



2009-2010 R&D PROJECTS

Project Reference GHP/038/08LD

Project Title **RFID Application Service Technology in Guangdong-Hongkong Import/Export Supervision and Management**

R&D Organisation Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies Limited

Abstract

The joint collaboration between Guangdong and Hong Kong has become an indispensable driving force for economic and technological development in the PRD region. According to statistics, Guangdong's total foreign-trade volume weighs more than 350 Billion US dollars. Guangdong-Hong Kong's import/export trade valued at 250 Billion US dollars. Hong Kong direct investment in Guangdong exceeds 5 Billion US dollars, accounting for over 52.3 percent of the provincial actual foreign direct investment.

Aiming at strengthening the co-operation and supporting the growth for both Guangdong and Hong Kong, this project focuses on the supervision and management of imported/exported goods between the regions. Its goal is to develop and establish a cross-border goods supervision service platform to facilitate e-logistics, information exchange and supply chain applications between Guangdong and Hong Kong. The project also focuses on exploring RFID technology and related applications for the imported and exported goods between Hong Kong and Guangdong. It will introduce cross-border supervision and management applications, application standard research and pilot cases which are all based on RFID technology, cross-border information service platform, and other key enabling technologies.

In order to demonstrate RFID technology in the sectors, pilot study and typical enterprise applications for the monitoring of live pigs will be developed. The adoption of RFID technology will ensure safety and quality of commodities and enhance their tracking and traceability, particularly for food safety and animal epidemic prevention and control. In addition, through the application of RFID technology, it is expected that the project will strongly promote the rapid development of the RFID industry.

Project Coordinator Dr Frank Tong

Project Reference GHP/039/08LZ

Project Title **RFID Tagging and Packaging Technology for Food Products**

R&D Organisation Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies Limited

Abstract

RFID technology is regarded as the ideal solution for the ever-increasing concerns of food safety issues. By applying the RFID tags onto the packages, food products will become tractable and traceable; furthermore, products with embedded RFID labels will give consumers a reliable mechanism for tamper-proof and authentication, thus ensure a safe and secured food supply chain from farm to store.

However, food safety poses new challenges for RFID deployments. First, food products often consist of materials with a large variety of physical properties which will result in antenna detuning, performance degradation and even failure. Second, food packages vary significantly in form-factor, package materials and packing methods, RFID labels are also expected to have self-destructive capabilities in tamper-proof applications. Third, most RFID labels with traditional antenna materials are not decomposable and environmentally friendly for recycling process.

In this project, we are proposing solutions to address the above concerns. 1) Content specific RFID tags tailor-made and optimized for different food products. 2) Tamper-proof RFID labels to ensure product safety, authenticity with self-destructive mechanism. 3) RFID antennas and inlays made from environmentally friendly materials.

With the successful dissemination of the project, RFID technology is expected to bring a paradigm shift for food industry.

Project Coordinator Dr Terry Ye



2009-2010 R&D PROJECTS

Project Reference GHP/059/08LP

Project Title Use-IT-Easy : A Low Cost, High Performance Mobile RFID Platform

R&D Organisation City University of Hong Kong

Abstract

RFID technology can change the world – this is evident by the support of leading company Metro Group. However, deployment of RFID is not as fast as expected. Cost, ease of use, ease of deployment, and integration to existing processes are factors that prevent pervasive and large scale adoption.

To make RFID adoption palatable, it must provide a quick return of investment. Increasing operations efficiency provides such an opportunity. RFID has always been envisaged as a tool to facilitate quick handover of goods from one party to another. However, using fixed reader installation is not only costly but also inflexible. Today's handheld readers are expensive, heavy and large, and are not easily adapted into existing workflows. As such these solutions are not even used in RFID deployments by Metro although tag failure at source is a common problem.

In this project, we aim to overcome these problems. Our project will develop a cost effective and easy to use platform that facilitates the efficient checking and handing over of goods that are tagged. It will be first tested and integrated into the QC inspection process of our collaborators, Metro Group and its suppliers before becoming a standalone killer application.

Project Coordinator Dr Andrew Lim

Project Reference ITP/018/09LP

Project Title Service Platform for PRD Waterway Logistics Operators

R&D Organisation The University of Hong Kong

Abstract

Waterway logistics industry is an important contributor to the growth of terminal ports in Hong Kong. The exploitation of its potential as a feeding force in PRD for terminal ports business is greatly dependent on an efficient waterway supply chain. This project proposes a waterway logistics software provisioning platform (WLSP) as a means to help the industry enhance efficiency and competitiveness. We are confident that the project will contribute to Hong Kong through helping:

- the waterway logistics industry with provision of affordable logistics software applications;
- the waterway logistics industry improve the industry's IT competitive advantage;
- Hong Kong maintain its role as logistics hub in Asia.

The project will help establish an environment fostering value chains benefiting all the stakeholders in the waterway logistics industry, via:

- Development of enabling technologies to support logistics application software provisioning, such that application software can be built from components provided by various software vendors for waterway logistics functions;
- Development of enabling technologies to facilitate customization made-easy and deployment of software services at flexible charging models, suiting the needs and affordability of enterprises in the waterway logistics industry;
- Development of a waterway logistics software provisioning platform (WLSP) prototype to host a variety of software services to facilitate the use of IT functions with business confidentiality.

Three pilot implementations will demonstrate both the resolution of prominent industry issues and various functionalities over WLSP.

Project Coordinator Mr Edward Wong



2009-2010 R&D PROJECTS

Project Reference ITP/019/09LP

Project Title **Low-cost Versatile Tracking Device and Technology for Logistic Applications**

R&D Organisation The University of Hong Kong

Abstract

With the growing global business activities, it becomes essential for the firms to manage the logistics flow and to track their goods properly, especially for the valuable and important goods. Continuous monitoring and end-to-end tracking are necessary for shipments of high end goods such as jewelry, electronic products, and legal documents, etc.

Although GPS is available for global tracking and RFID is emerging for pallet-level visibility, they represent the two ends of the tracking technology spectrum. The gap still exists for seamless and continuous tracking at goods level for transit from indoor to outdoor, from goods to container. None of the existing systems can monitor the goods from end to end in real time.

The major objective of this project is to develop the next-generation tracking device and technology which supports continuous, real-time, and ubiquitous goods-level tracking. By leveraging the strengths of different wireless technologies, such as RFID, Wi-Fi, GPS, GPRS and ZigBee, a hybrid and collaborative positioning technology will be proposed. A cost-effective tracking device and application system will be developed. The proposed system aims to provide a faster, more accurate, and more reliable location tracking service than that available with each of the underlying technologies. The proposed low-cost goods-level tracking system will be piloted in practical business operations.

Project Coordinator Prof Victor Li

Project Reference ITP/020/09LP

Project Title **RFID Traceability for Risk Management in Hospital**

R&D Organisation The Chinese University of Hong Kong

Abstract

In 2008, Hong Kong Hospital Authority identified five types of hospital risk management. The report showed that all five types of hospital risks had certain degree of relationship to whether it could be successful to trace drugs and medical equipment being used on patients, as well as to track people's identifications and locations when providing or receiving medical care.

This project aims to enable risk management in hospital by developing low-cost, high-efficiency sensor-integrated active radio frequency identification (RFID) technologies to track people movement, together with alerting and visualization systems to analyse the captured data. In this project, tracking of high-risk patients will be piloted as well to demonstrate the same RFID infrastructure compliant with EPCglobal network can be applied to safeguard patients' lives in other occasions.

This project makes use of the results from the past ITF-funded active RFID research and development projects to strengthen the medical system and research work on tracking and tracing infectious diseases and their spreading patterns. The projected enhancement comes in three aspects: interaction traceability, real time tracking, and continuous monitoring. Based on the findings from the pilot studies, we will devise a plan to commercialize the results from this project.

Project Coordinator Prof Ke-li Wu



2009-2010 R&D PROJECTS

Project Reference ITP/029/08LI

Project Title **RFID-based Enabling Technology for On-Target Visibility in Garment Supply Chains**

R&D Organisation The Chinese University of Hong Kong

Abstract

The garment industry has significant contribution to the HK economy. The industry competes very much on supply chain efficiency and effectiveness. RFID technology enables on-target visibility in supply chains beyond sight-to-sight expectation. This project guides and sets guiding standards for RFID adoption in the garment supply chain industry.

The objective is to develop and deploy innovative use of RFID technology enabling on-target visibility. High visibility in general is an impetus to effective information management leading to efficiency in collaborative chain performance. While on-target visibility provides not only about goods in process and in transit, but synchronized real-time on-target movement of goods, safeguarding against logistics risk and uncertainty.

To reach the objective, an innovative information infrastructure is to be designed to facilitate on-target visibility by plug-and-sync of parties of a RFID-enabled supply chain. The infrastructure is designed based on the practice of the key players of a complete garment brand name supply chain (ie. from supply accessories, manufacturing, distribution, to retailing) under IDS Group. The RFID adoption strategy and supply chain process re-engineering are developed based on a careful in-depth analysis of current practice using Supply-Chain Operations Reference-model (SCOR). Intellectual property is expected in the infrastructure design, the plug-and-sync design and implementation, and the SCOR-based RFID adoption framework and practice.

Project Coordinator Dr Waiman Cheung

Project Reference ITP/035/09LI

Project Title **Development of a Printable RFID Antenna on Packages with Polymer and Paper Substrate**

R&D Organisation Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies Limited

Abstract

RFID-Embedded packages, or so-called smart packages, are expected to bring tremendous benefits to supply chain industry by enabling every product tractable and traceable. However, the higher RFID integration cost forms a big barrier for this new technology to be mass-deployed.

Beside the integration cost, package-embedded RFID designs also face other challenges as well. RFID antenna performance is significantly affected by the antenna materials, package hosting materials, form factor as well as contents inside the packages. General purpose tags will be significantly detuned when attached or embedded into packages, and often result in performance degradation.

In this project, we propose to leverage LSCM's printed RFID antenna technology and implement it into smart package designs and manufacturing process. Not only the antenna material cost (currently mostly copper and aluminum) can be reduced, by integrating the antenna printing process with the traditional package printing process, the overhead cost will also be minimized. Using conductive ink as antenna material, this project will design tailor-made antennas that are optimized for the conductive ink formulas, package printing process and form-factors.

Low cost RFID-embedded smart package designs and prototypes will be developed as the research deliverables. This project will demonstrate the feasibility of printed RFID antenna technology being implemented in traditional printing industry.

Project Coordinator Dr Terry Ye



2009-2010 R&D PROJECTS

Project Reference ITP/038/09LP

Project Title Real Time Food Quality Management Service System

R&D Organisation The University of Hong Kong

Abstract

Food safety and wastage are two prominent issues in managing perishable food. Cold chain being a specialized industry is capable of managing precise conditions for goods. However, the provision of application services is inadequate for the food industry to efficiently guard compromised goods or for timely mitigating actions to prevent food quality being compromised. Existing sensing monitoring is often segmented and disrupted during transit.

The project is to develop application services easily customized to facilitate decision-support, auto alert and real time monitoring in satisfying various stakeholder requirements and established guidelines. A real-time sensing information infrastructure will be developed to provide data for the application services. The sensing infrastructure can integrate with different public and proprietary sensing networks to gather different information such as temperature, humidity, location etc. to provide complete and comprehensive knowledge of food products from producers to consumers and during transits.

The project will leverage prior Shenzhen-Hong Kong R&D developed platform – FOSSIM as the basic service platform for easy access while also enriches with additional cold chain applications. Innovation of the project is in the distinctive use of sensing data that enables a multi-dimensional information support, based on which application development is no longer constrained by segmented data. Instead, a variety of applications can be developed to address various needs and thus equip the industry with better food quality management utilities. Through the value added to industry, we hope the ultimate goal of safeguarding food quality and reducing food wastage can also be achieved.

Project Coordinator Mr Edward Wong



2009-2010 研发项目

项目编号 GHP/038/08LD

项目名称 **粤港进出口监管及管理的RFID应用服务技术**

研发单位 香港物流及供应链管理应用技术研发中心

项目简介

粤港合作成为双方经济发展不可或缺的动力。据统计,广东进出口贸易总额超过3500亿美元,其中粤港澳进出口贸易总值达2500亿美元。港澳在广东实际投资超过50亿美元, 占全省实际吸收外商直接投资的52.3%。

在粤港合作的大前提下, 本项目以粤港之间的进出口商品监管及管理为突破口, 开发和建立出入境商品监管服务平台, 促进两地物流的电子化、信息化发展, 为粤港货物跨境快速通检, 提供有效监管资讯。本项目集中探索RFID技术在粤港进出口商品监管及管理的应用, 包括支援有关RFID技术应用标准的研究与实施、数据管理等关键技术。针对监管服务行业的关键问题、开发和建立基于电子标签技术的监管应用。

本项目针对 RFID 技术在监管服务业的典型企业应用, 包括活猪监控与追溯的 RFID 应用服务技术, 研发相关技术及行业应用, 将促进监管服务行业的资讯化水平, 提高监管能力及效率, 并降低监管成本。通过电子标签技术建立货品安全质量追溯方案和动物监管溯源追踪方案, 为各类货品尤其是食物的安全和动物疫情防控、溯源追踪提供一条资讯化途径。本项目更会大力促进 RFID 相关产业快速发展。

项目统筹人 唐志鸿博士

项目编号 GHP/039/08LZ

项目名称 **适用于食品的 RFID 标签和封装技术研究与应用**

研发单位 香港物流及供应链管理应用技术研发中心

项目简介

RFID 技术在公众日益关注的食品安全问题上被视为理想的解决方案。食品包装上 RFID 的标签, 将使食品变得易于管理和追踪。此外, 嵌入 RFID 标签的食品, 将为客户提供一种可靠的防伪和验证机制, 确保从农田到分销商店供应链的食品安全。

然而, 食品安全为 RFID 的部署带来新的挑战。首先, 食品的材质种类繁多, 物理性质各异, 导致天线失谐, 性能下降, 甚至失效。其次, 食品包装的形状、材料、包装方式差异大, RFID 标签要求具备自毁的能力。第三, 大多数的 RFID 标签的天线材料, 无法分解, 潜在的环境危害。

项目针对以上问题提出解决方案: (1) 针对食品材质的 RFID 标签设计; (2) 具备自毁机制的 RFID 防伪标签; (3) 可分解及环保的材料制作 RFID 标签天线

项目推广将转变深港两地食品行业的模式

项目统筹人 叶涛博士



2009-2010 研发项目

项目编号 GHP/059/08LP

项目名称 简易高性能射频识别技术移动平台

研发单位 香港城市大学

项目简介

射频识别技术 (RFID Technology) 将能改变世界 - 全球最大零售商麦德龙和沃尔玛赞同这个观点。然而, 应用 RFID 并不是如预期容易。软硬件成本、易用性、配置和整合等因素, 令 RFID 未能在企业间广泛使用。

要吸引企业应用, 就必须要有快速的投资回报, 如提高工作效率。RFID 一直被认为是简化货物交收的重要工具。但是固定的阅读器不但安装成本昂贵而且缺乏灵活性。市面上的 RFID 手持设备昂贵和笨重, 并不适合在工作需求。尽管目前麦德龙和沃尔玛面对标签高损坏率问题, 但两家企业并没有采用以上的解决方案。

项目中, 我们致力解决以上问题。我们将开发一套低成本和方便的平台解决日常营运的交收问题。为使我们的解决方案更切合实际需要, 麦德龙和沃尔玛的品质控制团队将会首先试用。

项目统筹人 林良才博士

项目编号 ITP/018/09LP

项目名称 珠三角水路货运物流服务平台

研发单位 香港大学

项目简介

水路货运业对香港港口码头经营业务有重要意义。珠三角的潜力作为港口码头重要的货源提供者取决于水路物流链的效率。这个项目建议提出了一个水路物流平台解决方案 (WLSP), 帮助业界提升效率及竞争力。我们有信心本项目会透过以下为香港作出贡献:

- 提供内河物流业负担得起的信息技术,
- 提高香港水路物流业的竞争优势,
- 并帮助香港保持在亚洲的物流枢纽地位。

提出的物流平台解决方案将帮助在内河物流建立形成价值链的良性互动环境, 使各水路物流业界参与者受益。本项目开发内容包括:

- 开发物流信息技术环境, 支持内河贸易业务的信息服务可以来自不同的软件供应商, 并以组件的方式提供。
- 开发技术, 以方便定制信息服务, 并用灵活的收费模式, 适应各种沿供应链的水路物流业务。
- 开发物流软件供备平台(WLSP)原型, 以软件服务帮助水路物流业者使用负担得起的信息物流业务, 与保证隐私。

我们会通过三个试点专案的实施展示所开发的 WLSP 的各种功能和为业界解决难题的能力。

项目统筹人 黄础章先生



2009-2010 研发项目

项目编号 ITP/019/09LP

项目名称 **应用于物流的低成本多用途追踪设备与技术**
研发单位 香港大学

项目简介

跨地域商务活动的不断发展对于供应链可视化管理和货物追踪的需求日益迫切。现有的追踪系统往往需要巨额资金投入；一般的中小型公司即便意识到追踪系统的重要性，受制于其巨大投资，也只能望而却步。另外，现有系统往往受制于单一技术的局限，不能为货物提供不间断端到端的追踪服务。目前市场上急需一种符合成本效益、可以对一般货物进行不间断追踪的创新型追踪技术和系统。

这一项目的主要目标是研发新一代货物追踪技术和系统。我们将综合利用多种不同的无线技术（RFID、Wi-Fi、ZigBee、GPS 与 GPRS），提出一种创新的基于混合和合作模式的定位技术并研发相应的无线追踪装置与应用系统。与现有系统比较，新系统将为用户提供更加快捷，准确和可靠的低成本追踪解决方案。这一目标将在实际应用中得到展示和验证。

项目统筹人 李安国教授

项目编号 ITP/020/09LP

项目名称 **应用射频识别溯源性能于医院内的风险管理**
研发单位 香港中文大学

项目简介

在香港医管局2008年确定五类医疗系统风险管理中，所有五类风险都在某种程度上与能否确定与跟踪药品设备，人员的身份及地点有着密切的关系。

本项目的目标在于为医院提供一套低费用、高效率的，以具有传感器的有源射频识别技术为基础的人员移动监测，追溯系统。该系统同时具有图像化的预警和进一步的分析功能。本项目将对高风险病人的监测，追踪作为一个实验案例；通过这个案例，我们将展示项目中研发的技术，包括具有传感器的有源射频识别标签，在 EPCglobal 标准的网络上对保护病人安全，以及医院在风险管理方面的应用。

本项目将在多年来由港府创新基金资助的有源射频识别标签的研发成果之上，加强对于医疗系统中感染和传染机理的追踪和研究，其中包括接触追踪，实时溯源和联读监控。在实验案例的基础上，我们对如何将本项目的成果转化为商业化运作，也有一个初步设想。

项目统筹人 吴克利教授



2009-2010 研发项目

项目编号 ITP/029/08LI

项目名称 **促成制农业供应链「恰到好处」透明度的射频识别技术**
研发单位 香港中文大学

项目简介

射频识别技术的应用可为供应链带来「恰到好处」的透明度，这远超越于现时的「视觉监察」的监控管理。本研究项目将为射频识别技术在成衣业的应用建立设计指引及实施准则。

项目的目的是开发射频识别技术的创新应用，「恰到好处」的透明度不但能提供货物到站处理或等候转送的静态信息，更能即时适度提供正在转送中的货物信息，加强供应链中合作伙伴间的协调，以防范不必要的物流风险。

我们将为一个选定的成衣厂品牌设计并建立一个创新的信息框架，供应链上的成员能「一拍即合」式地轻易连接到信息框架上，利用射频识别技术达到「恰到好处」的供应链透明度。在利和集团的一个完整成衣供应链上，我们特以供应链营运参考模型（SCOR）为基础，对现行的成衣供应链进行流程再造。预计本研究项目将在信息框架、「一拍即合」式系统连接、使用射频识别的成衣供应链新流程及实施上创造知识产权。

项目统筹人 张惠民博士

项目编号 ITP/035/09LI

项目名称 **开发在聚合物及纸底材包装上之印刷射频识别标签天线**
研发单位 香港物流及供应链管理应用技术研发中心

项目简介

RFID 嵌入式包装，即所谓的智慧包装，由于该技术可对每一产品进行管理和跟踪而被认为将给供应链产业带来巨大的利益。然而，RFID 当前较高的集成成本成为限制该项新技术大规模应用的巨大障碍。

除了集成成本以外，采用嵌入式包装的 RFID 设计还面临着其它的挑战。RFID 天线的性能会因为天线的材料、包装所用的材料、包装的形状以及包装内部货物内容等因素受到显著的影响。通用型标签粘贴或嵌入于包装物时，会造成显著的失谐，从而常常导致标签性能的下降。

在这个项目中，我们提出推广 LSCM 的印刷天线技术，并将该技术应用于包装设计和生产。天线的材料（当前主要是铜和铝）费用将由于天线的印刷处理与传统的包装印刷处理相互结合而降低，总的使用成本也将因此而减至最低。本项目将使用导电油墨作为天线的材料，并根据导电油墨的配方、包装的印刷处理，包装的外形等因素，对标签天线进行特定的优化设计。

低成本 RFID 嵌入式智慧包装的设计及其原型将作为研究成果进行开发。这个项目将展示印刷 RFID 天线技术应用于传统印刷工业的可行性。

项目统筹人 叶涛博士



2009-2010 研发项目

项目编号 ITP/038/09LP

项目名称 **实时食品质量管理服务系统**

研发单位 香港大学

项目简介

食品安全与损耗是新鲜食品管理中面临的两个主要问题。冷链作为一项特殊的行业具有精确控制货物环境的能力。然而，现有的决策支援服务不足以满足食品工业有效防止食品变质和及时采取缓解措施缓解食品质量问题的能力。已有的传感监控措施在食品传输途中大多是分割和间断的。

该专案将开发可定制的应用服务来根据业者需求和既定准则提供决策支援。本专案将开发一套实时传感讯息系统来为应用服务提供资料。传感系统可以整合不同的公共和私有传感网络以收集不同资讯，如温度，湿度，位置等。并为客户提供完整和全面的食品资讯和运输资讯。

本项目将利用之前的深港科技创新平台- FOSSIM 作为基本的服务平台，在实现方便接入的同时提供了更为丰富的冷链应用。专案的创新之处在于其利用了传感资料来实现多方位的资讯支援。在应用发展中的使用将不再受到分离资料的制约。相反，大量的应用将被开发来满足各种需求，并为该行业提供更好的决策支援工具。通过为该行业提供增值服务，我们希望实现保障食品质量，减少食品浪费的最终目标。

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