

CMPE264 Project 1: High Dynamic Range (HDR) System

Aaron Hunter
Carlos Espinosa
November 14, 2018

1 Introduction

2 Camera Radiometric Calibration

First we need to reverse-engineer the function $f(\cdot)$ and invert it, obtaining an approximation of the true (linear) brightness $B = f^{-1}(B')$.

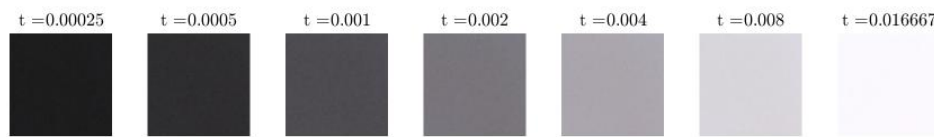


Figure 1: Fuji X-E2 white calibration images and exposure times. All images taken at ISO 800.

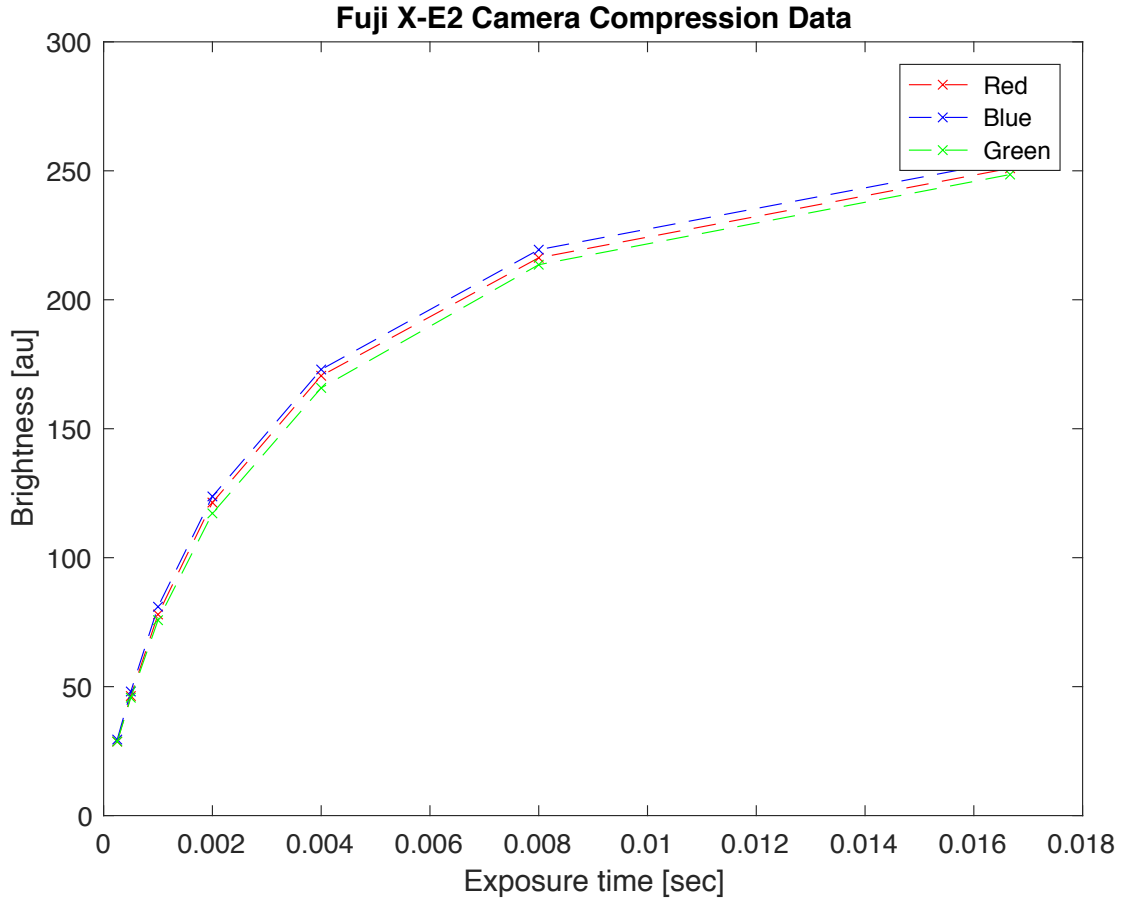


Figure 2: Fuji X-E2 brightness values versus exposure time at ISO 800.

3 Picture Stack Acquisition

Now we need to take a stack of 3 images of a high-dynamic (high contrast) scene, so we proceed to take a stack of multiple pictures at different exposure time T with fixed ISO gain G and based on their corresponding histograms we can decide which 3 pictures to extract from this stack.

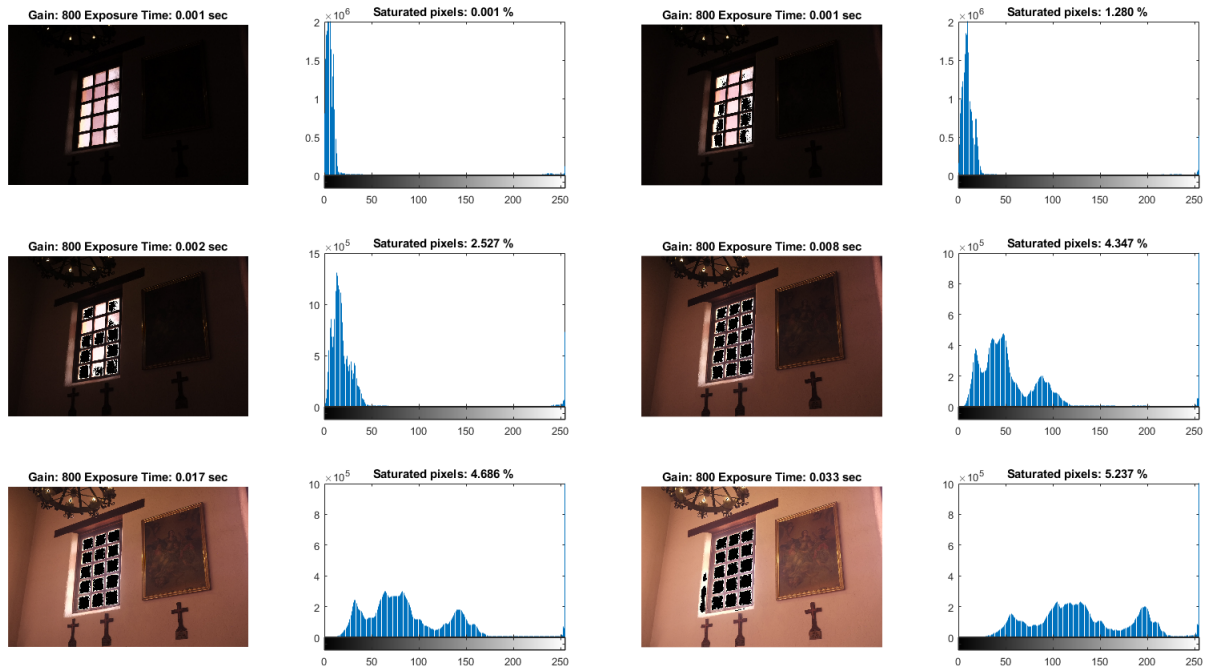


Figure 3: Picture Stack with ISO gain fixed at $G = 800$

4 Composite Image Creation

We proceed to create a composite HDR image from our stack of three linearized pictures. We will compose the images using two different algorithms.

4.1 Composition Algorithm 1

4.2 Composition Algorithm 2

5 Composite Image Reproduction

Now we need to revert the linearization by applying a non-linear function that will amplify the small values and reduce the large values

6 Script Execution

6.1 Requirements

7 Conclusions