EXTRACT OF SPEECH BY SUTD PRESIDENT PROFESSOR THOMAS MAGNANTI AT THE EAST COAST CAMPUS TOPPING OUT CEREMONY

In the past two years since the groundbreaking of this facility, various developments have been positioning SUTD to become what we envision: a GREAT university.

From a piece of levelled land, we now have the structure for buildings designed to foster growth, collaboration and creativity, with cohort classrooms, research facilities, residential housing for faculty, students and staff, a distinctive international design centre, an innovative library, modern athletic facilities, and an auditorium for cultural events.

As importantly, these structures will serve as a home for the SUTD family. A home is a very special place, a place where people we care for live and dream together, where young minds are nurtured and values are instilled, where we can speak freely and yet keep an open mind and embrace diversity of ideas. It is also where we give, as well as enjoy, full support to take risks, experiment, and try new things.

This is the environment we envision for the SUTD community: an eco-system that nurtures technically-grounded leaders and innovators to serve societal needs. As Benjamin Franklin said, “A house is not a home unless it contains food and fire for the mind as well as the body.”

Since May 2013, we have matriculated two cohorts of undergraduate students. They have achieved more than we might ever have hoped for and we are really proud of them. Just over the past month, our students made headlines in both Singapore and United States.

Two of our undergraduate students, Edward Tiong and Olivia Seow, are the inventors of “Easy Ring”, a wearable technology created with 3D printers.

Another group of students, Quak Chun Ming and Yeo Song Pei, emerged as a Finalist at the 2013 World Architecture Festival Student Charette.

This summer, 131 students participated in leadership programmes in MIT and Zhejiang University. Another 126 students took on internships in companies both locally and overseas.

In May this year, we graduated our first batch of students from the MIT-SUTD Dual Masters programme. They have secured jobs with such prestigious organisations as Google, Amazon, McKinsey, Roland Berger Strategy Consultancy, and the Port Authority of Singapore. On September 11, we matriculated our first cohort of 30 PhD students.

130 faculty members have joined us from renowned institutions from around the world and our talented faculty have secured numerous academic awards.

These creative and energetic students and faculty are our future. To support them, we have established five vibrant research centres. More than 250 companies have pledged internships and scholarships to SUTD.

All these achievements, and our remarkable progress, are made possible by wonderful support from the Government, industry supporters, MIT and Zhejiang University, our various collaborators, Governing Board, and staff.

Looking ahead, I see our SUTD home here brimming with excitement. I see our family of faculty, staff and students interacting and learning from each other, being fuelled by food and fire for the mind. A community with shared values and shared dreams. A learning spine filled with animated discussions at every turn. And I see the footsteps of the next generation of technical leaders and innovators, making an impact in Singapore, the region, and the World.
SUTD's model of education is an innovative and timely response to globalisation and technological shifts. By distilling the rigour of each key subject discipline and integrating these through the concept of design, by combining theory and practical experimentation, and by combining the best of East and West, SUTD offers a high quality education in the sciences and engineering that breaks new ground.

Students will benefit from the emphasis on rigour and inventiveness, as well as develop important 21st century competencies including teamwork, critical thinking, and communication skills. SUTD demonstrates our willingness to experiment, to continually innovate in education. Its model features many exciting innovations in teaching and learning, and is distinctive in several significant ways.

“Design” is the key organising principle behind why students learn the various subjects and how they put them together. They are exposed to a wide variety of technically grounded design, from architectural design, product design, to software design and systems design. In addition, students experience the full value chain of design – from problem solving, conception, invention, development, prototyping, manufacturing, to operation and maintenance.

Two months ago, I visited SUTD at its interim campus in Dover, and was fascinated by both their approach to teaching and learning, and the integrated access to the newest technology. It made me want to go back to school. Students are challenged, from their very first semester to identify real problems, learn the fundamental principles required to tackle these problems, and design and build real, working solutions. For example, in the Fabrication Laboratory, faculty and students experiment with materials, explore new fabrication processes using 3D printers, rapid prototyping machines and CNC milling machines, build physical mock-ups, and prototype scale models and full-size products. So they are not just learning theoretical knowledge in isolated silos, but designing and making real things in an integrated way.

SUTD’s mission to produce technically-well-rounded leaders, product and systems designers and engineers and architects to solve problems and develop solutions to improve the world is an exciting and meaningful one. I hope that many more students will take up the opportunities offered here at SUTD, to prepare themselves well to succeed in the future.

SUTD blazes a new trail in our education system, and adds a new jewel to our education landscape. It will provide exciting new opportunities for its students to design and forge a new way forward towards a better future for all of us.
SUTD Fabrication Laboratory

BY ANDY LIM

SUTD proudly opened its Fabrication Lab (Fab Lab) with great fanfare in October 2012. Touted to allow its students, faculty and researchers to design and create “almost anything”, the 1,000-sqm laboratory is fully equipped with a comprehensive array of fabrication equipment and tools for digital fabrication as well as metal and wood work. It also includes an electronics lab, Waterjet Machining Centre and an impressive project area to facilitate and support SUTD’s design-focused pedagogy and curriculum.

PROGRAMMES & WORKSHOPS

The Fab Lab team also conducts Practical Enrichment Programmes (PEP) for students and faculty. The programme inculcates skills such as basic laser cutting and engraving, basic turning/milling operation, setup and the production of a mini-vice. Armed with these basic skills and knowledge, SUTD students have made use of tools such as table saws, multi-material 3D printers and laser cutters for their Freshmore design projects. The Fab Lab has also produced more advanced prototypes and innovations by the faculty and researchers. For example, it produced a wall mural of a section of the Yueh Hai Ching Temple, a Singapore heritage building, in full 3D glory.

It was during the Open House 2013, that the Fab Lab showed itself to be more than a place for students, faculty and researchers to conceptualise and realise their works and projects. The Fab Lab team conducted workshops on toy making as the hands-on activity was not only engaging but also an experiential showcase of the endless possibilities to create and innovate. Visitors who toured the Lab were impressed with not only the range of machinery, but also the exhibits and toys that were showcased. It was heart-warming to see families, children, friends and SUTD colleagues come and bond together, having a blast building toys. That day, the Fab Lab and its team members managed to achieve their mission by allowing children, friends and SUTD colleagues come and bond together, having a blast building toys. That day, the Fab Lab and its team members managed to achieve their mission by allowing children, friends and SUTD colleagues come and bond together, having a blast building toys.

Dr Mohan advising students on the use of the upright drilling machine for prototyping.

3D dragon wall mural

Students fabricating a mini-vice using high speed mini-bench drilling machine; a basic hands-on course conducted by the Fab Lab.

ASSOCIATE PROVOST FOR EDUCATION

PROFESSOR PEY KIN-LEONG

Associate Provost for Education, Professor Pey Kin-Leong, was appointed by the Singapore Ministry of Education to take up the position at SUTD in 2009. He was previously Head of the Microelectronics Division, Programma Director of the Si Technology Research group, Director of the Nanyang NanoFabrication Center (NZFC), and the Director of the Microelectronics and Photonic Systems School of Electrical & Electronics Engineering at the Nanyang Technological University, Singapore, and had graduated 30 PhD theses.

Prof Pey previously held a Fellowship appointment in the Singapore-MIT Alliance (SMA) and has held various research positions in the Institute of Microelectronics, Chartered Semiconductor Manufacturing, Agilent Technologies and the National University of Singapore.

His research interests are pulsed laser annealing for channel engineering for nano-scale Complementary Metal Oxide Semiconductor (CMOS) and advanced alloy silicid for nano-structures and nano-devices. He has also been working on transistor reliability in dielectric breakdown and advanced interconnects for more than 10 years. In particular, Prof Pey pioneers in using physical analysis techniques in the study of breakdown mechanisms in ultra-thin gate dielectric stack and publishes regularly in the related area in the Institute of Electrical and Electronics Engineers (IEEE) journals and conferences, including regular invited talks at semiconductor devices related conferences.

A senior member of IEEE and an IEEE Electron Devices Society Distinguished Lecturer, Prof Pey has been the organising committee member of IEEE IPFA (Physical and Failure Analysis of Integrated Circuits) since 1995. He was the General Chair of IPFA2001, Singapore and the co-General Chair of IPFA2004, Hsinchu, Taiwan. Prof Pey has recently been elected to be a Fellow of the ASEAN Academy of Engineering & Technology.

Prof Pey’s research is directed toward the mechanics and physics of materials and structures, focusing on multiphysics issues at small scales and how to incorporate these into the design and manufacture of material and structural systems at higher length scales. A fellow of the American Society of Mechanical Engineers, he has made seminal contributions in active materials/composites, thin-film behavior, fracture and adhesion, nanomechanics, and optimal design. Prof Dunn has published over 230 research articles on these subjects in peer-reviewed journals, conference proceedings and book chapters. His research has been supported by many agencies and companies, and has been cited over 5,000 times, and has an h-factor of 37; his papers include some of the most-cited in the history of the journals in his field. Along with his students, he has won numerous awards for his research contributions.

When asked what his vision for research in SUTD was, Prof Dunn said: “As a research-intensive university we will actively engage in large societal challenges, employing multidisciplinary approaches to make important impacts for Singapore and the world. At SUTD we are in a unique position to bring together technical and social understanding and approaches to this end. I am confident that the engagement will run deep through the SUTD community, involving faculty, post-graduate students, and undergraduates. Indeed, we are hopeful that 100% of our undergraduates will engage in research!”

ASSOCIATE PROVOST FOR RESEARCH

PROFESSOR MARTIN DUNN

Associate Provost for Research, Professor Martin Dunn, took on the role at SUTD in January 2013. Prior to joining SUTD, he served as a Director in the Division of Civil, Mechanical, and Manufacturing Innovation at the National Science Foundation (NSF), USA. He served NSF while on leave from the University of Colorado, Boulder (CU) where he was the Associate Dean for Research in the College of Engineering and Applied Science, Chair of the Department of Mechanical Engineering, and a Professor of Mechanical Engineering, holding the Victor Schekel Endowed Chair. Prof Dunn held positions at Sandia National Laboratories and the Boeing Company in the US before joining CU. He has consulted for companies and government agencies, including the Defense Advanced Research Projects Agency, Air Force Office of Scientific Research, and the National Institute of Standards and Technology.

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MISSION, RESEARCH AND TEACHING

The Lee Kuan Yew Centre for Innovative Cities' (LKY CIC) mission is to be a thought leader on the critical issues of cities and urbanisation, and to develop breakthrough urban solutions using innovative technologies that work closely with the necessary governance and social frameworks.

Officially established in September 2012, the Chairman of the Centre is Professor Chan Heng Chee. The research strength of LKY CIC is drawn from the faculty in SUTD who collaborate and partner with a core team at the Centre.

The Centre’s research areas include:
- Design for Demographics
- Design for Density
- Design for Resilience
- Design for Resource Scarcity
- Design for Connectivity
- Design for Social Capital
- Dense + Green - a project exploring the integration of green spaces in buildings that could potentially lead to entirely new building typologies for future cities, especially for high density ones like Singapore.
- Ageing Urbanism - a pluri-disciplinary programme that aims to enhance the current understanding of older people’s appropriation and needs, to develop innovative designs to meet those needs, and to disseminate frameworks for action.
- Asian Port Cities - a comparative study of Asia’s busiest port cities that will give a more complete understanding of their broad interlinking structures, governance, networks and technological innovations.
- Technology and Governance in An Innovative City - a public forum to help build SUTD while waiting for school to start. Passionate and driven, some of these Campus Builders, as they were called, had started work as early as December 2010.

The Council then gave way to the SUTD Student Government, renamed as Root in February 2013. Members of Root, who will serve a one-year term, adopted this name for two reasons. The first is because “Student Government” sounds distant and authoritative, and Root does not aim to govern the students, but to work alongside them to build the SUTD culture. More importantly, Root hopes to give the necessary support to students when needed, just as roots of real plants draw nutrients from the ground to grow. Similarly, it aims to gather resources to cultivate a vibrant student life and school culture. As real roots are useless without the rest of the plant, likewise, the Student Root would be meaningless without the students of SUTD.

The Council

The 1st Root, led by president Joshua Chong, is a mere 12-member team that forms five committees: Communications, Events, Finance, Housing and Student Initiatives. No committee for student welfare has been formed as the team strongly believes that they are all custodians who will act as a single body to take care of students’ needs.

The small team of Root is dependent on sub-committees — adhoc, project or term based — to carry out initiatives. These committees are open to all SUTD students’ participation on a voluntary basis, be it to organise events, help with school publications and welfare initiatives, etc. Root welcomes all students to join these sub-committees not only because it is a good way to cope with the manpower shortage, but also because they feel the opportunity to build school culture should not be presented to a select few; every student should have equal opportunity to contribute to the building of the SUTD Culture.

The main goal of Root is to brand itself to be recognised as the official student leadership body in SUTD. It aims to expand and recruit more members so they can better serve the students. The team also aims to carry on from where the Pro Tem Council left off, and continue building the school culture that will hopefully continue to echo down the generations of Root to come, as it is an ongoing and ever-changing process, and especially important for a new university like SUTD.

We welcome your participation in Root or any activities. Please email: connect@root.sutd.edu.sg.
The SUTD Game Lab held a 14-week nation-wide Game Innovation Programme (GIP) in May this year. 32 students from local polytechnics, design institutes and universities, participated in this annual internship programme, designed to foster the next generation of game visionaries. Building on GAMBIT’s strong track record, the SUTD Game Lab has also established partnerships with key industry players, such as Ubisoft Singapore, Boomzap Entertainment and ZelRealm Interactive, who supported the Game Lab as lab advisors, GIP mentors and product owners.

Managing Director of Ubisoft Singapore Mr Olivier de Rotalier said: “SUTD’s Game Lab has a very innovative internship programme and Ubisoft Singapore is proud to be part of this great initiative. I believe that the programme’s focus on high quality game design research will benefit Singapore’s game industry as it will push students to think out of the box and innovate.” Mr Rotalier is also the advisory member for the SUTD Game Lab and mentor for the GIP this year.

During the GIP, the students worked with various product owners or clients to address their goals. See table below.

The SUTD Game Lab will build on the success of the Singapore-MIT GAMBIT Game Lab, and aim to not only fulfil the hopes of the MDA in entrusting GAMBIT to SUTD, it will also create new opportunities to seed new innovators, entrepreneurs and advances for Singapore, the region, and possibly even the world.

SUTD Game Lab continually challenges game design fundamentals by creating games, such as its latest, “One Upon Light”, which was produced by the Game Lab’s staff. The game won the Best Game Award recently at the 5th Annual Independent Games Festival China (IGF China).
The Music Maker, conceptualised during the Introduction to Design course, is one of the top team design exhibits chosen by the fellow students of the cohort. It aimed to bring users into a virtual reality environment through the use of a Kinect player and enable them to make music through their interaction, such as touching objects, with this environment. Through the use of technology and music, the creators hoped users would be attracted and intrigued to learn more about the science behind the exhibit, i.e., how they were able to create beautiful music just by having fun.

The Music Maker may be something seemingly simple and intuitive, but the process of conceiving, improving and prototyping it was not an easy one. As a team of five all-male students – Chua Jie Han, Elisa Chiang, Ian Teoh, Tay Jenn Chong and Wong Shun Him, who were mostly goal-oriented and lacking attention to detail, the team did not do well at the start. The design process required much detail and information, but the amateurs lacked thought in its project framework. Many times they were disheartened but fought on… improved their time management by taking into account the deadlines and paid more attention to detail by documenting the design process in a clearer manner.

The project idea turned out to be very comprehensive but the prototyping phase posed an even bigger hurdle to overcome. With no prior coding experience, it initially seemed like the goals were too lofty to accomplish. Hours were poured into online research and quick prototyping. Armed with an online tutorial and a kinect library, the team managed to exceed their own expectations by creating a working prototype in a short span of 10 days. Improvements on the prototype were made during a two-day user-testing phase to iron out more technical issues. In total, more than 100 hours went into the project.

The day of the Design Exhibition was an overwhelming yet heartwarming one as the team shared their concept with many people, including their parents, friends and members of the public, and subsequently received recognition for all their effort.

The Music Maker - Design Project

BY CHUA JIE HAN

The five-member team behind the Music Maker

2D+ Challenge: Bringing Milk Delivery to Life

BY HANSON JIE

The task mirrored the running of an errand at a grocery store – except we are not robots. This was interesting because it allowed us to pause and think about a mundane routine that we do regularly without thought. Have we ever wondered how many thought processes actually go through in our minds when we embark on such a trip? For example, what is the best route to and from the grocery store? What do we mean by ‘best’? If we buy things that need to be refrigerated, when will we need to reach home by? These are just some of the questions that popped up as we discussed the task.

As we delved into the challenge in greater detail, we learnt about shelf life of food products and their degradation with respect to time and temperature. We also explored materials and even colours for optimal insulation. More importantly, we pondered about the applications of such an autonomous system. If we were able to transfer our daily decision making processes into an autonomous system, then the potential would be limitless. It can be a short-term solution to deliver supplies into disaster-ravaged areas. It can even be a boon for the elderly whose movements are hindered.

The end of the 2D+ challenge coincided with an Engineering Systems and Design (ESD) field trip to the SMRT Corporation, a public service operator, where students visited the main operations centre and depot for the Circle Line subway network, which works on a driverless platform. It struck me that real world transportation problems are similar to this 2D+ challenge on a large scale. Such challenges are microcosms of the real world. With an open mind, these challenges are not just academic projects, nor preparation for the pillar years, but the groundwork for design solutions towards a sustainable future.

Design Exhibition

65 remarkable student exhibits were displayed. SUTD faculty and the Science Centre Board(SCB)‘s rated them, and eight exhibits were subsequently selected for display at the Science Centre.

Objective

To learn systematic strategies, methods and techniques for solving design problems and Grand Challenges in the 21st Century.

This exhibition is a culmination of students’ projects from SUTD’s signature design programme starting with a 13-week Freshmore subject, Introduction to Design, which taught them concepts of design at a variety of scales and integrated with both engineering and architectural design disciplines. Students were exposed to core technology and design themes including principles, design processes, modes of thinking and analysis, relationships between form, space, structure and materiality, and social and cultural aspects of design. Their designs were brought to life by their hands on learning curriculum which taught skills in fabricating their designs in SUTD’s world class Fabrication Lab.
Biology: Strong Fundamentals and Bio-Inspiration for SUTD Students

By Lakshminarasimhan Krishnaswamy, Dawn Koh and Julia Zhu Yajuan

A good understanding of the basic principles of biology (the study of the life sciences) is important for a wide variety of applications such as development of new medical therapies, pharmaceutical drug design, agricultural and genetic engineering, and alternative energy research. The goal of this Introductory Biology subject is to provide students with a strong foundation in basic biology, incorporating fundamental principles from the fields of biochemistry, molecular biology, genetics, and cellular biology. The core material taught focuses on the cell and how it functions at the molecular level: the structure, synthesis, and regulation of genes and proteins and how these molecules interact to form different cell types, which in turn interact to form different multicellular systems and organisms.

The course also explored current issues and research in human biology, covering basic topics ranging from biodiversity, immunology, cancer, human genetics and ecology.

Throughout the course, we emphasise on a sound understanding of the fundamental concepts. This is achieved through our unique cohort-system based pedagogy, where students form small groups and engage in active, “hands-on, mind-on” learning exercises. Students’ understanding of the physical, biochemical and biological properties of milk was embellished through engagement in a project on milk preservation and robotic-mediated transportation. They used LEGO models to learn the ‘central dogma of DNA’, protein synthesis, and the basics of Mendelian genetics. They even solved fictional case of mystery over identity of biological parentage. The hands-on activities introduced the students to basic molecular biology experimental tools, and also let them observe the anatomy of heart and lungs dissected from sheep/pig - a preamble towards futuristic bio-engineering training. The novel “Forest-in-a-Lab” and a nature walk exposed the students to the richness of bio-diversity, physiology and economic botany, in order to bring forth the concept of Sustainability to their inquisitive minds. They also learnt about the significance of choice of plants for urban planning and greenery, in terms of aesthetics, safety, low maintenance and functionality. Learning out-of-the-classroom to gain bio-inspiration, the students visited the Sungei Buloh wetlands and learnt about the special adaptations of fauna and flora for survival in the harsh conditions (high wave energy, high-salt environment) of the mangroves.

Learning practical applications of factual knowledge is equally as important as learning the facts themselves. Therefore, emphasis will be placed on scientific methodology, experimental design, problem-solving, and data analysis, skills which are useful and applicable in biological research, as well as many other different science and engineering disciplines.

ICOnIC VOICES FROM MIT

Professor Peter Diamond, Nobel Laureate for Economics

By Chia Zong Hong Amos

- UNEMPLOYMENT AND DEBT

Nobel Laureate Peter Diamond gave an inaugural Iconic Voices from MIT lecture in Singapore on 3 April. Entitled Unemployment and Debt, it discussed the current Euro-zone debt crisis, with references to the U.S. credit crisis back in 2007. Firstly, he gave a recount on the causes, which he then analysed with examples to better illustrate the situation, such as low interest rates that fuelled loans and mortgages in Southern Europe. He then talked about how this resulted in the current crisis, what was done and the dilemmas facing governments and banks. Something new I learnt from this talk was the infrastructure grade point average (IGPA), which is an American report card that grades the quality and level of government spending.

Overall, this light-hearted lecture was insightful and educational. It summarised and made simple a very complex topic that has baffled the top brains in governments across most of the European continent. A personal take-away from this lecture would be that the international topics discussed could be extrapolated to oneself in terms of discipline and management.

- ECONOMIC RESEARCH AFTER THE GLOBAL FINANCIAL CRISIS

Professor Diamond’s second lecture held at SUTD the following day was very different from the earlier one, perhaps due to the difference in the target audiences between the two talks. While the one given to the public was mainly geared towards professionals and academics, the one at SUTD was basically for its students.

This lecture gave SUTD students who had little economics background, a very good insight into the mistakes of the government and corporate banks. He also shared his personal opinions on how the global financial crisis could be avoided or mitigated. Professor Diamond went on to explain that more resources should be diverted towards economic research as it is arguably a more complex problem than science and engineering subjects, as human beings are unpredictable creatures.

Overall, Professor Diamond’s lectures were understandable as they were peppered with less economics-related jargon. I look forward to more luminaries coming to SUTD to give such illuminating talks.