2011-2012 R&D PROJECTS

Project Reference	ITP/013/11LP
Project Title	**Enabling Technologies for Baby Tracking in Hospital Environment (Tamper resistant & reusable baby tag)**
R&D Organisation	Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies Limited

Abstract

Baby abduction and its immense consequences that occurred in Hong Kong have aroused public and government concern. Hospital Authority's (HA) Group Internal Audit has recommended HA to look for solutions to eliminate the occurrence of baby abduction incidents.

Based on an initial pilot conducted in early 2009, active RFID is confirmed a plausible solution provided that several issues are addressed: (i) reusability and (ii) tamper-resistance of RFID tags; and (iii) there is a management and control system for end-user.

In this project, LSCM is committed both (1) hardware development which is a tamper-resistant strap lock to be integrated onto reusable active RFID tags and (2) software development which is the establishment of a comprehensive management and control system to support the use of the active RFID tags in baby monitoring in the hospital environment. The project team will work with United Christian Hospital (UCH) to ensure user requirements fulfilled and the results properly tested at a baby ward at UCH.

Through this project LSCM will leverage the capabilities of local RFID equipment vendors and enrich them with a specific and affordable tag to be used in the hospital environment to eliminate the risk of baby abduction.

Project Coordinator Dr Frank C H TONG

Project Reference	ITP/026/11LP
Project Title	**Optimal Design of Novel Reconfigurable UHF Antenna Systems for the Smart Shelf RFID Technology**
R&D Organisation	The University of Hong Kong

Abstract

RFID technology is increasingly important to the supply chain management. The smart shelf system is a new RFID application concept for the automatic item tracking through shelves equipped with RFID systems. Due to complex interferences, limited space, flexible shelf configurations, and unpredictable material contents of objects, the design of UHF smart shelf antennas is a new technology challenge with promising application futures. Hence, this project will focus on optimal developments of novel reconfigurable RFID reader antennas and arrays to the smart shelf technology.

This project will develop novel UHF smart shelf reader antennas suitable for scanning books, boxes, and fabric objects. It will employ the traveling wave theory and planar antenna design principles to implement ultra-thin configurations. To greatly reduce the manufacture cost and increase the application flexibility, the proposed novel antennas will be reconfigurable. Advanced automatic optimization design flow based on optimization algorithms and computational electromagnetics tools will be further developed to address the troublesome interference problems in smart shelf systems.

This project will provide novel reconfigurable UHF RFID reader antenna systems for new smart shelf technologies which could be commercialized. The proposed automatic optimal design flow will make this project sustainable in the long term point of view.

Project Coordinator Dr Lijun JIANG

2011-2012 R&D PROJECTS

Project Reference	ITP/027/11LI
Project Title	**Service-Oriented System for Real-time Optimization and Execution of RFID-Enabled Smart Container Loading**
R&D Organisation	The University of Hong Kong

Abstract

This R&D effort is concerned with developing a service-oriented system to optimize container loading plans & schedules and to ensure that optimal plans and schedules are executed with available resources under real-time operational conditions. Its use leads to substantial reduction in container loading cost and significant improvement in decision and operational efficiency as well as utilization of container spaces and loading resources.

The system demonstrates several key innovations. Firstly, Auto-ID/RFID enabled smart objects and gateways developed in universities are adapted to create smart container loading site environments. Secondly, RFID-enabled real-time information provides basis for coordinating decisions and operations of different parties involved in container loading process. Thirdly, adaptive optimization model and solution algorithm are developed to solve integrated container load planning and scheduling problems. Finally, real-time facilities are provided for container loading sites to dynamically manage resources and operations, and to monitor loading execution.

The system follows a standard service-oriented architecture with key modules implemented as web services. User interfaces are developed with XML-based standard components. A centralized information source service is developed to manage domain-standard XML documents (e.g. ISA95/B2MML). The innovative use of these cutting-edge technologies allows maximum modular integrity and scalability, and third-party customizability and usability.

Project Coordinator Dr George Q. HUANG

2011-2012 研发项目

项目编号 ITP/013/11LP

项目名称 **在医院环境的婴儿追踪应用技术（可再用及抗破坏的婴儿标签）**

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

在香港发生的婴儿绑架和其巨大的后果，引起公众和政府的关注。医院管理局（医管局）之集团内部审计部建议医管局寻求解决办法，以避免发生婴儿被绑架事件。

根据在2009年初进行的初步试点实验，有源RFID证实是一个合理的解决方案如一些问题得到解决：(i) 可重用性和(ii) 防篡改性的RFID标签，及(iii) 给最终用户的一个管理和控制系统。

在这个项目，香港物流及供应链管理应用技术研发中心将同时承诺提交：(1) 硬件的发展，这是一个防篡改手带锁被结合到可重复使用的有源RFID标签及(2) 软件开发，这是建立一个全面的管理和控制系统，以支援使用有源RFID标签在医院环境内作婴儿监察。项目小组将与基督教联合医院（联合医院）一起工作，以确保满足用户要求，并把成果正确地在婴儿病房测试。

通过这个项目，香港物流及供应链管理应用技术研发中心将充分利用本地RFID设备供应商的能力，并给他们特定的和负担得起的标签，用在医院的环境，以消除婴儿被绑架的风险。

项目统筹人 唐志鸿博士

项目编号 ITP/026/11LP

项目名称 **应用于智能货架RFID技术的可拼装UHF天线系统的优化设计**

研发单位 香港大学

项目简介

智能货架是RFID的新型应用，主要用于货架物品的自动追踪和统计。由于复杂互耦、有限空间、各种货架构成，和货物材料等因素，UHF智能货架天线设计是一种新的技术挑战。

本项目将设计新颖的RFID UHF智能货架读写器天线。我们将使用行波天线和平面天线的设计概念以达到低剖面要求。为尽量减少生产成本和增加应用多样性，天线设计将为新型可重构天线。同时将会开发基于遗传算法和计算电磁仿真的自动优化设计流程以解决信号互耦的技术难题。

本项目所设计的可重构RFID UHF天线具有广泛的商业前景。基于优化理论开发自动优化设计流程将使本项目具有长期可持续性。

项目统筹人 姜立军博士

Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies
香港物流及供应链管理应用技术研发中心

2011-2012 研发项目

项目编号	ITP/027/11LI
项目名称	**基于RFID的集装箱实时装货优化与智能监管服务系统**
研发单位	香港大学

项目简介

本项目计划开发一套基于面向服务架构的集装箱装载优化系统，利用自动识别／射频识别技术，在动态的多变的装载现场环境下获取实时信息，促进多个参与方进行协同决策与操作，合理调配资源，优化集装箱装载方案，并确保优化方案得以准确实施。该系统的使用将大大提高集装箱装载决策与操作的效率，提升集装箱空间以及装载资源的利用率，从而有效降低集装箱装载过程的整体成本。

项目统筹人　黄国全博士

联络我们 | 电话：(852) 2299 0551　传真：(852) 2299 0552　电邮：info@lscm.hk　www.lscm.hk