SHAPE SENSING FOR MINIMAL INVASIVE INSTRUMENTS

A biopsy needle is used to take a sample of tissue from a patient. It is important to take a sample of the correct piece of tissue. In order to help determining the position of the tip of the needle FBG sensors for shape sensing can be integrated.

Three separate fibers with FBG sensors are embedded in a groove on the side of the needle. The grooves are made in a 120° configuration with respect to each other. When the needle is bend, the FBG's on the inside will be compressed while the FBG on the outside will be elongated. This strain causes a change in the reflected wavelength of the FBG sensor. With the use of the Frenet-Serret formulas and the measured strain values, the 3D shape of the needle can be reconstructed. Because of the symmetric 120° configuration of the sensors, this principle is automatically compensated for temperature.

SwitchedGator

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