

# Color Detection Via Webcam



**Project Advisor:** Syed Mohsin Ali

**Submitted by:**

(Ali Ehsan – 101519-200)

(Husnain Shabli – 071020-196)

**Department of Electrical Engineering  
School of Engineering**

**University of Management and Technology, Lahore**

# DEDICATION

To our respected parents whose utmost love, care and struggle against all odds brought us to this height of knowledge with the blessings and help of the ALLAH ALMIGHTY

# COLOR FILTRATIONS VIA WEBCAM

Advisor:

**Syed Mohsin Ali**

Project by:

(Ali Ehsan – 101519-200)

(Husnain Shabli – 071020-196)

December 2013

School of Engineering

UNIVERSITY OF MANAGEMENT AND TECHNOLOGY, LAHORE

Submitted to University of Management and Technology in fulfillment of the requirements for  
the degree of Bachelor of Science

**Approved by:**

ADVISOR: \_\_\_\_\_

MEMBER I: \_\_\_\_\_

MEMBER II: \_\_\_\_\_

## Acknowledgements

First, we are grateful to ALMIGHTY ALLAH who gave us the strength to achieve our goals. Without HIS divine help, we could not have completed this project. Secondly, we would like to pay deep regards to our parents whose selfless and extreme love provided us with the required motivation, courage and confidence to complete our tasks. We would like to salute them because of their patience in managing with our busy routines and tight schedules.

We truly acknowledge the cooperation and help provided by Mr. Syed Mohsin Ali and Mr. Ali Murtaza. They have been constant source of guidance throughout the course of this project. They were cooperative through our complete voyage and provided us with every facility whenever and whatever was required for our project.

In the end, we are grateful to our friends who were always there to give us company whenever we needed motivation and confidence. They created the right mix of work atmosphere in the university, which led us all to complete our project successfully. We would also like to thank the lab attendants who provided us with all the equipment during this project.

## **Abstract**

Image processing is the process of arbitrarily manipulating an image to achieve certain pre-defined requirements. These requirements can range from aesthetic standards to supporting a preferred reality. To be concise, image processing can be defined as a means of translation between the human visual system and digital imaging devices. The human visual system differs greatly from digital imaging devices as it does not perceive the world in the same manner as digital detectors do. Moreover, digital imaging involves noise and bandwidth restrictions imposed by detectors and display devices. Salient differences between the human visual system and digital detectors will be shown in this project report along with the basic processing steps that are needed for translation between the two. It is ensured that the image processing is approached in a manner that is consistent with standard scientific methods to allow others to validate and reproduce the findings. This is done through recording and reporting processing actions and applying similar treatment to adequate control images.

# Table of Contents

1	INTRODUCTION.....	<b>Error! Bookmark not defined.</b>
1.1	Motivation.....	<b>Error! Bookmark not defined.</b>
1.2	Aim of Project.....	<b>Error! Bookmark not defined.</b>
2	COMPREHENSIVE DESCRIPTION FOR FINAL PROJECT .....	<b>Error! Bookmark not defined.</b>
2.1	Color Filtration via Webcam.....	<b>Error! Bookmark not defined.</b>
2.2	BRIEF DESCRIPTION .....	<b>Error! Bookmark not defined.</b>
2.3	CIRCUIT DESCRIPTION.....	<b>Error! Bookmark not defined.</b>
2.3.1	Electronic Components.....	<b>Error! Bookmark not defined.</b>
3	Servo Motor.....	<b>Error! Bookmark not defined.</b>
3.1	Introduction .....	<b>Error! Bookmark not defined.</b>
3.2	Mechanism .....	<b>Error! Bookmark not defined.</b>
3.3	HiTEC HS - 311 (Digital Servo).....	<b>Error! Bookmark not defined.</b>
3.3.1	Features.....	<b>Error! Bookmark not defined.</b>
3.3.2	Programmable Features Include .....	<b>Error! Bookmark not defined.</b>
3.3.3	Specifications .....	<b>Error! Bookmark not defined.</b>
4	Arduino.....	<b>Error! Bookmark not defined.</b>
4.1	What is Arduino? .....	<b>Error! Bookmark not defined.</b>
4.2	Why Arduino?.....	<b>Error! Bookmark not defined.</b>
4.1.1	Features.....	<b>Error! Bookmark not defined.</b>
4.1	Servo library.....	<b>Error! Bookmark not defined.</b>
4.2	Code of a servo motor use in project.....	<b>Error! Bookmark not defined.</b>
5	Digital Image Processing.....	<b>Error! Bookmark not defined.</b>
5.1	What is digital image processing .....	<b>Error! Bookmark not defined.</b>

Color Detection via webcam

5.2	Fundamentals .....	<b>Error! Bookmark not defined.</b>
5.2.1	Fundamental steps in image processing:.....	<b>Error! Bookmark not defined.</b>
5.3	RGB Model .....	<b>Error! Bookmark not defined.</b>
5.4	Filters use in the project. ....	<b>Error! Bookmark not defined.</b>
5.5	Invert Image .....	<b>Error! Bookmark not defined.</b>
5.5.1	Brief Description.....	<b>Error! Bookmark not defined.</b>
5.5.2	How It Works.....	<b>Error! Bookmark not defined.</b>
5.6	Grayscale Image.....	<b>Error! Bookmark not defined.</b>
5.6.1	Converting colors to grayscale.....	<b>Error! Bookmark not defined.</b>
5.7	Red, Blue and green .....	<b>Error! Bookmark not defined.</b>
5.8	Color Filtration in real time.....	<b>Error! Bookmark not defined.</b>
5.8.1	Input Methodology.....	<b>Error! Bookmark not defined.</b>
5.8.2	Color Range .....	<b>Error! Bookmark not defined.</b>
5.8.3	Allowance bar: .....	<b>Error! Bookmark not defined.</b>
5.8.4	From selection leave .....	<b>Error! Bookmark not defined.</b>
6	Codes Snippets .....	<b>Error! Bookmark not defined.</b>
6.1	Program.cs.....	<b>Error! Bookmark not defined.</b>
6.2	Camera.cs .....	<b>Error! Bookmark not defined.</b>
6.3	Color_Range.cs .....	<b>Error! Bookmark not defined.</b>
6.4	Filters.cs .....	<b>Error! Bookmark not defined.</b>

## Table of Figures

Figure 2-1	Components.....	<b>Error! Bookmark not defined.</b>
Figure 3-1	Servo Diagram .....	<b>Error! Bookmark not defined.</b>
Figure 3-2	HS -311 .....	<b>Error! Bookmark not defined.</b>
Color Detection via webcam		

Figure 3-3 Schematic Diagram HS-311 .....	<b>Error! Bookmark not defined.</b>
Figure 4-1 Arduino .....	<b>Error! Bookmark not defined.</b>
Figure 4-2 Components of Arduino .....	<b>Error! Bookmark not defined.</b>
Figure 4-3 Servo with Arduino .....	<b>Error! Bookmark not defined.</b>
Figure 4-4 Software look of Arduino.....	<b>Error! Bookmark not defined.</b>
Figure 5-1 Fundamentals steps of image processing .....	<b>Error! Bookmark not defined.</b>
Figure 5-2 RBG Axes Block.....	<b>Error! Bookmark not defined.</b>
Figure 5-3 RGB Ball.....	<b>Error! Bookmark not defined.</b>
Figure 5-4 RGB Cube .....	<b>Error! Bookmark not defined.</b>
Figure 5-5 Inverted Image from Project .....	<b>Error! Bookmark not defined.</b>
Figure 5-6 grayscale from Project.....	<b>Error! Bookmark not defined.</b>
Figure 5-7 RGB Graphical Representation.....	<b>Error! Bookmark not defined.</b>
Figure 5-8 Electromagnetic Spectrum .....	<b>Error! Bookmark not defined.</b>
Figure 5-9 Red Image .....	<b>Error! Bookmark not defined.</b>
Figure 5-10 blue Image.....	<b>Error! Bookmark not defined.</b>
Figure 5-11 Green Image .....	<b>Error! Bookmark not defined.</b>
Figure 5-12 GUI-avg, range and color range.....	<b>Error! Bookmark not defined.</b>
Figure 5-13 Color Range Image .....	<b>Error! Bookmark not defined.</b>
Figure 5-14 Allowance Bar.....	<b>Error! Bookmark not defined.</b>
Figure 5-15 Selection Leave .....	<b>Error! Bookmark not defined.</b>
Figure 5-16 Selection Clear .....	<b>Error! Bookmark not defined.</b>
Figure 5-17 Selection Leave .....	<b>Error! Bookmark not defined.</b>