

**Project:**  
**Magnetic Resonance Imaging Compatible Infusion Pump**

**Team Members:**

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**Client:**

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**Date:** 3-2-04 thru 3-9-04

**Problem Statement:** MRI compatible infusion pump for gadolinium and saline solutions has pumps that are syringe driven but limited in their sequence capability and in the amount each can hold. The client wants two new pumps that are programmable and can effectively control the infusion rates of gadolinium and saline independently without having to refill the syringes. New pumps will not only save client's time, but it will also save money since refilling the syringes wastes a lot of gadolinium.

**Restatement of Team Goals from Last Week:**

1. We all have to email our slides to Prakash by 8 PM tonight (last Tuesday). Prakash will then put the entire PowerPoint together.
2. Prakash will meet Dr. Block on Wednesday regarding the shielding of the motor from the MRI.
3. Miguel will meet Frank, the technician to ask a set of questions we all came up with on Sunday. He will inform us back. We may make some changes in our power point depending on what Frank has to say.
4. Aman will start the mid-semester paper and everyone will else help putting the remaining parts of the paper.
5. Set up an appointment with Nick to ask him if he can show us the programming kit.

### **Summary of Accomplishments:**

1. We all emailed Prakash our slides on time and put the finishing touches on our slides on Thursday. We also practiced going over our presentation few times and critiqued each member of our group.
2. Prakash was unable to get a hold of Dr. Block. However, he did talk to his mentor and a post-doc at the hospital who work closely with MRI machines. Prakash was told that shielding was possible if we wanted to keep the motor inside the MRI suite but since most companies don't tell what methods they use to shield ferrous materials, it will be hard. Other option is to keep the motor in the control room and attach the pump to a long aluminum bar that will rotate the pump.
3. Miguel met Frank, the technician, on Wednesday. Frank looked over our three designs and gave us some constructive feedback. We were worried that ripple effect and transport delay would dramatically decrease the efficiency of our pumps. However, Frank assured us that transport delay less than 5 seconds don't contribute significant changes. Moreover, he said that ripple effect is problematic in all pumps; as long as the final amount of fluid that is being delivered is accurate, ripple effect is not a problem. Another thing we were worried about was the sterility issue. Since fluid will touch both the spur and the vane gears, we thought we would have to change the gears often. However, Frank assured us that there is a filter that is placed where the tubing is connected to the pumps. This, he said, prevents contamination. The last thing we wanted to clear up was the money issue. Since our design is going to cost well over \$500, we wanted to make sure we would get money from the neurology department. Frank wasn't sure how much money the department would be willing to give us, but he said we would be able to get few hundred dollars quite easily. We will also have to discuss this matter with our client before starting on our chosen design.
4. Aman has already done the "introduction" and the "information obtained" sections of the mid-semester paper. Miguel, Can and Prakash have finished the "alternative design" sections. We are meeting on Wednesday as a group to work on the chosen design and to put any finishing touches on the mid-semester report before handing it in.
5. It turns out we will not have to set up an appointment with Nick who has the programming kit. We have found a better program called LabVIEW that works just as effectively to program a motor.

### **Individual Goals:**

1. Aman Ghotra: Finish Progress Report 7; Finish the mid-semester paper
2. Can Pi: Finish the mid-semester paper
3. Prakash Rao: Proof read the paper
4. Miguel Benson: Finish the appendix

**Statement of Team Goals:** We will finish our mid-semester paper by Thursday evening. After finishing the paper, we are going to have a good spring break. But, next week on Friday we will present our designs to our client, Dr. Newman. Also, we

will observe subjects undergoing the MRI procedure to better understand how the pump is utilized in this procedure.

**Rough Project Schedule:**

1/23/04: Made teams and assigned roles  
1/29/04: Meet our client  
1/30/04: Develop PDS  
2/13/04: Brainstorm possible designs  
2/24/04: Sketch out the three designs  
2/27/04: Evaluate Ideas and work on power point  
3/05/04: Mid-Semester Presentation  
3/05/04: Choose final design  
3/05/04 – 4/23/04: Work on final design  
4/23/04: Work on final power point, final paper and PDS  
4/30/04: Poster Presentation

**Difficulties:** None.

**Activities:**

Aman Ghotra: Progress Report 7; Research on stepping motor; Group meeting; class time (9.5 hours)

Can Pi: Research; Group meeting (9.0 hours)

Prakash Rao: Updated the Website; Group meeting; finished power point; class time (10.5 hours)

Miguel Benson: Group meeting; Research; met Frank; class time (9.5 hours)

**Running Total: 91.0 Hours**

Aman Ghotra: 35.5 hours

Can Pi: 31.5 hours

Prakash Rao: 34.5 hours

Miguel Benson: 28.0 hours