK 5th, Medicine: UK 6th, Education: UK 6th, Agriculture & Forestry: UK 6th, Art and Design: UK 7th, Linguistics: UK 10th, Geography & Environment: UK 10th, Architecture: UK 11, English: UK 11th, Law: UK 15th, Music: UK 16th. The University generates the 6th largest annual R&D income of 170M among UK universities. It has a university wholly owned subsidiary company, Edinburgh Research and Innovation, which employs 75 staff and turned over 10.4M in 2008-9, amounting to the 5th highest commercial activities among universities in UK.

University of Edinburgh is famous for many accomplishments, among which, for example, are the theory of evolution by Charles Darwin and the world first cloned adult mammal, Dolly (1997) by the Roslin Institute, which revolutionized medical research. College of Engineering and Science also demonstrated the world's smallest color TV screen based on micro emissive display (1999).

Professor Ian G Bryden of Institute of Energy Systems, School of Engineering introduced wave and tidal energy generation and the famous wave energy generation device, known as Edinburgh Duck. Professor Stephen Salter of Univ of Edinburgh 1974 invented the Edinburgh Duck also known as Salter's Duck or Nodding Duck in 1974, which marked an important milestone in the modern scientific evaluation of wave energy resource. Its development was prompted by the 1973 Oil Crisis. The Duck consists of a curved cam-like body moored to the sea bed. The body is allowed to oscillate or nod with the wave motion as a wave passes.

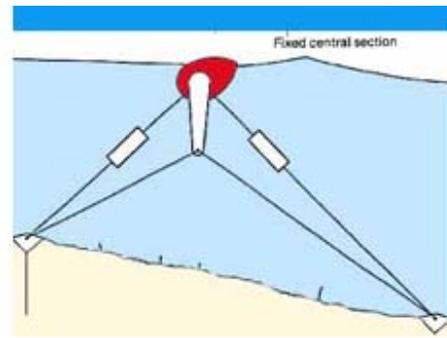


Dolly, the world's first animal cloned from an adult cell lived for six years and then was put down at the Roslin Institute in Edinburgh where she was created (from Nature).





Dr. Ian G Bryden of Institute of Energy Systems, School of Engineering, University of Edinburgh.



The Salter's Duck.

Prof. Bryden pointed out that by 2020 the UK government plans to build a 2GW wave energy system based on his R&D. Currently the state-of-the-art system generates only 2.5MW. For a 1.2MW system in operation, it cost 8M to build. The cost of energy production is still higher than that of solar photovoltaic at the moment. Studies showed that the ultimate amount of tidal wave energy which can be generated in UK is 30GW. Prof. Bryden has visited the Hydraulic Testing Facility at National Cheng Kung University and is keen to collaborate with NCKU faculty in ocean energy related R&D. He has been working on a number of EU FP projects. There is a favorable opportunity for NCKU faculty to participate in Prof. Bryden's wave energy project.

Dr. Pei-Jung Chung presented her wireless communication work in minimizing the energy consumption by ever increasing uses of cell phone. She called it Green Communication. Dr. Chung graduated from Tsing Hwa University in Taiwan and was an Assistant Professor at NCTU, Taiwan. She is familiar with Taiwanese culture and academics and willing to serve as a bridge for our collaboration with Univ of Edinburgh faculty in communication and general EECS disciplines.

Prof. Claus Nerlov, Director of Institute for Stem Cell Research, also introduced his research program. With the world famous Dolly breakthrough, The Stem Cell and Reproduction Group at Univ of Edinburgh developed rapidly into 80-90 faculty. Emphases are placed in gene diagnosis and therapy as well as reproduction science. This is one of the best Stem Cell research group in the world and a great opportunity for Taiwanese scientists to participate in state-of-the-art biomedical research. The exchange of information among hosts and us set the stage for further efforts towards true international collaboration.

University of Edinburgh currently has 129 Taiwanese students, who are well taken care of and welcome by the University. This is shown by the friendly presentation of both ROC national flag and Scottish national flag as the first slide of Dr. Hillier's presentation. Faculty of the University has also been actively collaborate with Taiwanese researchers. Four members of Scottish Parliament, including Iain Smith attend a dinner banquet in a local Chinese restaurant hosted by Director General Chu of Taipei Representative Office in the UK Edinburgh Office. Also attended the dinner banquet are Director Daniel S.T. Kuo and Assistant Director Selena C.H. Chang of the Office. Dr. Yun-Heh Chen-Burger of Artificial Intelligence Applications Institute also joined the dinner.





Leader of the Taiwanese delegation, President Lee of NTU presented a gift to a Scottish Parliament Member with Director General Chu looking upon during a dinner banquet in Edinburgh on July 16, 2010.



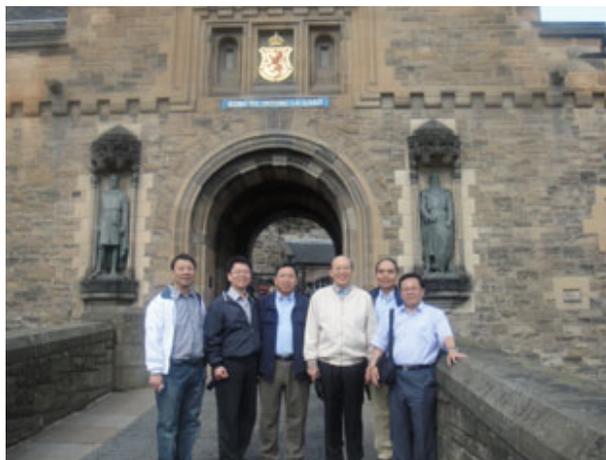
Photo of Dean Yonhua Tzeng of College of Electrical Engineering and Computer Science and representative of National Cheng Kung University for the Taiwanese delegation of Research and Development taken after a presentation made by Professor Stephen Hillier, Vice Principal International.

During the dinner, Dr. Yun-Heh Chen-Burger, Dr. Pei-Jung Chung and several of us discussed about the feasibility for a bilateral student exchange program for either undergraduate or postgraduate students. Dr. Chen-Burger pointed out the importance of convincing the counterpart college in the University of Edinburgh of the benefits that a student exchange program will offer to them. A combined cultural experiences, Chinese language learning opportunity, and internship in international well recognized company might be attractive to students of University of Edinburgh.

We also discussed about the possibility of engaging University of Edinburgh in the NSC Dragon Gate Project, which will sponsor Taiwanese doctoral students, postdocs, and PIs to spend one or two years conducting research in top-foreign institutions such as University of Edinburgh. Since this project offers additional research manpower and funds for consumable supplies to the hosting university, it appears to be attractive to faculty of University of Edinburgh.

Both Dr. Chen-Burger and Dr. Chung welcome the collaboration opportunity. Dr. Chen-Burger suggested that a bilateral student exchange MOU be signed as soon as possible. A draft MOU based on existing one NCKU has established with Purdue University will be sent to Dr. Chen-Burger for further development soon.

The Taiwanese delegation left Edinburgh in the Saturday afternoon on July 17, 2010 for London by train. Some of the delegation took the brief break in the Saturday morning to visit cultural and historical sites including the Castle of Edinburgh.



Shown in the photo taken in front of the entrance gate of the Edinburgh Castle on July 17, 2010 are (from left to right) Dean of R&D Cheng of National Chang Guan University, Dean of R&D Chen of National Chung-Hsin University, Dean of EECS Tzeng of National Cheng Kung University, President Lee of National Taiwan University, Vice President Perng of National Taiwan University of Science and Technology, and Director General Chang of Division of International Affairs, National Science Council, Taiwan.

Design & Layout : Ivan Tarn, The Banyan Editorial Office

Copyright 2010 National Cheng Kung University

University of Glasgow :

Visit by Taiwan Top University R&D Delegation

Yonhua (Tommy) Tzeng

Professor and Dean

Department of Electrical Engineering

College of Electrical Engineering and Computer Science

National Cheng Kung University

Tainan, Taiwan

tzengyo@mail.ncku.edu.tw

[July 16, 2010]

This article first appeared in EECS NCKU

Hosting Delegation:

1. Dr. Chris Pearce (Acting Dean for Engineering)
2. Professor Jon Cooper (Professor of Bioelectronics and Bioengineering, jmcooper@elec.gla.ac.uk; <http://www.elec.gla.ac.uk/~jmcooper/>)
3. Professor Anna F. Dominiczak (Regius Professor of Medicine and BHF Professor of Cardiovascular Medicine, Head of Division of Cardiovascular and Medical Sciences and Director, BHF Glasgow Cardiovascular Research Centre, ad7e@clinmed.gla.ac.uk)
4. Professor Graeme Milligan (Director of Research)
5. Professor Sheila Rowan (Physics and Astronomy lecturer)
6. Dr. Scott Roy (Head of Department of Electronics and Electrical Engineering, s.roy@elec.gla.ac.uk)
7. Professor John Chapman (Dean of Physical Sciences)
8. Professor Michael Barrett (Professor of Biochemical Parasitology)
9. Karen Clinton (Secretarial Assistant to Vice-Principal Research & Enterprise k.clinton@enterprise.gla.ac.uk)
10. Professor Douglas J. Paul (Professor of Semiconductor Devices, Dept of EEE, d.paul@elec.gla.ac.uk)

Taiwan Delegation:

1. Prof. Si-Chen Lee, President of NTU (sclee@cc.ee.ntu.edu.tw)
2. Prof. Ching-Ray Chang, Director General, Department of International Cooperation, National Science Council, Taiwan (crchang@nsc.gov.tw)
3. Ms. Cheng-Tung Tao, Program Director, Department of International Cooperation, NSC (cttao@nsc.gov.tw)
4. Prof. Ji-Wang Chern, Dean of R&D, NTU (jwchern@ntu.edu.tw)
5. Prof. Chao-Tsen Chen, Group Leader of Strategic Planning, Office of R&D, NTU (chenct@ntu.edu.tw)
6. Prof. Yonhua Tzeng, Dean of College of Electrical Engineering and Computer Science, National Cheng Kung University (tzengyo@mail.ncku.edu.tw, tzengyo@gmail.com)
7. Prof. Yeng-Horng Perng, Vice President, National Taiwan University of Science and Technology (vpresident@mail.ntust.edu.tw)
8. Prof. Chen-Yi Lee, Dean of R&D, NCTU (cylee@faculty.nctu.edu.tw)
9. Prof. Tsun-Yee Chiu, Dean of R&D, National Chang Gung University (dtychiu@mail.cgu.edu.tw)
10. Prof. Yen-Hsyang Chu, Dean of R&D, NCU (yhchu@jupiter.ss.ncu.edu.tw)
11. Prof. Chuan-Mu Chen, Dean of R&D, NCHU (chchen1@dragon.nchu.edu.tw)

In the morning on July 16, 2010 a delegation of R&D leaders from seven top universities in Taiwan arrived at University of Glasgow for an official visit with a mission to promote Taiwan-UK collaboration. We were received by a strong delegation of University of Glasgow with an impressive warm hospitality. The meeting last until past a working lunch before the Taiwan delegation left for visiting University of Edinburgh in the afternoon.

As the major university in West Scotland, University of Glasgow is the fourth oldest university in UK and ranks 79th in the world in 2008 according to Times Higher Education World University Ranking, and 101-150th by Shanghai Jiao Tong University World University Ranking. Its strength is in clinical medicine and pharmacy which ranks 51-76th in the world. In 2008-2009, total University earnings for research and related services reached 180M. In 2008-9, the University engaged in knowledge transfer activities totaling 67M, completed 12 new licenses with companies and generated almost 1M in licensing income.



Campus of University of Glasgow.

Since its inception in 1451, the University has fostered the talents of six Nobel laureates, one Prime Minister, Scotland's inaugural First Minister, and the country's first female medical graduate. Among famous scientists who contributed to the great history of the University are Lord Kelvin, after whom the division of temperature was named, economist Adam Smith and pioneer of television, John Logie Baird.

The University has about 22,000 students, among whom about 17,000 are undergraduates and 5,000 are postgraduates. One of the unique features of University of Glasgow is that its six thousand staff, including two thousand researchers are affiliated with four multidisciplinary colleges, which was created by merging related colleges to reduce barrier between faculties and promote effectiveness in multidisciplinary collaboration. It is a mission normally considered very difficult by most universities around the world. As a result, the faculties are able to respond to needs for multidisciplinary research much more effectively. For example, College of Medicine, Veterinary, and Life Sciences combines three different but related colleges. For Institutes, for example, neurosciences and psychology are in the same institute.



Delegation of R&D leaders of six top universities from Taiwan led by President Lee of NTU met with hosting delegation of University of Glasgow.

Hosting representatives of University of Glasgow took turns to introduce the strengths and main themes of their research. The emphasis was on micro and nanoelectronics, low gravity physics, and biomedical sciences.

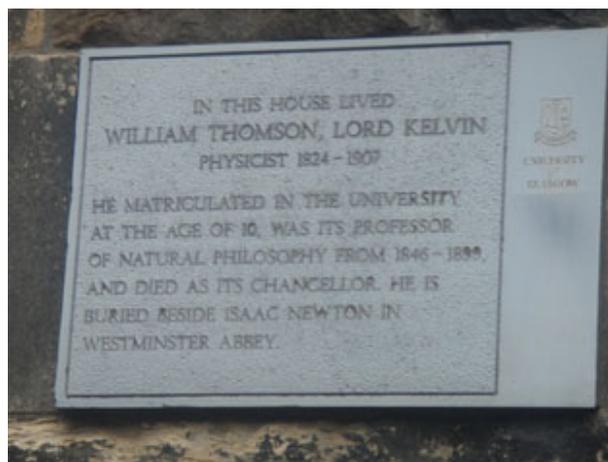
Although engineering is not among the major strengths of University of Glasgow, it does have active programs in micro/nanoelectronics, bioelectronics, and bioengineering. The University established the best nanofabrication clean room and has been collaborating with National Taiwan University and TSMC in Taiwan mainly in simulation study of nanoelectronic devices. Among nanodevices accomplished at Glasgow, it was noticed that the smallest diamond transistor was demonstrated in University of Glasgow's Nanotechnology Center. NCKU and University

of Glasgow have many complementary aspects of research strengths. During a break before lunch, Dr. Chris Pearce (Acting Dean of Engineering), Dr. Scott Roy (Head of Electric and Electronic Engineering), and Dr. Jon Cooper (Head of Bioelectronics and Bioengineering) kindly guided me across the beautiful campus full of historical neo-Gothic buildings and historical sites.

We visited the Nanotechnology Center which is housed inside a stripped down and completely renovated old building. This Center is equipped three e-beam lithography systems and is the best of its kind in UK. On the way back to our meeting room, we met the Director of the Center, Professor Douglas J. Paul (Professor of Semiconductor Devices, Dept of EEE). Dr. Paul told me that the annual operating budget for the Center is about 2M. We also visited the house of Lord Kelvin and observed the original Kelvin clock. In the old time, University of Glasgow had 9 professors, for whom the University built 9 comfortable houses for them and kept them on campus with close interactions with other researchers and students.



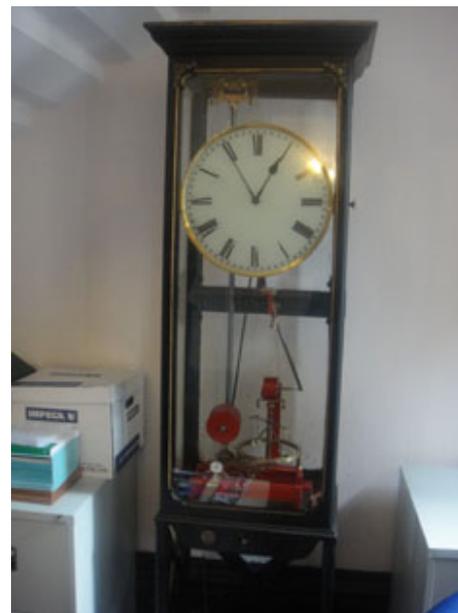
Glasgow's modern James Watt Nanofabrication Center inside an building.



A sign posted in front of the House of William Thomson, Lord Kelvin.

Based on the complementary strengths of NCKU and University of Glasgow, it was suggested that we could actively collaborate in nanotechnology, medical devices and integrated circuit “chip” design. Through collaboration, faculty and students of University of Glasgow can come to NCKU as visiting scholars and exchange students to work with NCKU faculty and students hand-in-hand using the state-of-the-art chip design software available in the Chip Implementation Center, and the subsequent chip fabrication by TSMC for verification and further characterization. Our faculty and students can go to University of Glasgow and work with them on project of common interest and learn different and rich culture of Scotland.

With Glasgow's strength in clinical medicine and NCKU's strength in engineering, it is advantageous for NCKU's EECS and engineering students to spend time in Glasgow to implement the true needs by medical professionals. This most likely will begin with bilateral students exchange in undergraduate and postgraduate levels. We will follow through with this collaboration soon after the delegation returns to Taiwan.



Kelvin Clock displayed inside the Professor Kelvin's House in University of Glasgow.

When we first arrived at University of Glasgow, I was very much impressed by the tall and delicately decorated

buildings, which were built one to two hundred years ago. I was later impressed by the historically famous scientists. After the half day interactions, I became most impressed by the hospitality and friendship of faculty and staff of the University. It fully reflected the historical nature of the Scottish people. The delegation concluded the visit at 1pm soon after a working lunch in the meeting room.

Design & Layout : Ivan Tarn, The Banyan Editorial Office

Copyright 2010 National Cheng Kung University

University of Southampton : Visit by Taiwan Top Universities R&D Delegation

Yonhua (Tommy) Tzeng

Professor and Dean

Department of Electrical Engineering

College of Electrical Engineering and Computer Science

National Cheng Kung University

Tainan, Taiwan

tzengyo@mail.ncku.edu.tw

[July 19, 2010]

This article first appeared in EECS NCKU

Hosting Delegation:

1. Professor Don Nutbeam, Vice-Chancellor (Secretary: Beverley Bennett, bab@soton.ac.uk)
2. Professor Philip Nelson, Deputy Vice-Chancellor (pan1@soton.ac.uk)
3. Professor Anne Curry, Head of School, School of Humanities (aec@soton.ac.uk)
4. Professor Maozu Lu, Director, Centre for Contemporary China (ml@soton.ac.uk)
5. Professor Harvey Rutt, Head of School, Electronics & Computer Science (hnr@ecs.soton.ac.uk)
6. Dr. Martin Charlton, Academic staff in Nano Research Group, School of Electronics & Computer Science (mdbc@ecs.soton.ac.uk)
7. Professor Mark Everist, Professor of Music, School of Humanities (me@soton.ac.uk)
8. Dr. Tom Irvine, Lecturer in Music, School of Humanities (tairvine@soton.ac.uk)
9. Dr. David Bretherton, mSpace Research Fellow (db4x07@soton.ac.uk)
10. Professor Mark Cornwall, Professor of Modern European History, School of Humanities (jmc3@soton.ac.uk)
11. Mr. Thom Bull, Recruitment Officer, School of Humanities (txb@soton.ac.uk)
12. Dr. Yvonne Marshall, Archaeology, School of Humanities (yvm@soton.ac.uk)
13. Professor Dan Hewak, Professor, Optoelectronics Research Centre (dh@orc.soton.ac.uk)
14. Mr. Jun-Yu (Bruce) Ou, Ph.D. Taiwanese student, Optoelectronics Research Centre (jo2c09@orc.soton.ac.uk)
15. Tsung-Sheng Kao, Ph.D. Taiwanese student, Optoelectronics Research Centre (tsk@orc.soton.ac.uk)
16. Dr. Kevin Chung-Che Huang, Research Fellow, Optoelectronics Research Centre (cch@orc.soton.ac.uk)
17. Professor Bashir Makhoul, Head of School, School of Art (bm5@soton.ac.uk)
18. Chris Sinclair, Deputy Director, Centre for Language Study (cs10@soton.ac.uk)
19. Ms. Frances Holley, Country Development Manager, International Office, U. of Southampton (frances.holley@soton.ac.uk).
20. Ms. Elizabeth Farnell, Communication Officer, International Unit, UK Higher Education (Elizabeth.farnell@international.ac.uk).

Taiwan Delegation:

1. Prof. Si-Chen Lee, President of NTU (sclee@cc.ee.ntu.edu.tw)
2. Prof. Ching-Ray Chang, Director General, Department of International Cooperation, National Science Council, Taiwan (crchang@nsc.gov.tw)
3. Ms. Cheng-Tung Tao, Program Director, Department of International Cooperation, NSC (cttao@nsc.gov.tw)
4. Prof. Ji-Wang Chern, Dean of R&D, NTU (jwchern@ntu.edu.tw)

5. Prof. Chao-Tsen Chen, Group Leader of Strategic Planning, Office of R&D, NTU (chenct@ntu.edu.tw)
6. Prof. Yonhua Tzeng, Dean of College of Electrical Engineering and Computer Science, National Cheng Kung University (tzengyo@mail.ncku.edu.tw, tzengyo@gmail.com)
7. Prof. Yeng-Horng Perng, Vice President, National Taiwan University of Science and Technology (vpresident@mail.ntust.edu.tw)
8. Prof. Chen-Yi Lee, Dean of R&D, NCTU (cylee@faculty.nctu.edu.tw)
9. Prof. Tsun-Yee Chiu, Dean of R&D, National Chang Gung University (dtychiu@mail.cgu.edu.tw)
10. Prof. Yen-Hsyang Chu, Dean of R&D, NCU (yhchu@jupiter.ss.ncu.edu.tw)
11. Prof. Chuan-Mu Chen, Dean of R&D, NCHU (chchen1@dragon.nchu.edu.tw)

The Taiwan delegation of R&D Leaders from seven top universities arrived at University of Southampton at around 10am on July 19, 2010 for an official visit. University of Southampton is about one and half hours away from London by bus. By the appointment of President Michael Lai, I joined the Taiwan R&D Delegation in representation of NCKU. It was a shining day with blue sky and comfortable temperature when University of Southampton was busy with summer graduation. In such a busy day, more than twenty faculty, staff, and students of the University spent their precious time meeting with the Taiwan delegation.

University of Southampton was founded in 1862 as the Hartley Institute and is situated in the South coast of England about one hour from central London. It currently has about 22,000 students of which over 4000 are from outside of UK. The University was ranked 95th by the Times Higher Education World Ranking and ranked 152-200th by Shanghai Jiao Tong University World University Rankings. Among its strengths in the world, Engineering/Technology and Computer Sciences (ENG) ranks 78-100th in the world, Chemistry ranks 51-75th in the world, Clinical Medicine and pharmacy ranks 77-100th in the world.

In comparison with other universities in UK, University of Southampton's Engineering ranks 2nd, Computer Science ranks 5th, Music ranks 7th, Nursing ranks 7th, Geography & Environment ranks 9th, Law ranks 10th, Psychology and Medicine rank 11th. University of Southampton is a leading university for collaborations with industry, ranked second in the UK. U of Southampton is ranked third, after Stanford and Cambridge, in the world for creating spin-off companies. It has spun off twelve successful companies since 2000. Four of them have been floated on London's Alternative Investment Market with a combined market capitalization value of 180M. One of its spin outs, PrimerDesign Ltd, was the first company globally to produce a DNA test kit for the Mexican H1N1 swine flu.

University of Southampton has a long history of R&D in the hi-tech world of performance sports. The Wolfson Unit for Marine Technology and Industrial Aerodynamics is one of eight organizations in UK chosen as innovation partners to UK Sport. 2010 Vancouver gold medalist, Amy Williams, in bob skeleton was aided by doctoral researchers working in collaboration with UK Sport.



Professor Don Nutbeam, Vice-Chancellor of Southampton University (fourth from left) and President Lee of NTU (fifth from the left) delivering opening remarks.

The University has the largest School of Electronics and Computer Science (ECS) in UK, which was ranked 1st and 2nd in the UK by the 2010 Guardian/ Times University guides. ECS also ranks 6th in the world based on publication citations. The department has 336 staff including over 90 academics, 250 research students, 180 MSc students, and 850 undergraduate students. Among the faculty includes Professor Sir Tim Berners-Lee, inventor of the World Wide Web.

One of the most important aspects of the School's distinguished history was the invention and development of the fibre optic cable, which transformed the potential of global communications. The School has distinguished research partners such as BAE Systems, Philips, ARM, BT, Microsoft, and Rolls Royce. The current research portfolio is worth 65M with an annual income around 15M. The School has a strong reputation in spin-off in the area of photonics and telecommunications.

ECS enjoys a state-of-the-art Nanofabrication Center (<http://www.southampton-nanofab.com>) which includes a 680 m² nanofabrication facility, 121 m² bio-cleanroom, and 118 m² thick-film cleanroom. The bio-cleanroom, when working together with the new Institute for Life Sciences in a custom-designed 47M Life Sciences Building, will serve as an interface between inorganic nanotechnology and life sciences.

Head of ECS, Prof. Rutt, proudly introduced the Center's unique strategy of investing in high-risk flagship equipment. The Center chose to acquire state-of-the-art equipment with unique and new capabilities instead of main-stream general purpose equipment available in the market. As a result, the Center is now equipped with the following flagship equipment items: Joel JBX9300FS electron beam lithography system, Zeiss Orion helium ion microscope, Zeiss Nvision 40 focused ion beam lithography system, Leybold Hellios high precision sputtering system, Oxford Plasma Technologies FlexAl atomic layer deposition system, and a silicon epitaxial system. For example, the helium ion microscope works as both a microscope for resolving fine structures and a nanofabrication tool for special materials. For example, graphene needs to be fabricated, when using focused ion beam nanofabrication, by light-weight ions, such as helium ions, instead of heavy gallium ions typically used in FIBs.



The 100M Mountbatten Building, which is equipped with state-of-the-art clean rooms for nanotechnology and optoelectronics research.



Director Lu of Center for Contemporary China, Dr. Kevin Chung-Che Huang, Mr. Tsung Sheng Kao, a new graduate student just arrived from Taiwan, and Dean Yonhua Tzeng (From left to right) in a lunch reception at Southampton University.

The University has an Optoelectronics Research Center which is equipped with advanced optical fiber manufacturing equipment and related infrastructure. The Optoelectronics Research Center is located side by side with the Nanofabrication Center. The delegation met with doctoral students and research fellows who are conducting research in the Center. Mr. Tsung Sheng Kao is a doctoral student from NTU-EE working on a joint project of his advisor in

NTU and their collaborators in University of Southampton. Dr. Kevin Chung-Che Huang is a research fellow having been working in the Center for several years. University of Southampton has demonstrated itself to be an excellent collaborative partner with universities in Taiwan. It matches well with the research strengths of NCKU and deserves special attention for further pursuit of effective collaboration.

Besides the Southampton Nanofabrication Centre (www.southampton-nanofab.com) and the Optoelectronics Research Center (www.orc.soton.ac.uk), School of ECS has the following Centers and Institutes: (i) ALADDIN-Autonomous Learning Agents for Decentralized Data and Information Networks (www.aladdinproject.org); (ii) EPrints (www.eprints.org) – created the first and most widely used archiving software (EPrints) which is used worldwide by 355 know archives; (iii) IT Innovation Centre (www.it-innovation.soton.ac.uk); (iv) MailScanner – an open source e-mail security system developed in ECS by Julian Field, the School’s Postmaster (www.mailscanner.info/); (v) OMII UK – Open Middleware Infrastructure Institute UK makes Grid software (www.omii.ac.uk); (vi) PASCAL – Pattern Analysis, Statistical Modelling, and Computational Learning; (vii) Tony Davies High Voltage Laboratory; and (viii) Web Science (www.webscience.org) – a new discipline bringing together researchers and educators from computer science, engineering, the social sciences, health and the humanities to better understand the Web, engineer its future and ensure its social benefit.

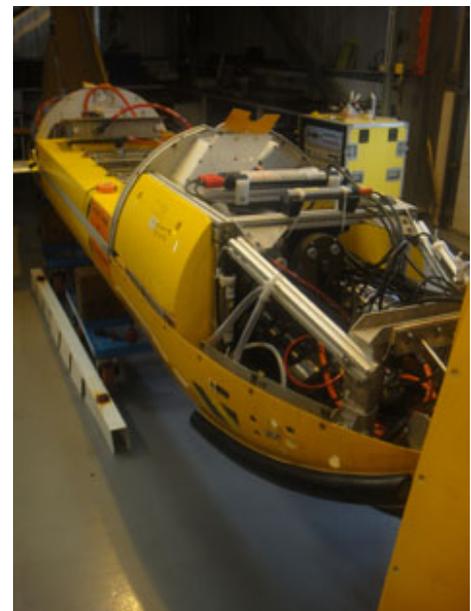
Multidisciplinary research among academics in ECS Department and Music Department is another impressive model of research. By joining forces of web science and data mining technology specialized by ECS academics with expertise of musicians, the music web science have been developed well beyond a simple combination of speech recognition and data mining with a musical database. For music, the data might involve the sounds of many musical instruments. It is like recognition of simultaneous speeches by many people with different accents speaking at the same time. The close collaboration with music professors and ECS professors sets a good inter-college collaborative model and fits well with the new research trend of “digital economy”.

Besides collaborative joint research projects, I proposed to Prof. Rutt and Dr. Charlton a bilateral student exchange program for both undergraduate and graduate students from both sides to be involved in academic studies, cultural experiences, foreign language learning, and possible internship in industries in partner foreign countries. Taiwan should be attractive to students of University of Southampton, especially when cultural visits and industrial internship in internationally renowned companies are part of the exchange program. We all agreed to follow up with this potential collaboration and try our best to turn it into a sustainable systematic reality.

University of Southampton is the basis of the National Oceanography Center, which is funded by UK government at an annual budget of about

30M. University of Southampton led a British scientific expedition that discovered the world’s deepest known undersea volcanic vents. The Center operates three ocean vehicles including a quite new ocean research ship, James Cook, and a remotely operated submarine. The deep sea submarine can get down to 6000 meters below the ocean surface to conduct research in life in unexpected places to give us insights into patterns of marine life, the origins of life on Earth and even the possibility of life on other planets.

The main research themes of the Center are on the south poles and the north poles as well as ocean geophysics and geology. The Center also operates a cold stock room, which keeps a large number of archived long samples taken by drilling into the ocean floor of different depths in various places of research. These samples are kept in a refrigerated stock



room to keep the original samples, which might contain certain unknown life. Cross sectional analysis of these cold samples allow scientists to understand the evolution of the ocean floor through different years of deposition on the ocean floor.



Professor Yonhua Tzeng and Ms. Pin-Ru Huang in the National Oceanography Center at Southampton University.

A remotely operated submarine in the National Oceanography Center at Southampton University capable of reaching 6000 meters below the ocean surface.

Ms. Pin-Ru

Huang, who earned her BS and MS degrees from the Earth Science Department of NCKU, is now a doctoral student at the National Oceanography Center working on pollution in ocean involving heavy metals. Having met with a delegation from her home country far away from UK, Ms. Huang appeared to be very pleased and volunteered to serve as a technical interpreter during our visit of the Center. Among subjects of possible collaboration, methane hydrate was discussed as an alternative energy source as well as an important substance of research related to the ocean geophysics.

The Center has published many papers in the journal Nature. With the unique capability in reaching deep ocean floors and places where normal ships can hardly get close,

the chance of nature discovery is outstanding. Taiwanese scientists are allowed to propose joint research projects in collaboration with the Center's academics in order to explore ocean related pioneering research. The return of investment for research projects using state-of-the-art equipment available in the Center is expected to be excellent.

University of Southampton has the fastest Microsoft Windows-powered 3M supercomputer in Europe for multidisciplinary research projects. The University has set up three doctoral training centers with 15M funding from the EPSRC: (i) Complex system simulation; (ii) Transport and the environment; and (iii) Web science. These centers provide advanced training and research in response to the emerging needs of UK industry and society.

University of Southampton has many common aspects to that of NCKU (and some top universities such as NTU in Taiwan). These universities have globally renowned research and teaching programs in electrical engineering and computer science as well as general engineering disciplines including ocean engineering. The University has the largest School of Electronics and Computer Science (ECS) in UK, which was ranked 1st and 2nd in the UK by the 2010 Guardian/ Times University guides and ranks 6th in the world based on publication citations. Among the strengths of University of Southampton, the general Engineering/Technology and Computer Sciences (ENG) ranks 78-100th in the world. In comparison, NCKU ranks 16th for its publications of SCI papers in the general engineering disciplines, including electrical and computer engineering, and 56th in the computer science.

Both NCKU (NTU, NCTU, etc., too) and University of Southampton (ranking 152-200th) are excellent universities, which make high influential impact to local and national industries and economy although rank behind top 100 universities in the world according to Shanghai Jiao-Tong University World University Rankings. How to effectively develop a university which contributes the most to national and local economy and accomplishes the most interruptive and transformative science and technology for solving global problems is a grand challenge for all top universities in Taiwan.

Design & Layout : Ivan Tarn, The Banyan Editorial Office

Copyright 2010 National Cheng Kung University

University of Bath :

Visit by Taiwan Top University R&D Delegation

Yonhua (Tommy) Tzeng

Professor and Dean

Department of Electrical Engineering

College of Electrical Engineering and Computer Science

National Cheng Kung University

Tainan, Taiwan

tzengyo@mail.ncku.edu.tw

[July 13, 2010]

This article first appeared in EECS NCKU

Hosting Delegation:

1. Professor Bernie Morley, Pro-Vice-Chancellor (Learning & Teaching) (b.j.morley@bath.ac.uk)
2. Ms. Virginia Irwin, Deputy Head, International Office (v.irwin@bath.ac.uk)
3. Professor J. Gary Hawley, Dean & Medlock Chair of Engineering, Faculty of Engineering & Design; Professor of Automotive Engineering, Powertrain & Vehicle Research Center (j.g.hawley@bath.ac.uk)
4. Dr. Richard Hooley, Head of Department of Biology & Biochemistry (bssrah@bath.ac.uk, www.bath.ac.uk/bio-sci)
5. Dr. Gareth J. Price, Senior Lecturer in Physical Chemistry, Head of Department of Chemistry (g.j.price@bath.ac.uk)
6. Professor Geof Wood, Prof. of Economics and International Development (g.d.wood@bath.ac.uk)
7. Professor Richard Hooley, Head of Department, Biology & Biosciences (r.a.hooley@bath.ac.uk)

Taiwan Delegation:

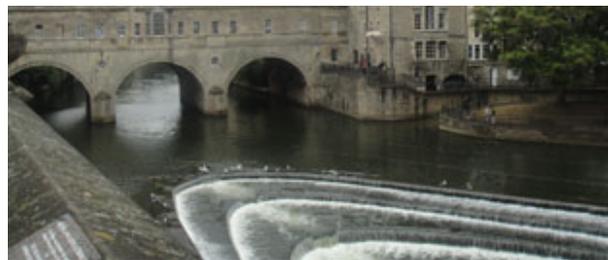
Prof. Si-Chen Lee , Prof. Ching-Ray Chang , Ms. Cheng-Tung Tao , Prof. Ji-Wang Chern , Prof. Chao-Tsen Chen , Prof. Yonhua Tzeng , Prof. Yeng-Horng Perng , Prof. Chen-Yi Lee , Prof. Tsun-Yee Chiu , Prof. Yen-Hsyang Chu , Prof. Chuan-Mu Chen , Mr. Hsin-Yuan Lai , Ms. Pei-Yi Chen , Mr. Ching-An Chuang .

Taiwan top university R&D delegation led by President S.C. Lee of NTU arrived at City of Bath around noon time on July 13, 2010. Bath is a historical city famous for its Roman spa of natural warm spring water at a constant temperature of about 46 ° C and containing special minerals that are thought to be good for curing certain diseases. Universities UK Office arranged for a one-hour guided walking tour of the City for the Taiwan delegation before the meeting with officers of University of Bath convened at 2pm. Well preserved ancient buildings and vivid story telling by the tour guide made our time slip back by thousand years. The ancient living environments and daily activities were almost clearly reconstructed in our mind.





City scene of the City of Bath.



A bridge with shops on a beautiful river in the City of Bath.



An expensive residential building overlooking an open green field around a circular road in the City of Bath.

The delegation arrived at University of Bath (<http://www.bath.ac.uk>) around 2pm and was welcome by Pro-Vice-Chancellor (Learning & Teaching), Professor Bernie Morley. The delegation met with Professor Gary Hawley, Dean of Faculty of Design & Engineering; Professor Gareth Price, Head of Department of Chemistry; Professor Richard Hooley, Head of Department of Biology & Biosciences; and Professor Geof Wood, former Dean of Faculty of Humanities & Social Science. After welcoming and appreciation remarks by Pro-Vice-Chancellor Morley and President Lee, brief self introduction was given by everyone and the hosting delegation took turns to introduce the overall University of Bath and the specific strengths of each discipline as well as open discussion of opportunities for mutual collaboration.

University of Bath roots in the Bristol Trade School 1856 and the Bath School of Pharmacy 1907 and was established under Royal Charter in 1966 as University of Bath. University of Bath has 13000 students and four faculties/schools including Science, Engineering & Design, Humanities & Social Sciences, and School of Management. Bath has a portfolio of external funding, over £100M, including new grants of about £30M each year. Bath currently ranks the 201st – 302nd in the world by the Shanghai Jiao Tong University World University Rankings and ranks the 144th by Times Higher Education World Rankings.

Chemistry is University of Bath's research strength and ranks 51-75th in the world. Among 32 academic staff, ten are in top 1% of cited chemists, two are RCUK and two are Royal Society Research Fellows. About 70% of 400 undergraduates spend 1 yr in industry or overseas. Major research activities in chemistry include (1) DTC in Sustainable Chemical Technologies (2009) - £16.5M total with 12 industrial partners to train up to 70 PhD students; (2) SUPERGEN Projects - £M's UK consortia in renewable energy - Excitonic Solar Cells; Photovoltaic Materials for the 21st Century; Energy Storage Materials; and Sustainable Hydrogen Energy Consortium; (3) EPSRC Knowledge Transfer Grant - £3.4M , one of 12 grants in the UK; (4) Current EPSRC Portfolio for Chemistry is more than £10M.

Among universities in UK, the University has the following research strengths according to Guardian Ranking UK: (i) Pharmacology & Pharmacy (UK 2); (ii) Engineering (UK 3); (iii) (Europe) Business (UK 4) ; (iv) Biosciences (UK 7); (v) Tourism & Sports (UK 8); (vi) Politics (UK 10); (vii) Computer Science (UK 15); (viii) Psychology (UK 15); and (ix) Economics (UK 15).





From left to right, Dean Chu of NCU, Dean Chern of NTU, Director General Chang of NSC, President Lee of NTU, who, along with other Taiwan delegation, met with Pro-Vice-Chancellor Morley and his colleagues of U of Bath.



A corner view of the meeting room showing (from left to right) Director Chao of British Council in Taipei, Professor Geof Wood, Mrs. Virginia Irwin, Dean Gary Hawley, Professor Richard Hooley, Professor Gareth Price, and Associate Research Fellow Tao of NSC, Taiwan.

University of Bath also has a strong research program in advanced manufacturing science and technology. The research programme is divided into four complementary themes: (i) constraint-based design and optimization, (ii) design information and knowledge, (iii) advanced machining processes and systems, and (iv) metrology and assembly systems and technologies.

Bath is involved in the following 6 out of 13 programs of the Sustainable Power Generation and Supply (SUPERGEN) Multidisciplinary research consortia managed by the Research Councils UK and the Carbon Trust to help the UK meet its environmental emissions through radical improvement in the sustainability of power generation and supply: (i) Sustainable Hydrogen Energy Consortium, (ii) PV materials for the 21st century, (iii) Highly distributed power systems, (iv) Future network technologies, (v) Energy storage, and (vi) Excitonic solar cells. Other green projects being undertaken at Bath include (i) Green packaging, (ii) Low carbon building materials, (iii) Low carbon IC engines, and (iv) Crops to combustion—a biodiesel focus.

There should be plenty of opportunities for the Institute of Manufacturing Information and System and the Energy Research Center at NCKU as well as a variety of research teams in all universities in Taiwan to collaborate with Univ. of Bath in their active research areas.

Interdisciplinary Bioscience Research (<http://www.bath.ac.uk/bio-sci/>) in Bath spans six departments: (1) Biology & Biochemistry, (2) Chemistry, (3) Mathematical Sciences, (4) Pharmacy & Pharmacology, (5) Chemical Engineering, and (6) Sport Health & Exercise Science. The main research themes are (1) Food Security, (2) Bioenergy & Industrial Biotechnology, (3) Health & Regenerative Medicine, and (4) Evolutionary Genomics.

Professor Richard Hooley is studying a special species of microalgae growing in the special warm spring water in Bath for CO₂ capture & biodiesel production. He believes that this species of microalgae probably will not grow in other environments and should not cause contamination to other water resources. It is not clear whether growing microalgae in special warm spring water at 46 °C in Bath is economically viable; but, the choice of a species of microalgae which might not have adverse effects on environments is an interesting consideration. A number of Taiwanese students have studied or are studying biosciences in University of Bath.





Roman spa in the City of Bath (left) and a researcher collecting microalgae growing in the hot spring water (right) (photo taken from U of Bath's presentation)

Design & Layout : Ivan Tarn, The Banyan Editorial Office

Copyright 2010 National Cheng Kung University