Special Projects for ESP1516

Last modified: March 29, 2016.

Each project can be selected by a single group of students unless otherwise noted. Collaboration among groups for such projects is not allowed in any case.

Gaze Tracking [ASSIGNED]

Implement a gaze tracker in the spirit of http://dx.doi.org/10.1109/SCOReD.2013.7002635. Can be used to spy the user, but also to help disabled/paralyzed people.

Removing Reflections

Analyze and implement the algorithm of Shih et al. to remove reflections from photos taken through windows.
Reference page, with source code: https://dilipkay.wordpress.com/reflection_ghosting/.

De-Flicker

Implement a time-lapse app with de-flickering, or a de-flickering app for high-FPS videos.
Examples of flickering: http://youtu.be/lCpERztQGbk.
A recent paper on the topic of flickering, with bibliography and a proposed algorithm: http://dx.doi.org/10.1137/090766371.

High-FPS flicker:
http://youtu.be/bOnRKQAeinQ
http://youtu.be/3LFNXpqgYNg
http://youtu.be/96kmIa5Zwik
http://youtu.be/vBd9fu4lkTg
http://youtu.be/Zlv07fEaSD0
http://youtu.be/s5jSAHuIQV4

Time lapse flicker:
http://youtu.be/U_MG_29OrKc
http://youtu.be/t56jdLtke64
http://youtu.be/uA_WJ3AUA1s
http://youtu.be/JqgMcCoiOFg

http://youtu.be/evNhNw_9zRM

Speech Recognition [ASSIGNED]

Implement a speech recognition app using Kaldi. It is acceptable for the app to support only a limited vocabulary.

http://kaldi-asr.org/doc/about.html

http://spandh.dcs.shef.ac.uk/chime_challenge/data.html

http://dx.doi.org/10.1109/TELFOR.2015.7377600

Are We There Yet? [ASSIGNED]

Design and implement a software solution for mobile devices that listens to a piece of music and detects the current position inside the piece in real time. The software can rely on a recording of the whole piece available before the live performance.

The project will be carried out in collaboration with Antonio Rodà and Nicola Orio. An existing score follower, developed by Nicola Orio and running on a personal computer, will be made available to the students as a starting point for their porting on a mobile device.

Students are required to sign an NDA before accessing the code of the existing detector.

http://dl.acm.org/citation.cfm?id=1085724

Recognizing Leaves [ASSIGNED]

Implement a mobile leaf recognition system.

http://leafsnap.com

http://neerajkumar.org/base/papers/nk_eccv2012_leafsnap.pdf

Common Issues in ESP1516

The group of students that tackles this project will

1. interact with all the other groups of fellow students,

2. collect the issues and difficulties faced by their fellow students, trying to cluster them into homogeneous sets,

3. propose possible solutions,

4. write a report on the issues, the solutions, and the outcome of the solutions.

Issues and difficulties can be both organizational and technical, hence at least one (better: more than one) of the members of the group must be familiar with Android (better: familiar with both Android and software engineering).

Vision Problems with OpenCV

Design and implement a solution for one of the following computer vision problems discussed in Chapter 10 of the book "A Practical Introduction to Computer Vision with OpenCV":

- *Reading Notices* (Section 10.5),

- *Determining the Time from Analogue Clocks* (Section 10.14),

- *License Plates* (Section 10.18),

These are toy problems; little assistance will be provided by the instructor, and the implementation must be flawless to get top marks.

More than one group of students can select this project.