**Introduction**

I propose a project that will improve the operation of the IEEE snack counter that is unmanned for most of the time. The operation of this snack counter is characterized by keeping inventory of products sold, counting the revenue from the sales, and keeping track of student tabs.

Keeping inventory requires accurate counting and plenty of time if it is done manually. The expected revenue from the sales is derived from keeping inventory and therefore depends on the accuracy of the person counting how many products are left. Finally, student tabs (recorded on a tab sheet) pose a security issue because anyone can add to another person’s tab and that person will probably get away with it.

The project that I propose to use at this snack counter is a barcode scanner system. The user will be able to program a name and a price to a certain barcode number (in UPC code) on a product. Also, the project will keep track of transactions and what was sold at each transaction. Also, the project will have an account system for people that want to keep tabs. People that have accounts will be given a barcode number (not in UPC code) to alter their tab balance so that no one can add to another person’s tab. The product information and the accounts will be able to be deleted from the system.

**Description**

The block diagram of the barcode scanner system is on page 5. The product sketch is on page 7. This project will use a wand scanner to scan barcodes. I will buy a wand scanner that will generate a pulse train output to the microcontroller. The microcontroller will decode the pulse train into the barcode number. Then the microcontroller will use the barcode number to
access certain data. The data are product tallies, student tab balances, total revenue from regular transactions, and the sum of all tab balances. This data will be stored in byte-erasable EEPROM because it must be able to be changed when the system is running, but it must remain when the system is off. The power supply for the system will use the wall outlet as the power source and convert this into the necessary dc voltage levels.

IEEE officers will have their own barcode to be able to execute certain (administrator) functions that no one else will be able to execute. The first administrative function is programming and deleting product information. The second function is creating and closing tab accounts. The third function includes accessing and resetting product tallies, total revenue from all of the regular transactions, individual tab balances, and the sum of all the tab balances.

The people that own student tab accounts will be able to add and subtract from their own tab account balance.

The user interface will consist of a keypad and an LCD. The keypad layout will consist of numbers, uppercase letters and miscellaneous buttons, which is shown on page 7. The numbers and letters will share buttons to switch between one number and three or four letters, similar to the fashion of a cell phone. 9 and 0 will be on one key with no letters. Other buttons include:

- A delete/backspace button
- A button to add to the total of a transaction
- An enter button
- A cancel button
- Up and down arrow buttons to scroll through data
- A power button
The LCD will be the instrument by which the data will be viewed and/or changed by the user. The following diagram shows examples of information being shown on the LCD:

<table>
<thead>
<tr>
<th>Product tally information</th>
<th>Tab account information</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME: DR. PEPPER</td>
<td>JOHN DOE</td>
</tr>
<tr>
<td># SOLD: 25</td>
<td>BALANCE: $5.60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Purchase information</th>
<th>Total revenue and</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME: DR. PEPPER</td>
<td>Total tab revenue</td>
</tr>
<tr>
<td>PRICE: $0.50</td>
<td></td>
</tr>
<tr>
<td>TOTAL $: 67.75</td>
<td>TOTAL TABS: 55.60</td>
</tr>
</tbody>
</table>

**Benefits of this project**

The barcode scanner system will help the IEEE officer in charge of keeping inventory by saving the officer’s time. Once the IEEE officer counts the total revenue, then this number can be compared to the total (expected) revenue from regular transactions to see if any money was stolen. Also, the tallies for each product sold will help the officer decide which products need to be stocked and the quantity that needs to be stocked.

The student tab system will be improved by increasing organization and decreasing theft. The current tab sheet is hard to read because of the numbers being crossed out and then added. This can be difficult to add up the sum of the tab balances for the IEEE officer. Also, people won’t have to worry about other people adding to their tabs without their knowledge, which can happen since some of the tabs become large.
Comparison of similar products

There are very many barcode scanners and data collection devices and they can mostly be purchased separately. These are the critical specifications of barcode scanners:

- 270 scans/sec
- 65 in. scanning distance
- 0.13 lb (total weight)
- Operating temperature range: below freezing to 120° F
- Durability: multiple 6 ft. drops to concrete are tolerable
- Anti-shock mounts built to absorb 1500Gs

These are the critical specifications of data collection devices:

- 2 line display
- Alpha-numeric keypad
• 12 pieces of information can be associated with each barcode number

**Project Development**

Project development will mainly occur in ET 340. I plan to work on the project from now through winter break to June and I expect to be able to complete it by then. I expect to use a 68HC12 since I am familiar with that microcontroller and it is supported by the ET 340 lab. I am planning to buy a wand scanner that outputs a pulse train because building one may not leave enough time to complete the rest of the project. Also, generating barcodes will be easy since there is barcode labeler software available.

Demonstration of the project will require the IEEE snack counter. The products at the IEEE snack counter will be programmed into the barcode scanner system and then a regular transaction will be easy to demonstrate. To demonstrate using a tab account or accessing inventory data, barcode labels will be generated.
Barcode Scanner System