

VI. Appendices

This section contains the following project related documentation: references and project research, a copy of all weekly project status reports, a lessons learned writeup, and an in-depth self-evaluation. Project status reports and the written evaluations are included first in this section. Powerpoint slides of each milestone have also been included with the weekly status reports. Please note that the research documents and printouts found at the end of this section have been sorted by relevance, with the most important documents first.

VI.A Lessons Learned and Future Directions

Without question, Silhouette has been one of the most interesting and difficult projects I've worked on during my career as a student at LMU. In January, during the first several weeks of this course, I worked extremely hard to identify my weaknesses and strengths as a software engineer. Based on that research, I strove to leverage my strengths and correct weaknesses as my project and I progressed throughout the semester. Ultimately, I'm happy with my progress and I feel I've successfully addressed several weaknesses of my developmental approach. However, I've identified additional "lessons learned" which created several significant roadblocks throughout the semester:

- **Limited Research Resources** - Not only is machine vision and shape recognition a difficult task, research resources and solid examples are extremely limited. Unfortunately, I spent several weeks searching for shape recognition information on the web, and in our campus library. Ultimately, there wasn't much information available. **Therefore, much of the raw algorithm invention and implementation was left strictly up to me.** From my experiences, I can conclude that I should ensure ample research is available before committing to a large software development project.
- **Maintaining a Strict Project Schedule** - At the start of the semester, I prepared a fairly detailed project development schedule which outlined all required tasks for the Silhouette Project. As the semester progressed, I found myself more concerned with accomplishment rather than maintaining a strict project schedule. As a result, I lost several weeks of valuable implementation time to research and experimentation of various tools and information.

As the semester comes to a close, the work on my project does not. There are several future directions and other added features I'd like to add to my project:

- **Improved Algorithm Efficiency** - Due to multiple time constraints, my vector extraction and shape recognition algorithms are extremely primitive. Much work can be done to optimize and improve the efficiency of the various algorithms.
- **Detect Free-Form Polygons** - Allow users to physically specify a polygon they'd like to detect, rather than a given set of restricted shapes.
- **Add Additional Camera Support** - Add USB or Firewire (IEEE 1394) camera connectivity support.
- **Open-Source Community** - As aforementioned, little implementation research has been done on the topics of machine vision and shape recognition. Ultimately, I'd like to distribute my source code to the open-source community, hence, giving back to those which have helped me with my project.

VI.B Self-Evaluation

At the beginning of the semester, I quickly realized my project was simply much more difficult than an “average” Senior Computer Science project. After all, I had little or no experience with graphics/image processing, machine vision, shape recognition, and edge detection. Throughout my educational career at LMU, my interest in computing has primarily focused my efforts on networking, web-applications, web-based development, and open-source computer systems. Therefore, one of the most powerful benefits of the Silhouette Project was exposing me to an entirely new and extremely fascinating side of computer technologies.

As the semester winds to a close, I've had the opportunity to reflect on my performance. As a whole, I am extremely happy with my work and accomplishments this semester. Specifically, however, there were several aspects my performance I'd like to highlight in this evaluation.

First, was my commitment to project organization. One of the first tasks I completed this semester was successfully creating a consistent framework for my Software Develop Notebook and its content. At each stage of my project, I was consistently ahead of my classmates in binder content, and binder content quality. Additionally, I also developed a project development schedule which was designed to help me stay focused and on track throughout the semester.

Second, was my strong dedication to creating my own shape recognition algorithm. Clearly, during the first quarter of the semester, I struggled to grasp some of the tougher abstract concepts of image processing and machine vision. Unfortunately, this was a large hurdle for me to overcome. Thankfully, however, as the semester progressed I quickly found my “groove” and eventually created a primitive, yet fairly decent shape recognition algorithm. Additionally, I also successfully implemented the Sobel edge detection algorithm in Java from information found in several research papers on edge detection and machine vision.

Third, was my accomplishments with the actual project application itself. As it turns out, I've created a very stable and aesthetically pleasing piece of software

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which integrates various custom machine vision components. In doing so, I've successfully completed my primary project objectives which were established at the beginning of the course.

Finally, my last core accomplishment was successfully teaching myself the fundamentals of image processing. As aforementioned, before this course I had no experience with image processing, binary image manipulation, and other interesting image transformation applications. As a result of this project, I now have a solid understanding of image processing and the fundamental concepts behind complex machine vision systems.

To help me evaluate my performance, I've prepared a small table below which identifies several key components of my project, and the grade I feel I've "earned" for each one:

<i>Component/Aspect</i>	<i>Level/Grade</i>
Project Difficulty	Difficult
Hardcopy of Potential Project Ideas	A
Project Analysis/Research	A
Project Design	A-
Implementation	B+
Timely Delivery of Project Status Reports	A
Completion of Original Objectives	A-
Completion of Software Dev. Notebook	A
Milestone Presentations	A
Final Presentation	TBD
Overall Success/Achievement	A

In conclusion, I feel my overall performance this semester has been extremely solid, very professional, and showed a significant amount of dedication to my project, the course, and the department.

VI.C Status Reports

The following pages of this section contain copies of weekly project status reports in chronological order, oldest in front.

VI.D References and Research

The following documents of this section contain various research papers and other informative research materials used throughout the Silhouette Project. As previously noted, they are sorted according to relevance with the most important research materials first.

VI.E Bibliography (MLA-format)

Fisher, Perkins, Walker, Wolfart. "Hyper Image Media Processing Reference".
HIPR Online. 10 March 2005. University of Edinburgh.
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Modules for Testing VHDL Models of Digital Systems. Virginia Tech Masters
Thesis Press. 8 July 1997.

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Construction Points in the Measurement of 3D Geometries via Light
Sectioning." Institute for Automation, University of Leoben. 2004.

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