<https://info3.erg.cuhk.edu.hk/internship/view-topic.php>

#### Titles for Undergraduate Summer Research 2015

Title 1: Create 3D models for 3D printing using Computer vision

A 3D printer can print objects in detail with very little cost. However, constructing the 3D model of an object using a computer is usually very time-consuming. In this project we will develop a 3D scanner using computer vision to capture the 3D model of an object automatically. A similar product can be found in the market, we propose to use pure computer vision (no laser) methods to lower the building cost and be able to scan products that cannot be achieved by laser scanning methods, such as those with metallic or reflective surfaces.

Ref:

<http://www.bitrebels.com/technology/compact-laser-3d-scanner-startup/>

<http://www.fastcolabs.com/3017109/this-cheap-crowdfunded-3-d-scanner-lets-you-reproduce-pretty-much-anything>

Title 2: Build an intelligent wearable glass computer system

An intelligent wearable glass is a spectacle like device (similar to Google glass) which has a camera to view the surrounding to assist the user. It is a hardware and software integrated development project. The hardware part is to design the glass using a 3D printer and the software part is to develop computer vision programs perhaps using the library (http://opencv.org) to achieve the goal. One idea is to translate the words written on billboards or road signs that the camera sees into a language that the user can understand. For example, you travel to Korea and the billboards are in Korean, the system can translate the words into English so you can understand the meaning. The information collected by the on board GPS and the words being translated can also be used to locate the billboard using Google map. It will be useful for many online mobile applications.

Ref: <http://www.cse.cuhk.edu.hk/~khwong/proj/idea1_Optical%20character%20recognition%20for%20Google%20glasses.pptx>

Title 3: FPGA based computer vision application development using Verilog or VHDL

FPGA (Field programmable gate Array) is becoming very popular and useful in engineering because it can be used to develop efficient hardware for many applications. In this project a student will use the hardware description language (Verilog or VHDL) to program the FPGA for various computer vision tasks, such as feature extraction and pose estimation. Usually these algorithms are executed by an advanced expansive CPU or GPU (graphic processor) and are costly and power consumptive. Using our method, the cost of achieving the same performance is much lower, so it is suitable for systems in mobile phones with cameras.

Demos of our recent FPGA computer vision projects can be found below. Student can further develop these ideas to turn them into marketable products

https://www.youtube.com/watch?v=6L\_bPeTDHBs&feature=youtu.be

https://www.youtube.com/watch?v=yDMdCoAg\_20&feature=youtu.be