

Exercise VI

Snack Vending Machine

Business Overview: Your company has decided to use the systems engineering process to develop a next generation vending machine for snacks. The vending machine will be capable of operating autonomously in any location selected for placement.

Stakeholders:

Company Owners: The owners of the company have invested a substantial amount of money into this venture and expect to show a profit after 2 years of operation. The machines will only require permission to operate at the selected site and no other infrastructure

Users (Customers)- Any person over the age of 5 desiring a snack regardless of physical abilities

Site Owners- Those entities that provide permission for the machine to be operated on a location they own/control

Vendors- Those companies providing fresh inventory to the machine

FDA- Requires compliance with food safety laws

Financial institutions- Those entities capable of supporting Point of Sale (POS) transactions

Exercise VI

SVM Use Cases

1. A person with cerebral palsy spots the SVM and decides to purchase a snack. They approach the machine and survey the possible selections. They settle on the Snickers bar and make the selection with the SVM controls. The customer is prompted to select the mode of payment and they respond that it will be a debit card transaction. The machine reads the card, contacts the bank and the purchase is authorized. The SVM dispenses the correct product and prints a receipt for the customer.
2. A blind person approaches the machine and interacts with it to determine what is available and to communicate to the machine what is to be purchased. A cash transaction is enacted and the product is dispensed along with the appropriate change.
3. The food service vendor receives a request to restock the SVM. They approach the machine. They gain access to the area where the snacks are stocked in the machine. The appropriate items are added to the stock and the serviceman secures the machine and leaves.
4. The building manager where the SVM is located receives a complaint that the machine is not functioning. They notify the SVM company and a repairman is dispatched to the site. The trouble is identified and repaired and the machine is placed in service again.

Exercise VI

SVM Needs

1. Provide service to customers with mental capabilities over the age of an average 5 year old.
2. Provide services to customers with physical limitations (sight, mobility, and hearing)
3. Be easily serviceable by a single person of average physical skills
4. Perform POS transactions
5. Perform cash transactions
6. Be capable of stocking multiple product types
7. Be secure from theft
8. Operate under its' own power
9. Be reliable
10. Food beyond the expiration date must be identifiable as such

Exercise VI

SVM Technical Performance Metrics

1. The Time required to accept a selection and deliver the product needs to be less than 5 seconds.
2. The time required to authorize a POS transaction needs to be less than 3 seconds
3. The SVM must operate on internal 28V DC power
4. The cash transaction operation must reliably operate with 99.9% accuracy
5. Accept \$20 bills and lower, as well as coins
6. Be capable of stocking a quantity of 5 of each product and at least 20 product types
7. Product packages will not exceed 8" high x 5" wide by 3 "deep, nor be smaller than 4"H x 1.5"W x 1"D
8. Have a mean time between failure of at least 5 years (reliability attribute)

SVM

Exercise VI Instructions

1. Break up into teams of 4
2. Read and discuss the information provided in the class handout (also in D2L exercise section)
3. Write the system functions required to satisfy the listed needs
4. Write functional requirements for each function, as well as the associated performance requirement dictated by the list of TPMs.
5. Identify 2 areas where standards would apply (Don't look up the standard specifics nor the actual values)
6. Report out to class

Homework 7: System Architecture (material to be covered in lecture 7)

From Your Class Exercise VI Team Output:

1. Create a System architecture defining the subsystems
2. Flow down the system requirements to the appropriate subsystems (ensure traceability)

Task: This is an individual assignment that builds on the in-class team exercise. If you could not participate on a team, then you are a team of 1 and must generate the basic exercise information first, in order to do this homework assignment.

Submit: File can be in powerpoint or pdf format