



# Hong Kong IoT Awards 2014

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# Welcome Message

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Growth in the global Information and Communications Technologies (ICT) industry is driven by the demand for mobile devices such as smartphones, mobile networks as well as greater use of social networks and business analytics. This has paved the way for the rapid ascent of the Internet of Things (IoT), a network of devices with sensing capabilities to collect data from the world around us, and share the data across the Internet where it can be processed and utilized for myriad purposes. It is a disruptive technology that will radically transform our daily lives, businesses and global economy. According to the McKinsey Global Institute, the projected economic impact of IoT applications can be as much as US\$5 trillion to US\$7 trillion by 2025.

Hong Kong has an advanced infrastructure with excellent global connectivity and is therefore in a good position to be a vibrant IoT hub in Asia. Our telecommunications infrastructure provides a robust foundation for supporting the development and deployment of innovative services at competitive prices. Furthermore, IPv6 (Internet Protocol version 6) is ready to provide sufficient IP addresses to meet the enormous demand, generated by IoT devices interconnecting and interacting with each other over the Internet. Under the 2014 Digital 21 Strategy, the government proposes to leverage on IoT and other emerging technologies like big data analytics to build smarter infrastructures and provide better public services in the city.

The Hong Kong IoT Awards, organized by GS1 Hong Kong, presents both a great opportunity and a high-profile platform to recognize excellence in IoT innovations among local industries, enterprises and tertiary institutes. The event started out in 2008 as the Hong Kong RFID Awards. Since then, we have noticed the entries increasing, reaching a record number this year. Until now, we have received over 300 entries from both organizations and students. Nearly 500 young talents have participated in our U-21 Awards Program. I am delighted to see many truly inventive and engaging entries that push the boundaries creatively and inspire us to think differently about IoT applications.

As the local chapter of GS1, a not-for-profit global supply chain standards organization, has been involved in the evolution of Internet of Things since 1999, at a time, when a group of retailers and manufacturers members supported the MIT Auto-ID Labs to research for potential usage of RFID in the next generation supply chain. By 2003, Auto-ID Labs' research was evolved to the formation of EPCglobal standards, with the vision of 'Internet of Things'. Under the auspices of ion of GS1, EPCglobal Inc was formed to undertake the task to drive EPC standards adoption around the world. GS1 Hong Kong has worked closely with the Government to raise the bar on local industry in line with internationally recognized standards and best practices, while harnessing technology intelligently.

Before I close, I would like to thank the Government and leading minds of industry for supporting the Awards, and making it one of the most prestigious events in this field. Heartiest congratulations, too, for all Hong Kong IoT Awards recipients and I wish you the very best in your endeavors. Thank you.

**Ms. Anna Lin, J.P.**  
**Chief Executive**  
**GS1 Hong Kong**



# Congratulatory Message

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I am delighted to congratulate GS1 Hong Kong on its silver jubilee as well as the Hong Kong Internet of Things Awards 2014 Presentation Ceremony.

Over the past 25 years GS1 Hong Kong has played a pivotal role in establishing Hong Kong as a leading trade and logistics hub. I wish to thank GS1 Hong Kong for continuously promoting technological adoption and knowledge exchange in achieving world class supply chain management. Through the innovative accomplishments of the award winners, the efficiency of the entire supply chain was highly enhanced. The Internet of Things allows the integration of time, place and people simultaneously, accelerating the tracking process and improving the transparency of workflow through internet-enabled devices.

The Government is committed to nurture a vibrant innovation culture in the society, and support the development and adoption of supply chain management related solutions and applications of related technologies.

Lastly, I would like to congratulate GS1 Hong Kong on organising such a successful event. I am sure that GS1 Hong Kong will continue to contribute the very best to Hong Kong.

**Miss Janet Wong, J.P.**  
**Commissioner for Innovation and Technology**  
**The Government of the Hong Kong Special Administrative Region**

# About the Hong Kong IoT Awards and U-21 IoT Awards 2014

## The Organizer

GS1 Hong Kong's mission is to enable Hong Kong enterprises to have more efficient, visible and safer supply chains through the provision of global standards and a full spectrum of standards-based solutions and services, thus making possible business optimization and value creation. It engages with communities of trading partners, industry organizations, governments, and technology providers to understand and respond to their business needs through the adoption and implementation of global standards.

## The Objectives

IoT (Internet of Things) refer to any smart interconnected devices (e.g. RFID, sensors, etc.) that enterprises or organizations adopt to obtain more visibility into the identification, location, and condition of products, assets, transactions, or even people with the ultimate goals to be able to trace their pedigree and to drive more effective, timely business decisions or to improve customer interactions, leveraging the Internet backbone.

The Hong Kong Internet of Things (IoT) Awards bring recognition to the best practice of applying Internet of Things enabling technologies spanning from **sensors, M2M, cloud computing, big data, data analytics, to storage, security, mobility and business intelligence** with the ultimate goals to uplift business performance and customer satisfaction.

The Hong Kong Internet of Things (IoT) Awards (Formerly known as Hong Kong RFID Awards) is established in 2014 by GS1 Hong Kong with two key purposes:

1. To widen the adoption of IoT technologies in the community, to promote the efficiency of the industries, services, product qualities and overall competitiveness.
2. The IoT Awards program aims to champion the original IoT application and product development so as to promote creative exploitation of IoT technologies and to meet the market needs.



## The Awards Categories

### 1. IoT Implementation Excellence | RFID Implementation Excellence

The winner of this award will demonstrate successful implementation of IoT technology(ies) / RFID technology(ies) in business operation to deliver business value and return on investment through cost savings, operational efficiency gains, improved production and supply chain management, and better customer service, etc.

### 2. IoT Application Innovation | RFID Application Innovation

The winner of this award will demonstrate a high degree of innovation and creativity in the application and the innovative use of IoT technology(ies) / RFID technology(ies) to solve operational issues and meet business challenges, such as improving customer service quality and operation efficiency, etc.

### 3. Winning IoT Technology | Winning RFID Technology

The winner of this award will be an IoT / RFID product or solution, which is innovative, easy to deploy, cost effective, addresses market needs and provide additional value to its customers.

## Cross-border Recognition



The Guangdong - Hong Kong IoT Awards program is co-organized by GS1 Hong Kong and Guangdong - Hong Kong RFID Technology Service Centre. To drive industry adoption of IoT Technology and further enhance the co-operation on IoT applications in Hong Kong and Guangdong region, we have nominated the winners of the Hong Kong IoT Awards to participate in the Guangdong-Hong Kong IoT Awards.



## Hong Kong U-21 RFID Awards

### The Objectives

Hong Kong U-21 Internet of Things (IoT) Awards aim to bring recognition to creative young talents who were committed to developing new IoT applications or technological products to address business issues and problems of daily lives. Against this backdrop, the Hong Kong U-21 IoT Awards program is established to:

- Foster collaboration between industry and academia to develop new IoT applications and technological products with market potential
- Nurture a new generation of technical professionals with creativity and business acumen
- Stimulate market demand for innovative IoT applications and products
- Inspire new insights into the industry with the innovativeness and enthusiasm of tertiary students



### The Hong Kong U-21 Awards Categories

#### 1. IoT Revolution Concept

The winner of this award will demonstrate a high level of originality and creativity in adopting IoT technologies spanning from sensors, M2M, cloud computing, big data, data analytics, to storage, security, mobility and business intelligence etc. with the ultimate goals to uplift business performance and customer satisfaction, and address a well-defined business issue or problem in daily life, which has foreseeable market potentials.

#### 2. IoT Revolution Application

The winner of this award will be an IoT application, integration or product, which is innovative, possesses distinctive features, and may also address market needs. Heavy weight will be allocated for projects developed through partnership between an enterprise and an academic institution.

### Cross-border Recognition

Hong Kong – Taiwan IoT Academia Awards is another cross-border award program established by GS1 Hong Kong and GS1 Taiwan with the mission to bring recognition to creative young talents in Hong Kong & Taiwan.

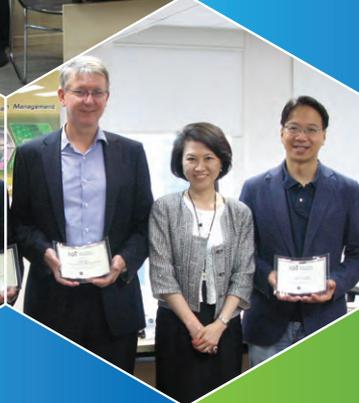


# Hong Kong IoT Awards 2014

## By Numbers

86

Entries Received



4

Internet of Things  
Knowledge Transfer  
Sessions



36

Organizations  
Participated



39

Panelists Involved





**16**  
U-21 Mentors  
Participated

**68**  
Awards Granted



**239**  
Students  
Participated



**27**  
Tertiary Institute  
Departments



**45**  
Assessment  
Hours Spent



**8**  
Cross Border Award  
Recognition Received



# Hong Kong IoT Awards 2014

## Messages from the Judging Panel



**Mr. Robert Burton**  
**Panel Chair**  
**President**  
**Hong Kong Internet of Things Industry Advisory Council**

It is my great pleasure to extend congratulations to all the winners of the Hong Kong Internet of Things (IoT) Awards 2014, on behalf of the Panel of Judges, as the President of the Hong Kong Internet of Things Industry Advisory Council.

I am very glad being one of the panel judges to review many innovative IoT applications. Throughout the discussion with the award participants, I have experienced very innovative, but definitely applicable solutions for fulfilling the market needs. The participants' passions and creative ideas result not only award winning but also further enhancing our living styles, in many different aspects.

Our society and our organizations shall encourage more participation of the IoT Awards in the coming years. The IoT Awards not only promotes successful IoT applications for meeting business needs, but also telling the world that we have great talents in Hong Kong. Those talents will continuously contribute and develop our community, our environment and our future.

I look forward to meeting more participants in the next year Hong Kong IoT Awards.



**Mr. Andy Bien**  
**Chief Information Officer**  
**Airport Authority Hong Kong**

Hong Kong community has shown, through this Hong Kong IoT Awards program, many outstanding innovations in product development and its adoption in exciting business cases. I especially send my congratulations to the recipients of the awards. I look forward to seeing further innovative IoT uses and products.



**Mr. Andrew Ling**  
**Group Director of Information Technology**  
**Esquel Group**

We have entered the world of the Internet of Things (IoT) - a world that brings people, data, processes and things together into a vast web of connectivity. With the exciting developments in IoT with unprecedented potential, the rapidly expanding IoT represents an increasingly digital and mobile world that promises to improve our lives and the betterment of our community.

I am very delighted to see so many excellent and high-quality IoT/RFID projects were awarded by GS1 Hong Kong this year. Please accept my heartiest congratulations for the great achievement from the winners. I wish this well-reputed awards program would continue to encourage excellence in making IoT innovations and adoption in our society.



**Mr. Yeap Soon Kuan**  
**Manager, Costuming Distribution**  
**Hong Kong Disneyland**

Among this year's entries, I am very excited to see so many innovative solutions. My congratulations to all the winners of the IoT Awards 2014. Many of them are pioneering the application of IoT/RFID in their respective lines of industry. I applaud them for their contributions to safety, customer service, environment and efficiency through innovative use of technology. Their efforts will inspire others to adopt similar implementations in years to come.



**Ir Dr. Karl P.H. Leung**  
**Head of Department of Information Technology**  
**Hong Kong Institute of Vocational Education**

I wish to extend our heartfelt congratulations to all the winners of the Hong Kong IoT Awards 2014. It is my pleasure and honour to be able to participate in this prestigious award. Thanks for the hard work and dedication of GS1 Hong Kong, the Hong Kong IoT Awards has evolved from the Hong Kong RFID Awards with increasing recognition. The awards program recognizes the innovations and efforts of our local enterprises and individuals in enhancing the IoT technology or enriching the applications of the technology. With the synergy of these advancements and business community, our lives would become smarter and easier.



**Mr. Rainer Duespohl**  
**Vice President (Business)**  
**Hong Kong Internet of Things Industry Advisory Council**

As an honoured member of the judging panel, it is my deepest pleasure to congratulate this year's participants and winners.

It has been an incredible judgment day to see the energy and passion of you presenting new innovative ideas, out of the box approaches and value added technology application around RFID and IoT. The quality and the professionalism of the concepts and implementation are impressively high and demonstrates the maturity we have here in Hong Kong and China in our IT community around EPC/RFID.

I would like to sincerely congratulate the winners of this year, who have clearly demonstrated that the RFID technology is pushing IoT to the next level of usage and consumer benefits. Your projects and showcases will inspire and generate more adoption of today's available technology for a broad audience and make it a commercial relevant businesses. The projects are very impressive and the winners of the Hong Kong IoT Awards 2014 should be proud to be recognized for the excellent achievements.

Congratulations once again.



# Hong Kong IoT Awards 2014

## Messages from the Judging Panel



**Dr. Lawrence Cheung**  
**General Manager, Automotive and Electronics**  
**Hong Kong Productivity Council (HKPC)**

I am really excited to see the level of innovation and sophistication of this year award entrants. They are truly representative of Hong Kong spirit of vibrancy and market sensitivity. IoT is not a thing to come. It is already here. It is evidenced by the maturity of the award entrants that will have impact on all parts of our lives. Many congratulations to all the Awardees as your entrants are truly amazing. I wish you great success in the future!



**Mr. Simon K.Y. Wong**  
**Chief Executive Officer**  
**Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM R&D Centre)**

The emergence of internet-of-things (IoT) has facilitated technological improvements in various fields, including transportation, logistics, retail and healthcare sectors. The IoT technology is thus becoming more important in today's business environment and will likely bring a multitude of business opportunities and benefits in the coming future. I sincerely congratulate the winners for their exceptional accomplishments, and I look forward to seeing them to pursue continuing development in the area of IoT.



**Mr. Tony Cheng**  
**Marketing & Sales Division – IT & Telecom Cluster**  
**Hong Kong Science & Technology Parks Corporation**

It is my honour to be a member of the judging panel this year. I am pleased to see most of participating projects applying different types of technologies and adopting a wide range of applications in different industries. Through this awards program, it can promote development of IoT and innovative technology in Hong Kong. I would like to take this opportunity to congratulate the winners on their excellent achievements.



**Ms. Angela Ho**  
**Senior Service Promotion Manager**  
**Hong Kong Trade Development Council (HKTDC)**

Congratulations to all winners of the Hong Kong IoT Awards. The Hong Kong IoT Awards promote the development and adoption of RFID / IoT - the technology bringing us a smarter life and better future. It is my honour to be a member of the judging panel this year and I am pleased to see many local innovations have been successfully transformed into user-friendly commercial applications. Clearly, the awards program, recognizing excellence of local home-grown creativity, will continue to create business opportunities for Hong Kong companies and talents. Congratulations again and I look forward to seeing more brilliant ideas coming up!



**Ir Dr. Hon. LO Wai Kwok, BBS, MH, J.P.**  
**Legislative Councillor (Engineering)**  
**Legislative Council of the Hong Kong Special Administrative Region**

I am honored to be a member of the judging panel of the Hong Kong IoT Awards 2014. In the competition, a lot of innovative ideas emerged and vividly demonstrated the boundless potential of the applications of IoT in various business sectors and in our daily life. I would like to congratulate all the participants and winners for their efforts and contribution on IoT development.



**The Hon. Charles Peter Mok, J.P.**  
**Legislative Councillor (Information Technology)**  
**Legislative Council of the Hong Kong Special Administrative Region**

Congratulations on being awarded the HK IoT Awards, this prestigious recognition from GS1 Hong Kong demonstrates the outstanding effort of the local ICT industry in conjunction with other industries to push forward the era of M2M communications for the improvement of business operations and also quality of life. I look forward to seeing more creative implementation of IoT and RFID technologies. I wish the awardees success in continued innovation.



**Prof. Ke-Li Wu**  
**Director of Radio-frequency Radiation Research Laboratory**  
**The Chinese University of Hong Kong**

Thanks to GS1 Hong Kong's efforts to organize this important IoT event in Hong Kong and their efforts in promoting innovative IoT technologies in Hong Kong. I am glad to be a Judge for the HK IoT Awards 2014, and to witness the innovation and accomplishment made by our local industry. I wish this well-reputed award event would continue to encourage more adoptions of IoT technologies into our life and businesses to enrich our life quality, improve our living environment and enhance our competitiveness. Congratulations to the winners on their excellent achievements.



# Hong Kong IoT Awards 2014

## Messages from the Judging Panel



**Dr. Andrew Ip**  
**Associate Professor, Department of Industrial and Systems Engineering**  
**The Hong Kong Polytechnic University**

I am honored to be a judge for the Hong Kong Internet of Things (IoT) Awards, a brand new awards program established this year. As emerging technologies, wide adoption of IoT technologies would definitely enhance efficiency and competitiveness of different industries. It is really impressive to see the innovative ideas and applications of IoT technologies on various businesses and services sectors, and those successful innovations would be persuasive demonstrations to further promote the adoption of IoT technologies. I would like to take this opportunity to congratulate the winners, and wish the Hong Kong IoT Awards will continue its success to encourage more innovations and applications of IoT technologies.



**Prof. Shing-Chi Cheung**  
**Associate Head of Department**  
**The Hong Kong University of Science and Technology**

I am honored to be a Judge for the HK IoT Awards 2014, and am proud of the innovation and accomplishment made by our local industry to advance the RFID/IoT technologies and their applications. I need to express thanks to GS1 Hong Kong for her effort to organize this annual event. I look forward to seeing the winners of the awards to make further advancement in the coming year.

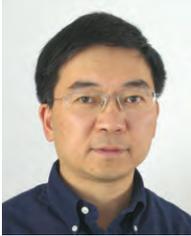


**Prof. George Q. Huang**  
**Professor and Head of Department**  
**Department of Industrial and Manufacturing Systems Engineering**  
**The University of Hong Kong**

It has been a great pleasure to have seen so many high quality entries from companies. It becomes clear that industries have been adopting the IoT technologies and achieving increasingly significant benefits. I also congratulate GS1 Hong Kong on successfully initiating this meaningful awards scheme. I look forward to sharing more exciting stories and successful stories in the years to come.

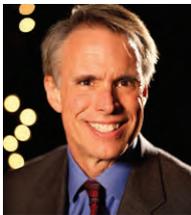
# Hong Kong IoT Awards 2014

## IoT Expert Advisory Group



**Prof. Hao Min**  
**Research Director, Auto-ID Lab**  
**Fudan University, Faculty of Microelectronics**

All the entries for “The Hong Kong IoT Awards” are of excellent standard, stretching the potential of RFID/IoT Technology with a high level of creativity. I hope that this initiative will continue to help industry excel in adding value to the business in the the years to come. Well Done.



**Mr. Steve Bratt**  
**Chief Technology Officer and President, Standards**  
**GS1**

The innovative projects submitted to the Hong Kong Internet of Things Awards this year exhibited a high level of creativity, but also pragmatism - focused on solving real-world challenges. It was fascinating to see the broad range of business areas and IoT technologies employed. Interests in IoT as a practical solution to real business problems is accelerating rapidly around the world. Clearly, the brilliant business leaders and scientists behind this year’s projects will be driving the future of IoT across an expanding number of domains in an expanding number of countries. Congratulations to all participants in the 2014 competition!



**Prof. Sanjay E. Sarma**  
**Professor, Mechanical Engineering**  
**Massachusetts Institute of Technology**

It gives me great pleasure to congratulate the winners of the HK IoT Awards. You are pioneers in a pioneering area. Hong Kong is especially positioned to become the gateway for IoT because of its location and personality. I am particularly happy that GS1 Hong Kong is leading this effort.



**Dr. Gerd Wolfram**  
**Head of Innovation and Partner Management**  
**METRO AG**

It is really impressive to see the innovative spirit and dedication of all the contestants and certainly my special appreciation goes to this year’s winners. Congratulations! Being on the IoT Expert Advisory Group for the Hong Kong IoT Awards this year, I am very excited to see so many highly professional cases from so many different sectors. The creativity of the solutions and projects shows that the RFID/IoT technology are becoming more and more important in so many sectors. This technology is the key for driving efficiencies and creating added value for any kind of business. I am keen to see what the future holds for the use of RFID/IoT.

# Hong Kong IoT Awards 2014

## List of Awardees

### IoT Implementation Excellence



**Real-World IoT Platform for Electricity Supply Market - myEnergy Programme**

CLP Power Hong Kong Limited



**IoT-based Advanced Automobile Parking Navigation System**

Sino Parking Services Limited and  
The Hong Kong Polytechnic University, Department of Industrial and Systems Engineering



**Intelligent Agriculture based on IoT**

Guangdi (Hong Kong) Company limited

### IoT Application Innovation



**Real-World IoT Platform for Electricity Supply Market - myEnergy Programme**

CLP Power Hong Kong Limited



**IoT-based Advanced Automobile Parking Navigation System**

Sino Parking Services Limited and  
The Hong Kong Polytechnic University, Department of Industrial and Systems Engineering

### Winning IoT Technology



**Equipment Height Real-time Monitoring System (EHRMS) for Hong Kong-Zhuhai-Macao Bridge Project**

DigiMobi Technology Limited and Rodsum Wireless Limited



**Mobile Heart Health Monitoring System**

Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI)



**Bluetooth Smart Home**

Lincogn Technology Co. Limited



**HKC Real Time Location Tracking System Application Platform**

Hong Kong Communication Company Limited

### RFID Implementation Excellence



**ICS RFID-technology Deployment (IRD)**

Chow Tai Fook Jewellery Co. Ltd



**CABLE ANTENNA with Enhanced Surface Wave Guide Technology for Battery Exchange Stations**

KentFa Advanced Technology Corp., EPC Solutions Taiwan Inc. and Sunbest Technology Company Limited



**RFID-based Electroplating Process Management System**

PCCW Solutions Limited and Jing Mei Industrial Limited

### RFID Application Innovation



**ICS RFID-technology Deployment (IRD)**

Chow Tai Fook Jewellery Co. Ltd



**CABLE ANTENNA with Enhanced Surface Wave Guide Technology for Battery Exchange Stations**

KentFa Advanced Technology Corp., EPC Solutions Taiwan Inc. and Sunbest Technology Company Limited



**RFID-based Electroplating Process Management System**

PCCW Solutions Limited and Jing Mei Industrial Limited

### Winning RFID Technology



**Heat Transfer RFID Label**

U.R. RFID Limited



**mTray - mobile Retail Tray**

Megabyte Limited



## Certificate of Merits

**Tyco Retail Solution TrueVUE RFID Inventory Intelligence Solution**

ADT Hong Kong Limited

**Playthe.net**

Amaranto Asia Limited

**Confidential Waste Destruction Project**

Baguio Green Group Limited and Megasoft Limited

**RFID Asset Management System**

C & C Security Printing Co. Ltd and HK Systems Limited

**Cloud Based Sleep Guard**

Colt Advance International Ltd

**A BLE-based Intelligent Caring System (BLE-iCare) for Improving Services Quality to Residents in Elderly Home**

Contech Lab and The Hong Kong Polytechnic University

**CS8304 Cold Chain Temperature Logging Tag**

Convergence System Limited

**RF Guard**

E-Business Solution Limited

**Smart LED Bulb For Security System**

Esport Lighting Limited

**BusinessPlus ERP | CRM System [on HTML5]**

FlexSystem Limited

**F-1 Solution**

Galaxy Automotive MS Inc. and SecurePro Technology Security System Limited

**iGen6agon - The Unique Digital Marketing Platform Leveraging Indefinite Possibilities of New Media**

iGen6 Digi-Marcom Limited

**Automatic Medication Compliance System**

Infoengine Technology (Hong Kong) Limited

**IoT Intelligent Gateway**

QBS System Limited and Cenique infotainment Group Limited

**Intelligent Supply Chain Track & Trace Solution**

TradeLink Technologies Ltd.

**Wireless Intelligent Node**

Wifinity Limited

# Hong Kong IoT Awards 2014

## Winning Cases Sharing



### Real-world IoT Platform for Electricity Market – myEnergy Programme



**IoT Implementation Excellence**



**IoT Application Innovation**

#### Background

CLP Power Hong Kong Limited is the city's largest vertically-integrated electricity generation, transmission and distribution company, serving 80 percent of the local population. Besides supporting energy conservation, it is also committed to developing sustainable energy generation and responsibly managing the environmental impact of its operations.

#### Challenges

In order to achieve the goal of energy conservation, it aims to help its customers control and manage their electricity consumption, by providing them with detailed information on their power usage, together with energy-saving tips.

#### Solution



Leveraging on IoT technology, a mEnergy programme has been developed by CLP to provide residential and corporate customers with regular energy consumption information. In fact, the entire Advanced Metering Infrastructure of the electricity provider has been reconfigured to realize the IoT Concept. Devices, such as smart meters and routers, are integrated with billing and other systems, which can be connected to the customers' smartphones via the Internet.

Two tariff products – Time-of-Use (ToU) and Summer Saver Rebate (SSR) – are provided to customers, incentivizing them to

reduce energy use. Customers can set up alert signals, which will automatically remind them when their energy consumption is approaching their predetermined upper limits of usage.

A brand new myEnergy Web portal has been launched to provide timely and meaningful electricity consumption information to customers to drive their behavioral changes.

Through mEnergy mobile apps, customers can keep track of their energy usage levels on smartphones. They can access their consumption data on their mobile devices, including monthly, weekly or even daily energy usage, usage comparisons and tariff analysis, energy-smart tips, latest news, promotion information and consumption-level alerts.

#### Results

High Peak Time Rebate (PTR) Group customers reduced their energy consumption by an average of 0.3kW after the mEnergy Programme was launched. CLP also saw peak reductions of customers' energy usage of between 16% and 20%.

An interim customer survey indicates that 98% of residential customers and 94% of SME customers said they would take advantage of the saver rebate next summer.



**IoT Implementation Excellence**



**IoT Application Innovation**

## IoT-based Advanced Automobile Parking Navigation System

### Background

Hong Kong's increasing numbers of private vehicles lead to difficulty in finding parking space. This problem is especially severe for drivers navigating in the car parks of busy malls and commercial buildings, during peak hours.

### Challenges

For drivers, the lack of clear directions on actual routes to the car park is frustrating. Furthermore, searching for vacant parking bays inside the car park is a hassle, wasting time and fuel. Pollution inside the car park is exacerbated by the vehicles driving round and round. Ultimately, the unpleasant experience will erode customers' goodwill and affect the car park's reputation.

Car park operators find it necessary to deploy more staff to monitor parking bay vacancies in real time. This will drive up their operational costs. Due to the low transparency of parking vacancy information, some car parks cannot be fully utilized.

### Solution



An IoT-based automobile parking navigation system has been jointly developed by Sino Parking Services Limited (Sino Parking) and The Hong Kong Polytechnic University (PolyU), to provide an end-to-end solution to give drivers a better parking experience.

This system offers an integration of emerging technologies, including Internet of Things (IoT), Cloud Computing, Near Field Communications (NFC), Wireless Sensor and Actuator Network (WSAN) and IoT middleware.

The navigation solutions it provides include:

- Guiding drivers to their selected Sino car park
- Enabling them to enter the car park using an Octopus card or a NPC-enabled smartphone
- Guiding them to the available parking bay
- Recording the location of the bay where the vehicle is parked
- Monitoring the car park's environmental quality
- Selecting parking schemes with the lowest parking fee for drivers
- Allowing fees to be settled via Octopus cards or NPC-enabled smartphones.

### Results

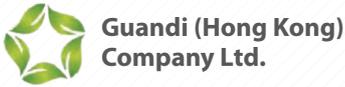


This project has created a win-win outcome for drivers and car park operators. With the enhanced customer services provided, drivers are more willing to choose car parks managed by automation technology. Customer satisfaction has gone up with better air quality in the car parks. With reliable navigation guidance readily available, drivers enjoy savings in time and fuel consumption. All these help cultivate customer loyalty, which in turn ensures a continual income stream for car park operators. Using smartphone and navigation system applications, the system can help maximize the utilization of parking bays, while minimizing operational costs required for monitoring and managing the payment operation system.



# Hong Kong IoT Awards 2014

## Winning Cases Sharing



**IoT Implementation Excellence**

### Intelligent Agriculture based on IoT

#### Background

In recent years, IoT technology has been applied to greenhouse agriculture with promising results in crops quality and output, contributing to the growth of what has been termed as precision farming.

#### Challenges

Greenhouse farming is the type of farming in which crops are grown in a built structure with different types of covering materials such as glass or plastic roofing and walls. The success of such a mode of agriculture is dependent on the management of various environmental factors, including air temperature, humidity, carbon dioxide, light, soil moisture, soil temperature, temperature outside the greenhouse shed and wind speed.

#### Solution

An IoT-based intelligent agriculture project was developed by Guandi (Hong Kong) Company Limited to gather agricultural information, with the aid of sensors, with the aim of helping farmers control environmental conditions and make the most of them in crop cultivation.

Greenhouse sensing devices have been installed for real-time acquisition of environmental and geological data in this project, which are then transmitted to the service management platform for processing and analysis.

Remote control functions have also been set up for the electric roller shutters, exhaust fans, electrical and mechanical equipment as well as electric irrigation systems inside the greenhouse. Using their smart phones or a computer login system, farmers can control the abovementioned equipment remotely, along with the greenhouse water valves, exhaust fans, rolling machines switches.

Communicating with the service management platform, farmers can also find out the greenhouse environmental parameters, temperature and humidity records, which will assist them in making agricultural decisions. Through the system, farmers can also gain access to industry and market information, such as the local agricultural policies, market prices, supply and demand, to aid their decision-making.



In addition, farmers can also set warning alerts on the different crop species. Whenever a crop species exceed the anticipated output limits, the system send out alerts automatically so that the farmers can take timely measures.

#### Results

Accepted by a number of rural production agencies in mainland China, the system will soon facilitate a notable increase in agricultural production efficiency following its implementation. The large-scale automation of farming efforts, alongside the remote control of agricultural functions, has generated considerable savings in manpower apart from boosting farming efficiency.





**Winning IoT Technology**

## Equipment Height Real-time Monitoring System (EHRMS) for Hong Kong-Zhuhai-Macao Bridge Project

### Background

Due for completion in 2016, the Hong Kong-Zhuhai-Macao Bridge Project consists of a series of bridges and tunnels to connect these three major cities in the Pearl River Delta.

### Challenges

For the project's construction period from 2013 to 2016, one of the safety concerns is to ensure that the height of a jib/boom on crane barges does not exceed the Airport Height Restriction (AHR) parameters mandated by the Civil Aviation Department of the HKSAR government. Violation of Airport Height Restriction might jeopardize aircraft safety as the construction site is so close to airport runway.

### Solution

DigiMobi Technology, a GPS Tracking Service Provider, and its partner Rodsum Wireless, a R&D Center on GPS & Wireless Equipment, have been commissioned to develop the EHRMS, for compliance with the project's height restrictions.



A core component of this system is an Industrial-grade "mobile phone/embedded system" that controls the sensors, including the tilt sensor to detect the jib angle and draught sensor for the draught height; I/Os and communication protocols and processes. It is also capable of communicating with the GPS receiver to determine location and the Hong Kong Observatory to find out the heights of real-time tides. There is also a GSM connection linking the cloud server with the Internet and a map website made accessible to end-users.

If the jib height comes close to the Airport Height Restriction (AHR) limit, an onsite alarm will be triggered to inform the jib/barge operator not to raise the equipment any higher.

Once the jib height exceeds the AHR limit, email and SMS alerts would be automatically sent to offsite parties, including the Construction Manager and the Civil Aviation Department, for them to take immediate action.

### Results



Exemplifying a high-value, low-cost IoT solution, the system has helped to achieve a critical mission to assure aircraft safety during the construction of at the Hong Kong-Zhuhai-Macao Bridge. The system is also a very smart and proactive system by alerting construction managers and other stakeholders before any serious accident occurs. Hence, it ensures compliance of the project to the Airport Height Restriction (AHR) limits set by the local authorities.

Developed by an entire Hong Kong R & D team, the system can be modified with its functions extended to other areas including hill-fire detection, waste management, pet tracking, health monitoring, lift maintenance management, building structure monitoring, dolphin conservation as well as pull-off container management. EHRMS can also be used by small and medium-sized industries, airports, government projects and several other related industries.



# Hong Kong IoT Awards 2014

## Winning Cases Sharing



**Winning IoT  
Technology**

### Mobile Heart Health Monitoring System

#### Background

Monitoring chronic heart-related medical conditions has become increasingly important for patients and their caregivers. This complex health problem requires patients to manage disease demands in collaboration with their doctors.

#### Challenges

Failure to monitor chronic heart problems closely could result in acute exacerbations, long-term complications and even death. However, existing devices designed for this purpose are costly, large and unwieldy. Frequent examinations of the patients' heart conditions at hospitals and clinics are not only inconvenient but also time-consuming.

#### Solution



A Mobile Heart Health Monitoring System, developed by the Hong Kong Applied Science and Technology Research Institute (ASTRI), a government-funded research organization based and registered in Hong Kong, is a new model of medical monitoring based on sophisticated computer networks, modern communications and sensor technologies.

Created with the aim of providing a "Virtual Hospital," this is

a low-power wireless electrocardiography (ECG) device in a miniature size module that allows heart patients with stable cardiac conditions to monitor their heart health anytime and anywhere using a smartphone, electronic tablet or PC, after being discharged from hospital. It consists of a low-power, high-performance mixed-signal integrated circuit (IC), a compact PCB board, and a multiple platform software interface compatible to Android and Windows systems, with a remote database server.

The data captured can be viewed on the host device or uploaded to a remote server in real time, thereby enabling physicians, nurses and other caregivers to be informed as well as monitor and diagnose the patients' evolving heart conditions remotely, through Bluetooth Low-Energy wireless connection.



#### Results

This innovation is a vast improvement over the current generation of ambulatory ECG monitoring devices, such as the Holter monitors, which are not only very expensive but also do not support wireless connection. While the waiting time for getting Holter monitors can take up to 18 months in Hong Kong hospitals, this new invention can be made available without a long waiting time and at a comparatively low cost.

This e-health application can help reduce the escalating healthcare cost for diagnosed heart patients substantially and spare them the time and hassle of queuing at public hospitals or private clinics for further monitoring and diagnosis of their conditions. It also provides healthcare practitioners with instant access to information about patients' conditions, facilitating emergency medical intervention to be undertaken if needed, which can prevent disease deterioration and save lives.



## Bluetooth Smart Home



**Winning IoT Technology**

### Background

The concept of smart home – which envisages smart TVs, appliances, air-conditioning and refrigeration and telecommunications connected and managed through a single integrated platform – has been talked about for over a decade.

### Challenges

Yet, the implementation of such an idea has not made much progress, partly because the existing products are too complex or expensive. This applies to even the recently launched ones, which rely on routers and complicated setups.

### Solution



Lincogn Technology, which specializes in Bluetooth R & D and manufacturing of various related electrical accessories, has developed Bluetooth Smart Home to tap potential demand in the smart home market. Its products are designed to replace the existing wall switches in ordinary homes, with no configuration required, because these Bluetooth-enabled items can be controlled by a proprietary app available for downloading on smartphones.

This system is less complicated and much more affordable than similar products offered in the market. For example, the

home automation system offered by an established provider of telecommunication services is quite costly. Furthermore, its installation requires the assistance of engineers. By comparison, this new product is much less expensive, with no setup needed, thus offering a more convenient and affordable option in the home automation market.

Currently, R & D efforts are made to incorporate voice activation into this system in order to offer greater convenience for users, including disabled people, and make their life easier.

### Results

This smart-home product provides a low-cost solution making every home appliance controllable through a mobile device. In addition, it is a green innovation with a minimal carbon footprint.



# Hong Kong IoT Awards 2014

## Winning Cases Sharing



**Winning IoT  
Technology**

### Real Time Location Tracking System Application Platform

#### Background

SikSik Yuen Wong Tai Sin Temple, a Taoist shrine and tourist attraction in Hong Kong frequented by thousands every day, had an increasing challenge with providing its visitors with quality information service and a satisfying customer experience. The temple also aspired to improve its operational efficiency.

#### Challenges

Even on normal days, it is difficult for first-time visitors to obtain tour information about the temple and find their way around the extensive premises, despite the availability of traditional signage boards and information counters. There was also insufficient administrative staff to address visitors' enquiries.

#### Solution

Hong Kong Communications Co., Ltd was tasked to develop a real time location tracking system platform that operates via WiFi networks with accuracy at room, floor and building levels. Temple visitors are required to connect to SikSik Yuen's WiFi network to use the tracking and orientation service.

Once they click in, signals will be activated and the visitor's location will be displayed on the temple's floor map, displayed on their mobile devices. As the temple area map pops up on the screen, visitors can browse the popup information to check the whereabouts of facilities and locations they want to visit.

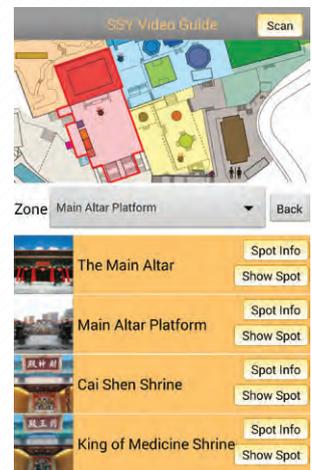
#### Results

Traditionally, tourists and visitors were accustomed to checking the information kiosks or notice boards for direction. But with the mobile application, users can check up in advance. When they arrive at the desired destination, tour information about the site will also be presented online.

This location tracking system also helps promotes the business services offered by merchants operating on the temple compounds. When visitors reach a location, they will receive push notification popup promotional offers from nearby retailers or service providers. Using such an advantage, the merchants can

design promotional campaigns and activities based on users' locations.

In addition, customized games are incorporated into this platform to provide mobile entertainment for visitors as they wait in queues.



Once a user is connected to the temple's WiFi network by mobile phone, his or her real-time physical location is generated and if there's any request for emergency help, the temple management can assign staff in the vicinity to provide the contingency support needed.

Overall, the platform has enabled the temple management to enhance the experience and satisfaction of visitors, without having to expend additional staff resources to achieve such a goal.



## ICS RFID-technology Deployment (IRD)



**RFID Implementation Excellence**



**RFID Application Innovation**

### Background

Chow Tai Fook Jewellery Group Limited (“Chow Tai Fook”, “the Group”) has been constantly seeking new technologies to enhance operations, strengthen security and facilitate sales for nearly 2,200 points of sale and a number of distribution centres located in different cities. By leveraging IoT infrastructure, the Group determined that RFID technology is the most suitable to meet the diverse needs and requirements for supporting their ever growing business operations and long-term strategic development.

### Challenges

In retail business, retailers face various challenges. Tedious and time consuming stock taking distracts sales staff from performing sale duties and providing customer service. Substantial products are in transit frequently, making it difficult to track them. It is also difficult to capture data on customers’ preference and shopping behavior during the sales process.

### Solution

Chow Tai Fook has adopted a RFID-enabled inventory control system (ICS) developed in-house, featuring the use of RFID-enabled price tags; logistic trays, mHand and Smart Tray backed by an Internet of Things platform. Designed as a real-time, web-based and generic item level cloud system, it focuses mainly on three areas—logistics management, retail stock taking and sales operations.

First of all, the RFID-enabled price tag of each product contains a unique product ID with the respective product information so as to enhance product traceability in all stages of the business flow and facilitate the use of the other three devices which are all integrated with the ICS system for data collection and processing purposes to achieve defined objectives.

The logistics tray is a scale-like device that can read product codes in lots of tens when they are placed there on versus the traditional way of shooting barcode one by one. The mHand, a portable handheld RFID device, serves as a scanner to read the codes of the products that are displayed inside the counters and showcased through the glasses saving the trouble of having each and every piece taken out and put back. Both enable a

fast, convenient and accurate stock take process in the daily operations, thus a more efficient stock taking and effective inventory control for enhanced supply chain management.

The application of smart tray is at shop level that facilitates customer servicing. With a built-in sensor, the tray displays product information of the jewellery pieces placed on it and can access other products’ information and stock data in any shop instantly with a few touches of the buttons. Along with other built-in functions such as price calculation, currency conversion, etc. it helps frontline staff provide fast, professional customer service thus can streamline sales process and enhance customers’ shopping experience. It also helps collect big data for understanding customer tastes and preferences, shopping behavior, etc.

### Results

In the logistic side, the use of logistic tray has resulted in a significant reduction of operation time in stock taking by 50%. In the retail stream, the mHand provides an accurate “item level” daily stock-take process in the retail shop, thereby saving stock count time by 50% as well.



As for the Smart Tray, frontline sale staff are satisfied with its features and functions and appreciate the benefits in assisting sales process, enhancing customer shopping experience, and improving sales conversion rates.

Overall, the RFID platform has led to notable improvements in operational efficiency, work accuracy and inventory management. Equally important is frontline staff are less tied up with stock taking duty and can concentrate on sales work to provide professional customers services for achieving higher sales conversion rates while customers can enjoy a better shopping experience. In addition, the new system is able to collect big data for understanding customer, doing analysis, formulating business strategies and facilitating decision making.

Being one of the first Hong Kong jewellery retailers to embrace RFID technology, Chow Tai Fook’s image as forerunner and leader in innovative technology in the industry is further strengthened with customer appreciation and industry recognition.



# Hong Kong IoT Awards 2014

## Winning Cases Sharing



**RFID Implementation Excellence**



**RFID Application Innovation**

### CABLE ANTENNA with Enhanced Surface Wave Guide Technology for Battery Exchange Stations

#### Background

There are 13.5 million scooters and motorcycles plying the roads of Taiwan. While 122,500 of them are electric, most others are gasoline-powered, which produce polluting hydrocarbon emissions. In view of this, the government has introduced battery-exchange stations (BES) in the streets, aimed at encouraging motorcyclists to switch to cleaner electric vehicles. The authorities reckoned that motorcyclists will find it more convenience to replace a spent battery with a fully-charged one, for a fee, at these stations.

#### Challenges

Kentfa Advanced Technology Corp, with implementation support from EPC Solutions Taiwan Inc. and Sunbest Technology Company Ltd, was commissioned to develop the BES, which are RFID-enabled to facilitate motorcyclists and scooter-riders' exchange of their depleted batteries for fully-charged ones. It was necessary for the stations to track which depleted and fully-charged batteries were exchanged and by whom, without manned assistance. The project's greatest challenge lies in the highly metallic environment inside the BES, which interfered with the reliable RFID readings using traditional patch reader antennas. In addition, the electromagnetic noise reflected by the metallic BES cabinet might cause saturation and malfunction of the reader's receiver.

#### Solution



To circumvent these problems, each of the station has been equipped with a passive Ultra High Frequency reader and the enhanced surface wave cable antenna, to monitor batteries inventory in real time; check incoming batteries' ID to ensure batteries are valid and recognize the battery's history, including its manufacturer, expired date, times of recharging, life time and maintenance. Each of the BES has also been installed with a passive High Frequency reader to read the subscriber's card and verify if it is valid

and that the account is current. The readers were placed inside the cabinet of the BES and a tag embedded in every battery. Once the tag is read by the cable antenna, the particular battery inserted into the station will be known. The data is then sent to the database via Ethernet, where the subscriber's ID is correlated to the battery ID. This also enables the BES to monitor the batteries and perform real-time tracking.

#### Results

The system monitors the batteries inside the cabinet around the clock, without any operational staff onsite. Batteries can also be easily recycled with the RFID technology in place. The system can easily register the battery IDs and build the batteries' pedigree, lifetime and ensure that they are recharged and recycled via the exchange process.



The success of the BES will also encourage more motorcyclists to change to green vehicles, which helps alleviate traffic pollution on Taiwan's roads.



## RFID-based Electroplating Process Management System



**RFID Implementation Excellence**



**RFID Application Innovation**

### Background

Electroplating is a highly specialized process of production, requiring careful quality control every step of the way to meet manufacturing specifications and standards. As electroplating activities are subject to predictable and random fluctuations, close process monitoring and control are required to assure quality and productivity.

### Challenges

Electroplating plants with low production visibility are prone to inventory problems, which arise from errors in manual input of semi-finished and defective products. As a result, the manual records do not accurately reflect the Work-in-Progress inventory. Inaccurate data captures will also affect materials resources planning, giving rise to ineffective inventory management, overstock or shortages.

Due to the lack of production transparency, workers have no idea when the products will be completed and about any abnormal performance of electroplating machinery. If the system cannot track the output records at the end of the electroplating line, operational failures will arise.

Bar-code applications may be used, in principle, to improve accuracy of records on defective products and processes. But implementing them would be problematic due to unique temperature, humidity, and pH level etc, of the electroplating environment. Moreover, barcode labels may become damaged and no longer readable by scanners.

### Solution

Jing Mei Industrial has had an RFID-based electroplating process management system designed on a pilot basis, to deal with the production line problems. Two RFID readers are placed at both ends of the production line to capture data. RFID tags are attached to the racks holding the products being manufactured, for easy identification by workers and to generate Quality Control records.



This system is integrated with the factory's Enterprise Resource Planning (ERP) system to automatically generate records of defective or partially finished products, analyze the collected data and produce precise production records. These reports provide the traceability and visibility that management needs, in order to take immediate action in contingency situations such as urgent order placements or unforeseen machinery downtime.

By staying on top of real-time data, the management can swiftly respond with a better production plan, reallocate resources and improve production efficiency immediately.

### Results

Compared to the manual input method, RFID-enabled tracking shows a higher level of data accuracy. RFID tracking has not only eliminated the need for human input at the production line, but also in the backend office too, with manual records replaced by system-generated ones.



Output quality is assured, given the automatic alerts that warn production engineers of faulty production processes. The system also enables them to identify the specific lots with defective products. Such real-time information has enabled key personnel to fix problems on the spot, thereby reducing wastage and output of defective items.



# Hong Kong IoT Awards 2014

## Winning Cases Sharing



### Heat Transfer RFID Label



**Winning RFID Technology**

#### Background

As an industry with an increasingly complex supply chain as well as the most-targeted merchandise for retail thefts, counterfeiting and brand infringement, the apparel sector has long accepted RFID technology to help it overcome these challenges. Increasingly, item-level tagging is becoming the norm for time-saving merchandise tracking and inventory management among retailers and other stakeholders.

#### Challenges

Traditionally, RFID washable tags have been produced using lamination technology. However, the labels manufactured by such a method lose their softness and elasticity and excessively large in size. Others may be easily removed and they easily wear off, making them dysfunctional after a few wash cycles. They are also costly to produce, requiring heavy investments in lamination machines, production lines as well as skills training at factory level.

#### Solution



One new solution offered is the Heat Transfer RFID Label, jointly developed by U.R. RFID Limited and the Hong Kong University of Science & Technology. The tags produced under this project are washable, non-removable upon being embedded into apparel items and serve multiple functions in providing visibility and traceability.

The tags are produced by heat transfer technology, which is less costly compared to lamination technology. With their slim unobtrusive design, these smart labels are discreetly hidden

in the garment. They also form a secure bond with the product and will stand up to up to 100 wash cycles without falling off or fading, thus ensuring that their intended functions remain uncompromised.

#### Results



Heat-transfer tags embedded in individual garment items can prevent many logistics problems – including wrong shipment, item misplacement and wrong data captures – as well as reverse them quickly and automatically. They can also ease heavy manual workload on inventory audit and monitoring, facilitating quick check-ins and check-outs and speeding up repacking work to meet a tight seasonal schedule. As a form of retail management, the tags can accelerate inventory checks, with high accuracy achieved, and effective search for misplaced items. In brand management, the end-to-end track and trace capabilities facilitated by the tags can identify counterfeits and therefore protect the brand's integrity.


**Winning RFID  
Technology**

## mTray - Mobile Retail Tray

### Background

Traditional inventory tracking for jewelry is a manually intensive process, requiring plenty of care, attention to details and time, carried out on a daily basis.

### Challenges

A jewelry store's inventory often includes many small, high-value items that can prove to be an inventory management challenge. A loss of even a few pieces could mean a costly shrinkage affecting the bottom line. To complicate matters, it is an industry practice to move all items from display into vaults every night. In addition, items may be periodically sent to shows or exhibitions. Every time assets are moved they need to be counted. Many jewelry retailers conduct time consuming manual inventory counts regularly. These labor-intensive processes are expensive and leave room for human error which can delay the replenishment of goods, resulting in lost sales.

### Solution

mTray has been developed by Megabyte Limited, to provide complete traceability, throughout the supply chain. Embedded with a RFID POS system, it provides check-in and check-out operation, manages online inquiries to inventory records, displays and decentralizes product information and alert systems for the operator. Each luxury item is attached with a passive RFID tag as a unique identification. To facilitate integration of RFID tags and tagged items in Internet of Things systems, a RFID reader is needed to provide a media to the network. This solution integrates the latest low-energy ARM-embedded Android mobile system, UHF RFID technology with tailor-made near field antenna for proximity-range reading, latest embedded WiFi and Bluetooth connection interface, biometrics fingerprint and NFC sensor.

### Results

Apart from its aesthetic appeal as a portable platform for product display, the device eases the sales process, as it allows fully-integrated RFID technology to facilitate cash and mobile payment, with receipts automatically generated through linkup with Bluetooth, WiFi as well as NFC technology. Detecting nearby



VIP customers via their smartphones, the tray automatically alerts in-store staff to their presence. Shop assistants can tailor their retail strategies to offer effective sales propositions to speed up the customers' purchase decisions. Moreover, customer data is captured from the transaction process, generating client-profile analytics to inform business decision making by senior management. Based on the customer data analytics, top management executives are better positioned to formulate branding and sales strategies and tactics more effectively. Stock shrinkage can be reduced at storage and storefront levels, as mTray can track the exact location of stock in real time and automatically issue alerts for item movement. Better retail security is assured because the mTray can automatically issue alerts on item movements, while identifying everyone who has been in contact with the jewelry items on it.



# Hong Kong IoT Awards 2014

## Certificate of Merits



### Tyco Retail Solution TrueVUERFID Inventory Intelligence Solution

Running department chain stores can be daunting for many business owners. As competition among manufacturers and distributors continues to rise, companies are constantly looking for ways to maximize their efficiency and gain better control over their warehouse inventory management – at item level for apparel products. Other challenges include erroneous corporate stock ledger, inventory inaccuracies, out-of-stock conditions and poor inventory visibility.

ADT Hong Kong Limited supported a US based retail chain with a RFID item level tagging solution, the TrueVUE Solution. The deployment consisted of handheld readers for department-store personnel to carry out inventory counts, replenishments and store receiving.

Following the system's implementation, inventory accuracy across the supply chain rose to 95% in RFID-supported categories, up from 70% to 75%. Faster and more accurate inventory count has since been made possible. In addition, depleted stocks are replenished in time with out-of-stock situations greatly reduced, while sources of shrink and selling-floor losses can be identified in hours. Sales, margin and stock revenues have seen significant improvements. All this has resulted in enhanced customer satisfaction and loyalty, with the right products available at the right place and time for in-store and omni-channel shoppers.

### PLAYTHE.NET

Many advertisers are making the switch from traditional static signage, such as print posters and signboards, to digital signage including LED screens, video walls and plasma displays. Static billboards do not get a chance in getting consumers' attention against the dynamic display of content in digital signage, complete with full motion video, colours, voice and music, stylized text and artistic presentations.

Amaranto Asia Limited has created a digital signage platform called PLAYTHE.NET, to offer an information channel, through which governments can reach a large population with their public announcements, and an advertising channel for marketers to target a smaller but more specific consumer segments. It is an Internet of Things (IoT) solution, where data collected from the company's digital display networks are analysed. Upon analysis, the content is then played across a network of digital screens, both indoors and/or outdoors as well as of any chosen number.

This solution provides an affordable advertising channel for marketers with a limited budget. It is also an innovative medium for products and services providers, such as telecommunications companies, to promote their offerings in an animated, interactive format and undertake cost-effective brand building.



## Confidential Waste Destruction Project

Leakages of confidential personal information, for instance, to unauthorized third parties can lead to business losses, legal penalties and damaged reputations to governments, organizations and companies entrusted with the data. Companies providing a truly secure way to destroy confidential materials are hard to find in Hong Kong. Hence, the risks of data security breaches remain for businesses even if they have outsourced the sensitive task to others.

Baguio Green Group has developed a system to track and destroy confidential data, using a combination of Bluetooth expertise, RFID tags, various handheld devices and proprietary software. Confidential materials belonging to a specific client are sealed in a bag, attached with a barcode and RFID tag. Stocktaking of such bags can be performed in minutes using a RFID scanner. If any of them are found missing, the scanner can be used to locate them in a designated zone and other possible areas. Emails are sent to clients to inform them on collection time of their confidential materials, truck pickup time, arrival time at destruction site and destruction time.

By and large, this system provides complete traceability from collection to destruction; speedy stocktaking with 100% accuracy and safe delivery of confidential materials to destruction site, thus offering peace of mind to customers.

## RFID Asset Management System

From travel document, valuable assignment, entry tickets to industrial tools, documents and more, a company's ability to identify, track and control the physical assets they own, accurately with cost-and-time efficiency, will impact on its bottom line. However, manual data entry, auditing and retrieval of records can tie up staff with unnecessary paperwork, and hampers real time visibility, especially when assets are spread across multiple sites.

A RFID Asset Management System, developed by C & C Security Printing Co. Ltd, is aimed at eliminating the manual inputs. All assets are attached with RFID tags. Using RFID readers, check-in/check-out records can be updated and automatically uploaded to the backend system. Inventory count and tracking can be carried out with speed, ease and accuracy in real time.

The system comes at a lower implementation cost compared to wireless monitoring. Maintenance cost is also minimal as it covers only the RFID fixed antenna. Automation of the asset management process enables users to track the location of each asset and its conditions. It also helps avoid human error and item loss, in the supply-chain process. Alerts are provided if the assets are moved to unauthorized locations.

# Hong Kong IoT Awards 2014

## Certificate of Merits



### Cloud-based Sleep Guard

Elderly people are prone to falls, which may result in injuries and even death. But what happens when a fall occurs and the victim is unable to summon help, especially late in the night? How can caregivers be alerted to ensure that help is given urgently? Fall prevention and detection are therefore vital in elderly care services.

Sleep Guard, an IOT home automation product developed by Colt Advance International Limited, provides automatic lighting for the elderly when they get up at night, hence preventing them from falling, and alerts their caregivers when a fall occurs. An IoT mat sensor is placed next to the bed. The lights will be automatically turned on when the elderly wake after bedtime, so they need not search for the switch in the dark.

Should a fall occurs, the Sleep Guard would note the victim's absence from bed after a preset time interval. Data of the person's wake-up time, unusual movements and potential emergency situations are automatically stored on a Cloud server, then transmitted to the help centre. Automatic alerts are sent to the caregivers' mobile devices for them to take emergency action.

### BLE-based Intelligent Caring System (BLE-Care) for Improving Service Quality to Residents of Elderly Homes

There are three common hazards that senior citizens face: Falling without being able to call for help; wandering due to dementia or Alzheimer's disease, and medication errors. Due to understaffing, elderly homes are challenged to provide round-the-clock monitoring of their residents round the clock and cater to their safety and wellbeing.

Contech Lab Limited has developed an intelligent caring system to help elderly homes cope with their responsibilities. It consists of Bluetooth Low Energy-based wristbands to monitor residents' movements and identify them individually, including their medication and dietary needs. A cloud platform has also been created to monitor data gathered by the wristbands; transmit data and alerts to caregivers; and provide real-time analysis of residents' behavior and fall patterns.

Caregivers can be alerted in real time when residents fall or pass through antenna-installed doorways through this invention. When dispensing medication, these care providers can also double-check the name of resident and the medicines prescribed on a Medication Identification Module. In addition, they can check the resident's dietary patterns, requirements and food allergies from the database stored in the wristband, when distributing meals. As for the elderly residents, the invention can be used to guide them back to their rooms by special headphones, should they trespass onto unauthorized areas.



## CS8304 Cold Chain Temperature Logging Tag

RFID tags are used to monitor the temperature history of perishable products, including foodstuff and pharmaceuticals, in cold-chain logistics to ensure their quality and safety for consumption. Some of these RFID temperature logging tags are however beset by a low read range, offer no real-time alerts, lack sufficient battery power, unable to withstand harsh environment conditions or incompatible with existing, standards-compliant RFID infrastructure.

CS8304 Cold Chain Temperature Logging Tags have been developed by Convergence System Limited to address the above challenges. Fully enclosed by a plastic case to meet IP67 standards, these tags can be programmed to monitor a specified temperature range at a resolution of 0.25C and at a preferred time interval.

A distinctive benefit of this innovation is that it is capable of cold-chain monitoring even when placed on products with high water content or under low temperatures. Offering temperature sensing applications at carton-and item-level, the tags can monitor temperature levels -20°C to 60 °C, of even the internal cases, without having to have the packaging opened. Their battery power is also high enough to support multiple journeys. These tags are fully EPC Class 3 Gen 2 compliant, so they can be read by all EPC Gen 2 readers.

## IoT Intelligent Gateway

Digital signage represents a growing advertising medium offering vivid, moving images, voice and music and stunning display technologies, to capture audience attention. The audience for digital signage is largely unmeasured – compared to other media such as TV, radio and newspapers. There is a lack of reliable metrics informing advertisers how many people watch the signage, when, for how long, their genders, their purchase actions and others. Such data can help retailers make important business decisions.

An IoT Intelligent Gateway has been developed by Cenique Infotainment Group and QBS System that combines digital signage management with the capturing of shopper analytics. The system is supported by RFID tags embedded in visitors' badges, RFID readers, sensors, software and a centralized platform to manage them. A compact device, containing a cloud connector for a standard-based track and trace platform, is connected to the signage.

With the use of the low-cost solution, key metrics of the signage audience - including impressions, opportunity to view, gender, age group, dwell time, time of day of visit, day of week of visit, effectiveness and location performance can be captured automatically and anonymously. Based on the data gathered, retailers can develop highly customized messages to increase their business success.

# Hong Kong IoT Awards 2014

## Certificate of Merits



### RF Guard

Shoplifting has caused tremendous loss of merchandise and profits to the retail sector around the world. Many retailers have therefore resorted to Electronic Article Surveillance (EAS) systems, to identify articles as they pass through a gated area in a store. Alarms are triggered when stolen merchandise is detected by the sensors. However, the 5-foot high antenna installed at the exits are unsightly. The system also has a limited reading distance, hence offering a loophole, and false alarms are sometimes triggered due to the simple security mechanism. Moreover, the EAS system is incompatible with item-level tagging.

RFGuard, developed by E-Business Solutions Limited in Hong Kong, is an improved security system combining the versatile EBSL RfIDY Middleware with advanced RFID antenna technology. Instead of using five-foot high antennae installed at shop entrances, this new system relies on latest theft-detection devices that can be wall-mounted, hidden under carpets or sealed underground. Gen2-based RFID tags deployed with RF Guard can also support item-level tagging for end-to-end supply-chain management. This system also offers a greater detection range (of stolen items) at 2 metres, compared to the 1.2 metre read range in EAS systems.

Because of its small, unobtrusive device design, RF Guard system makes it possible for store décor and aesthetics to be maintained. As it leverages on EPC for anti-theft detection, false-alarm occurrences are eliminated, thus sparing shoppers and patrons from embarrassment.

### Smart LED Bulb for Security System

Designers of home security systems are always looking for innovative devices to provide reliable, cost-free solutions to detect unauthorized intrusions. Presently, many existing security systems available in the market come with a number of drawbacks. Hardwired systems require extensive installation which might be excessively complicated for homeowners and tenants. As for the wireless ones, they can be too costly and susceptible to hackers. Many are also prone to false alarm. These factors deter many people from getting a security system for their homes.

Esport Lighting Limited has designed a LED bulb that also serves as a stand-alone security device. Equipped with a Doppler motion sensor, a Zigbee, a LED driver and visible light communication technology with a software algorithm, it flashes automatically whenever movement is detected. Intrusion alerts are sent through Cloud, to the user's smartphones, for emergency security measures to be taken. A mobile app can be downloaded to provide setup guidance and control of the LED bulb's functions through wifi.

As a light bulb, it saves more than 50% energy compared to ordinary ones. It is also easy to put on with no special installation or wiring required. As a security device, it does not generate false alarms, as an embedded algorithm is built in to improve the motion sensor's stability. Compared to other home security systems, it is much more affordable to most consumers.



## BusinessPlus ERP/CRM System [on HTML5]

The growth of a decentralized, mobile workforce means that teams and employees no longer have to operate under the same roof, but in multiple locations and while on the road instead. Mobile workers sometimes have trouble communicating with each other and the backend office. To stay connected, they turn to different mobile devices, desktop computers and other appliances. This requires the company to provide system administration and data integrity control, including synchronization and interface support, in managing its increasingly mobile operations.

An Enterprise Resource Planning/ Customer Relationship Management platform, developed by FlexSystem Limited, is designed as a seamless integration solution. Drawing on the interoperability of HTML5 web technology, this platform incorporates software installations on standard window servers hosted on Cloud or work premises, a configured web server and fixed IP as well as updated mobile device O/S and browser to support employee browsing.

This system facilitates a faster checking of inventory status by employees over the internet, regardless of their whereabouts. Considering that no software installations or programming of mobile devices are needed, it offers a cost-effective solution, enabling users to save on hardware and smart devices expenditures as well as on the labour and time for system deployment.

## F-1 Solution

There is a pressing demand for its automotive service industry to upgrade its services and meet rising customer expectations. Carparks, vehicle servicing centres and automobile warehouses are increasingly expected to perform automotive tracking, as part of the service operations they carry out.

A RFID vehicle tracing and tracking system has been created by Galaxy Automotive MS Inc, to meet the need for real-time information and visibility. Active RFID tags are attached to the windshields of automobiles upon arrival, with RFID readers and antenna installed at the service centre's access points. This facilitates tracking of the vehicles' real-time locations throughout the service period.

With the real-time tracking information obtained, operators can perform inventory count - including vehicles' check-ins and check-outs - accurately and quickly. Well-informed decisions can be made on the spot, so vehicles can tailor and adjust their services to the situation on hand. Higher visibility enables operators to match their resources and service capacity with customer needs and demands. This allows resources to be fully utilized, without minimal manual checking and errors. Manpower overheads will also be reduced as a result. Thanks to the improved automotive services provided, operators will be better placed to retain their customers and gain new ones.

# Hong Kong IoT Awards 2014

## Certificate of Merits



### iGen6agon

Technology has drastically altered the way businesses conduct their marketing, engage consumers and manage their customer base. While customer relationship management (CRM) software has been around for some time, there is also a growing trend of utilizing mobile apps for customer management.

Customized mobile apps can be too time-consuming and costly for small-and-medium-sized enterprises to develop and still often miss the mark in meeting users' needs, such as sales ordering, field service management and workflow management.

iGen6agon, a digital marketing and customer service platform for SMEs and NGOs, has been developed by iGen6 Digi-Marcom Limited, to enable companies and organizations to promote their business on mobile phones, across most operating systems, at economical costs and in a short time-frame. Using a proprietary mobile maker and editor to create mobile pages, this platform comes with a tested User Interface and preferred industry templates. Clients can easily deploy their respective mobile pages via the promotion channels.

Compatible to iOS, Android and Windows systems, this integrated mobile platform offers SMEs, NGOs and other user organizations a low-cost solution with diversified functions, including marketing communication and PR services, product promotion, mobile commerce, digital marketing and customer relationship management activities such as polling & voting, B2B/B2C interactions, event invitation, social media engagement, broadcasting, instant ordering & payment, consumer behavior analytics and stock database management.

### Automatic Medication Compliance System

Medication adherence is a serious problem around the world. In the United States, the total economic burden of medication non-adherence is estimated to be \$200 billion annually including the cost of hospitalizations and emergency department visits. The primary reasons why patients do not take medications as prescribed include forgetfulness and lack of information.

Infoengine Technology offers a wireless pillbox that alerts patients when they have to take their medicine, keeps track of their dosage/ usage as well as collect and send data in real-time. Targeting the elderly and chronic patients, this platform is built on patented Bluetooth Low Energy (BTLE) technology, a patented pill activity tracking algorithm, smart sensors and other proprietary expertise. Connected to the Internet, the smart pillbox alerts patients at specific times, either through text message or phone call, or via a blinking light found on the bottle. Data showing when the box is opened and how many pills are removed are wirelessly sent to the servers. If a dose is missed, it reminds the patient about it. The information is also sent to doctors and caregivers who can monitor the patients' adherence and intervene if necessary.



## Intelligent Supply Chain Track and Trace Solution

The solution is developed for a retailer of childcare product in Mainland China with more than 100 chain stores, all sharing the same end-to-end supply chain process. The enterprise operates a sizeable distribution centre, which receives products of various categories from multiple suppliers; classifies the items accordingly; places them on the shelves and picks the goods as per orders before dispatching them to the stores. However, its supply chain process was beset by manual stocktaking errors; merchandize loss, wrong shipments, a lack of traceability on transportation boxes, low visibility of delivery as well as inventory and sales records that remained unrecorded.

Tradelink Technologies was commissioned to design a supply-chain track and trace solution supported by a selection of UHF RFID handheld readers, RFID Gate with antenna and readers and RFID tags. The backend system was integrated with its robust middleware called ScanOne mapping effort with customer's ERP system.

An increase in operational efficiency; better traceability of the delivery process; as well as a faster, more accurate on-shelf rate in stores are among the benefits offered. Besides a 30% reduction in error rate, this solution also cuts sales loss due to uncontrolled delivery while enhancing system integration and interoperability.

### Wifinity Limited

## Wireless Intelligent Node

In modern buildings, many sensors are interconnected to form a control system. Such sensor networks provide a valuable tool to facilitate the efficient use of energy, without reducing occupants' comfort and quality of life. But the deployment of a building control system is complicated due to different proprietary controls, industry and communication standards. Building sensors are expensive and integrating them with cabling can increase the financial overheads in building management.

An intelligent node developed by Wifinity Limited integrates a collection of sensors, controllers and interfaces integrated into a single unified platform. Operating on Radio Frequency network addressability and Power Line-based Connectivity, it can fit seamlessly into any HVAC (heating, ventilating and air-conditioning) appliances, lighting luminaries, heavy duty consumer appliances such as washing machines, TVs and printers.

This solution eliminates the need for physical connection between sensors and their associated cabling/ power supplies. Furthermore, the deployment of sensors control is now simplified and the number of sensors and controllers required can be reduced up to 70%. Not only does it contribute to substantial savings in capital expenditures, it can also reduce building energy consumption by 20% or more.

# Hong Kong U-21 IoT Awards 2014

## Messages from the Judging Panel



**Ir. Paul W.K. Wu**  
**Panel Chair**  
**Senior Manager, Special Systems**  
**Airport Authority Hong Kong**

I am very honoured to be the Chairman of the HK IoT Awards 2014 panel judges and deeply impressed with the creativity and enthusiasm of the projects presented by the college students.

As compared to the RFID Awards in the past, this year it embraces a wider conceptual development and applications on the use of Internet of Things (IoT) which relates directly to our daily lives and business operations.

I have to give a big Congratulation to all award winners for their brilliant presentations and on the other hand a big Thank to all my panel judges for giving the students invaluable expert advice on the presented projects!

I would also like to compliment on such meaningful event organized by GS1 Hong Kong in supporting Hong Kong to become a Smart City through the application of IoT.

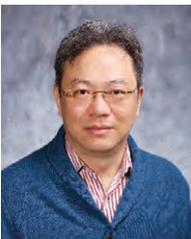


**Mr. Ken Chung**  
**General Manager, B.D.**  
**DCH Logistics Company**

I am honoured to be a Judge for the HK U-21 IoT Awards 2014. We were deeply impressed by the quality, innovative solutions and enthusiasm of the participating students.

I found that most of the projects were not just only focusing on the technology but also considering the actual application to the commercial side or society. I do hope that those innovative solutions can be applied in the market soon and further enhanced the daily life of community.

I would like to express my heartfelt thanks to GS1 Hong Kong for organizing such meaningful event. I congratulate GS1 Hong Kong for the success in hosting the HK U-21 IoT Awards.



**Ir Dr. Paul Tsui**  
**Chairman**  
**Hongkong Association of Freight Forwarding & Logistics (HAFFA)**

I am honoured to be a judge of the first-ever Hong Kong IoT Awards 2014. It has been a challenging but enjoyable experience in selecting the winners of the awards among so many high-quality entries. I am particularly impressed and encouraged to see the original and innovative solutions which I believe can immensely enhance the overall competitiveness of the industry.

Thank you GS1 Hong Kong for organizing such a successful and meaningful event. I wish to send my heartfelt congratulations to all the winners and participants! Well done!



**Dr. David Chung**  
**Chief Technology Officer**  
**Hong Kong Cyberport Management Company**

Congratulations to the winners of the Hong Kong U-21 IoT awards and they are all great ICT talents to reshape the world!! Very meaningful IoT awards organised by GS1 Hong Kong to attract and develop many ICT young talents to become entrepreneurs of tomorrow and build for “Smarter Hong Kong, Smarter Living”.

**Mr. Ken Ngai**  
**Head of Information Technology**  
**Hong Kong Federation of Youth Groups (HKFYG)**

Congratulations to those who won the trophies. Nevertheless all participants are all winners.

Trial is the best stepping stone to the success. All contestants have demonstrated good understandings of technologies. More importantly, it is how to apply the knowledge into daily lives for social good innovatively. As one of the judges, I was at the presentation session to appreciate the positive energies, witness the creativities and experience the passion of participants. It is my pleasure to be part of the event, to see their paths to success.

The Internet of Things competition has given a remarkable opportunity for young technologists to show their talents. It is also a good learning experience for participants and judges. Thanks for all the effort of the organizer, GS1 Hong Kong.



**Ms. Barbara Chiu**  
**Vice President (Technology)**  
**Hong Kong Internet of Things Industry Advisory Council**

On behalf of the Hong Kong Internet of Things Industry Advisory Council, I'd like to offer our heartfelt congratulations to all the outstanding winners of the Hong Kong IoT Awards. The high standard of presentations on IoT innovations and creative IoT applications, clearly demonstrates the competence and huge potential of our local IoT talent. The IoT is clearly underway and will continue to play a profound role in our businesses and in our daily lives. Looking ahead, I am sure the Hong Kong IoT Awards will continue to serve as a valuable platform to promote greater awareness and understanding, and widen local adoption of IoT technologies, leading us to a smarter and more connected future!

# Hong Kong U-21 IoT Awards 2014

## Messages from the Judging Panel



**Mr. Stephen Cheng**  
**President**  
**Hong Kong Logistics Association (HKLA)**

As a member of the judging panel, I found it difficult to assess the potential awardees since the participants were very close in their standards. Both the concepts and applications of IoT were excellently presented. They deserved my commendations. As it was a competition, only the best ones have been selected for the awards. I hope they will continue to research into their respective areas of IoT and make further enhancements. To the awardees they have my sincere congratulations.

As the organizer, GS1 Hong Kong has made the competition a meaningful event and deserves all our respect.



**Dr. P.M. Lai**  
**Chairman**  
**Hong Kong Retail Technology Industry Association (RITA)**

It is my honour to be a member of the judging panel for the HK IoT Awards 2014. I am excited to witness so many innovative concepts and applications for use of IoT in various business areas. The contestants have vividly demonstrated a wide portfolio of use cases which highlight the market potential for IoT adoption is enormous. I look forward to seeing more innovative ideas from these creative minds who can nurture real business cases in the coming years. Much congratulation again to the winners and contestants for their achievements and efforts.



**Miss Joey Lam, J.P.**  
**Deputy Government Chief Information Officer (Policy and Community)**  
**HKSAR Government**

Hong Kong is a smart city. With wider adoption of Internet of Things technologies, cloud computing and big data analytics, Hong Kong is poised to become even smarter, bringing efficiency, convenience, comfort and smarter living to all. I am delighted to serve on the judging panel of "Hong Kong Internet of Things Awards 2014". The myriad of Internet of Things applications presented to the judging panel are shrewdly used in energy consumption tracking, health monitoring, smart home and practically all aspects of daily life, demonstrating impressive ingenuity and creativity.

I congratulate all award winners. Your innovations reflect relentless pursuit of quality and excellence. I would also like to thank GS1 Hong Kong for organising this meaningful competition to encourage the development of more Internet of Things applications for our smarter future.



**Mr. Andrew Young**  
**Vice President, Marketing and Sales**  
**Hong Kong Science and Technology Parks Corporation (HKSTP)**

Congratulations to all winners of the Hong Kong IoT Awards 2014. This new programme not only brings honour to the award winning organisations, but also enhances the overall competitiveness of the industries, thus enabling Hong Kong to become a smarter city. I wish that the Hong Kong IoT Awards would continue to encourage wider adoption of IoT technologies and more creative applications that can uplift business performance and customer satisfaction.



**Mr. Peter Mok**  
**Head, Incubation Programmes, Business Development and Technology Support**  
**Hong Kong Science and Technology Parks Corporation (HKSTP)**

On behalf of Hong Kong Science and Technology Parks Corporation, I am most honoured to be appointed as one of the judges for the “HK IoT Awards 2014”. The overwhelming responses from schools, enterprises, public utilities, research centre and startups in competing for the Awards proves that Hong Kong is a fertile ground for creativity and innovations. I am very much impressed with this year’s candidates, spanning from large scale R&D projects with advanced and sophisticated RFID technologies to small and portable designs delivered by small team’s research works. Regardless of the size and nature of the participants, the shared virtue resides in its Research depth, Innovation excellence, and the outstanding value proposition.

I congratulate this year’s winners of the “HK IoT Awards 2014” and hope their innovative RFID product & service applications will be further expanded to bring significant impact to Hong Kong’s industry, economy, society and beyond. I believe this awards program will continue its role as a key enabler in innovation technology development and facilitating Hong Kong to become a technology hub in Asia.



**Prof. Becky Loo**  
**Immediate Past President**  
**The Chartered Institute of Logistics and Transport in Hong Kong (CILTHK)**

The Internet of Things (IoT) represents many new possibilities of improving system management, business practices and people’s daily life. The technological trends are global. Yet, the impacts are local. This year’s submissions once again show the board spectrum of applications from attractive but functional PiCodes, disabled rehabilitation, smoking cessation, waste management, child safety, manufacturing inventory management to shopping experience. I want to extend my hearty congratulations to the winners of this year’s competition who have helped to realize the dream of integrating technology into people’s daily life.



# Hong Kong U-21 IoT Awards 2014

## List of Awardees

### IoT Revolution Concept



#### **PiCode : Picture 2D Barcode**

**Student:** Huang Wen Jian  
**Supervisor:** Mr. Wai Ho Mow

**Department of Electronic & Computer Engineering, Hong Kong University of Science and Technology**



#### **The iWear Closet**

**Students:** Chung Ka Ming, Yip Kin Chung, Au Yeung Shan Shan, Lin Yat Tin, Hung Chak Chiu, Kwok Chak Yung  
**Supervisor:** Dr. Terence Cheung Chun Ho

**Department of Information Systems - Information Management, City University of Hong Kong**



#### **Q-Waste**

**Students:** Kwok Chiu Wa, Wong Po Yan, Tang Sau Yan, Wong Shuk Ying, Wong Sze Ki  
**Supervisor:** Mr. William Leung

**Associate in Business (Marketing), Hong Kong Community College**



#### **Open Toilet**

**Students:** Leung Ming Sze, Hui Sze Wai, Lee Chak Hong, Lau Kong Fat, Chiu Chun Ting, Yeung Man Kit  
**Supervisor:** Mr. Leung Kwok Way

**Associate in Business (Marketing), Hong Kong Community College**

### IoT Revolution Application



#### **Disabled Assistant System: Using RFID and Hand Detection Technologies**

**Students:** Lau Shiu Fung, Ho Man Fai, Sin Ping Tat, Yu Chin Ting, Yau Chi Kuen  
**Supervisor:** Dr. Henry C.B. Chan

**Department of Computing, The Hong Kong Polytechnic University**



#### **UbiPen: A Multisensory and Wearable Smart Pen for The Internet of Manufacturing Things**

**Students:** Kong Xiang Tian Rui, Shao Sai Jun, Lan Jian Hua, Yang Hui Bin, Zou Bing Feng, Fang Ji  
**Supervisor:** Mr. George Q. Huang

**Department of Industrial and Manufacturing Systems Engineering, The University of Hong Kong**



#### **Smart Shopping Mobile Service Platform with Using iBeacon, NFC and QR Code Technologies**

**Students:** Chau Siu Fai, Lau Tsz Yan, Cheung Wai Tak, Tong Cham Fei, Chan Chun Hei, Chan Tik Ki  
**Supervisor:** Mr. Johnny Kwong

**High Diploma in Software Engineering, Hong Kong Institute of Vocational Education (Tsing Yi Campus)**



#### **"EyeBB": Intelligent Behaviour and Safety Tracker for Kids**

**Students:** Wang Liwei, Chen Zhuo, Li Tong, Pei Kexin  
**Supervisor:** Mr. Hu Haibo

**Department of Computer Science, Advanced Information System, Hong Kong Baptist University**



## Certificate of Merits

### Public Transportation Infrastructure

**Students:** Chung Siu Hang, Lai See Lok, Tse Sze Man, Ko Ka Man, Wen Yu Shan, Cheung Ho Lun  
**Supervisors:** Mr. Simon Chan Pui Yuk, Dr. Lee Choi Hing

**Division of Business (ABA in Global Logistics & Supply Chain Management), Community College of City University**

### EASY ELECTRONIC TICKET - RFID based Dynamic Electronic Ticket

**Students:** Lo Leong Cheung, Chan See Yu, Cheng Man Cheng, Chu Wai Yin, Yip Wai Ting, So Ka Ho  
**Supervisor:** Mr. Tsoi Yau Chat

**Division of Applied Science and Technology, Community College of City University**

### Multifunction DIGITAL-Card

**Students:** Kwan Hei Yin, Mak Lai Fong, Yeung Wong Ho, Wong King Hei, Tse Ham Yan  
**Supervisor:** Mr. William Leung

**Associate in Business (Accounting), Hong Kong Community College**

### Holy Seat

**Students:** Kwok Ko Chit, Law Jason, Wong Kit Hing, Leung King Nam, Lam Nang Tat, Lee Ting Ting  
**Supervisor:** Mr. William Leung

**Associate in Business (Accounting), Hong Kong Community College**

### Magic Pen

**Students:** Wong Tsz Kin, Kong Wai Pong, Chan To Hong, Chung Kit Sing, Ho Sin Tung  
**Supervisor:** Mr. William Leung

**Associate in Business (Marketing), Hong Kong Community College**

### I-pillow

**Students:** Law Ka Yan, Yuen Wing Tung, Cheung Hoi Ching, Tsang Man Wai  
**Supervisor:** Mr. William Leung

**Associate of Business Management, Hong Kong Community College**

### Smart Bluetooth Traffic Control System

**Students:** Wong San Yi, Lee Kin Ho, So Hiu Fung, Wong Yuen Sum  
**Supervisor:** Mr. William Leung

**Associate in Business (Finance), Hong Kong Community College**

### RFID in Using Hospital Management System

**Students:** Yeung Chin Hang, Chan Ka Ho, Siu Wing Hung, Wong Chin Fung  
**Supervisor:** Mr. Woo Hok Luen

**Higher Diploma in Computer Systems Administration, Hong Kong Institute of Vocational Education (Tuen Mun Campus)**

### Home and Outdoor Elderly Taking Care Automation

**Students:** Leung Ka Hei, Lam Pan, Lam Hin Leung, Lau Chun Ming  
**Supervisor:** Mr. Woo Hok Luen

**ICT / HD in Mobile Application Development, Hong Kong Institute of Vocational Education (Tuen Mun Campus)**

### E-elderly Management System

**Students:** Yuen Ka Lok, Chung Chun Ming, Wong Chun Sun  
**Supervisor:** Mr. Woo Hok Luen

**Information and Communications Technology, Hong Kong Institute of Vocational Education (Tuen Mun Campus)**

### Smart Transport System

**Students:** Lau Cheuk Ho, Lai Lap Man, Gan Jia Cheng, Ho Tak Fai, Ho Tung  
**Supervisor:** Mr. Fung Kim Wan Eric

**Higher Diploma in Electrical Engineering, Hong Kong Institute of Vocational Education (Tsing Yi Campus)**

### Product Authentication System with NFC Technology - A Mobile Application

**Students:** Chau Tsun Fai, Cheung Ping Kong, Lau Tin Yu  
**Supervisor:** Mr. Johnny Kwong

**ICT High Diploma in Software Engineering, Hong Kong Institute of Vocational Education (Tsing Yi Campus)**

### i-Gotcha

**Students:** Pong Kai Sze, Pong Dik Yin  
**Supervisor:** Dr. Pimtong Tavitiyaman

**Hospitality Management - Business, School of Professional Education and Executive Development, The Hong Kong Polytechnic University; Griffith University**

# Hong Kong U-21 IoT Awards 2014

## List of Awardees

### Certificate of Merits

#### Intelligent Museum Guiding System

**Students:** Chen Ying Ting, Li Xin Wei  
**Supervisor:** Mr. Cheng Chun Hung

**Systems Engineering and Engineering Management, The Chinese University of Hong Kong**

#### Indoor Acoustics Positioning System – For Vulnerable Group

**Students:** Li Ho Kwong, Chen Mei Zhi  
**Supervisor:** Prof. Wu Ke-Li

**Department of Electronic Engineering, The Chinese University of Hong Kong**

#### Wetland Smart - Development of Navigation Mobile Application for Android

**Students:** Lui Ming Yuen, Leung Pak Hin, Cheung Ka Yan  
**Supervisors:** Mr. Cheng Chun Hung, Mr. Ng To Bun

**Systems Engineering and Engineering Management, The Chinese University of Hong Kong**

#### RFIQ: RF-based Intelligent Queue Management System

**Student:** Ho Yik Him  
**Supervisor:** Dr. Henry C.B. Chan

**Department of Computing, The Hong Kong Polytechnic University**

#### iBeacon-Based Intelligent Store

**Students:** Pun Chi Ho, Hui Tik, Lee Wai Man, Leung Sze Nga, Ho Yik Him, Li Hoi Yi  
**Supervisors:** Dr. Henry C.B. Chan, Dr. W.H. Ip, Dr. C.H. Wu

**Department of Computing, The Hong Kong Polytechnic University**

#### Low Cost Smart Home System with Android Application

**Students:** Wong Chun Fai, Ho Yik Him  
**Supervisor:** Dr. Henry C.B. Chan

**Department of Computing, The Hong Kong Polytechnic University**

#### Gym, Gym, Gym... My Personal Fitness Coach

**Students:** Lee Yuet Hei, Ng Toi Chun, Wong Ching Yuen, Kwok Hiu Lam, Poon Koon Hung, Yeung Yuen Ki  
**Supervisor:** Mr. Mak Wai Lun

**Department of Industrial and System Engineering, The Hong Kong Polytechnic University**

#### An Integrated Shopping Mall Mobile Application - PocketMall

**Students:** Wong Yau Ting, Tam Hiu Man, Cheung Chun Pong, Ng Wing Ki  
**Supervisors:** Dr. Jacky Ting, Dr. Albert Tsang

**Department of Industrial and System Engineering, The Hong Kong Polytechnic University**

#### Smart Waste Management System for Hong Kong Community

**Students:** Wu Junjie, Ng Kam Hung, Heung Shuk Fong, Xiong Zhi Ren, Zou Jinglam  
**Supervisor:** Dr. Lee Ka Man

**Department of Industrial and System Engineering, The Hong Kong Polytechnic University**

#### i oppose Tobacco

**Students:** Cheung Ngai King, Chan Chui Fun, Fung Ying Man, Chan Ka Li, Suen Hon Ki, Mak Ka Shing  
**Supervisors:** Dr. C.H. Wu, Dr. G.T.S. Ho, Dr. W.H. Ip

**Department of Industrial and System Engineering, The Hong Kong Polytechnic University**

#### Integrated Care (i-Care)

**Students:** To Yip Sum, Liu Lai Shan, Li Hoi Yi, Leung Sze Nga  
**Supervisors:** Dr. C.H. Wu, Dr. W.H. Ip, Dr. Henry C.B. Chan

**Department of Industrial and System Engineering, The Hong Kong Polytechnic University**

#### An NFC-Enabled Anti-Counterfeiting System for Wine Industry

**Student:** Yiu Chung Kit  
**Supervisor:** Dr. S.H. Choi

**Department of Industrial and Manufacturing Systems Engineering, The University of Hong Kong**

#### Uwatch - CONnet Everything U Need

**Students:** Leung Kin Yeung, Cheng Wing Hang, Chan Ling, To Tsz Fung, Wong Kin Long, Ho Sze Wan, Choi Tsz Hong, Tsoi Kwan Kit  
**Supervisor:** Mr. Wilson Lu

**Department of Real Estate and Construction, The University of Hong Kong**

#### The Novel Ultra-Thin Reconfigurable UHF Antenna Technology for the Smart Shelf

**Students:** Chen Menglin, Ma Zilong, Shualbh Gupta  
**Supervisor:** Dr. Jiang Lijun

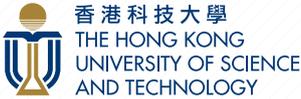
**Department of Electrical Engineering, The University of Hong Kong**

# Hong Kong U-21 IoT Awards 2014

## Winning Cases Sharing



### IoT Revolution Concept



**Department of Electronic &  
Computer Engineering,  
Hong Kong University of  
Science and Technology**

#### Student

Huang Wen Jian

#### Supervisor

Mr. Wai Ho Mow

### PiCode: Picture 2D Barcode

In marketing, QR codes are one of the most common ways to direct customers to designated websites, aimed at achieving a high sales conversion rate. However, QR codes are not aesthetically pleasing and could expose the audience to virus and unsafe information.

To tackle these challenges, a Hong Kong University of Science and Technology team has created a PiCode, using coding and signal processing methods to automatically embed a generic picture into a 2D barcode. This novel picture-embedding barcode enables the embedded brand logo to be easily recognized and eliminates the need to distort the logo in order to fit it into a small area.

In addition, PiCode shows the embedded picture with some artistic effect induced by the specific form of mosaic patterns used and has a better aesthetic appearance than existing barcodes. PiCodes can be created for URLs and SMS messages. As their embedded pictures can carry multiple messages, placement of several PiCodes can convey more promotional messages within the same marketing space. They can be coded and decoded with a mobile application within a few seconds, saving uploading and downloading time. Currently, PiCode is decodable only by smartphones equipped with a specially designed barcode app developed by the HKUST team.



### IoT Revolution Concept



**Department of Information  
Systems - Information  
Management,  
City University of Hong Kong**

#### Students

Chung Ka Ming, Yip Kin Chung,  
Au Yeung Shan Shan,  
Lin Yat Tin, Hung Chak Chiu,  
Kwok Chak Yung

#### Supervisor

Dr. Terence Cheung Chun Ho

### The iWear Closet

Many people have to make daily decisions about what to wear, how to mix and match as well as organize, manage and streamline their personal wardrobes, while looking trendy and presentable for different occasions.

Designed by a City University of Hong Kong team, the iWear Closet provides technology-enabled solutions for the fashion-conscious. The idea is to build a centralized clothing database, to which data is contributed by the average users and by fashion retailers and brands. Users are encouraged to upload photos of their garments, install sensors and a camera in their wardrobes and tag their every apparel item with RFID labels. Related data, including size, colour, brand, fabrics and more, will be stored in the iWear Clothing database on Cloud. Friends and other iWear Closet users can then offer timely fashion advice and mix-and-match suggestions, along with that of independent stylists, fashion retailers and the platform's clothing recommendation tools. Users can also receive alerts from their wardrobes, where temperature, relative humidity and dew point levels are monitored, if closet cleaning is required for hygiene reasons.

With free fashion advice from friends and professional stylists, iWear Closet users can optimize the use of every garment item in their wardrobes. This will discourage them from buying new clothing, hence helping to conserve the environment. Information mined from the centralized platform can also provide fashion retailers and brand owners with consumer analytics to understand market trends and carry out design and production for subsequent seasons.

# Hong Kong U-21 IoT Awards 2014

## Winning Cases Sharing



### IoT Revolution Concept



**Associate in Business  
(Marketing),  
Hong Kong Community College**

#### Students

Kwok Chiu Wa, Wong Po Yan,  
Tang Sau Yan, Wong Shuk Ying,  
Wong Sze Ki

#### Supervisor

Mr. William Leung

## Q-Waste

Waste management is a major problem in Hong Kong, where 6286 tonnes of waste are generated and 13,800 tonnes are buried in landfills daily. Given the urgent need to reduce waste generation, green practices such as the “Environmental Levy on domestic wastes” and “Producer Responsibility Scheme,” have been suggested for adoption.

Hong Kong Community College team has developed a waste tracing system based on IoT technology to enhance efficiency of waste collection and ensure it is undertaken at the lowest cost and highest efficiency. RFID tags and a RFID mesh network design are proposed for this project, along with garbage bins to be equipped with humidity sensors. Using garbage bags embedded with RFID tags can help trace the waste generated by each family in a residential estate and record its weight under the family’s account. RFID mesh networks will help collect data on garbage bins, including the depth and humidity of their content. This will offer government departments and companies the information they need to decide on when to collect residential waste.

For families and individuals, the system makes it possible for them to check on the Internet the amount of waste they have created and seek ways to reduce their waste generation. As a summary of garbage sites requiring waste collection will be provided, the system will offer useful data to government departments and waste management companies for waste collection planning and in ways that could minimize their carbon footprint.



### IoT Revolution Concept



**Associate in Business  
(Marketing),  
Hong Kong Community College**

#### Students

Leung Ming Sze, Hui Sze Wai,  
Lee Chak Hong, Lau Kong Fat,  
Chiu Chun Ting, Yeung Man Kit

#### Supervisor

Mr. Leung Kwok Way

## Open Toilet

Finding public toilets in Hong Kong, especially clean, hygienic and well-equipped ones, can be far from easy. Open Toilet, a mobile application developed by the Hong Kong Community College, aims to provide users with real-time information on the whereabouts of public washrooms and much more. Under this project, it is proposed that public toilets be installed with different sensors to collect data on user traffic and the availability of toilet rolls, tissues, toilet seat covers and hand-washing liquid. Air-quality eggs are also called for to record air quality, bacteria and ventilation level as well as odor.

Relevant data collected will be uploaded to a server and be made accessible to anyone with the mobile app downloaded on smartphones or electronic tablets. App users will be provided with a list of public toilets, including their locations, and information under the criteria described. Based on the data, users can therefore choose the most suitable toilets. After using these facilities, they can also leave their comments and feedback for the reference of subsequent users. They can even offer toilet rankings on criteria like cleanliness and number of cubicles, on Cloud. The app can also identify public toilets that are closed for maintenance and repair, so potential users can make informed choices.

Shopping malls are encouraged to take part in this programme, in order to provide their customers with a pleasant washroom experience as part of a strategy to gain their goodwill and satisfaction.


**IoT Revolution Application**

 THE HONG KONG  
 POLYTECHNIC UNIVERSITY  
 香港理工大學  
 DEPARTMENT OF COMPUTING  
電子計算學系
**Department of Computing,  
 The Hong Kong Polytechnic  
 University**
**Students**

 Lau Shiu Fung, Ho Man Fai,  
 Sin Ping Tat, Yu Chin Ting,  
 Yau Chi Kuen

**Supervisor**

Dr. Henry C.B. Chan

## Disabled Assistant System: Using RFID and Hand Detection Technologies

Physically disabled people are encouraged to undertake occupational therapy practices for faster recovery. For students with hand disabilities, it is costly for them to always seek professional physiotherapy treatment. Some of them may not practise their hand motion enough, due to the monotony of such practices.

Developed by the Department of Computing of The Hong Kong Polytechnic University, the Disabled Assistant System (DAS) seeks to help disabled students through an online game requiring various hand motion, attuned to occupational therapy practices.

Students wear a RFID tag each, so when they enter the detection area, they can be detected and their particulars automatically captured. Records of their therapy practices via the online games are captured and kept in a database. A student activity panel is designed for occupational therapists to monitor the recovery progress of every student and give recommendations for future practices. A Leap Motion game is devised for students to perform different hand gestures using a Leap Motion controller. After each game, the results are stored into the database to be analyzed for report generation.

Students are motivated to undertake the therapy practices more as they have fun playing the online games. The system can track and monitor the performance and progress of students automatically, hence saving manual input. Data captured helps therapists to monitor every disabled student effectively. Overall, the DAS is effective in getting the students to do occupational therapy more for faster recovery, under minimal supervision.


**IoT Revolution Application**

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## UbiPen: A Multisensory and Wearable Smart Pen for The Internet of Manufacturing Things

Real-time information allows manufacturers to make better-informed factory floor decisions, from raw material to product output, quality control and troubleshooting. Real-time visibility and data sharing across the production chain make efficient operational management, coordination with suppliers and swifter response to contingencies possible.

However, many manufacturing facilities still lack timely, accurate and consistent data. Moreover, visibility tools such as fixed RFID readers or hand-held auto-ID readers, are difficult to use and costly to purchase and maintain.

UbiPen, a multisensory and wearable smart pen, is developed by the University of Hong Kong to collect and analyze manufacturing data automatically. Lighter than RFID readers, it can be worn by factory personnel for data capture, without using paper and pen. A sensing environment for different functional zones on the manufacturing floor is fostered, with RFID tags attached to equipment and other assets while barcodes are used to identify incoming material.

Using Internet of Manufacturing Things (IoMT) technology, the UbiPen captures various information, including barcode data, RFID tag data and temperature data, of operators, machinery, pallets, materials and other resources, including their whereabouts and movements. The smart pen can also capture workers' gestures and motions onsite. The device is a core component of the wireless personal area network (WPAN) interacting with other smart devices via bluetooth or wifi.

By capturing different types of data, integrating and sharing them among various stakeholders, the smart pen helps uplift visibility along the production supply chain significantly.



# Hong Kong U-21 IoT Awards 2014

## Winning Cases Sharing



**IoT Revolution  
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## Smart Shopping Mobile Service Platform with iBeacon, NFC and QR Code Technologies

Shopping malls are located everywhere in Hong Kong, providing a place for visitors to shop, eat, enjoy a coffee, watch a movie and meet with friends. But sometimes, consumers need help to navigate around and find out the ongoing promotional campaigns or discounts they can take advantage. Some also need more information to make consumption decisions.

A Hong Kong Institute of Vocational Education (Tsing Yi) team has developed a smart shopping solution using Bluetooth low-energy (BLE) wireless technology, Near Field Communication (NFC) technology and common QR codes. Each shop is equipped with iBeacon stations to provide for mobile app detection.

By downloading a dedicated app, shoppers can obtain direction guidance to stores, restaurants, cafes, washrooms or elevators. Promotional and discount messages would also pop up on their smartphones. They can even use the app to make restaurant reservations and book cinema tickets.

This mobile service platform enables shoppers to navigate in the mall with ease. They are better informed of the product and service offers and hence are encouraged to spend freely. Even when a shop is crowded, they can preview the items sold without entering. Due to the information offered, shoppers can speed up their purchase decisions. All these initiatives enable mall operators to raise their service quality. Hence, a win-win solution is provided to the mall, the individual shops and consumers.



**IoT Revolution  
Application**



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## “EyeBB”: Intelligent Behavior and Safety Tracker for Kids

The market for children's protection products is enormous. Every year, about 200,000 children in China go missing and the figure in the United States is 800,000. Besides being vulnerable to kidnapping, children in the 3-to-6 age group are predisposed to accidents, such as falling, slipping and scalding, due to their active nature and curiosity.

Developed by a Hong Kong Baptist University team, EyeBB is promoted as “an intelligent behavior and safety tracker for kids.” Weighing only 15 grams and smaller than a 1-dollar coin, this is a Bluetooth Low-energy-powered smart device “Macaron,” an accessory that children can wear as a badge or accessory. Offering children behavior analysis, monitoring application and alerts, the project infrastructure consists of a web server, a cloud application server and Bluetooth access point.

With this system, parents and teachers can locate the children on live maps in any indoor environment. Location information can be used to interpret the children's behavior. SOS alarms are triggered when the child presses a button or scream, so their guardians are alerted in time. When ‘radar tracking’ mode is activated, caretakers will receive alarms when the child moves beyond a certain distance or enters a danger zone such as the kitchen or balcony.

The benefits of the device are that they monitor children's safety at home, in the school bus or kindergarten, while providing accurate analysis of their behavior to their caretakers.

Reference:

[www.jwt.com/en/beijing/work/missingchildren](http://www.jwt.com/en/beijing/work/missingchildren)

# Acknowledgement

## Co-organizer



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