Efficient spectral imaging based on imaging systems with sensor adaptation

In this presentation I plan to offer a summarized personal view of trends in imaging over the last decade specifically on projects related to high-dynamic range and spectral imaging that I have been involved showing the opportunities for adaptive systems. In order to exemplify such adaptive systems I will also talk about an efficient spectral imaging system using sensor adaptation. Conventional spectral imaging systems use a set of predetermined filters to capture multi-band images. Liquid crystal tunable filters (LCTF) and active illumination allow reconfiguration of spectral sensitivities but these techniques have shortcomings such as latency due to multiple captures and the fact that the same filtering or illumination is applied to the whole frame of the image. There are emerging device technologies that allow independent adjustment of the filtering for each region or even at a pixel level of the imaging frame. The operation of such imaging systems is controlled by adapting to the scene based on scene analysis. Experiments were run by simulating a spectral imaging system which adjusts pixel sensitivities based on color information from the scene. As a result this new system exhibits superior performance compared to traditional spectral imaging systems in terms of color accuracy and imaging capture efficiency.