LESSBAG

by

SUBASSEMBLY SPECIFICATION REPORT

TEAM 7

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1. INTRODUCTION

The project consists of two main subassemblies: Control Point and Bag Dispenser. Those two subassemblies also have their own subassemblies. All Bag Dispensers are connected to Control Point and Control Point is connected to the main computer. Main computer is a computer that all markets have one in their market, and connected to all cash registers. A general top view of the system will help the reader to understand how a market works and where and how we mount LessBag in a market (see Figure1).

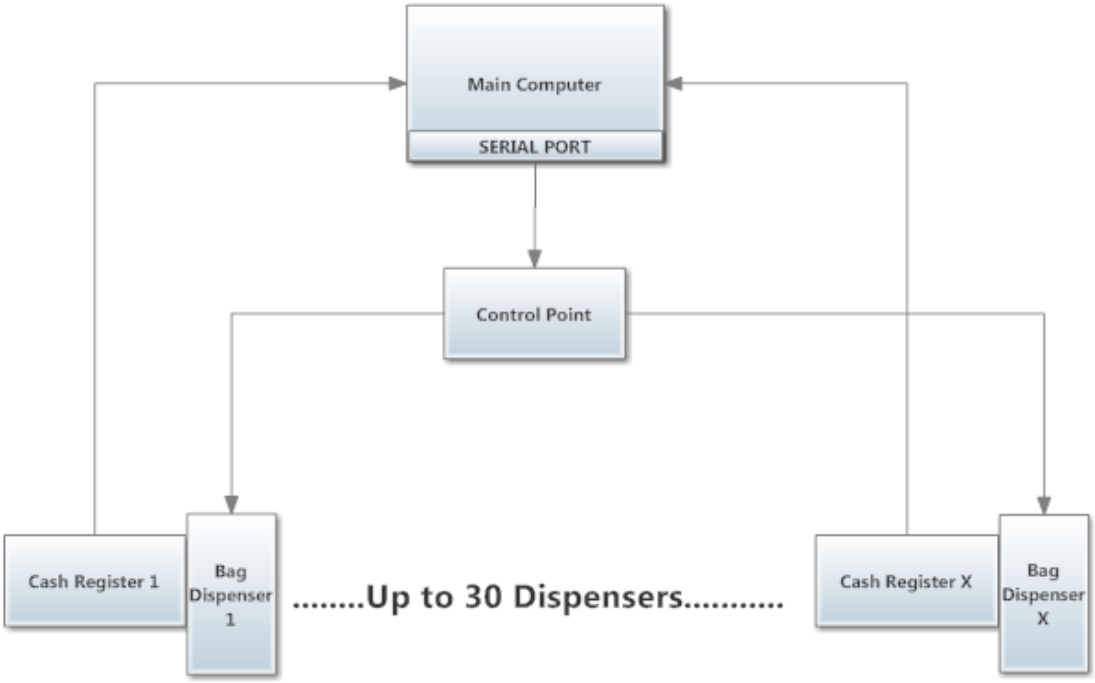

Figure 1: General top view of the operation of market and LessBag

2. SUBASSEMBLY SPECIFICATIONS

LessBag has 2 subassemblies: Control Point and Dispenser (see Figure2). So we divided these subassembly specifications into two main parts. Under each part, we talked about their own subsystems.

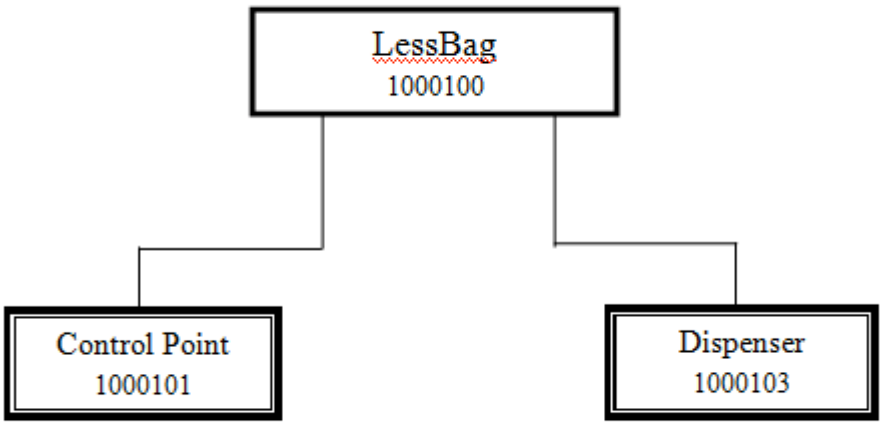

Figure 2: LessBag's two main subassemblies

2.1 CONTROL POINT

Control point is responsible for controlling the dispensers. Each dispenser is connected to control point, and control point is connected to main computer. Main computer will send the information (which bag dispenser should be rolled down) to control point from its serial port. Control point will take this information and send a bag-rolling request to related bag dispenser.

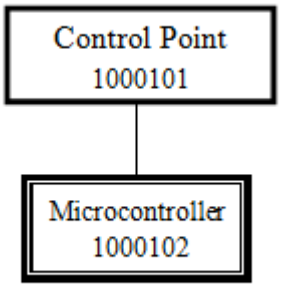

Figure 3: Control Point's subsystem

2.2 BAG DISPENSER

Bag dispenser is responsible for rolling the bag. Bag giving process starts when the signal comes from control point, or when the give-1-bag button is pressed by cashier. Bag dispenser has 6 subsystems (See Figure 4). Block diagram of the Bag Dispenser will help the reader to understand how Bag Dispenser works and how the subsystems are related with each other (see Figure 5).

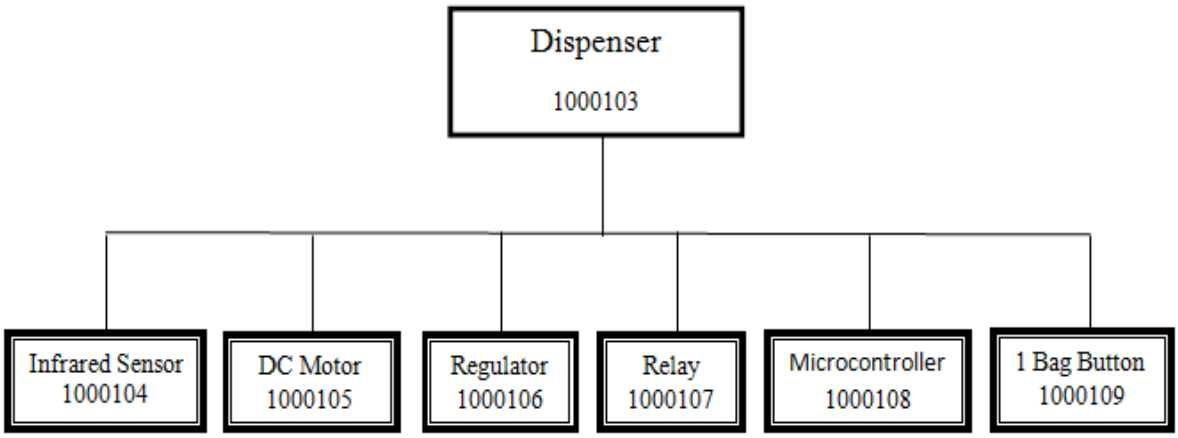

Figure 4: Bag Dispenser's subsystems

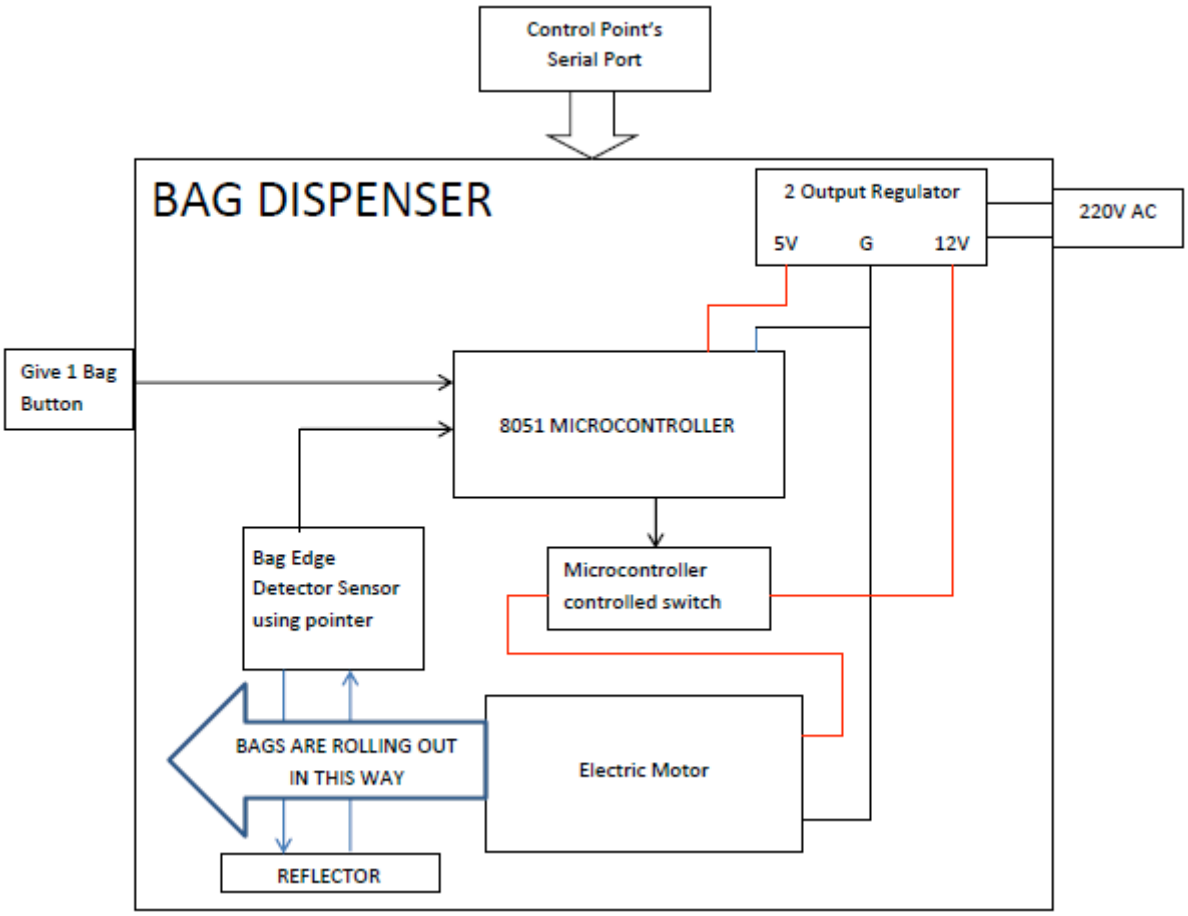

Figure 5: Block Diagram of the Bag Dispenser

2.2.1 Infrared Sensor Circuit

Infrared Sensor will be used to detect the space between the rolled bags. After the detection, dispenser will understand that 1 bag is rolled down then it will stop the motor. The infrared sensor will be placed under the DC motor and in front of the rolling bags.

Dimensions	: 4 x 7 x 1 cm
Weight	: 15gr
Operating Temperature	: 0°C to 100°C
Operating Voltage	: 12 V DC
Detection Distance	: 15cm
Detection Space between bags	: 8cm
Output Voltage:	
a. Edge Detected	: 5 V
b. No Edge	: (0-1.8) V
Supply Current	: 25mA

2.2.2 DC Motor

DC Motor will be used to roll down the bag. Motor will have break capability when its power is off so DC gear motor will be used to satisfy this functionality. The motor will be placed on the left side of the dispenser, and the cylinder shaped rolled bag will be mounted to the rotor.

Dimensions	: 4 x 8 x 5 cm
Weight	: 200gr
Speed	: 350 rpm
Torque	: 12kg.cm
Power	: 40W
Operating Voltage	: 12V DC
Load Current	: 3A
Operating Temperature	: -30°C to 70°C

2.2.3 Regulator

Multi output regulator will be used to regulate 220V AC to 5V and 12V DC. This regulator will be a multi output regulator. 5V will be used by microcontroller and 12V will be used by both DC motor and infrared sensor. The regulator will be mounted near the 220V AC power input of the dispenser.

Dimensions	: 6 x 5 x 5 cm
Weight	: 200gr
Input Voltage	: 200 V-240 V
Output Voltages:	
a. +5 +/-0.3 V (0.2A)	
b. +12 +/-0.6 V (4A)	
Operating Temperature	: -20°C to 80°C

2.2.4 Relay

Relay will be used for driving the DC motor. It will be switched on/off by the microcontroller. When it is on, DC motor will run and roll down the bag, when it is off, DC motor will stop. The relay will be mounted between the microcontroller and the motor.

Dimensions	: 2 x 2 x 2 cm
Weight	: 5gr
Operating Temperature	: -30°C to 100°C
Switch on/off time	: 50ms

2.2.5 Microcontroller

Microcontroller is the heart of the dispenser. 8951 which is eight bit single chip microcontroller would be used and it is a derivative of 8051 microcontroller family. It will get the bag giving request from either control point or 1-bag-button then will run the bag giving process: It will start the motor by switching on the relay and wait for sensor data. One of the external interrupt pin of 8051 would be connected to this button and microcontroller starts to bag giving process according to this external pin. Other interrupt pin of 8951 would wait until the data comes from the control point and after the data comes, it will start the bag giving process. When infrared sensor detects a new edge in the bag giving process, this means one bag is rolled down, microcontroller stops the DC motor by switching off the relay.

Dimensions	: 2.5 x 10 x 0.5 cm
Weight	: 11gr
Operating Voltage	: 5V +/-1.1V
Output Current	: 15 mA
Operating Temperature	: -50°C to 120°C

2.2.6 Bag Button

This is a simple button that will be used by the cashier to give extra 1 bag. This will send an interrupt signal to microcontroller and microcontroller will run the bag giving process. The button will be mounted on the outside of the dispenser and it would be on the front of the cashier so that the cashier can press easily.

Dimensions	: 1 x 1 x 1cm
Weight	: 5gr

3. References

1. "Infrared Sensor". http://www.pololu.com/catalog/product/958/
2. "Pololu 12VDC, 350rpm Metal Gearmotor".< http://www.robotshop.com/pololu-12vdc-350rpm-29-1-metal-gearmotor.html>
3. Absolute RLS125 Relay.< http://www.sonicelectronix.com/item_31162_Absolute-RLS125.html>
4. "8951 8 bit Controller". <http://www.datasheetcatalog.org/datasheets/134/411652_DS.pdf>