SmartCart
The Interactive Shopping Cart Display
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Product Definition

An interactive touchscreen display affixed onto the handlebars of a shopping cart which allows users to:

- Scan items to a checkout list
- Find aisle locations of items
- Search for item availability
- Obtain item coupons
Application

- Supermarkets
- Department Stores
- Any other vendor that uses shopping carts
Benefits

SmartCart will make the shopping experience more efficient for both customers and market employees:

- Customers can track the price of their purchases
- Sales associates will spend less time answering questions

All in a straightforward, intuitive user interface!
Software

Implemented in C using Eclipse Programming environment LPC2000 Flash Utility. The GUI consists of five screen types:

1. **Home screen**: Map of store with current location indicated

![Home Screen]

- Search
- Shopping List
- You are in aisle 6 - Produce and frozen goods
Software Cont.

2. **Search Screen**: Where a user can query items

3. **Item Screen**: Displays information about a specific item
4. **Sleep screen**: Activated after touchscreen is idle for over two minutes. Displays coupons or advertisements.

5. **Shopping List Screen**: Shows all items user has scanned and their prices.
Software Overview

Home Screen
- You are in aisle 6 - Produce and frozen goods

Search Screen
- Keyword
- List of items pertaining to keyword
- Search
- Return Home

Item Screen
- Image
- Item name
- Description
- Price
- Location
- Coupon (if available) apply
- Return to Search
- Return Home

Shopping List
- Remove? Item Name Price
  - Kellogs Corn Flakes $5.99
  - Wonderbread $3.29
  - Flamin Hot Furryuns $1.00
- Remove items
- Return Home
- View item
High Level Block Diagram
Group Organization

- Pallavi Jain
  - Team Leader
  - Memory/Power management

- Deniz Kaplan
  - Barcode Scanner

- Peter Nguyen
  - LCD

- Vivian Vasquez
  - RFID

- Combined:
  - User interface
  - Software Integration
Hardware
**Purpose**: Basis of our project, displays all information and takes user input.

**Capacitive Touch Panel:**
- I2C interface
- 6-pin Connector

**TFT:**
- SPI interface
- 54-pin Connector
RFID

**Purpose**: Uses radio frequency communication to identify current aisle location. It is interrupt driven.

13.56 MHz RFID Mifare Read / Write Module:
- UART interface
- PCB antenna required
Why RFID?

- Does not require line of sight access like other tag detection technologies (orientation doesn’t matter)

- Can set off alarm if cart gets too far from store

- GPS has horrible indoor performance and can be off by up to a few feet
PCB Antenna/ RFID Tags

**Purpose**: Allows communication between smart system and tag

13.56 MHz Mifare PCB Antenna
- 55mmx55mm
- 70-80mm read range
Barcode Scanner

**Purpose:**
Scan each item’s barcode and transfer to shopping cart list.

**ID TECH's Econoscan ii**
- DB9-DCE serial interface
- Interrupt driven (mapped to VICVectAddr7)
- Uses external power supply
Why do we need a Barcode scanner?

RFID tags can also be attached to items and scanned into shopping list, why have two scanners?

RFID tags are more expensive than barcodes and most (if not all) products today already use barcodes, making SmartCart’s transition into the market seamless.
Memory Management

**SDRAM**

*Purpose:*
- Store layout map
- Interfaces via external memory controller

Micron’s MT48LC8M16A2 – 2 Meg x 16 x 4 banks

**SDCard/Connector**

*Purpose:*
- For nonvolatile storage of database and other information, uses SD/MMC interface on microprocessor.

Kyocera Memory Card Connector 5638 Series
Processor

**Purpose:** Operates all other devices on board

**NXP LPC2478:** Single-chip 16-bit/32-bit micro, ARM 7, 512 kB flash
Power Management

Voltages Needed: 19.2V DC, 5V DC, 3.3V DC, 3V DC

Power Planes: 3.3V DC

Voltages Supplied: 19.2V and 5V from external power supplies

Linear Regulators: 3.3V LDO with 5V (500mA max) input and 3.0V LDO with 5V (150mA max) input; Biased with 1uF caps; Enable pins tied high
Conclusion

Lessons:
- Start Early
- Work in parallel
- Read data sheets thoroughly
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Questions?