SCS-2250

University of Houston
College of Technology
Department of Engineering Technology
Computer Engineering Technology
Program
ELET 4308/4208 Senior Project
SCS-2250
Fall 2008
October 30, 2008

Team Members:
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Julio Flores
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Rogelio Topete

Project Advisor:
Dr. Farrokh Attarzadeh

Introduction

- Motivation
  - To eliminate the hassle of cleaning the shower every week
  - To prevent the collection of mold and fungi
- Existing Prior Work
  - Scrubbing Bubbles Automatic Shower Cleaner
    - Patent number: 7337989
    - Patented on March 9, 2007

Project Objective

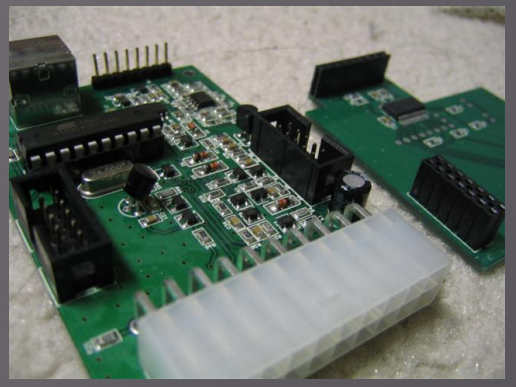
- The goal for the project was to provide an alternate method for cleaning and maintaining the shower area clean
- The SCS-2250 is:
  - Programmable for the user to determine when cleaning will take place
  - Affordable when building a new home or remodeling an existing home

Which One Should I Choose?

- Scrubbing Bubbles does not have the spot flexibility of a hand spray
- **The SCS-2250 is designed to spray the same areas that you would clean with a hand spray**
- Scrubbing Bubbles mounts over the shower head, so it only sprays on the other shower walls
- **The SCS-2250 sprays every shower wall equally**
- Scrubbing Bubbles needs batteries in order to operate
- **There is no need for batteries for the SCS-2250 because the power comes from the user's home power supply**

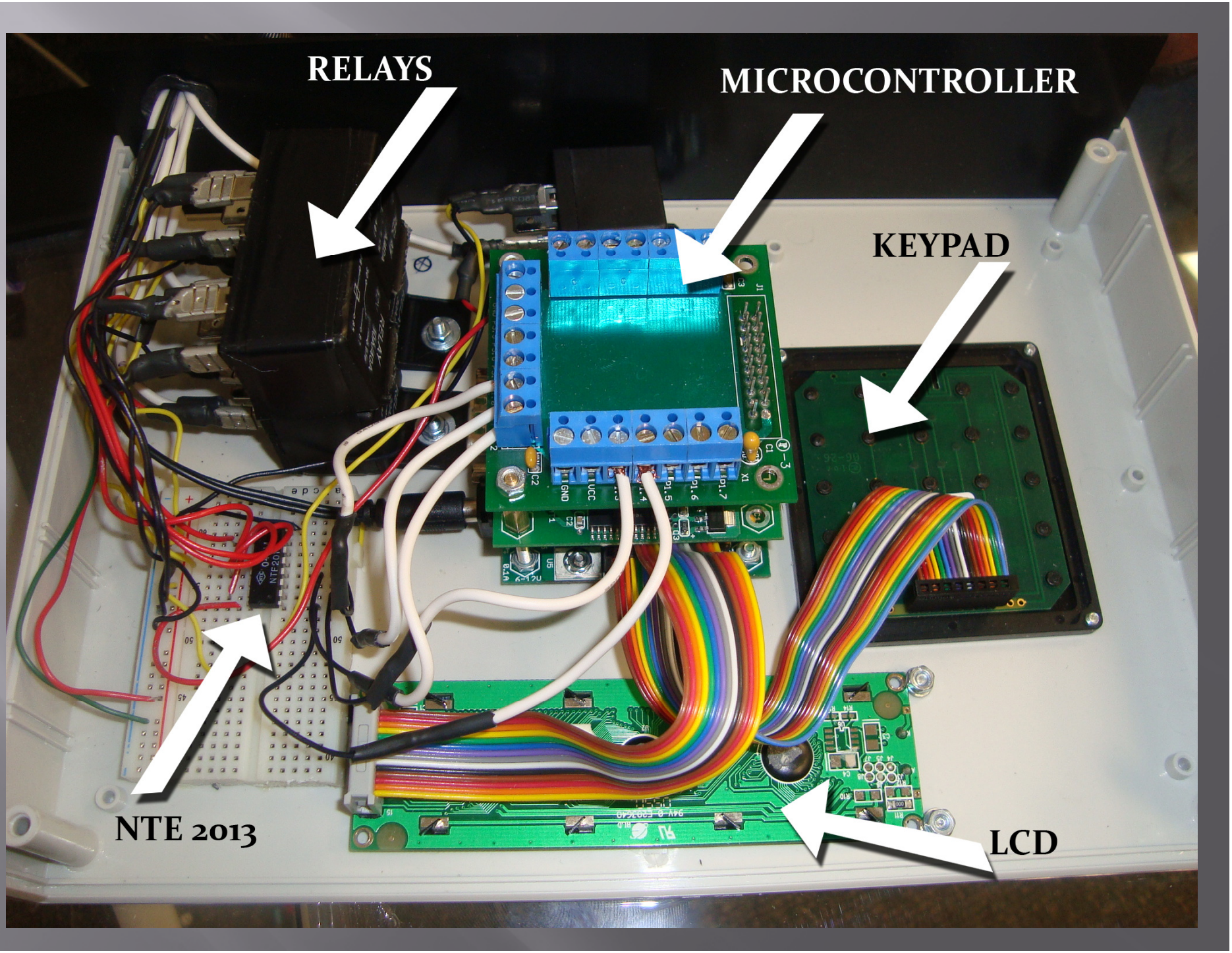
Description

- This project requires the integration of:
  - PVC Pipes
  - LCD Screen
  - Microcontroller
  - Real-Time Clock
  - Expansion Board
  - Keypad
  - Electric Valves
  - Cleaning Agent Tank
  - Cleaning Solution
  - Hoses
  - Hose Connectors
  - Plexiglass
  - Wires
  - Transistor Array IC
  - Relays
  - Sealant

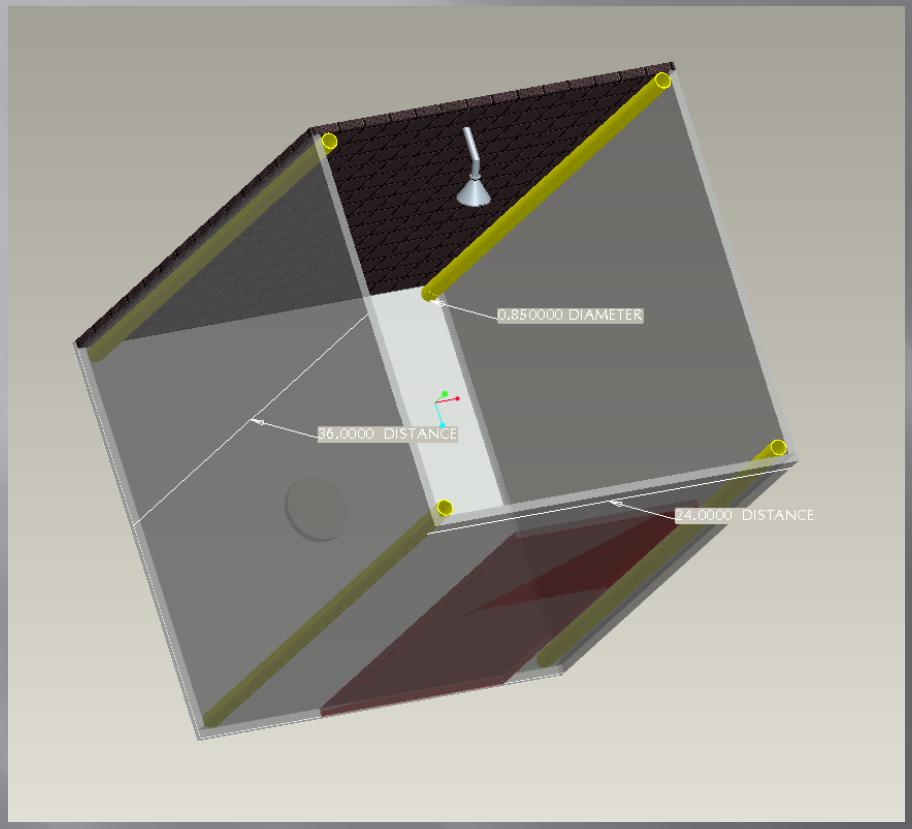


Set Up

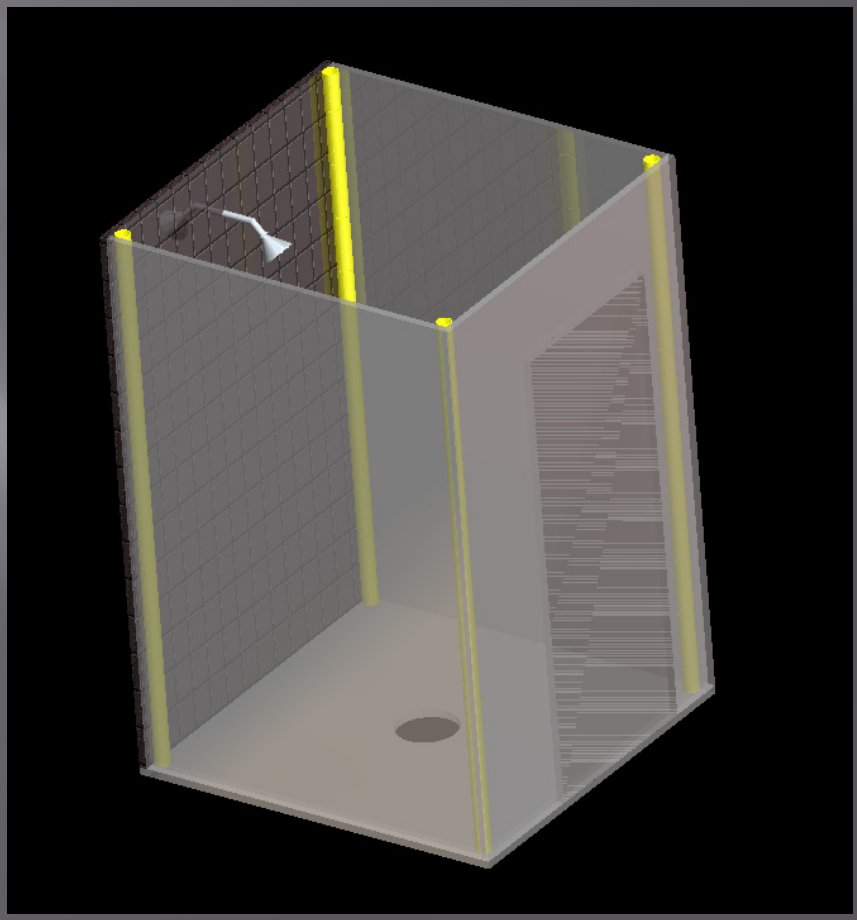
- Microcontroller is connected to a NTE 2013 IC (7 Transistors)
- 5 outputs of the IC are connected to 5 relays
- Relays are connected to 5 12V electric valves
- LCD and Keypad provide the user interface for the system
- 4 perforated PVC pipes on each corner of stand up shower
- Valves are set up to activate 2 pipes at a time
- Pipes are connected to water supply and cleaning solution container


RELAYS
MICROCONTROLLER
KEYPAD
NTE 2013
LCD

Visual Representation



TOP VIEW

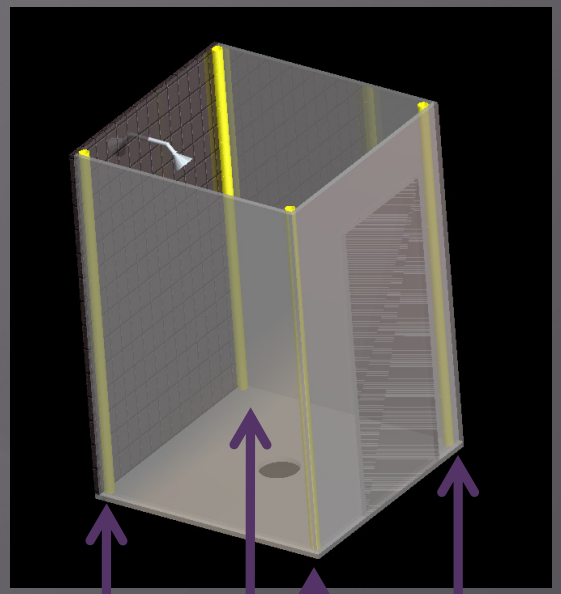


SIDE VIEW

Mode of Operation

- SCS-2250 starts up and asks user to input the time and select the schedule of operation
  - Daily, Bi-weekly, and weekly cleaning
- The microcontroller will check the variables entered during setup with the variables of the RTC
- Once the RTC matches with the assigned cleaning time the cleaning process will begin
- Cleaning solution is pumped through two PVC pipes at a time to be dispersed to the shower walls

Cleaning Process Flow



V2

V1

V3 Drain

V4

V5

Verification

- Relays
  - Verified that each relay was working according to the code
- Electric valve test
  - The electric valves were connected to the microcontroller during testing to ensure the programming was correct
- Water Pressure Test
  - The water pressure was tested to make sure that the shower walls were cleaned equally
- Complete system run-through
  - This was done once the building of the SCS-2250 was complete. This ensured the circuitry, components, and program are working properly

Cost Analysis

Item	Estimated Cost	Actual Cost
Microcontroller	$70.00	$70.00
Plexiglass	$80.00	$128.91
PVC	$15.00	$5.31
RTC-1 Board	$49.00	$63.04
Expansion Board	$24.00	$34.00
Electric Valves	$40.00	$41.96
7 CH Darlington IC	$5.00	$5.00
Totals	**$283.00**	**$348.22**

Donated Items

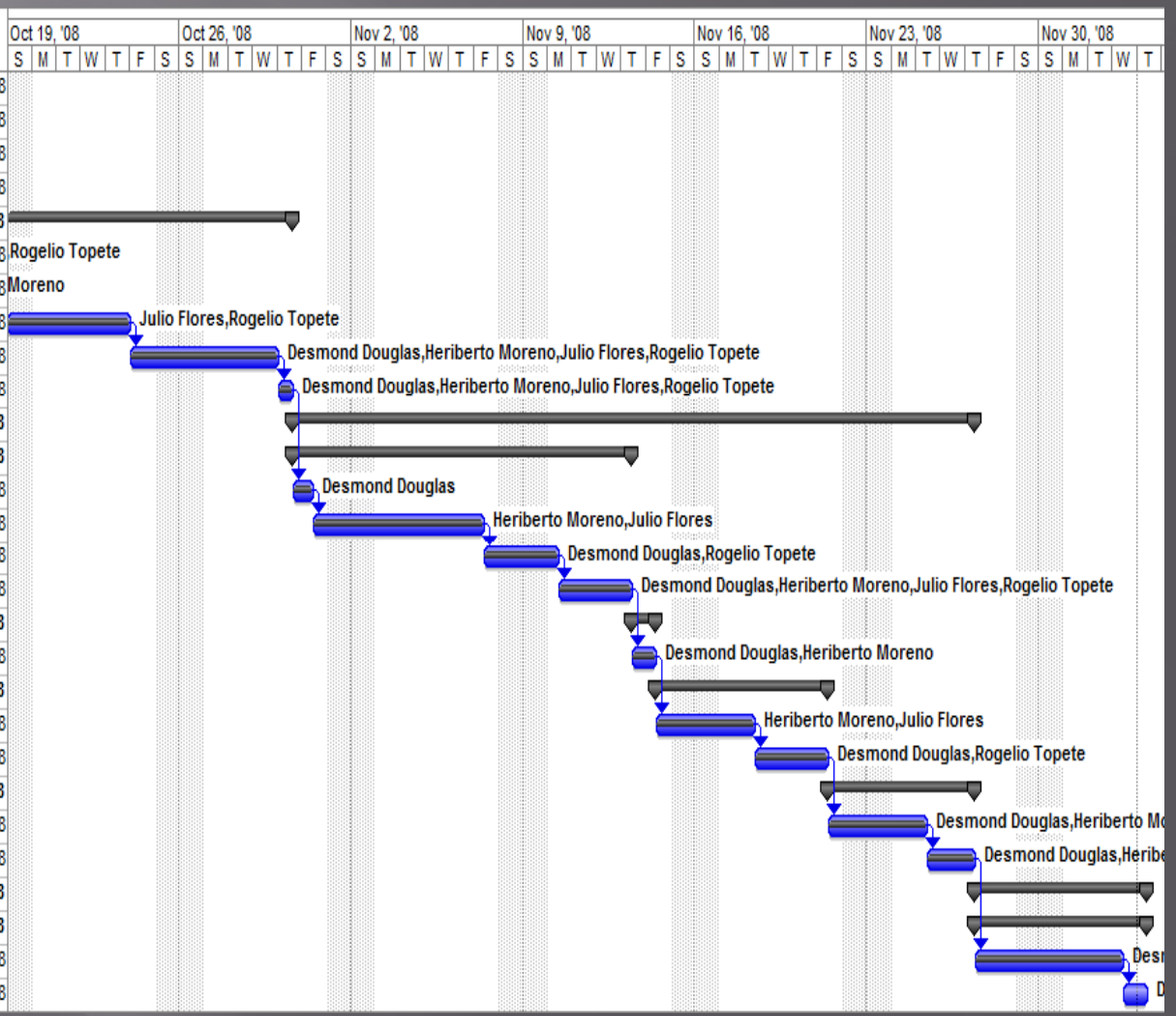
Item	Estimated Cost	Actual Cost
Door Hinges	$10.00	$9.18
Circuit Enclosure	$20.00	$18.40
Fittings	$15.00	$16.12
Square Brackets	$15.00	$10.67
Acrylic Sealant	$8.00	$7.94
Wires	$5.00	$5.49
Electrical Connectors	$3.00	$2.99
Black Wire Conduit	$3.00	$2.99
Relays	$25.00	$19.75
12 VDC Transformer	$10.00	$9.90
Totals	$114.00	103.43

Labor Cost

Member	Hourly Rate	Number of Hours	Salary
Desmond Douglas	$25.00	200	$5,000
Julio Flores	$25.00	200	$5,000
Rogelio Topete	$25.00	200	$5,000
Heriberto Moreno	$25.00	200	$5,000
Total Labor Cost			$20,000
Total Project Cost			**$20,348.22**

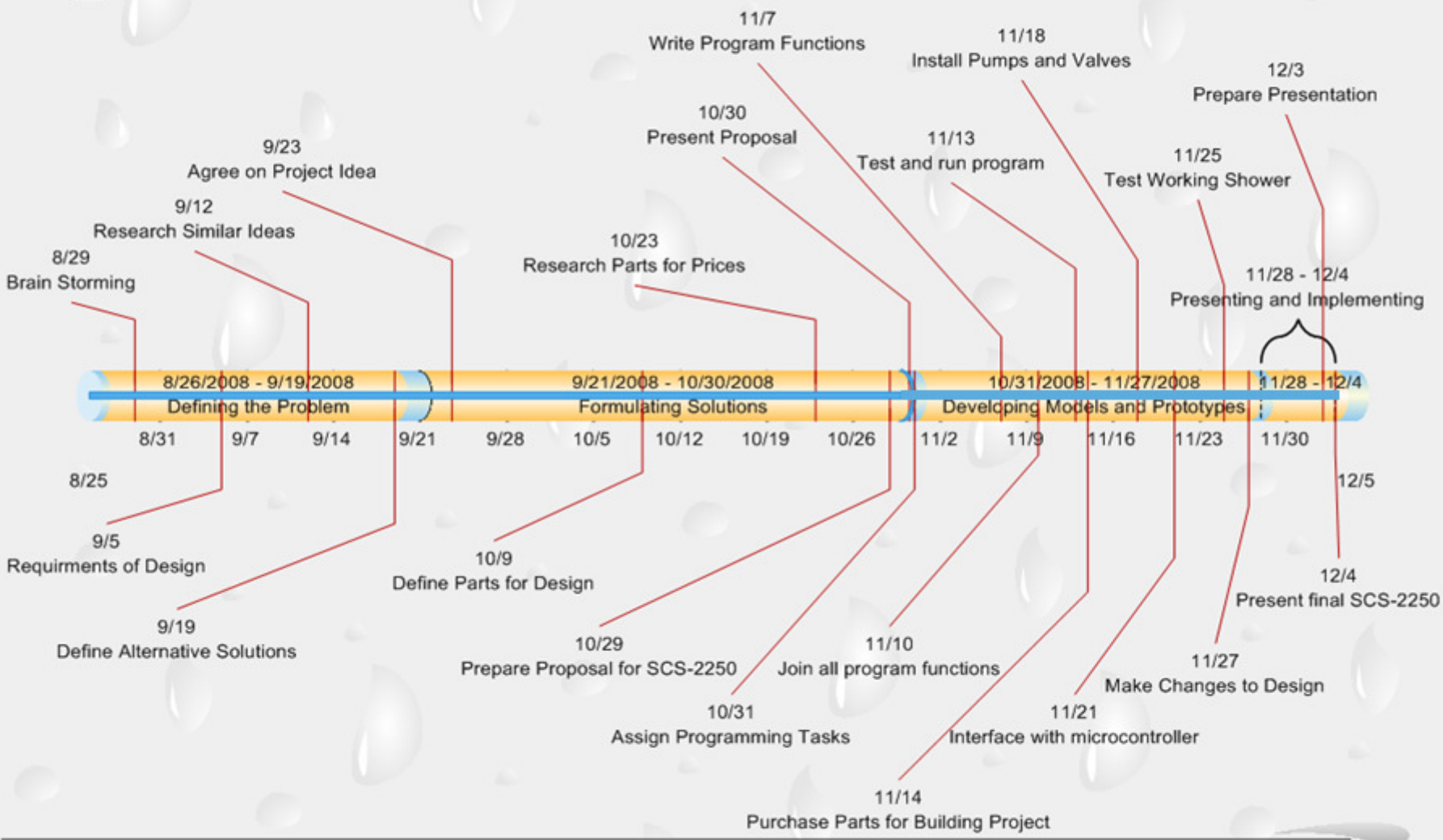
Project Gantt Chart

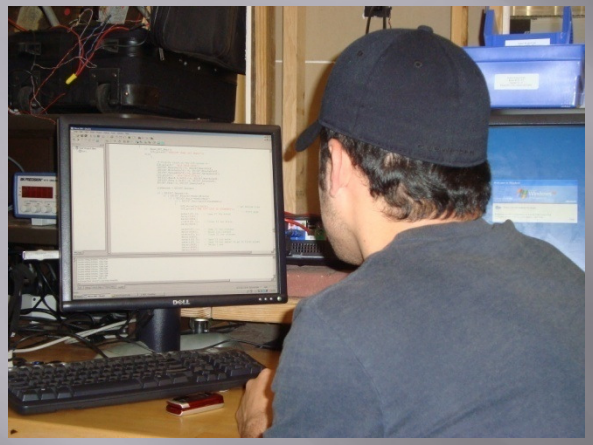
ID	Task Name	Duration	Start	Finish
20	Brain Storming	1 wk	Mon 8/25/08	Fri 8/29/08
21	Requirements of Design	1 wk	Mon 9/1/08	Fri 9/5/08
22	Research Similar Ideas	1 wk	Mon 9/8/08	Fri 9/12/08
23	Define Alternative Solutions	1 wk	Mon 9/15/08	Fri 9/19/08
24	**Phase 2: Formulating Solution**	**28.75 days**	**Mon 9/22/08**	**Thu 10/30/08**
25	Agree on Project Idea	2 wks	Mon 9/22/08	Fri 10/3/08
26	Define Parts for Design	4 days	Mon 10/6/08	Thu 10/9/08
27	Research Prices for Parts	2 wks	Fri 10/10/08	Thu 10/23/08
28	Prepare Proposal for SCS 22	4 days	Fri 10/24/08	Wed 10/29/08
29	Present Proposal for SCS 22	0.75 days	Thu 10/30/08	Thu 10/30/08
30	**Phase 3: Developing Models a**	**19.5 days**	**Thu 10/30/08**	**Thu 11/27/08**
31	**Software Design**	**9.5 days**	**Thu 10/30/08**	**Thu 11/13/08**
32	Assign Programming Ta	0.5 days	Thu 10/30/08	Fri 10/31/08
33	Write Program Functions	1 wk	Fri 10/31/08	Fri 11/7/08
34	Join All Program Functio	1 day	Fri 11/7/08	Mon 11/10/08
35	Test and Run Program	3 days	Mon 11/10/08	Thu 11/13/08
36	**Parts**	**1 day**	**Thu 11/13/08**	**Fri 11/14/08**
37	Purchase Parts for Build	1 day	Thu 11/13/08	Fri 11/14/08
38	**Build Shower Structure**	**5 days**	**Fri 11/14/08**	**Fri 11/21/08**
39	Install Pumps and Valve	2 days	Fri 11/14/08	Tue 11/18/08
40	Interface With Micro-cor	3 days	Tue 11/18/08	Fri 11/21/08
41	**Testing**	**4 days**	**Fri 11/21/08**	**Thu 11/27/08**
42	Test Working Shower	2 days	Fri 11/21/08	Tue 11/25/08
43	Make Changes to Desigr	2 days	Tue 11/25/08	Thu 11/27/08
44	**Phase 4: Presenting and Impl**	**5 days**	**Thu 11/27/08**	**Thu 12/4/08**
45	**Presentation**	**5 days**	**Thu 11/27/08**	**Thu 12/4/08**
46	Prepare Presentation	4 days	Thu 11/27/08	Wed 12/3/08
47	Present Final SCS 2250	1 day	Wed 12/3/08	Thu 12/4/08

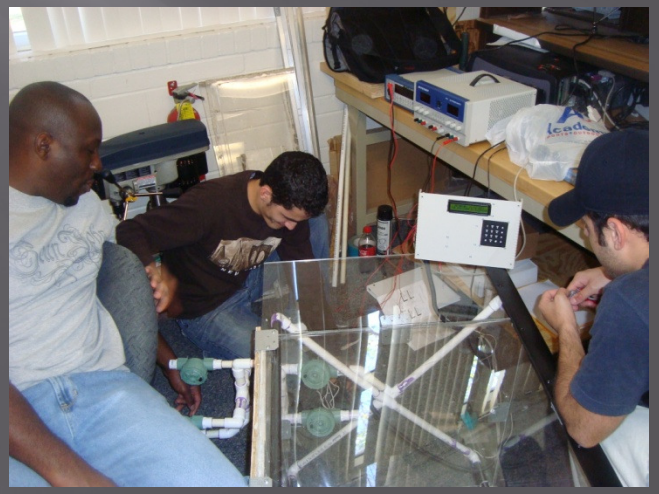


Plan of Action

Thursday, Dec. 4, 2008







Conclusion

- Very rewarding experience
- Learned a lot about team dynamics
- Used acquired skills throughout the years to complete an original project

References

- "Automated cleansing sprayer patent." Google Patent Search. 23 November 2004. http://www.google.com/patents?id=Yk0QAAAAEBAJ&dq=automated+shower+cleaner
- "How do I keep a Shower Clean." Wise Geeek. April 2007 http://www.wisegeek.com/how-do-i-keep-a-shower-clean.htm
- "How to prevent and remove mildew : home methods." U.S. Dept. of Agriculture, Science and Education Administration. Nov.1980.

Questions