RFID-enabling Shenzhen Hong Kong Integrated Food Safety and Supply Chain Public Information Platform

基於RFID技術的深港一體化食品安全供應鏈公共訊息平臺

A Low-cost Solution for Pre-packing Business
低成本預包裝解決方案

Packing Workflow

The Most of the supermarkets have pre-packed food products such as vegetables, fruits and meat. Pre-packing is getting very popular due to the convenience it provides to customers. Therefore, an efficient and low-cost pre-packing solution is critical to the business of food enterprises.

分包流程

現時大部份超市都會銷售預包裝的食品，如蔬菜、水果和豬肉等等。因為預包裝銷售模式方便客戶選購而大受歡迎，所以一個高效和低成本的預包裝解決方案對企業來說是非常重要。

Technology Integration

Taking product mobility and the environment of packing workflow into consideration, our solution has integrated wireless network technology, Bluetooth technology, mobile RFID and mobile barcode printing technology into one solution. Through the technology integration our solution realizes good effectiveness in packing activities as well as combination of RFID and barcode tagging technology at low cost.

技術整合

考慮到分包流程的工作環境和其流動性，這個解決方案集合了無線網路技術、藍牙技術、流動RFID技術和流動條碼打印技術。透過整合這些技術，我們可以實現高效益的分包作業和低成本的RFID標籤和條碼標籤綁定技術。

Cost Effectiveness

This integrated technology, when applies to pre-packing workflow, would cut down the use of RFID tags that cost about HK$1-2 each. Instead, they are replaced by barcode tags that cost only a few cents each. The fact that our solution has a great improvement to the cost effectiveness of pre-packing activities will enhance enterprise adoption of the solution.

成本效益

應用這個綁定技術在預包裝流程中，可以將一個價值 HK$1 - $2 的RFID標籤成本降至幾仙成本的條碼標籤。這樣就可以大大地提高方案的可行性。

RFID tag
RFID 標籤

Workers in a supermarket use handheld RFID readers to read the RFID tags attached at vegetable carrying baskets
超市人員利用手持式RFID閱讀器讀取菜籃上RFID標籤的資訊

Vegetables from a basket being divided into small packs each tagged with a barcode that related to the basket's RFID tag
超市包裝人員把菜籃的蔬菜分包成小包，再貼上與RFID標籤相連的條碼

Pre-packed vegetables ready for sale
已完成分包的蔬菜

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Food Safety Information Kiosk 食品安全資訊站

Purpose

Food Safety Information Kiosk is a comprehensive food safety information platform for the public. The Kiosk operates with friendly interfaces to swiftly provide food safety information as requested by a consumer.

目的

食品安全資訊站是一個以普羅大眾為服務對象的綜合性食品安全查詢平臺。 此資訊站將以簡易的操作介面來顯示食品安全的資訊，務求讓每一個市民都能快捷地查閱相關資料。

Operating Steps 步驟:

1. Put the barcode / RFID tag of a packed product over the respective reader of the Kiosk.
   把查詢的蔬果條碼 / RFID 標籤放於對應的閱讀器前。

2. The Kiosk will instantly show the information relevant to the product such as name of the farm, inspection results etc.
   資訊站會實時顯示相關蔬果的資訊， 如產地農場， 檢查結果等等。

3. Press ⊕ Detail Info for more supply chain information.

   如要查看更詳盡的資料，可按下 ⊕ 詳細資料 便可獲得更多的供應鏈數據。

4. Press ⊕ Nutrition Info for more ingredients and nutrition value information.

   如要了解食品的營養價值，可按下 ⊕ 營養資料 便可獲得食品的成份和營養價值。

Future Prospect

Food Safety Information Kiosk is an interactive information platform that connects food safety information with people's daily lives. The Kiosk provides not only convenience to information searching, it also strengthens people's confidence on food consumption. In the future, we can further leverage the information kiosk to provide more diversified and custom-made services such as propaganda of balanced diet and healthy menu.

展望

食品安全資訊站是一個連接市民生活和食品安全訊息的互動平臺，除了為市民帶來便利之外，還提高市民對食品質量的信心。 將來，我們更可以通過資訊站，提供更多元化和貼身的服務，如查詢貨品所建議的營養餐單和宣傳健康飲食的重要。

IoT in Food Quality and Supply Chain

Sensor-Integrated Active RFID Technologies for Tracking and Monitoring Food Safety and Quality

Project

This project aims to develop a set of sensor-integrated active RFID technologies for tracking and monitoring food safety and quality during the entirety in food supply chains regardless being online or offline from monitoring check points.

Project Objectives

1. Integrating science, technologies, and infrastructure for the better practices of food safety and quality management based on RFID technology
2. Enabling monitoring capability throughout entire food supply chains regardless being online or offline from monitoring check points
3. Proactively providing timely alerts on questionable food safety and quality statuses to both management and operational levels

Sensor-Integrated Active RFID Solution

To achieve the objectives set out for providing better monitoring capability for food safety and quality, the project team from CUHK has placed its research and development focus on sensor-integrated active RFID hardware technologies, including: (1) Sensor-integrated active RFID tag and reader; (2) Advanced anti-collision algorithm; and (3) Communication protocol to support sensor data and tag memory management. The developed sensor-integrated active RFID technologies can enhance universal supply chain visibility, monitoring and management activities by providing real-time alerts on questionable food safety and quality statuses to enterprises at both management and operational levels; tracking food products, source information, logistics, handling operations as well as consumption to ensure a high and consistent level of food safety and quality. It can also facilitate Hong Kong's food quarantine and inspection process as well as customs clearance.

Licensable Deliverables:

1. Advanced Dynamic Frame Slotted ALOHA (DFSA) Algorithm
2. Communication Protocol
3. Reference Design on Active Tag and Reader
4. Reference Design on Sensor Integration
5. Reference Design on Multi-Reader Communications
6. Reference Design on GUI & Monitoring Software

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LSCM

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# IoT in Food Quality and Supply Chain

Sensor-Integrated Active RFID Technologies

The following introduces a spectrum of RFID technologies developed in this project for supporting various applications in food industry and safety fields such as food warehousing and delivery and cold chain management.
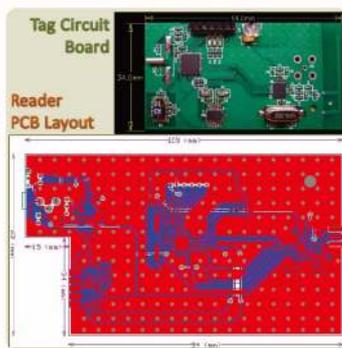
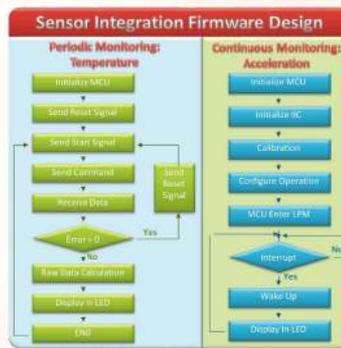### Advanced Dynamic Frame Slotted ALOHA (DFSA) Algorithm

Collision pattern sent back to tags for selecting slots to response in next ACP.
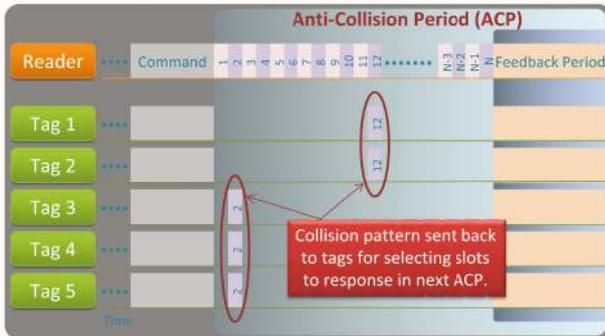
Communication Protocol
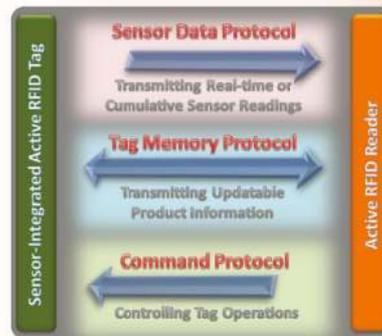
Reference Design on Active Tag and Reader

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