

EGR 3380

Engineering Design I

REQUEST FOR PROPOSAL
FOR THE DESIGN OF A

CANDY VENDING MACHINE



Baylor University
Department of Electrical and Computer Engineering
Department of Mechanical Engineering

Spring 2007

I. STATEMENT OF WORK

Qualified engineering design teams are invited to submit a technical proposal for the design of a *Candy Vending Machine*, hereafter referred to as the *CVM*, to the instructors of EGR 3380, hereafter referred to as the *client*. Upon owner approval of the proposed design, each engineering design team, hereafter referred to as the *team*, shall build, test, and evaluate a prototype device, and shall provide the client with final documentation of the prototype design.

Any specific instructions and schedules not included in this RFP for completing design, presentation, construction, testing, and documentation milestones will be found in the course calendar and other specific milestone documents to be distributed by the client at appropriate times during the project. The design, construction, testing, and reporting of the *CVM* is a requirement for completion of Engineering 3380 - Engineering Design I at Baylor University for the spring semester 2007.

II. DESIGN SPECIFICATION

1. General Description

Vending machines are a ubiquitous presence in our society. Though they may seem mundane, they are actually fairly sophisticated engineered devices that require input sensing, decision-making controls, and response actuation.

This project calls for the design, construction, testing, and documentation of a vending machine—CVM—with the following attributes. The CVM will dispense individually-wrapped single Starburst® candies. The candies will cost 5¢ each. The CVM will accept only quarters as payment and will dispense only nickels as change. A customer shall use the CVM by inserting a quarter and then inputting the desired number of candies (from 1 to 5). The CVM will then dispense to the customer the requested number of candies and the proper amount of change.

2. Design Requirements

2.1 DESIGN CRITERIA

The design team shall design the device to meet or exceed all of the criteria listed below.

- 2.1.a. Control: the CVM shall use a Basic Stamp microcontroller.
- 2.1.b. Power: the CVM shall be powered by a voltage source of less than or equal to 24 VDC. This voltage may be achieved either through the use of dry cell batteries or via a transformer that converts 110 VAC.
- 2.1.c. Size & weight: when set up for operation, the CVM shall fit within a volume defined by a cube 18-inches on a side (excluding power cords) and its weight shall not exceed 15-lbs (empty of candy/change).
- 2.1.d. Setup: the CVM shall be capable of setup and operation on any typical classroom desk/table top with no requirement other than access to a 110VAC wall outlet, if

required. For purposes of prototype testing, the CVM should be capable of holding a supply at least 15 candies and 15 nickels. Loading/reloading of the coins and candies, as well as the retrieval of quarters input to the device, shall be accomplished in no more than 1 minute.

- 2.1.e. Initiation, data entry, and operation: the CVM is allowed to have a main power switch to turn the device on. The subsequent operation of the CVM shall be as follows. When a quarter is inserted into the device, a user input mechanism shall become active. The user shall enter a value in the range 1 to 5. After selecting the value, the user shall enter a “send” command to activate the dispensing. The CVM shall then dispense a number of candies equal to the entered value. It shall also dispense a number of nickels equal to the correct change given the number of candies purchased.
- 2.1.f. Visual display & corrections: Upon user entry of the number of candies to be purchased, the value shall be displayed in a way visible to the user. Before “sending” the value, the user shall have the option of clearing that value and reentering.
- 2.1.g. Speed of operation: the CVM shall dispense all of the required candies/coins for a given purchase in no more than 10 seconds from the “sending” keystroke.
- 2.1.h. Reset: after completion of a purchase (change and candies available to the customer), the CVM shall within 5 seconds be reset and ready for another transaction at the insertion of another quarter.
- 2.1.i. Dispensing Receptacles: each receptacle into which either the candies or coins are dispensed shall allow for easy extraction of all candies/coins with a single grasping action of one hand. In addition to the receptacles into which candies and change are dispensed for the user, there should be a receptacle which collects quarters which are input to the device.

3. Design Documentation

The team shall document the project by use of manuscripts, calculations, and computer models/drawings. Specifications for required documentation and due dates are contained in the course calendar and/or will be distributed at appropriate points during the project.

4. Safety Requirements

The team shall conduct all construction and testing with safety as a paramount consideration. Failure to observe workplace rules will lead to penalties in performance evaluation. Egregious or repeated safety violations, or disregard for Safety Officers, can result in dismissal from the course.

Cleanliness in the workplace is expected at all times and in all work areas. Failure to observe workplace rules will lead to penalties in performance evaluation. The design team shall clean all work areas with each use.