



THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

SPEAKERS



Dr. Claudia Xu

Director
Technology Transfer Center
Vice President
HKUST R and D Corporation
General Manager
HKUST R and D Corporation (Guangzhou) Limited
The Hong Kong University of Science and Technology

Biography

Dr. Claudia Xu is Director of Technology Transfer Center at the Hong Kong University of Science and Technology (HKUST), with responsibilities for the University's intellectual property management, patent portfolio development, patent licensing, academic-industrial collaboration, technology commercialization and entrepreneurship program. She also serves as Vice President of the HKUST R and D Corporation and General Manager of the HKUST R and D Corporation (Guangzhou) Limited, which are the two commercial arms of the University in Hong Kong and China respectively.

Dr. Xu's career has spanned over 20 years in management consulting, strategic planning, business development, and management and commercialization of high-value university research outputs and technologies. She started her career with the provincial Science and Technology Bureau in China. Prior to joining HKUST, Dr. Xu first worked for McKinsey & Company (Hong Kong) as Energy Specialist engaged in the energy, chemical and petrochemical, and utility sectors. She then moved to Bechtel (Asia Pacific) as a Strategic Planning Manager and subsequently as Business Development Manager, where she was involved in the development of large size infrastructure projects in the region.

Dr. Xu received a BEng and Ph.D. in Chemical Engineering, and a MEng in Energy Technology.

Abstract

Building Mainland China Partnerships at HKUST

Hong Kong stands in the unique position of a truly international city linking the East and the West and is a strategic gateway to Mainland China. Similarly, the Hong Kong University of Science and Technology (HKUST) has established global distinction as a research university with highly international orientation in focus, reach and impact, while at the same time has been actively pursuing opportunities to participate in the Mainland research schemes and collaborations with various Mainland organizations ranging from public to private sectors.

As of today, there have been over 50 collaborative arrangements with various universities and research institutes in the Mainland. The University formed early links with Shenzhen through an alliance in 1999 with Peking University and the Shenzhen Municipal Government leading to the establishment of the Shenzhen Industry, Education and Research (IER) Base and the Shenzhen PKU-HKUST Medical Center. With the support of the Shenzhen Municipal Government, HKUST opened its new research base in Shenzhen on 22 September this year, which marks another milestone in HKUST's development in the Mainland.

In Nansha of Guangzhou City, the HKUST Fok Ying Tung Graduate School was formed as the fifth school of HKUST in January 2007 with the mission to foster research and technology advancement and provides education through PG program, academic exchange and professional training.

Other collaborations in the Mainland include the Zhejiang Institute for Advanced Materials in Hangzhou City and Foshan LED Technology R&D Center in Foshan City, with which HKUST has established platforms for research, innovation, and technology transfer, along with training for local entrepreneurs. Private sector collaborative efforts include the Huawei-HKUST Innovation Lab set up on the HKUST campus, funded by world-leading telecoms solution provider Huawei Technologies.

Fostering these diversified links is an important part of our strategic outlook and mission at HKUST. Working together with our Mainland partners can complement each others' strengths to energize regional development in order to achieve win-win situation for innovation and strategic R&D development in the long run.



Professor Jow Ching Tu

Associate Professor
Division of Social Science
The Hong Kong University of Science and Technology



Biography

Prof. Tu Jow Ching, Division of Social Science, HKUST. The major research interests include population aging, mortality and health, fertility and gender, the socio-economic consequences of population changes.

Abstract

Population Aging and Economic Growth

With populations aging in nearly all countries, there has been widespread concern about the possible effects on economic growth and on the ability of countries to provide support for their elderly populations. In particular, because the elderly are in general less economically productive than younger people, a preponderance of old-age individuals would seem to suggest that (a) economic growth will be slower than in the past, and (b) relatively smaller working-age cohorts of the future will be burdened by the need to care for, and pay for the support of, the elderly population.



Professor Gordon McKay

Acting Head/ Professor
Department of Chemical & Biomolecular Engineering
The Hong Kong University of Science and Technology

Biography

Prof. Gordon McKay is the Acting Head of the Department of Chemical and Biomolecular Engineering at HKUST. Prof. McKay received his PhD from Bradford University in 1970 in Combustion Kinetics. In 1970, he was appointed Lecturer II in Chemical Engineering at Queens University, Belfast, Senior Lecturer in 1980 and Reader in 1985. During the years 1984-85, Prof. McKay was appointed as Professor and EC Project Manager to establish Faculty of Engineering at University of Jordan.

Prof. McKay served as an owner and CEO of Consultant Process Engineering and Management Systems Ltd. (1985-95), Senior Process Specialist, Project Management Ltd. (Foster Wheeler Ireland) and Project Manager of 200 HAZOPs, 20 EIAs, 5 IPCLs, 50 Environmental Audits & 100 Process Plant Designs.

Prof. McKay's research focuses on developing a fundamental understanding of the design and optimization of processes and products for environmental applications, waste minimization and energy recovery. Prof. McKay's current research activities include wastewater treatment for dyes and metals using adsorption, ion exchange and ozonation, biopolymers from crab and prawn shells, process design, dioxin removal, MSW processing and production of new adsorbents.

Abstract

Waste to Energy

Worldwide human society produces vast amounts of wastes from our own domestic and social activities, industrial, commercial and constructional activities. Our own community in Hong Kong of just under seven million people produce between nine to ten thousand tonnes per day of municipal solid waste and around two thousand tonnes per day of sewage sludge. At present almost all of this goes to our three landfill sites a very valuable resource on Hong Kong which could be used for other purposes.

Furthermore, it has been projected that the current capacity of these three sites will be exhausted in the next six to seven years. The proposed extension of one of these sites into a Country Park area has already caused a significant controversy in Legco.

What can we do? There are several pilot projects using different technologies under trial in Hong Kong but most are several years away from a full scale operating waste processing plant. A brief mention of these will be made in the presentation.

However, Hong Kong Government Departments, like most countries around the world in a similar situation, are proposing to alleviate the waste problem initially by the introduction of one or two large scale waste volume reduction processing plants using incineration. This presentation will discuss the advantages and disadvantages, particularly in terms of the emissions, of waste reduction by thermal treatment and show some photographs of some incinerators in other countries. You will see some results from a pilot plant constructed and operated in Hong Kong by Chemical Engineers from HKUST and engineers from Green Island Cement Company Limited.



Professor King Lun Yeung

Joint-Professor
Department of Chemical and Biomolecular Engineering and Division of Environment
The Hong Kong University of Science and Technology



Biography

Prof. King Lun Yeung, a joint-Professor of the Department of Chemical and Biomolecular Engineering and Division of Environment, received his Ph.D. in Chemical Engineering from the University of Notre Dame. Prof. Yeung's research is on smart materials in health, environment and energy applications, with more than 150 publications, 300 presentations and 12 inventions (ca. 36 patents) in these topics. Prof. Yeung is also editor of the Chemical Engineering Journal and member of editorial board of Catalysis Today, Recent Patents in Chemical Engineering, International Journal of Chemical Engineering. He is reviewer for major funding agencies around the world including USA's SBIR, PRF and NSF, UK's EPSRC and RSC, EU's F7, Singapore's A-Star and Czech's RCSS.

Abstract

Smart Antimicrobials for Healthy Living Environment

The World Health Organization (WHO) reported that one of the most common routes for transmission of infectious diseases is by indirect contact with surfaces contaminated with infectious droplets produced by the patient's coughing, sneezing and talking. Many microbes, including viruses can survive for days on surfaces. Hand contact with contaminated surfaces (i.e., fomites) and subsequent transfer of microbes to mucosal membrane of the mouth, nose and eyes is the cause of many reported gastroenteritis outbreaks (i.e., norovirus) and rhinovirus infections. Other pathogens known to transmit through fomites include cold virus, rotavirus, *P.aeruginosa* and methicillin-resistant *S. aureus* (MRSA).

Regular cleaning and disinfection are therefore important for breaking the chain of infection, and the use of antimicrobial surface coating provides an additional safeguard against disease transmission. HKUST has developed a system of smart antimicrobials designed to treat and disinfect air, water and surfaces of harmful microorganisms. The antimicrobial systems create synergy in design and function to achieve multilevel action against microorganisms to ensure rapid disinfection and long-term protection.

Smart responses were integrated in the design to achieve self-cleaning and self-disinfecting actions that are triggered by contaminating actions of touch and droplets. Laboratory, field and clinical tests were carried out to demonstrate the practical applications of these antimicrobial systems.



Professor Ali BeBa

Director
Entrepreneurship Center
Consultant
HKUST Business School

The Hong Kong University of Science and Technology

Biography

Prof. Beba graduated from the Middle East Technical University, Turkey and received his PhD in chemical engineering from the University of Tulsa, Oklahoma, USA. In his 30+ years of profession, he has worked extensively in and outside of Turkey for a range of public and private institutions as well as NGOs, including Smithco Engineering Inc, Procter & Gamble, UNEP, EU and WB. He served as the Chairman of the Environmental Protection and Packaging Waste Recovery & Recycling Trust (CEVKO) and taught engineering, business and entrepreneurship in academic institutions including Colorado State University in the USA; Ege, Yıldız Technical Universities and Ozyegin University in Turkey. In addition to his academic duties, he provides services for SMEs and NGOs to support their R&D projects and help them to draft professional business plans. He was the Academic Director for the Center for Entrepreneurship of Ozyegin University in Istanbul where he taught entrepreneurship to UG and MBA students and executed international outreach entrepreneurship activities such as, the Goldman Sachs Foundation (GSF)'s Global 10000 Women Entrepreneurs Program, European Forum for Entrepreneurship Research (EFER) and Life Long Learning (LLL) projects for EU. Prof. Beba is currently the Consultant of HKUST Business School and he is also the Director of the HKUST Entrepreneurship Center.

Abstract

Awakening Entrepreneurship in Knowledge Transforming Societies

Entrepreneurship is at a crossroads in East Asia. The former Asian Tigers — Hong Kong, Singapore, South Korea and Taiwan — have turned largely to technological innovation, constantly reinventing consumer goods and gadgets at ever-lower prices. Business innovation — the creation of wealth in new ways — is retreating, pushed on by generational change in populations and at the helms of once dynamic corporations. At stake is the prosperity that is all too often

considered permanent. In an era of corporations spanning the globe it is well worth recalling that small business established by entrepreneurs drives the world economy. Entrepreneurs use their initiative and imagination to generate breakthrough products and services. Whether social or monetary, wealth is at the very centre of the entrepreneurial spirit. Yet, wealth can be transitory. East Asia's population is ageing rapidly, which has the potential to restrict economic growth. The environment for fostering entrepreneurialism in the region is good but by no means great. R&D is limited throughout the region, with most innovation driven by foreign investors, and there are few incubation centers and limited angel investors and VCs from whom entrepreneurs can benefit. Family businesses predominate in this region, with often less than ideal succession planning, governance and financing. Very few family businesses survive to the third generation. As the economies of East Asia, including China, become freer, problems such as these will proliferate. In places with limited land, most notably Singapore and Hong Kong, "me too" investment mostly in real estate by family businesses intolerant of failure has the potential to create economic bubbles that could burst at any time. Obviously, this must change, and quickly. There is an urgent need to revive the spirit that drove entrepreneurs in East Asia to create an economic powerhouse of the region. Family businesses have the responsibility to reform themselves through professionalization and independent management. Governments, too, must develop adequate and enforceable frameworks in such areas as corporate governance and the protection of IP. The tertiary education sector also has an obligation to revive the flagging spirit of entrepreneurship in the region. HKUST, being well aware of its responsibility in this area, has started to implement campus-wide entrepreneurship programs and activities. The University currently is in the process of renewing its philosophy and restructuring the organizational structure of its EC which was established in 1999. HKUST 2011 Entrepreneurship Competition of May 17th, (<http://onemilliondollar.ust.hk>) was launched with this new philosophy and an expanded scope. This helped to promote the development of an entrepreneurial ecosystem at the campus and its impact was felt in the region. These efforts will be increased in-line with the concept of 1-HKUST in the coming year since the prosperity, and the future in knowledge transforming societies of this region well depend on awakening entrepreneurship.



Professor Matthew Tommasini

**Associate Artistic Director
The Intimacy of Creativity -
The Bright Sheng Partnership: Composers Meet Performers in Hong Kong
Composer-in-Residence/Adjunct Associate Professor
Division of Humanities**

The Hong Kong University of Science and Technology



Biography

Matthew Tommasini is Associate Artistic Director of the internationally-acclaimed workshop The Intimacy of Creativity – The Bright Sheng Partnership: Composers Meet Performers in Hong Kong at The Hong Kong University of Science and Technology where he also serves as Composer-in-Residence and Adjunct Associate Professor of Music. Mr. Tommasini holds degrees in music composition from the University of Michigan (DMA, MA) and UCLA (BA). He is a recipient of the Charles Ives Scholarship from the American Academy of Arts and Letters and grants from the ASCAP Foundation's Leonard Bernstein Fund and the American Music Center's Composer Assistance Program (CAP). He has been commissioned by prominent arts organizations including the Milwaukee Ballet, the New York Youth Symphony, and danzfest, the Italian international dance festival. His work has been performed by principal members of the Los Angeles Philharmonic, Dallas Symphony and the Detroit Symphony and by renowned chamber ensembles, including Daedalus Quartet, Antares, and Parker Quartet. He also serves as Composer-in-Residence of the southern California-based Connections Chamber Music Series, which he co-founded with members of the Pacific Symphony. His work is published by Alfred Publishing, recorded on the Centaur Records label, and has been featured on RTHK's Radio 4 and The Works television program.

Abstract

Witnessing Creativity in Action – Stimulating Learning in the Creative Arts through Direct Engagement with Composers and Performers

The value of direct engagement with the creative process in creative arts education is explored through a discussion of The Intimacy of Creativity – The Bright Sheng Partnership:

Composers Meet Performers in Hong Kong. The presentation begins by outlining the format and goals of the internationally-acclaimed, annual two-week workshop hosted by The Hong Kong University of Science and Technology (HKUST), which brings an international group of world-renowned performers and composers together with selected emerging composers to Hong Kong to revise and present chamber music compositions through in-depth open discussions and public performances. Specifically, the presentation explains how the workshop aims to turn the normally passive concert-going experience into an active, engaging one by asking audiences to re-think the traditional notion of a complete musical work, offering the unique opportunity to observe the revision process from start to finish. The presentation also explains how this project educates audiences about contemporary classical music, a genre little known and understood by the general public, by asking composers to speak about the ideas behind their work. The discussion continues by summarizing the direct impact of the workshop on Hong Kong audiences, including HKUST students enrolled in music courses, who, as part of the developing Creative Arts Program at HKUST, observe open discussions and public performances and write about their experiences. The discussion concludes with a summary of the project's broader engagement with the Hong Kong community via partnerships with Hong Kong-based arts and media organizations, including Radio Television Hong Kong (RTHK), the Leisure and Cultural Services Department (LCSD), and the Hong Kong New Music Ensemble (HKNME), among others, which play a key role in expanding the impact of the project and defining the event as an important part of arts and cultural offerings in Hong Kong.

POSTER PRESENTERS



Professor Karl W.K. Tsim

Professor

Division of Life Science & Director of Center for Chinese Medicine R&D

The Hong Kong University of Science and Technology

Biography

Prof. Tsim received his Bachelor and MPhil degree in Biochemistry from the Chinese University of Hong Kong. He pursued his graduate study in University of Cambridge and received his PhD in Molecular Neurobiology. He began his Post-doctoral training in the field of Neurobiology in University of Cambridge and followed by Stanford University School of Medicine. He then received an Assistant Professor position in the Hong Kong University of Science and Technology (HKUST), and now he is a Professor in the Division of Life Science and the Director of Center for Chinese Medicine R&D in HKUST.

Prof. Tsim's research interests cover three main areas: i) Molecular and Cellular Neuroscience. ii) Modernization of Traditional Chinese Medicine (TCM) and iii) Determination of drug/chemical residues in hairs. He has been publishing over 200 articles in high profile journals such as Journal of Neuroscience, Journal of Biological Chemistry and Planta Medica. He is the inventor of 10 patents in the field of TCM and hair drug testing. Not only having an excellent track record in research, Prof. Tsim also eager to share his research finding to different communities. He has been the organizing committee member for 40 international meetings and had provided mentorship to over 30 graduate students. His research team developed an efficient hair drug testing technology in the year of 2009 and has been providing over 1200 hair drug testing service to local communities. The mission of his research team is to transfer research findings to benefit the society.

Poster - HKUST-1



Project Objectives

We aim to promote hair drug testing technology and provide hair drug testing service to local communities to deter drug abuse among teenagers in Hong Kong.

Description of the project

According to the Central Registry on Drug Abuse, the no. of young drug abuser (age ≤ 21) has been increased 51% from 2006 to 2009. The ratio of young drug abuser also increased from 14% in 2006 to 24% in 2009. The average age of drug abuser continue to decrease and reach the age of 33 in 2009. Hong Kong Government has been taking different measures such as school drug test to tackle this problem. However, ketamine which is the most popular drug among young drug abusers, cannot be easily detected by the traditional urine drug test. Therefore, HKUST developed a hair drug testing technology in 2009 to provide free hair drug testing service to local communities to support and facilitate their rehabilitation program.

Strengths of hair drug testing include:

- Review drug consumption history for as long as a year
- Easy and safe sample collection procedure
- Hair sample is difficultly adulterated
- Stable nature of hair allows re-analysis of the same hair sample

Hair drug testing platform in HKUST:

- Able to detect over ten common drugs including cannabis, ketamine, cocaine, MDMA, amphetamine and methamphetamine
- Require only 5-10 hair strands
- 1000 times more sensitive than the traditional method

Impact and Contributions

We have been providing over 1,200 free hair drug testing service to the local communities in the past two years. We also performed survey on the collected hair samples. Over 500 questionnaires from different non-government organizations were collected (Fig. 1) and the data was summarized in Fig. 2:

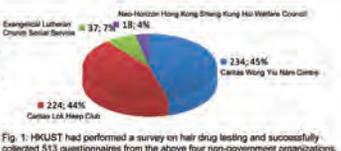


Fig. 1: HKUST had performed a survey on hair drug testing and successfully collected 513 questionnaires from the above four non-government organizations.

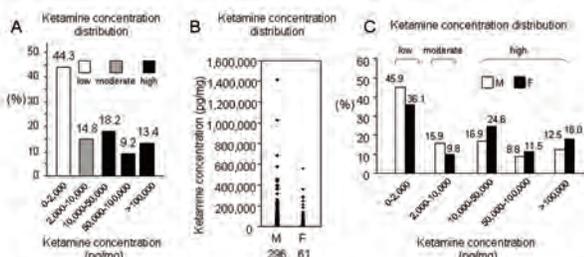


Fig. 2: Studies on ketamine consumption pattern among male and female drug abusers.

- Over 40% of ketamine abusers are considered consuming high concentration of ketamine (>10,000 pg/mg). Among them, 13.4% are consuming very high concentration of ketamine (>100,000 pg/mg).
- The highest ketamine concentration found in male and female hair samples are 1,418,500 pg/mg and 549,026 pg/mg, respectively. However, the average ketamine concentration found in male and female hair samples are 49,129 pg/mg and 58,806 pg/mg, respectively.
- Over 50% of female ketamine abusers are classified as consuming high ketamine concentration, it is 15.9% more than those found in male ketamine abusers. Moreover, about 18% of female ketamine abusers are considered consuming very high concentration of ketamine, indicating ketamine abuse is a very serious problem among the female drug abusers in Hong Kong.

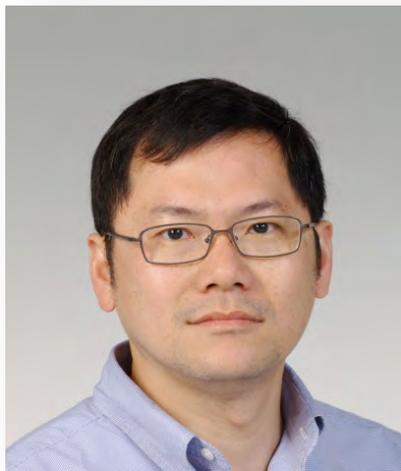
Project Team:

Division of Life Science, HKUST
 Prof. Karl WK TSIM, Professor
 Dr. David TW LAU, Assistant Research Professor
 Dr. Wing KW LEUNG, Research Associate
 Dr. Annie KL TING, Research Associate
 Mr. Zack CF WONG, Research Assistant
 Miss Winki YY NG, Research Assistant



Project Sponsor:

Beat Drug Fund (BDF101014)



Professor Chak K. Chan

Head and Professor
Division of Environment
Professor
Department of Chemical and Biomolecular Engineering
Director
Institute for the Environment
The Hong Kong University of Science and Technology

Biography

Dr. Chak K. Chan obtained BSc in Chemical Engineering from the University of Texas at Austin in 1986 and PhD in Chemical Engineering from the California Institute of Technology in 1992. He is currently Head and Professor of Division of Environment, Professor of Chemical and Biomolecular Engineering, and Director of the Institute for the Environment at HKUST. His research interests include air pollution, aerosol science and atmospheric chemistry. He has published over 100 papers with citations to date over 3700 and an H-factor of 32. He received Second Prize of the State Natural Science Award in 2010 and First Prize of the Natural Science Award in 2007. He is an Editor-in-Chief of *Atmospheric Environment*.

Poster - HKUST-2



Project Objectives

(a) Mobile Real-time Air Monitoring Platform (MAP)

A mobile air quality monitoring facility built on a vehicle for continuous measurements of air pollutants while in motion to obtain snapshots of the spatial distributions of air pollution levels on the streets.



(b) HKUST Air Quality Research Supersite

An integrated research facility to measure the real-time air quality data and the physical and chemical properties of airborne particulate matter (PM).

Brief Description of the Project

(a) Mobile Real-time Air Monitoring Platform (MAP)

- It collects air pollution data as it travels, anywhere accessible by road, including highways, urban streets, tunnels and bus depots.
- It is also a research platform for tracking on-road pollution automobile emissions, and large-scale environmental and episodic studies.



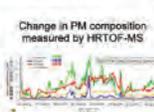
On-road pollution tracking of MAP

(b) HKUST Air Quality Research Supersite

- It has a total floor area more than 1,000 m² with an automatic weather station tower and outdoor plinths for samplers & equipment.
- It has a 72 m² weather-proof air-conditioned modular house, which houses a variety of the state-of-the-art real-time instruments for physical and chemical characterization of gases, volatile organic compounds (VOC) and particulate matter (PM).



LIDAR, VOC Analyzer and CCN counter in HKUST Supersite



Change in PM composition measured by HRTOF-MS

For more information on the supersite, please visit the supersite webpage at <http://www.emvr.usst.hk/supersite>.

Project Team:

Mobile Real-time Air Monitoring Platform (MAP)
Chak K. Chan, Ming Fang, Arthur Lau,
NT Lau, XH Yao, HY Chen

HKUST Air Quality Research Supersite
Chak K. Chan, Alexis Lau, Christopher Chao,
Jimmy Fung, Arthur Lau, NT Lau, Jian Yu (HKUST),
Frank SC Lee (HKPU)

Project Sponsor:

The Hong Kong Jockey Club Charities Trust (MAP)
Environment and Conservation Fund and
the University Grants Committee (HKUST Supersite)

Impact and Contribution

(a) Mobile Real-time Air Monitoring Platform (MAP)

The platform is used extensively for air quality research studies as well as educational programs:

- It is listed in the Hong Kong Engineering Archive of the Hong Kong Institution of Engineers, as an example of achievements that HK engineers have made to the society.
- Over 25,000 km equivalent of air quality data in HK and Macau have been collected.
- A comprehensive street-level air quality survey for the 18 Districts of Hong Kong was conducted in collaboration with Civic Exchange in 2009-10.
- Over tens of schools have been visited through the HKUST School Outreach Program in which we gave lectures and conducted demonstrations of the MAP.



MAP in Standard Chartered Bank Marathon 2007



Demo to regulatory agencies, industries and students

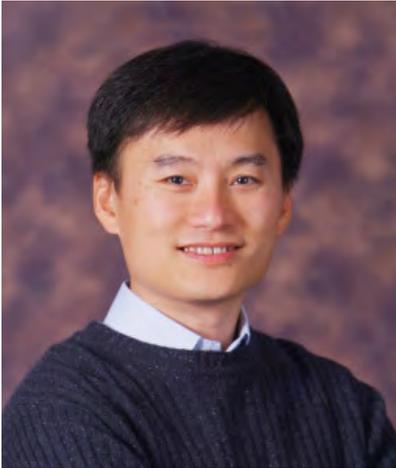
(b) HKUST Air Quality Research Supersite

The Supersite facility is designed and operated in the way:

- to facilitate and foster research to solve the air quality problems in Hong Kong using advanced methodology and instrumentation
- to promote the inter-institutional collaborations between HKUST and other institutions, regulatory agencies and industries
- to be used as a training facility for postgraduate and undergraduate students
- to be used as an education platform for the public on air quality issues



Inauguration ceremony and visit of the HKUST Air Quality Research Supersite



Professor Gary Shueng-Han Chan

Associate Professor
Department of Computer Science & Engineering

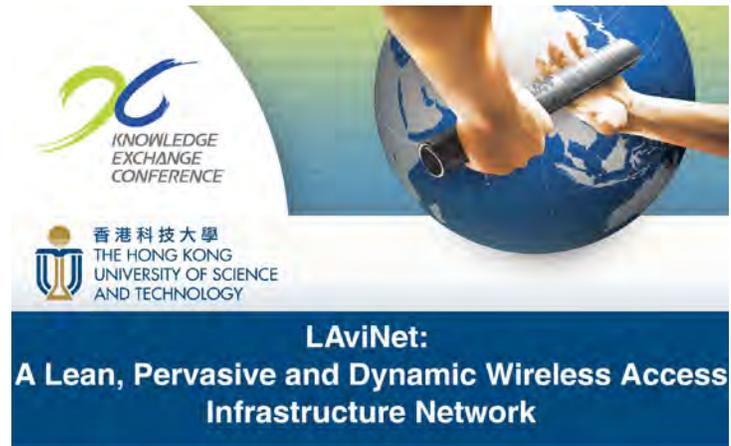
The Hong Kong University of Science and Technology

Biography

Prof. Shueng-Han Gary Chan is an Associate Professor in the Department of Computer Science and Engineering at HKUST. Prof. Chan got his BSE in Electrical Engineering from Princeton University. At Princeton, he was the recipient of Charles Ira Young Memorial Tablet and Medal, awarded "to the student who excels in research in EE." He also received the POEM Newport Award of Excellence, awarded "to a senior who has demonstrated high scholastic achievement and also shown high potential for leadership in the field of photonics, electro-optics or optoelectronic materials." He won the Sigma Xi book award in 1993. He is a member of honors societies Tau Beta Pi, Sigma Xi, and Phi Beta Kappa, and a senior member of IEEE since 2003.

Prof. Chan has been conducting research and development on wireless and peer-to-peer networking for more than 15 years with very fruitful results. Focusing on applied research useful to industry, he currently has more than 10 patented or patent-pending inventions and 110+ papers published in these areas. Prof. Chan has chaired/co-chaired numerous international conferences. He has over 6 years of ITF experience with 4 ITF projects, and has a strong team addressing software and deployment issues of his ITF projects.

Poster - HKUST-3



KNOWLEDGE EXCHANGE CONFERENCE
香港科技大学 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

LAviNet: A Lean, Pervasive and Dynamic Wireless Access Infrastructure Network

Project Overview

LAviNet is a software solution for a lean, pervasive and dynamic wireless access infrastructure network. Smart Access Points (APs) can cost-effectively cover most of the area, but it is hard to eliminate all the blind spots. LAviNet uses a multi-hop approach which complement and extend the coverage of those APs with its flexibility, intelligent channel assignment and routing to achieve ubiquitous wireless access. It is a research project supported by HK Innovation and Technology Commission and carried out by Hong Kong University of Science and Technology, and with strong supports from the industry.

LAviNet offers two software products:
1. LAviNet Mesh: Embedded mesh network software build on top of the firmware of existing APs.
2. LAviNet Manager: A server application that monitors and manages wireless network with web-based interface.

Key Features of LAviNet Mesh

- Self configuration, self adjustment, self healing
- Best path selection
- Fast switching: every mesh node actively keeps a backup path, which enables efficient routing switch to the backup path if the main path is blocked
- Intelligent channel assignment: Minimize interference and maximize overall throughput
- Layer 2 switching and layer 3 dynamic routing
- Client and mesh node roaming and tracking
- Support OSPF and RIP routing protocol
- Dynamically adjusted for optimal network performance, load-balancing, and throughput improvement
- Flexibility, plug-and-play and easy to deploy
- Transparency: Compatible with most existing Wi-Fi APs and end-clients
- Existing AP add-on: Support features on existing AP, such as:
 - 802.11 s/airn operating modes,
 - WEP/WAP/WAP2 security standards,
 - proprietary antenna technologies.
- Enable interoperability among APs: when loaded with LAviNet mesh, APs of different brands will operate in a single mesh
- Support both centralized and distributed wireless operation: optimized central controlling but will switch to distributed mode automatically if central controller is not available
- Support hidden SSID: Prevent accidental association
- Support multiple SSIDs: Establish standalone authentication and encryption schemes
- Support VLAN: logical group of clients

Key Features of LAviNet Manager

- Easy to use, light weight and high performance
- Web interface runs on multiple browsers
- Single interface for multiple networks
- Remote network control and management using CAPWAP protocol
- Realtime visual representation of outdoor/indoor topology using Google Maps or user defined floorplan
- Realtime status monitoring of mesh gateway, mesh nodes and clients associations
- Static collection and graphical presentation of client associations and network throughput
- Logging and alerts
- Manager/Backup that provides realtime data synchronisation to the backup server with disaster recovery mechanism

Successful Stories



The environment in the Modern Terminals Limited (MTL) is full of dynamics. Large moving cranes, lorries and containers often form moving "metal walls" that blocks the signal transmission from hop to hop intermittently. One of the features of LAviNet is fast-switching. Every hop is actively calculating and searching for a best backup link. So at any time, each hop will have both a main link and a backup link. If the main link is down, the fall over to the backup link is almost instant. This mechanism ensures that during the restructuring of hop paths, the client connections are completely unaffected. This is critical to the busy operation on both where the data submissions and verifications are very frequent. The operation efficiency has been greatly improved. After our successful trials, LAviNet has been adopted and deployed in MTL since September 2011.



At Boeing and HAECC, aircraft maintenance is a huge and complicated task. There is increasing bandwidth demand even for mobile users. However, parked planes, hangars and corridors create many dynamic blind spots. By using a LAviNet-enabled wireless network, a great deal of time and effort currently spent on paperwork and commuting on foot between the aircraft and maintenance office to check records, update logbooks and sign off worksheets can be reduced. This enhances efficiency of aircraft maintenance operations, which in turn means more productive use of aircraft, which then helps to increase revenue.

Project Team

LAviNet is driven by two forces — the fruitful academic research results and strong industrial demands. The team comprises many faculty members, staff members, postgraduate students and graduate students. Led by Prof. Gary Chan, the research team are working hard to realize our dream of "wireless everywhere".

Sponsors



Team Contact

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The Hong Kong University of Science and Technology,
Clear Water Bay, Hong Kong
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Professor King Lun Yeung

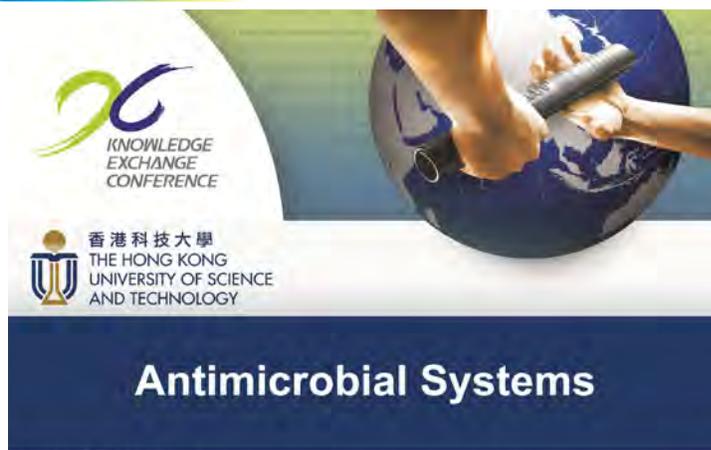
Joint-Professor
Department of Chemical and Biomolecular Engineering
and Division of Environment

The Hong Kong University of Science and Technology

Biography

Prof. King Lun Yeung, a joint-Professor of the Department of Chemical and Biomolecular Engineering and Division of Environment, received his Ph.D. in Chemical Engineering from the University of Notre Dame. Prof. Yeung's research is on smart materials in health, environment and energy applications, with more than 150 publications, 300 presentations and 12 inventions (ca. 36 patents) in these topics. Prof. Yeung is also editor of the Chemical Engineering Journal and member of editorial board of Catalysis Today, Recent Patents in Chemical Engineering, International Journal of Chemical Engineering. He is reviewer for major funding agencies around the world including USA's SBIR, PRF and NSF, UK's EPSRC and RSC, EU's F7, Singapore's A-Star and Czech's RCSS.

Poster - HKUST-4

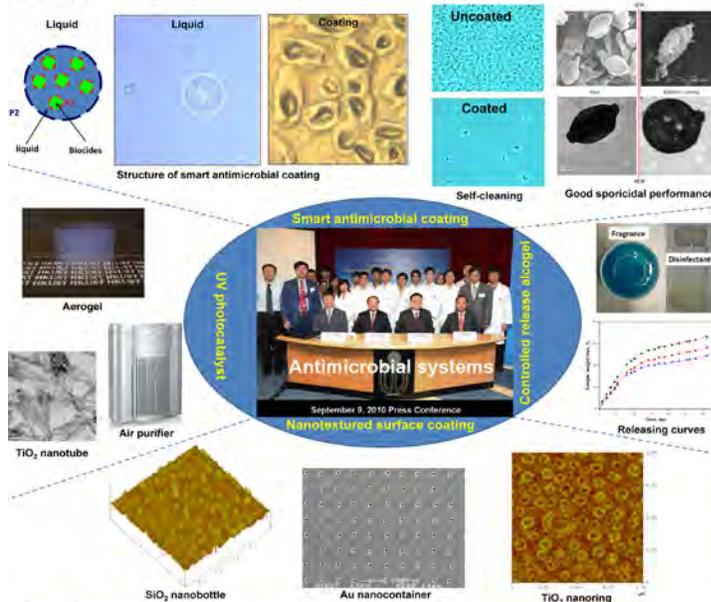


Project Objectives

Each year, about one billion people worldwide suffer from influenza infection with fatalities reaching half a million. These figures will further increase whenever a new strain of virus emerges. Hand, foot and mouth disease is another global public health threat, and in China alone, 1.3 million cases were recorded in the first 8 months of this year. As contaminated surfaces are common vehicles for the spread of microbes, keeping surfaces clean in public areas is essential in controlling the spread of infections through physical contact. By stopping this route of infection, disease transmission can be better controlled.

Brief Description of the project

Antimicrobial systems based on smart antimicrobial coating, nanostructure, UV photocatalyst and controlled release algogel are developed by HKUST to keep surface and air clean for individual and community. A smart antimicrobial coating that last for months in a single spray, safe and easy to use as well as environmentally friendly was formulated using USFDA and USEPA approved ingredients. Nano-encapsulated within smart materials, the coating self-cleans and self-disinfects when touched or contaminated. The coating kills 99.99 % bacteria in 1 min, 99 % H1N1 swine flu virus in 3 min and 99 % spores in half hour. The coating is tested at Hong Kong public hospitals and shows good practical performance. Antimicrobial technologies of UV photocatalyst and controlled release algogel have been commercialized by local and international companies. New nanotextured surface coating is in development.



Impact and Contributions

Antimicrobial systems will revolutionize public and personal hygiene by providing effective measures against the spread of infection. It would enhance the general health and well being of the population and also reinforce the positive image of Hong Kong as a "World City".

Project Team:

Leaders

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