Keio University

1858

CALAMVS GLADIO FORTIOR

Tetsuo Kan's course - 2020

# Biomimetic Micro/Nano Engineering
# Report 10 : Sensor/devices inspired by natural eye functions

[1]


Academic year 2019-2020
Tsuda Hiroyuki's Laboratory

*Santacatterina Simon*
*ID: 81923479*

# Contents

# 1 Essay on a popular vision/camera device

High definition smart phone cameras have revolutionized our way of living. In 2007, the state-of-the-art phone cameras had a resolution between two or three Megapixels such as in the first iPhone. Ten years later, in 2017, the phone cameras were reaching the resolution of 25 Megapixels [2]. Nowadays, with the miniaturization of the cameras and the improvement in the smart phone technology (much more complex devices), commercially available phone have several cameras, each one for a particular purpose. For instance, the various types of cameras are : ultra wide and wide cameras, macro photography camera, selfies, special colors, ...

Those very good cameras of high quality, being miniaturized and embedded into a connected phones, allow people to take good pictures wherever they are and whenever they want in order to show their personal experiences of everyday life. A very good example of this phenomenon is the well known social media "Instagram". In other words, the improvement in the smart phone cameras, with the help of increased network connectivity, changed the way of how people present their everyday life to others. In a way this has both positive and negative consequences. The positives consequences being that the shots of the moments, places or people are way more realistic and beautiful. For example, since I have been studying in Japan, I have travelled in many places exploring the landscapes, the cultures and trying new food. As I am able to take beautiful pictures my family can therefore follow my adventures and really understand how is my life here. Also, because of the progress of the smart phone camera, it is not anymore necessary to have a "real" camera, this makes the technology less costly and lighter. But on the other hand, it seems that the quality is so good that the picture are not realistic anymore and that "Instagram" or other social networks might display a fake "virtual reality" of people's life.

My ideas to evolve such a device is that for phones it is not much necessary to improve the resolution for traditional pictures as the quality is already high enough to represent the reality. Instead, it might be more interesting to develop and miniaturize new smart phone cameras for more particular uses. This new camera could be more adapted to take pictures under bad weather conditions, at night or when the light is very weak. It could even be interesting to create cameras to observe things that are not visible for the human eyes such as IR or other not visible wavelengths. This last point could be good for both object recognition or just to see things that are unexpected, hidden for us.

In conclusion, in the last decade the resolution and different uses of cameras for smart phones have increased a lot. This changes how people can show their lives to others both positively with more beautiful pictures, showing reality more precisely, and negatively with the creation of an extraordinary version of life, too different from reality. Finally, instead of further increasing the quality for traditional pictures I would rather think of developing more exotic functions for smart phone cameras. This could includes "night vision" camera, not visible spectrum (like IR) cameras and others.

# References


[1] Tetsuo Kan's slides of "lecture on vision sensor/devices inspired by natural eye functions". slide #4.

[2] *This is How Smartphone Cameras Have Improved Over Time.* `https://petapixel.com/2017/06/16/smartphone-cameras-improved-time/` [Accessed: 12.07.20].