

Precise tracking of subsurface tissue probes and objects

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OTHER  
INFORMATION

CATEGORIZED AS

- » Optics and Photonics
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BRIEF DESCRIPTION

The invention is a novel method that tracks the position of probes and objects deep inside tissues, with unprecedented 3D precision. Data obtained from optical techniques are combined with that provided through ultrasound methods, providing accurate localization in the 3D space, along with precise anatomical structure. Such a combined method is crucial for precision-sensitive applications as anesthetic drug delivery.

RELATED CASES

2018-222-0

FULL DESCRIPTION

Precise tracking and localization of subsurface tissue probes and objects have always been an important step in clinical procedures. Ultrasound techniques have been adopted in some cases, but not fully embraced due to a lack of adequate contrast. Ultrasound also provides information regarding the anatomical structure rather than the precise location of the needle itself. Thus, modified catheter needles were proposed with optically illuminated tips to provide more insight when used in turbid tissues. Even so, this method suffers from poor guidance to localize the needle since the attenuation of light as a result of depth or optical properties of the tissue is difficult to separate.

Inventors at the Beckman Laser Institute created a novel method that offers high precision localization and guidance with accurate anatomical structure information. This optical system is designed for accurate 3D space localization of the needle (object) superimposed over results obtained from ultrasound. Localizing the needle in the ultrasound field of view provides clinicians with accurate information and insight that allows for safe and precise execution of sensitive medical procedures, such as anesthetic drug delivery.

SUGGESTED USES

- Optical tracking, localization and characterization of subsurface tissue probes and objects
- Deliver anesthetic drugs
- Help clinicians gaining more precision with applications as guiding a needle to a biopsy site

ADVANTAGES

- Combining information from both the optical and ultrasound techniques provides physiological information together with the needle position
- Eliminating reliance on eye-balling through providing quantitative position information, thus various clinical procedure can be safely and precisely executed
- Appropriate for use in turbid tissue for up to several centimeters deep, because of the nature of the light used

PATENT STATUS

| Country                  | Type                  | Number      | Dated      | Case     |
|--------------------------|-----------------------|-------------|------------|----------|
| United States Of America | Published Application | 20200008836 | 01/09/2020 | 2018-222 |

Additional Patent Pending

STATE OF DEVELOPMENT

One dimensional needle tracking in turbid media has been demonstrated using a tissue-simulating gel phantom

