

Date: June 3, 2006  
To: Intel Foundation  
From: Chris Kuryak, University of Texas at Austin  
Re: Undergraduate Research Project Progress Report 2

### Project Overview

The project I am working on involves the creation of three-dimensional (3D) objects using microstereolithography ( $\mu$ SL). The overall purpose of  $\mu$ SL is to create complex microstructures for use in micro electromechanical systems (MEMS). For example,  $\mu$ SL can produce extremely small springs to be used in microscopic machinery. My project over the next two months is to modify the current  $\mu$ SL system at the University of Texas at Austin so as to expand its capabilities in the production of 3D microstructures. More specifically, I will be creating a customizable lens in conjunction with a DMD (Digital Micromirror Device) chip so that the system can produce high quality microscopic images.

### Work Completed

Thus far, I have performed background research on  $\mu$ SL and examined the system held in the Mechanical Engineering Lab. My first assignment was to create a bypass for the projector light bulb. Currently, we are using the DMD chip in a commercial projector for our system. However, in order for the DMD chip to work, the projector light bulb must be on. The downside of this is that the light bulb will not last very long and is very expensive to replace. So to trick the projector into thinking that the light bulb was still attached, I replaced it with a nine resistors in parallel. The resistors combine to create a total resistance equal to that of the projector light bulb. So now the DMD chip works without the projector light bulb having to turn on.

However, the downside to this replacement is that the resistors get very hot because they are dissipating the same amount of energy as the light bulb was. So my next task was to create a case for the resistors to insulate the heat and protect them from the surroundings. I believe that I am going to use a ceramic material for the casing. Ceramics are excellent insulators that can withstand very high temperatures.

### Current Work

Currently I am building the ceramic casing I described above. The casing needs to have holes present so that air can flow over the resistors and cool them down. After completing the case, my next assignment will be to create the customizable lens for the  $\mu$ SL system. After that, I will begin creating my poster for the final presentation of my work.

### Schedule For Next Month

1. Finish the ceramic case to house the resistors
2. Construct a customizable lens for the system
3. Create a poster summarizing all of my work and results
4. Present my results to the appropriate personnel

### Current Thoughts on the Project

So far I am very pleased with the work I have been performing. I find most of the material very interesting and am happy to be a part of the project. Things have been going kind of slow at first because school was just ending, but I feel that it will all pick up speed this month as I begin to uncover more useful results.