The Endless Coffee Pot

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Introduction

Product Requirements

Automatic functions and features:

- **Auto Operation Cycle**
- **Self-Cleaning Cycle**

3. Loads coffee pouches

4. Disposes coffee pouches

5. Fills the water reservoir

6. Empties the coffee reservoir

7. Manual Mode

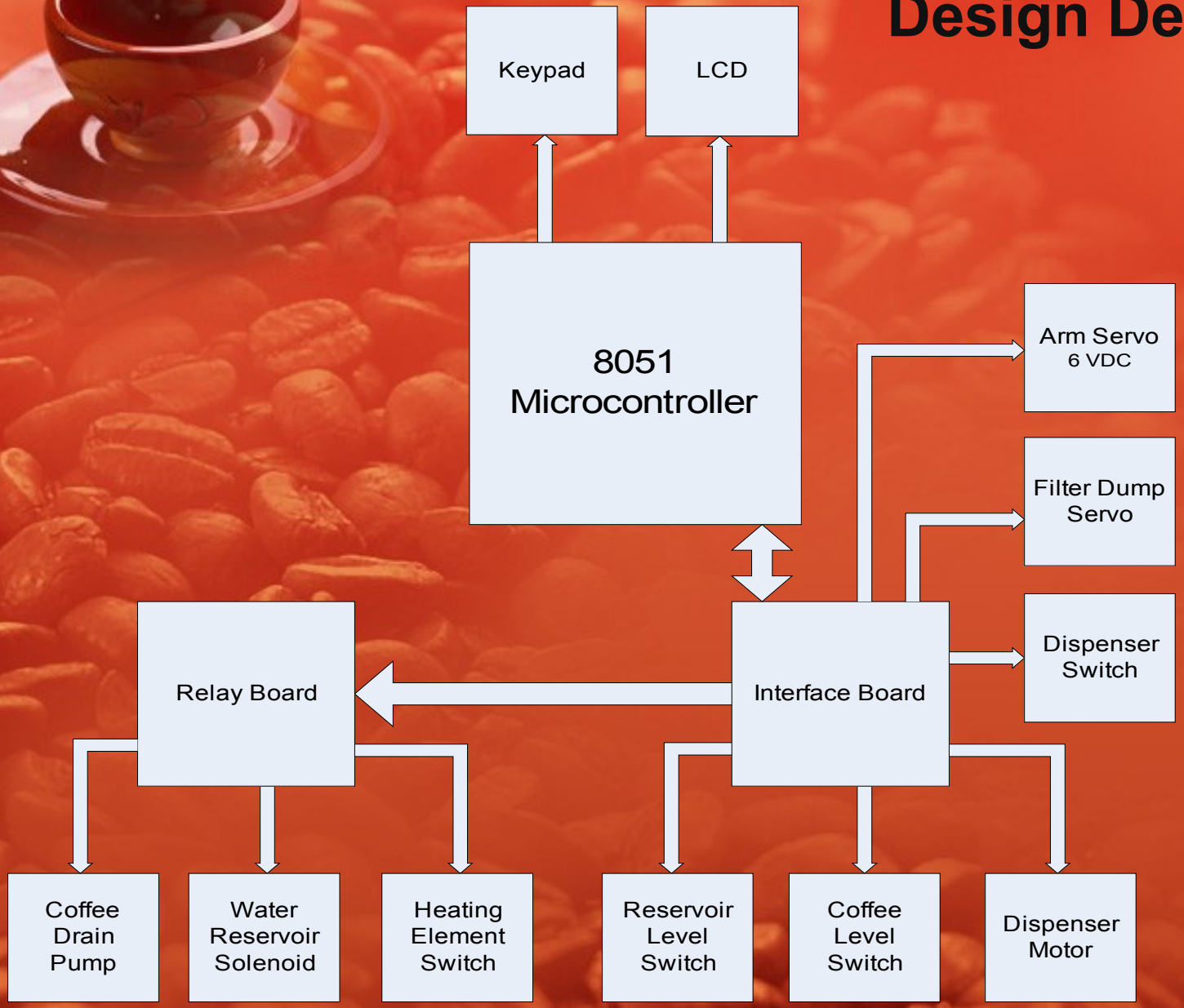
Design Alternatives

- High impact plastic cabinet
- Large touch screen for user interaction
- Calendar function
- U-shaped 30 pouch dispenser
- Coffee “age” displayed on main menu
- Closed valve system
- Steam hood
- Circuit board shield
- Interior mounting of motor
- Modify for different beverages

Design Specifications

- BiPOM 8051 Microcontroller
- User input and display
- Water reservoir sensor and control
- Coffee reservoir sensor and control
- Coffee pouch dispenser and feedback
- Filter change arm

Design Description



Design Description

Program Flowchart

- User enters setup information
- Current time compared to brew time range
- If current time is in range, operation cycle begins
- Once operation cycle ends, cleaning cycle begins
- Repeat step 2

Construction Details

- Product housing
- Robotic arm
- Plumbing
- Sensors
- Pouch Dispenser
- Wiring
- Program

Verification and Testing

- Coffee Pouch Dispenser
- Robotic Arm
- Sensors
- Brew Cycle
- Cleaning Cycle
- Overall System

Costs

Parts

Item	Actual Cost
MINI-MAX/51-C2 8051 Microcontroller	$69.00
Coffee Maker	Donated
Futaba S3004 Servo Motors	$29.98
8 Relay Board	$10.00
LCD242 Display Module	$24.00
KP1-4X4 Matrix Keypad	$24.00
1/2" Plywood	Donated
Nylon Horizontal Level Sensor	$14.90
Polypro Vertical Level Sensor	$20.65
Solenoid Valve	Donated
Pumps	$19.90
Vending Machine Parts (motor, coil, etc.)	$53.40
Electrical components (switches, resistors, transistors, connectors, etc.)	$5.55
Plumbing (spigot, tubing, connectors, hose)	$36.64
Pouch Components (coffee, filters, thread)	$6.84
Mounting Hardware (bolt, hinges, etc.)	$4.95
16 mm Diamond Core Drill Bit	$25.70
TOTAL	$345.51

Costs

Labor

Item	Rate	Hours	Cost
Lee Howard	$20.00	200	$4,000.00
Brian Meixell	$20.00	200	$4,000.00
Juan Montelongo	$20.00	200	$4,000.00
Brian Sturhan	$20.00	200	$4,000.00
TOTAL		800	$16,000.00

Lab Equipment

Item	Cost
BK Precision DC Power Supply	$689.00
BK Precision 5 1/2 Digit Multimeter	$695.00
BK Precision 10 MHz Sweep/Function Generator	$399.00
Tektronix Oscilloscope	$500.00
Gateway Laptop	$1,000.00
Tektronix 2 Channel Digital Storage Oscilloscope	$1,600.00
TOTAL	$4,883.00

Total

Cost	Amount
Parts	$345.51
Labor	$16,000.00
Lab Equipment	$4,883.00
Total	$21,228.51

Conclusions

- Project was completed on time and within budget
- Handmade pouch production lacks precision
- Solenoid valve and servos faster than expected
- Limitless automated beverage options


Questions?