Mark Gorewicz

**CS 499 Senior Project Proposal**

1. **Scripture**

Doctrine and Covenants 129:4

“When a messenger comes saying he has a message from God, offer him your hand and request him to shake hands with you.”

Traits of objects, in this case personages, help us to identify them.

1. **Abstract**

The focus of this project is static image processing. The application for the focus is a computer program that identifies objects in a static image taken by a webcam.

1. **Background**
   1. **Definitions**

Image processing – computer manipulation of images. (dictionary.com)

Edge detection – name of methods which aim at identifying points in a digital image at which the image brightness changes. (Wikipedia)

* 1. **Interest**

This topic is of interest to me because I have been interested in subjects related to computer vision for a while now. I want to explore how a computer can interpret information from an image and draw conclusions that help people. With technology moving more towards automation it would be advantageous create machines which can detect their surrounds and image processing one way this can be accomplished.

* 1. **Previous work by others**

Some of the previous work done by others that I hope to use in my project was done by Paul Viola and Michael Jones in rapid object detection. They used generic insights and algorithms to minimize the computational time required for object detection.

* 1. **Previous work by me**

In deal with image processing so far the only experience I have is writing a program in C++ using OpenCV to access an external webcam to capture images.

1. **Description**

The project is to take a photo of an object and to process the image in order to identify the object. The object will be identified using edge detection to determine the shape of the object. The shape of the object will be used to narrow the possible candidates for the object. The colors on the object will also be identified to narrow the field and the placement of the colors will also be used. If an object cannot be found the user will have the option of adding the object to the database. By using these three identifiers I hope to identify object in adequate lighting with 90% accuracy.

The project will be divided into several tasks. First is the preliminary research and proposal preparation. This will be completed through the use of broad searches of topics related to edge detection, color detection and image processing. Second the main research shall be completed through refined searches related to preliminary designs which will be continually changing throughout the research phase with what is deemed plausible for the project. Third using the information gathered during the research phase and the initial designs a requirements specification will be created. Fourth the finalized design will be created and the project will be coded. Fifth the project will be tested using various objects of different shapes and sizes as well as some of similar shape to test the accuracy of the program to properly identify objects.

1. **Scope**

The scope of the project deals with edge detection and color detection and storing the values. The images can have multiple objects and the object at the center will be identified. The object in the image will not be obstructed. The object can be rotated and skewed up to 35 degrees provided that the complete front face of the object can still be seen. The scope does not include code to interface with the camera to capture the image.

1. **Tasks and Schedule**

Preliminary Research – Start 4/20 End 5/21 Hours 34

Proposal – Start 4/29 End 5/21 Hours 5

Research – Start 5/22 End 6/11Hours 60

Requirement Specification – Start 6/12 End 6/13 Hours 5

Design/Coding – Start 6/14 End 7/5 Hours 45

Testing – Start 7/6 End 7/13 Hours 24

Total hours 173

1. **Deliverables**

* Initial designs
* Final designs
* Source code

1. **Applicability**

This project covers computer vision which is not a part of the Computer Science curriculum. In this project involves the use of a third party library that needs to be integrated into the project. Object-oriented programming will be used for this project. A major part of this project involves researching and implementing algorithms.

1. **Required Resources with Costs**

* External USB webcam for testing and presentation. $15.00

1. **References**

Jones, Michael., Viola Paul. “Rapid Object Detection using a Boosted Cascade of Simple Features”, 2001, http://www.cs.cmu.edu/~efros/courses/LBMV07/Papers/viola-cvpr-01.pdf

Hancock, Edwin., Mittal, Ajay., Sofat, Sanjeev., “Detection of edges in Color Images: A review and evaluative comparison of state-of-the-art techniques”, https://www.stlo.unicaen.fr/icisp/ct/uploads.old/814/4-Detection\_of\_edges\_in\_color\_images.pdf

Chaudhuri, Bidyut B., Dutta, Soumya., “A Color Edge Detection Algorithm in RGB Color Space”, 2009, http://www.researchgate.net/profile/Soumya\_Dutta/publication/209566657\_A\_Color\_Edge\_Detection\_Algorithm\_in\_RGB\_Color\_Space/links/056dae8506257de691c80372.pdf

Aggarwal, Himanshu., Maini, Raman., “Study and Comparison of Various Image Edge Detection Techniques”, http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.301.927&rep=rep1&type=pdf