System Test Plan

The PillMaster

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1. Mechanical Module

1. 1: Pill Dispensing Mechanism	
Test 1: Dispensing one pill at a time	**Results**
Parts Tested: Containers, shaft and servomotors **Expected Outcome:** The system has to dispense only one pill at a time at each servomotor rotating cycle. Out of 100 test pills at least 90 should be dispensed one at a time.	o Pass o Fail
Test 2: Pill Position as entering into the cutting module	**Results**
Parts Tested: Pill-orienting slides **Expected Outcome:** The pills have to enter the slots of the cutter smoothly. The slides have to route 90 out of 100 test pills into the cutter slots smoothly.	o Pass o Fail
Test 3: Idle position of the system	**Results**
Parts Tested: Containers, Shaft **Expected Outcome:** The containers and the shaft have to retain the pills when the system is in idle mode.	o Pass o Fail

1. 2: Pill Cutter Mechanism	
Test	**Results**
Tested Parts: Servo motor, DC motor, Blade **Procedures:** Dispense one of the vitamins, Tylenol, or M&M to their respective pill slots in the cutter. Connect the power to Arduino and pill cutter. Observe the outcomes and repeat the procedure for the other 2 kinds of pills. **Expected Outcomes:** The pill must be cut roughly even and remain inside the pill slot. Then the pill platform will move to let the pill fall into slide. All three kinds of pills must have the same outcome.	o Pass o Fail

2. Software Module

2. 1: Timing and Monitoring	
Test	**Results**
Tested Parts: LCD, Timer, Microcontroller board **Procedure:** Connect the timer and LCD to the microcontroller; upload the code onto the board. **Expected Outcomes:** The LCD panel can display time in the format of *hours:minutes:seconds*, it can display date in the format of *day/month/year*, and also the day of week. The time is updated each second and will be reflected on the LCD.	o Pass o Fail

2. 2: User Keypad Input	
Test	**Results**
Tested Parts: LCD, Keypad, Arduino board **Procedure:** Connect the LCD and keypad to the Arduino board, when user press 1, the board goes into programming mode. If the user wishes to exit the menu at this stage, they can press *. User can then follow the instructions shown on the LCD. **Expected Outcomes:** The user input is successfully stored in memory. For example, user entered 3 time slots for container one (9am, 1pm, 8pm), one pill each time, do not cut the pill. When it is 9am, one pill will be dispensed from container one, and it won't be cut.	o Pass o Fail

2. 3: Servo Motor Control	
Test	**Results**
Tested Parts: Servo motor,Timer, Microcontroller board **Procedure:** Connect the timer and servo motor to the microcontroller; upload the code onto the board. **Expected Outcomes:** The servo motor can be activated according to the user input time. For example, at 9 am the user wish to take pill, then the motor will start rotating at 9am. The motor speed and rotating angle is restricted based on the functionality of the motor in our code. For example, for the cutter mechanism, we only want the motor to rotate 90 degrees, and the speed is 1mm/ms.	o Pass o Fail

3. Sensors

3. 1: Timing and Monitoring	
Test: Photo interrupter sensors	**Results**
Test Parts: Photo interrupter sensors Procedure: Drop one pill to pass through the motion sensor. **Expected Outcomes:** The output voltage of the motion sensor will change to 0.8V from 5V when the pill passes through. Microcontroller board will detect this voltage change and store a variable to indicate the pill has been dispensed correctly.	o Pass o Fail

4. Power Module

4. 1: Power up the board	
Test	**Results**
Parts Tested: Voltage routing circuit. **Expected Outcome:** When connecting the wall plug to the voltage routing circuit, all the power monitoring LEDs on the Microcontroller Board and the DC Motor Controller Board must be on.	o Pass o Fail

4. 2: Power up the motors	
Test	**Results**
Part Tested: Voltage routing circuit, Servomotors **Expected Results:** The servomotors have to move. This has to be done by using the Voltage routing circuit to power the motors and the microcontroller to produce their motion.	o Pass o Fail

4. Overall

4. 1: The system input and output	
Test	**Results**
Parts Tested: All the modules **Expected Results:** The user has to input the time to dispense the pill. The pill has to be dispensed and cut by the system at the time specified.	o Pass o Fail