Multi-Colour, 2D Confocal Implemented on a DMD Based Confocal Imaging System

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Confocal microscopy is a technique widely used in the imaging of biological samples. While ideal confocal imaging results in a lateral resolution increase when compared with widefield microscopy[1], it is primarily used because it offers superior optical sectioning[2]. Traditionally, confocal microscopy has been implemented via either laser scanning or spinning disks[2]. The drawback of laser scanning confocal microscopy for 2D imaging is the low frame rates achievable (due to the laser needing to be scanned point-by-point over the entire sample, either by moving the sample or scanning the laser with a galvanometer)[2]. While spinning disk systems can perform acquisitions at video frame rates, confocal parameters (e.g., pinhole size and spacing) are fixed and may not be optimal for the objective lens or sample being imaged[2],[3]. When the parameters can be varied it involves manually changing disks and therefore cannot be done during acquisition. DMD based confocal microscopes are able to open and close arbitrary virtual pinholes[4],[3], allowing video rate imaging and the ability to change confocal parameters during acquisition. This work presents the use of the CairnFocal DMD based confocal microscope in conjunction with 89 North's LDI and an external FPGA to perform up to 7 colour confocal imaging.

References

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