**Chapter 4**

**Simulation and Testing**

* 1. **Work Plan**

The workflow followed will be to simulate LCD display and to check real time function tracker and testing will be done for components that cannot be simulated in software. During testing, modules will first be tested with Arduino to understand the commands and to configure module like HC-05 with password.

* 1. **Simulation**

The main objective for simulation was to check the function, that kept track on real time. The software that we used was Proteus 8 Professional. The main challenge that we faced during this was keeping the track on actual real time since the real time in controller was lagging with respect to actual real time. This problem was solved by making the timer faster than before. Finally real time function was able to track the real time properly. We also simulated LCD Display on Proteus to check for errors in LCD program. Two other major components namely GSM module and Stepper motor couldn’t be simulated so when directly went for hardware testing.

* 1. **Testing**

The testing was divided into various phases. The main objective for phase wise testing was to detect problem at component level.

* GSM Module Testing: We first tested GSM Module with Arduino Uno board. Here we found that the legend printed on board had some error. Power and Status light were wrongly printed and Tx, Rx were also wrongly printed. After detection of this error the GSM Module was working properly.
* Bluetooth Module Testing: We first interfaced HC-05 with Arduino board to check for any errors in module. After testing we were able to conclude that HC-05 was working in the expected manner.
* LCD Testing: We tried to print some characters on LCD to check the program of LCD.

* Stepper Motor Testing: The stepper motor was working properly but the power dissipation in motor was much more than expected so to over come this we used a relay that would cut the power supply to driver when motor is not in use. This resulted in reduced power consumption.
* IR Sensor Testing: The concept behind testing IR sensor was to display ‘1’ on LCD when object is detected and print ‘0’ when no object is found.
* Battery Operated Power Supply Testing: The main objective was to provide the controller an uninterrupted power supply on mains failure. Thus in testing phase we used a led as load and intentionally turned off the mains power supply so that battery provides power to led.
* Overall Testing: When the circuit was powered then we connected our phone to HC-05 and entered the medicine time along with real time. When the medicine time was reached then the buzzer was enabled. If medicine was not taken in 2 minutes (just for testing), then a miss call was made to the care taker. If the person kept his hand in front of the dispenser, then the stepper motor was rotated to dispense medicine in the hand of people. We also tried to interrupt the mains power supply so that we can check whether the controller is getting uninterrupted power supply from battery.