Project Proposal

C. A. R. T. S.
Completely Automated Retail Transaction System

18-549 Team 13 (Shark Laser)
Team Members

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Concept

- This project will expedite the checkout process in retail stores.

- We will do this by using RFID tags and low range RFID sensors to uniquely identify products as they are placed in the C. A. R. T. S. An additional weight sensor will be included to improve the accuracy of the system.
Motivation

The traditional checkout process:

• Creates a bottleneck in the retail experience
• Prone to human error when scanning items
• Self-checkout stations often need human input to handle edge cases

C. A. R. T. S. will:

• Eliminate waiting times for checkout
• Improve accuracy by automating checkout scanning
• Function with little to no human input
Competitive Analysis

- **Self Checkout**
  - Requires users to scan each item
  - Still requires large infrastructure for accuracy

- **Manual Checkout**
  - Requires Employee for Checkout

- **Online Shopping**
  - Requires shipping service
  - Requires employees to process orders
Requirements

• Uniquely identifies a product as it enters or leaves the cart
  ○ Lets the store and user know if there is a problem
  ○ Keeps a complete list of products in the cart
  ○ Must transfer product list from cart to checkout system

• Must identify the product with 99% accuracy

• Must keep an accurate inventory within 1 second of product movement

• Must be able to identify products until a specified level of fullness is reached

• Must transfer data to store checkout system within 1 second of connection
Technical Specification

Proposed Hardware:

- Low range (inches), low power RFID Reader
- Inexpensive RFID Disposable Tags
- Load/Flex Sensors
- Arduino Leonardo Microcontroller
- Arduino Bluetooth shield/dongle
- Status LEDs
- Shopping Cart
- Standin Products
- LCD Display
Architecture
Risks and Mitigation

Risks:

❖ RFID interference
❖ Detecting loading vs. unloading items
❖ System failure could lead to incorrect checkout
❖ Metal/Liquid interference with RFID

Mitigation:

❖ Use multiple, low-range sensors
❖ Use weight sensor to verify RFID input data
❖ Provide user feedback using status LEDs
Questions?