

Surgical tweezers for tissue identification.

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Patent Type

Patent for invention.

Ownership

Sapienza University of Rome 100%.

Inventors

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Industrial & Commercial Reference

The application ambit of the present invention is the technological aid to surgery.

Time to Market

The invention is at hardware architecture stage and at real-time identification software block scheme definition phase.

Availability

Cession and Licensing.

KEYWORDS

- ☐ SURGICAL TWEEZERS
- ☐ TISSUE
- ☐ ELECTRO-OPTIC PROBE
- ☐ REAL-TIME IDENTIFICATION
- ☐ TISSUE RECOGNITION METHOD

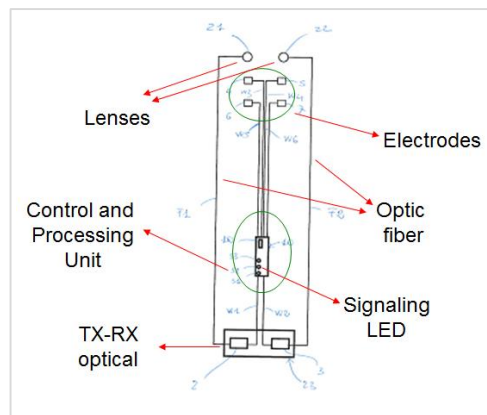
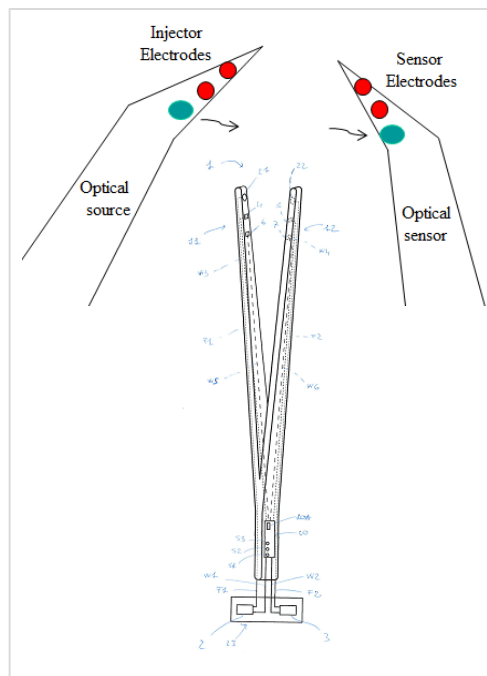
AREA

- ☐ BIOMEDICAL

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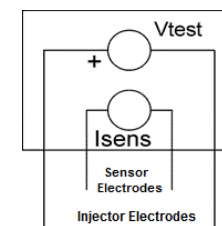
Abstract

The object of the present invention is the development of surgical tweezers with electrical and optical interface for measurement of anatomical structures during the different phases of a surgical intervention.

Anatomical structures recognition during surgical intervention is difficult, and most of the surgical errors are caused by recognition failure.

Analysis of electric impedance in conjunction to bio-photonics analysis of the affected anatomical structures (nerves, arteries, blood vessels, organs) permits automatic recognition of the structures themselves, and therefore allows to distinguish one from another.

The surgical forceps also makes it possible to differentiate the normal tissue from the neoplastic tissue, without having to resort to extemporaneous histopathological examination, with considerable savings in operating time.



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Surgical tweezers for tissue identification.

Technical Description

On the two sides of the surgical tweezers a light emitter is placed, able to transmit one or more different optical signals, together with an optical receiver.

The latter is connected to a recognition unit that is configured to extract an optical spectrum from the received signal.

Also some electrodes are placed on the two terminations of the tweezers, that inject an electrical current within the tissue and read the related voltage, so that the impedance of the tissue is evaluated.

Finally, the recognition unit, that includes a database containing the optical spectrum and the impedance of several anatomic tissues, allows identification by comparison to measured data.

The tissue type is brought to the surgeon attention in real time also by means of light indicators.

Technologies & Advantages

The present invention combines benefits of optical and electronic technology to user-friendly application, that is strongly required in order to make it desirable for a surgeon.

In fact, on one side it is important that the proposed tool does not add any difficulty to the surgical intervention.

On the other side, anatomical structures recognition during surgical intervention is difficult, and most of the surgical errors are caused by recognition failure.

In order to avoid that surgical errors happen, often it is preferred to avoid surgical intervention, and to replace it with therapies showing higher cost and being less effective.

In particular, in Italy such cost is estimated to be in the order of 10 billion euros per year.

Then, it is strongly required the use of technological tools able to perform tissue identification during surgical intervention, but in a user-friendly way.

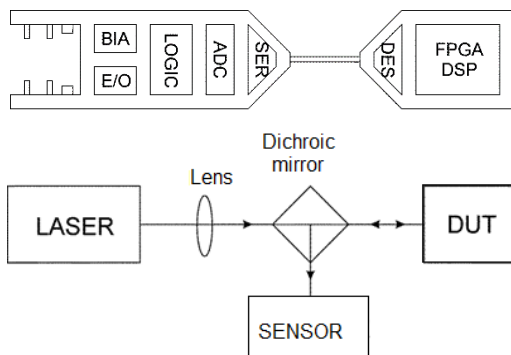
Applications

The surgical tweezers object of the present invention are applicable for measurement of biological and anatomical structures during the different phases of both an open and a robot-assisted surgical intervention.

Measurements are mainly finalized to real-time tissue recognition (to absolutely distinguish a nerve from an artery, an artery from a blood vessel, a parathyroid from a lymph node, and so on), and therefore to avoid surgical errors.

For instance, the partial or total incision of the recurrent or non-recurrent laryngeal nerve is the most important reasons of thyroid and parathyroid surgery complications.

However, the surgical tweezers could be applied also to distinguish a cancer tissue from a healthy one.



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