

IPRO 341

Developing a Prototype Cardiovascular Display for the Prenatal-to-Newborn Blood Flow System

IPRO 341 worked with the science and exhibit development staff of the Museum of Science and Industry (MSI) to develop a working prototype of a cardiovascular display of blood flow from a pre to postnatal system. MSI is currently developing a number of new human physiology and health displays.

The goal is to present more current scientific and engineering concepts to better educate the public on the relationships between physiology, pathology, and medical technology. The IPRO team developed a bench-top working model as well as an educational presentation that demonstrates the change in blood flow from fetus to newborn. The first phase of this semester was to refine both the model and flash animation, and the second phase was to take the displays to the museum and obtain feedback from the public, making changes as needed. This project was started last semester; both the model and flash animation will be turned over to the museum at the end of this semester.

To accomplish the goals set forth at the beginning of the semester, the group was divided into teams that evolved throughout the project. During the initial phase, three teams were formed: a computer animation team, a model team, and a text/imaging team. As the semester progressed, more students were transferred to the model team. Students from each team were sent to the museum to collect feedback from the public and report to the rest of the group. Multiple skill and knowledge disciplines were required to carry out this project, including: fluid mechanics, materials, physiology, control systems and interactive design capabilities.

The team encountered several challenges throughout the semester, including issues that arose during last semester's project. While all of the teams met together weekly to discuss progress, there was a lack of cohesion between the model and animation by the first iteration at the museum. As was noted last semester, the balance between too little and too much information in the animation was difficult to find; these issues led to several major changes to the final animation in the second half of the semester.

This semester, the IPRO completed an interactive flash presentation and model display that visually illustrates the pressure and blood flow changes that occur in a newborn. The flash presentation has a run time of two minutes, as it was streamlined to include essential information and use the model to illustrate the major points. The model includes lights running along the tubing to indicate the oxygenation of blood as it flows, and solenoid valves to redirect blood flow as it changes from prenatal to newborn flow, all of which can be controlled from the animation. The layout of the model was also streamlined to be easier to understand and follow. This project could lead to further collaborations between MSI, IIT, and various industrial partners in the field of medicine and medical technology.

Project Sponsor: The Museum of Science and Industry

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