Automated Portrait Photography Processing

Revolutionizing portrait photography, this project introduces a fully automated solution for the time-consuming and manual task of selecting and removing backgrounds. By creating an adapter that seamlessly integrates between the camera body and lens, a precise transmission mask of the subject is captured using infrared light. This innovative technique will allow photographers to effortlessly replace the background of their images.

Introduction

Photographers often find themselves spending an immense amount of time on post-processing tasks after a photo session. This includes laborious activities like color correction, skin and detail retouching, and more. One crucial step in this process involves manually erasing the background by carefully selecting the subject's contours. However, with the introduction of the Automated Portrait Photography Processing system, perfect and effortless portrait photography without any manual post-production correction despite complex and semitransparent background removal becomes possible.

Concept

The system functions by capturing the subject image and its mask simultaneously. The first image represents the main picture, displaying the visible (VIS) colors of the spectrum, while the second image is obtained by capturing infrared (IR) light from the background. The purpose of the second image is to serve as a mask, revealing the translucidity of different materials on the subject. This is accomplished by illuminating the subject from the back with IR light. The process involves inserting an adapter between the camera body and lens, redirecting VIS light to the camera body and reflecting IR light to a dedicated second sensor as shown in Figure 1. Through this innovative dual-image approach, the system enables
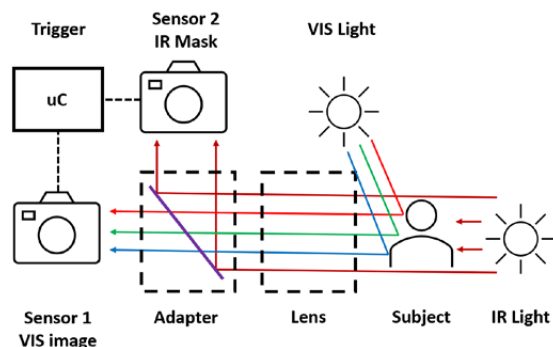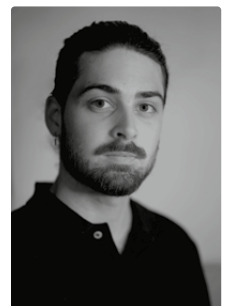
precise background removal. It is essential to calibrate both cameras exclusively once, using a target, to ensure the seamless superposition of the two images.

Goals

The goals of this thesis are to develop a dedicated adapter designed for Nikon Z camera bodies, which features a Z-Mount system. Additionally, image processing scripts for calibrating the two sensors and for the background erasing tool are developed. These objectives focus on enhancing the overall functionality and performance of the adapter, enabling seamless integration with the camera body and facilitating efficient background removal through precise calibration and image processing.

Results

The developed adapter offers a handheld solution for the Automated Portrait Photography Processing system, incorporating a trigger controller and the essential image processing scripts. Figure 2 demonstrates the successful background replacement while preserving details of the subject. The alignment accuracy of the IR mask and the VIS image is 0.7 +/- 0.5 pixel and the simultaneous triggering.

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Fig 1 illustrates the setup of the system and depicts the path of the VIS and IR light.
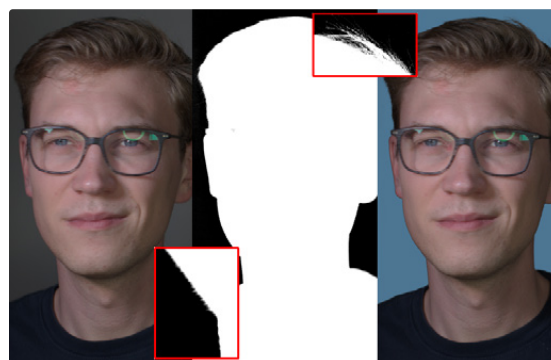

Fig 2 shows the original image (left), the IR transmission mask (middle) and the final image with replaced background (right).