



ISTITUTO ITALIANO  
DI TECNOLOGIA

#### TITLE

A smart hand-held device for precise needle tip positioning inside non-homogeneous materials

#### INVENTORS

Leonardo SERRA DE MATTOS, Zhuoqi CHENG, Brian L. DAVIES, Darwin CALDWELL

#### DESCRIPTION

The invention is based on a Hand-held device featuring a mechanical connection to a needle whose tip is able to measure the physical property of the material, such as electrical impedance, it is in contact with.

The insertion operation is performed directly by the operator, who holds the device handle and controls the position, direction and angle of the needle for the insertion. The operator also provides the necessary force to insert the needle, and can adjust manually the course of the needle during the operation; when the target location is reached, the needle insertion motion is automatically stopped and device mechanism is actively changed to keep the needle static or to retract it.

This feature is based on a trans-motion mechanism, which allows the needle motion to be physically decoupled from the motion of the device handle.



#### APPLICATIONS

Catheterization of blood vessels, precision biopsy of tissues, Brachytherapy, Blood sampling, Spinal cord puncture

#### KEYWORDS

Precise needle tip placement, trans-material detection, hand-held device, electrical impedance, trans-motion mechanism

#### BIBLIOGRAPHIC DATA

Dispositivo portatile per l'inserimento di un ago in un materiale non omogeneo, particolarmente per cateterizzazione endovenosa

Application Number IT102017000059659

Priority Date May 31, 2017

Applicants Fondazione Istituto Italiano di Tecnologia

#### CONTACTS

Technology Transfer Office

Matteo Faccenda

+39 010 71781 968

matteo.faccenda@iit.it