



10.05.2018

COMPUTATIONAL PHOTOGRAPHY ASSIGNMENT 2

Submission deadline for the exercises: Thursday, 17. May 2018 before 11:59.

Instructions: Upload the source code to your solution (**no images please, just the plain code**) in the ILIAS system at:

[ILIAS Computational Photography SoSe2018](#)

2.1 Simulation of Rolling Shutter Effect (40 points)

In the lecture, we learned about the majority of CMOS sensor uses rolling shutter, which scans across a scene rapidly rather than taking a snapshot of the instant moment. Therefore images with specific distortions are captured when recording fast-moving objects. This is referred as the rolling shutter distortion. In this exercise, we would like to simulate an image with this effect by sampling a highspeed video of a rotating ceiling fan. In the uploaded dataset, you are given 360 jpg pictures with a rotating fan (e.g. Figure ??-??). Sample one row of each highspeed frame to the generated image to produce a rolling shutter effect such as Figure ??.

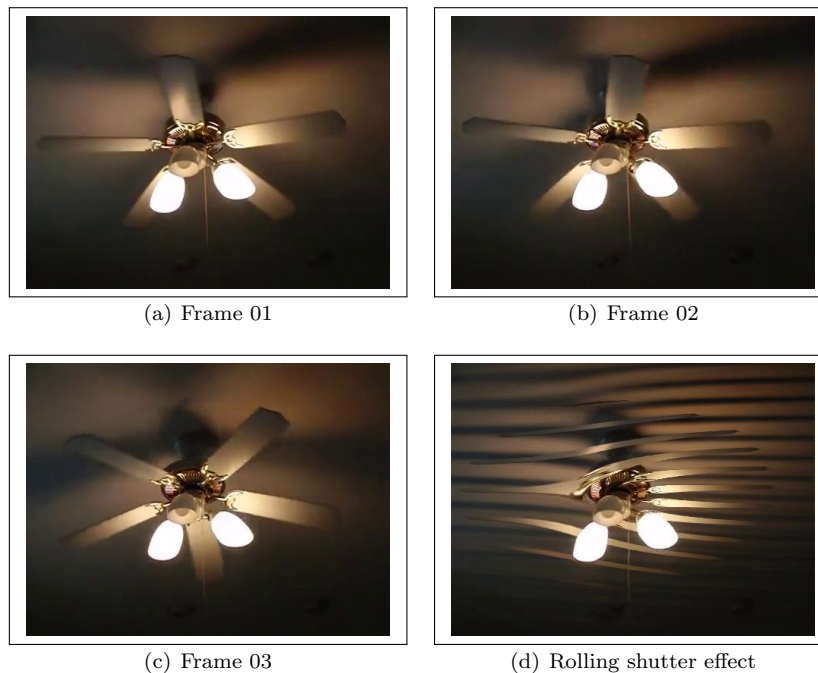


Figure 1: Video frames of rotating ceiling fan and rolling shutter effect image

General Tips:

- Write and run your programs as single scripts for the different sub-exercises before you put your code in functions. The advantage of working in this way is that your variables are persistent and you can easily inspect and visualize them. In contrast, variables in functions are only temporary and thus debugging is more difficult. The modularization is more or less a just cleanup step and to enhance the overview.
- Instead of working on 3D-matrices all the time you can extract the color layers to separate variables and work with 3 2D-matrices. This saves you some stress with indexing errors.
- Accessing image data demands some advanced indexing, for example the red channel of a normal picture is accessed by `img(:,:,1)` (with `img` being the picture). The sampling of each row is similar as `img(1,:,:)`. MATLAB also provides a data type called cell array, where each cell can contain any type of data. One can access the contents of cells by indexing with curly braces, `{}`.

Links:

- Rolling shutter effect
https://en.wikipedia.org/wiki/Rolling_shutter
- Distortion comparison: CCD vs CMOS
https://www.youtube.com/watch?v=4lHlzRw_Oek