Optical Design for the Volume Holographic Imaging System (VHIS) Endoscope

Published date: Aug. 21, 2013

Technology description

Invention

This technology is a hand-held version of the Volume Holographic Imaging System (VHIS) microscope. It is suitable to use as an endoscope by a physician in a clinical setting. The invention extends the designed modular rigid endoscope system and can be used along a standard VHIS. The endoscope assembly is designed and allows usage for both volume holographic imaging and conventional white light imaging while having the resolution characteristics suitable for histology. The modular approach allows the end user to easily extend the length of the endoscope to suit the application. It also has a swappable objective lens that can be changed to alter first-order optical characteristics. This invention provides an inexpensive optical design adaptable to imaging modalities other than volume holographic imaging.

Background

An endoscope is an instrument that allows a doctor or surgeon to look inside the body through existing openings or through small incisions. The endoscope is a metal tube with two ends, one end has a small light source and camera and the other end has an eyepiece. Endoscopes may be made from a rigid tube or, more often, from a flexible tube that allows the surgeon to freely move and adjust the endoscope as it enters the observed area. Advances in the technology over these past several decades have added a wide variety of optional equipment to be used along basic endoscope. Commercially available rigid endoscopes are generally expensive instruments with a fixed length that are designed to fit particular imaging modalities.

Application area

Clinical settings

Diagnosis, treatment, and management of cancer patients.

Advantages

Scalable, cheap, easy to manufacture, and adaptable to a wide variety of microscopic imaging modalities.

Modular Design and can be made from commercially available off-the-shelf optical components.

Faster video and image acquisition than confocal microscopes or optical coherence tomography.
Simultaneous image acquisition from multiple object planes.
This device can capture 3-D information about an object at camera frame rates.

Institution

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