Photonics / Imaging / Display

Abstract

Imaging is an important problem‑solving tool. Through image acquisition, processing/analysing and visualisation, the real world can be electronically and optically duplicated to improve our understanding and vision. For instance, in the healthcare field, a variety of bioimaging techniques can be applied to visualise patients' diseases. Over the past decade, the advancement of imaging techniques and visualisation methods has become a popular research topic. The aim is to provide better images that give a better understanding of the world. Imaging quality can be evaluated in three major aspects: i) acquisition speed, ii) information content and iii) ease of understanding. For example, although super-resolution microscopy possesses a high resolution and 'easy to interpret' information content, the scanning speed is very slow. This challenge can be addressed by proposing multimodal imaging platforms and designing more efficient algorithms for data analysis.

In addition to imaging techniques, visualisation is an important area for improving imaging quality. Current display technology allows images to be projected only on a two-dimensional medium (or screen), with the limited viewing angle of one plane impairing important information. However, most applications such as medical imaging require a real three-dimensional (3D) model as a visual aid given the complexity of biological structures. The challenges of visualising a real 3D image will be addressed in this proposed theme-based research.

Our proposed theme, 'Photonics/Imaging/Display', focuses on three main research areas (imaging detection, processing, and visualisation) that cover a wide range of research disciplines from optics to materials, nanomanufacturing, numerical analysis and medicine. The success of this theme-based research proposal will not only reinforce collaborations between experts at local and international universities, but also benefit the economy, society and scientific ranking of Hong Kong.