

## **Abstract**

**IPRO 332:** Tournitech: Smart Clothing for sensing Muscle Development

### **Objective:**

This IPRO is the second of a two phase design project. Its objective is to continue the work of the summer 2004 IPRO 332 team, advancing from feasibility study and conceptual design to prototype development. Also a target market for this product will be investigated for which this product is both safe and effective.

### **Key Tasks:**

This project was subdivided into four groups; Safety/Background, Mechanical Prototype, Electrical Prototype, and Sensor Devices. One of the areas, the Safety/Background group, focused on defining design parameters for producing both a safe and effective prototype. These parameters were then passed onto the prototype design groups. The Mechanical Prototype team focused on producing a simple design that would eliminate the possibility of user error. Similarly the Electrical Prototype group worked to develop an equally simple design that through the use of electronics could produce additional safety features. The Sensor Devices group worked to develop ideas for a sensor that would aid in making sure the consumer was training within the optimal training zone.

### **Critical Barriers and Obstacles:**

In the beginning there were two major obstacles that prevented quick advancement of this project. First we lacked a student from the summer IPRO that could provide a smooth transition from the ideas and information collected to be incorporated into the advancement of this semester. Second we lacked a student from the Life Sciences department with more of an understanding of the basic physiological processes occurring.

However more related to this project we faced the issue of finding related scientifically based information. Occultation for muscle development is both relatively new and somewhat controversial. Furthermore the information that was found had to be analyzed and presented in such a way for our group who had little experience in the field of exercise physiology.

### **Key Findings:**

Both prototype groups were able to come up with creative design solutions. These results could be compared to determine the best fit to this application. The sensing group was also able to discover a new solution for measuring muscle activity. It was determined that pH could be measured to determine when the muscle is within the optimal training zone. Finally the Safety and Background group was able to use research in determining an appropriate use for such a controversial product.

### **Recommendations:**

After reviewing the advantages of both the mechanical and electrical prototypes the electrical prototype was selected as the most effective solution. It was chosen because it could have more safety features incorporated in its final design. It was also determined that the effects of this product, with low intensity exercise, are similar to those of traditional high intensity exercise. The advantages that it does provide are with rehabilitation and those with limited ability to lift large amounts of weight. This will also allow for a group to be monitored for overall physical health. Certain side effects or long term effects of this product can be monitored and prevented.

### **Next Steps:**

The next step for this project is to miniaturize the overall design of the electrical prototype to a size more suitable for a marketable product. Continued research into the long term effect and optimal pH levels investigated. With pH levels defined the added safety feature could be included in the final design. Finally a new name for this product should be determined to get away from associating this product with a tourniquet that has been the cause of loss of limb.

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