Introduction
An image processing system can be found in most digital cameras or devices with the similar functionalities, i.e. the mobile phone. Image processing refers to the computations performed on the input that could be in the form of a photograph or video frame to produce pictures or video frames with enhancement or emphasis on a set of parameters. The image processing system conducts various algorithms on the input to realize an enhanced effect on the input or to extract a group of characteristics inherent to the input. The standard structure of an image processing system consists of a data acquisition system, an image signal processing component and an output component. The data acquisition system, in its primitive form, is mainly an image array, also called an image sensor that converts the sample analog current signal into digital signals and transmitted it as RAW data to an image signal processor (ISP). ISP will perform algorithms to produce images favorable to human eyes.

Goal

Methodology

- Produce a single-chip imaging system
- Investigate low-level image processing algorithms

Algorithms:
- Exposure compensation
- White Balance

Exposure compensation is achieved based on the content information, the identification of relevant regions which carry the most important information.

Automatic white balancing is achieved with the assumption on the scene light. Combined of two assumptions was utilized in this project.

Results

Figure 1. System diagram

Figure 2. The setup of the image processing system

Figure 3. GUI of the software

Figure 4. Processing pipeline

Figure 5. Alternative processing pipeline