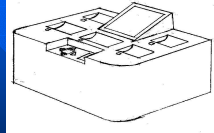


Automated Medication Dispenser System (AMDS)



BoboCo.

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Team Members

- Peter O'Donnell – Team Leader / Documentation
- Sam Crowell – Software and Web Page
- Gill Huffman – Hardware and Documentation
- Nathan Jones – Hardware and Software

Abstract

Elderly, sick, and mentally handicapped people have to take multiple medications to deal with their ailments. Keeping track of these medications is very burdensome and can be life threatening. Our project will attempt to assist these people in taking the correct dosage at the appropriate times.

Project Goals

Automatic Medication Dispenser System (AMDS)

- The AMDS will assist the elderly, or sickly, with taking their medication.
- The AMDS will have 5 Medication Dispensing Trays that will automatically open at a given time.
- An individual (pharmacist or family member) will program the device for each medication the person is to take.

Competitive Analysis

Main Competitor: E-Pill's MD.2

Advantages:

- Holds more medication
- Can be monitored over a phone line

Disadvantages:

- Dispensing Scheme uses cups which are predefined and filled by the pharmacist.
- Extremely expensive

More info:

<http://www.epill.com/md2.html>

Design

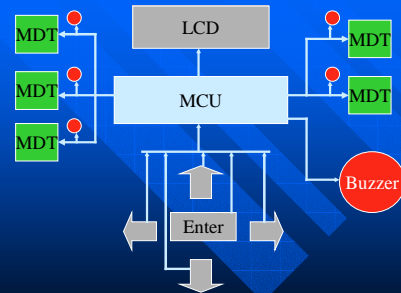
Programming the AMDS:

- Microcontroller – Control operations and store data
- LCD – Display menu of options
- Four Directional Keypad – Scroll through options

Dispensing Medication:

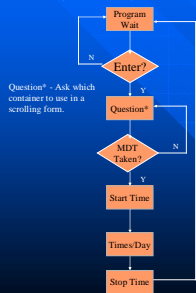
- Five Medication Trays – Store Medication
- Solenoid – Open latch
- LEDs – Indicates corresponding tray
- Buzzer – Indicates a medication is ready to be taken
- Microcontroller – Controls Solenoid, LEDs, and Buzzer

Design Layout

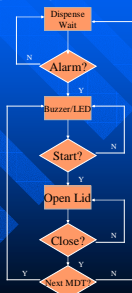


Design Flow Chart

Programming Flow Chart



Dispensing Flow Chart



Design Constraints

- Device must be small, light weight, and portable.
- Power Source
 - 110 VAC
 - Battery backup source
- Real-time clock
 - Accuracy up to 5 seconds

LCD

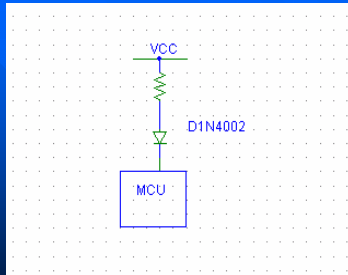
- Options
 - Parallel
 - Serial
- Solution
 - Serial
- Reason
 - Ease of programming
 - Occupation of fewer pins on microcontroller



Latching

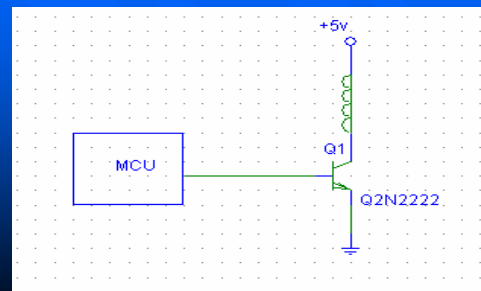
- Options
 - Constant Voltage Magnetic latch
 - Momentary Magnetic Latch
- Solution
 - Momentary Latch
- Reason
 - Significantly less power consumption
 - Lid security

LED Schematic



Logic '0' turns the LED on

Solenoid Schematic



Microcontroller

- Options
 - PIC
 - Ubicon SX
 - Cypress PSOC CY8C26443
- Solution
 - Cypress PSOC CY8C26443
- Reason
 - Real-time clock
 - C and Assembly language support
 - 16K Flash Memory
 - 256 bytes of RAM

Medication Dispensing Tray (MDT)

- Rounded bottom allows for easy access to small medication
- Contains a full prescription in each tray
- A solenoid driven electromagnetic latch controls the lid operation

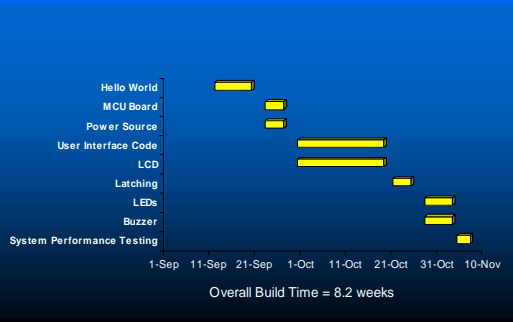
Test Specifications

Requirements	Digital Multimeter	C Compiler	Oscilloscope	Simulator
LCD Interface		X		X
Accuracy of Real-Time Clock			X	X
LED Visual Alarm	X			X
Audio Alarm	X			X
Lid Sensor	X			X
Dispense Button / Solenoid	X			X
Keypad		X		X
Power Source	X		X	

Test Specifications (contd)

- The real-time clock will be accurate up to five seconds
- Both the LEDs and buzzer will be tested against known times and voltages.
- Backup battery life will last up to five hours
- The solenoid will retract the latch for approximately 250ms to release the MDT lids.
- Closure of a MDT lid will result in the resistance across the two pins of the lid sensor to be negligible

Schedule Graph



Schedule

Task	Week	# of Weeks
"Hello World" Microcontroller	9/12 - 9/20	1.5
Build MCU Board	9/23 - 9/27	1
Power Source	9/23 - 9/27	1
User Interface Code	9/30 - 10/18	3
LCD	9/30 - 10/18	3
Latching	10/21 - 10/25	1
LEDs	10/28 - 11/1	1
Buzzer	10/28 - 11/1	1
System Performance Testing	11/4 - 11/8	1

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