

MINIMALLY-INVASIVE SURGICAL APPLICATION OF MULTISPECTRAL AND POLARIZATION RESOLVED IMAGING

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We are exploring the use of multispectral imaging and endoscopic polarimetry in a range of minimally invasive surgical and diagnostic applications. We present results using rigid endoscopes for polarization- and wavelength-resolved reflectance imaging with the aim of providing image-guided surgical diagnostics and therapy. This includes designs for miniature polarization state generators using sheaths that fit around the outside of the endoscope body, with the polarization state analyzer consisting of a polarization array camera with additional polarization optics external to the endoscope. Multispectral devices have been integrated with endoscopes and neurosurgical microscope systems, and the robotic control of spectroscopic probes tracked using computer vision techniques can also improve the ergonomics of data collection. We are working with surgical teams to apply these technologies in various organ systems in human studies.