

## PATENTS AND REGISTERED SOFTWARE RELATED TO BioTech-UPM INITIATIVE

Below is the portfolio of patents and registered software of the Universidad Politécnica de Madrid that are related to some of the subject areas of BioTech-UPM Initiative. Patents are listed by their priority date, starting with the most recent ones. Similarly, registered software are ordered by their date of registration, starting with the most recent ones.

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<b>M-006038-2008</b>	Glottex Voice Analysis System	30
<b>M-003351-2008</b>	CUSQ: Cardio US/Quantification 2.1	31
<b>M-007576-2003</b>	MedivozCaptura: System for patient database management and capture of audio, electroglotography and laryngoscopy signals applicable in oto-rhino-laryngology, phoniatriy and speech therapy	32
<b>M-5927-2002</b>	WPCVOX: Tool developed for the parametric extraction and acoustic analysis of voice aimed at the study of voice quality for medical purposes	33

**P200930993****Device and method for stress detection using physiological signals**

Application Date	16/11/2009
Owner	Universidad Politécnica de Madrid and SECUWARE S.L.
Inventors	Carmen Sánchez Ávila, Alberto de Santos Sierra, Javier Guerra Casanova, Carlos Jiménez Suárez
Situation	Filed; not published yet

**P200930992****Device and method for biometric recognition based on hand movement in space with an accelerometer embedded device**

Application Date	16/11/2009
Owner	Universidad Politécnica de Madrid and SECUWARE S.L.
Inventors	Carmen Sánchez Ávila, Alberto de Santos Sierra, Javier Guerra Casanova, Carlos Jiménez Suárez
Situation	Filed; not published yet

**P200930776****Human Blood Phantom**

Application Date	01/10/2009
Owner	Universidad Politécnica de Madrid
Inventors	Francisco del Pozo Guerrero, Javier Serrano Olmedo, Ainara Macías Delgado, Rubén Antonio García Mendoza
Situation	Filed; not published yet

**P200901614****Method and system for measuring the fluorescence lifetime in the frequency domain with high levels of background signal**

Application Date	20/07/2009
Owner	Universidad Politécnica de Madrid
Inventors	Álvaro Navarro Tobar
Situation	Filed; not published yet

**P200901528****System and method for the detection of magnetic nanoparticles by magnetoencephalography**

Application Date	02/07/2009
Owner	Universidad Politécnica de Madrid, Universidad Complutense de Madrid y Fundación para la Investigación Biomédica del Hospital Universitario Ramón y Cajal
Inventors	Ceferino Maestú Unturbe, Claudio Aroca Hernández-Ros, Francisco del Pozo Guerrero, M. del Mar Sanz Lluch, Marco César Maicas Ramos, Alin Javorsky, Fernando Maestú Unturbe, Javier García Pacios, José María Gaztelu Quijano, María Romero Vives, Juan Antonio Barrios Heredero
Situation	Filed; not published yet

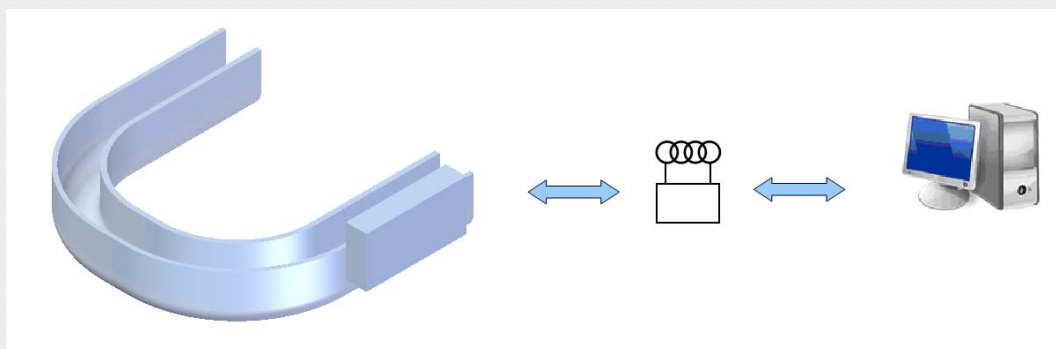
**P200930346****Thermomagnetic applicator device**

Application Date	23/06/2009
Owner	Universidad Politécnica de Madrid and Centro de Investigación Biomédica En Red-Bioingeniería, Biomateriales y Nanomedicina
Inventors	Ceferino Maestú Unturbe, Francisco del Pozo Guerrero, Francisco Paúl Mikuski Silva
Situation	Filed; not published yet

**P200900875****Telemetry system using communication via magnetic field for diagnosis and detection of bruxism**

Application Date	31/03/2009
Owner	Universidad Politécnica de Madrid
Inventors	Jesús Sanz Maudes, Francisco Javier Jiménez Leube, Julio Muñoz García, Javier Echávarri Otero, Antonio Barrientos Cruz, Pedro Luis Castedo Cepeda, Roberto González Herranz, Héctor Lorenzo Yustos, Pilar Lafont Morgado, Andrés Díaz Lantada, Alexander Martínez Álvarez, Carlos González Bris, Jesús Latorre Escribano
Situation	Filed

The present invention consists in a telemetry system that, via wireless communication using magnetic field, allows permanent and real-time recording of teeth clenching and grinding, known as "bruxism". It is based on the use of a passive sensor element / transceiver, whose minimum dimensions allow its integration into a splint that is placed in the oral cavity, combined with an exciter / receiver element located outside the oral cavity, maintaining a reduced consumption in intraoral electronics, which requires no batteries since it extracts the energy needed to operate the excitation field, allowing for perpetual operation.



**P200803751**

## Manual- synchronization somatosensory pneumatic stimulation system

Application Date	30/12/2008
Owner	Universidad Politécnica de Madrid
Inventors	Francisco del Pozo Guerrero, Ceferino Maestú Unturbe, Álvaro Cortés de Castro, Emmanuele Tenenbaum, José Manuel Vázquez Méndez
Situation	Granted

Manual-synchronization somatosensory pneumatic stimulation system with measurement devices that contain no trigger comprising three modules:

- A first control module comprising means for data visualization and data processing of a stimulation sequence that sends the information to the mechanical module through a connecting cable (8).
- A second mechanical module comprising:
  - An air compressor (12) connected to a filter regulator (4), and
  - A metal box (11) that receives the information from the control module and sends it to the applicator module in the form of pressure through valves connected to the filter regulator (4).
- A third applicator module, comprising a support with at least two connections (3a and 3b) to the valves of the mechanical module, which regulate the extension-retraction movement of a piston (1).

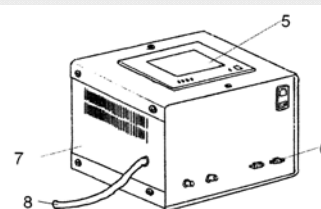


Figura 3

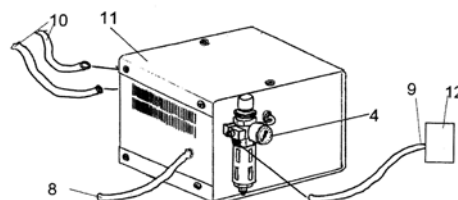


Figura 4

**P200803750**

## **Automatic- synchronization somatosensory pneumatic stimulation system**

Application Date	30/12/2008
Owner	Universidad Politécnica de Madrid
Inventores	Francisco del Pozo Guerrero, Ceferino Maestú Unturbe, Álvaro Cortés de Castro, Emmanuele Tenenbaum, José Manuel Vázquez Méndez
Situation	Granted and internationally extended

Automatic-synchronization somatosensory pneumatic stimulation system with magnetoencephalography and/or magnetic resonance devices that contain trigger comprising:

- A first management subsystem comprising a portable computer (7).
- A second control subsystem comprising a data acquisition card (9) that synchronizes automatically signals generated by the computer (7) and the information received from the trigger (10) of the measurement device, being communicated with the valve system of the mechanical subsystem through at least one connecting cable.
- A third mechanical subsystem comprising a system with at least two valves, one is proportional (14) and the other one is not proportional (15), that are connected to the applicator subsystem.
- A fourth applicator subsystem, comprising an applicator support (2) with at least two connections (4, 5) to the valves of the mechanical module which regulate the extension-retraction movement of a piston (1).

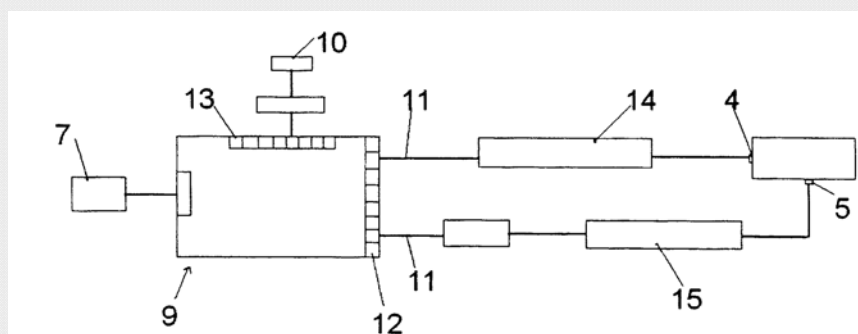


Figura 4

**P200803086****Method and system for controlling the activity of the driver in road vehicles**

Application Date	30/10/2008
Owner	Universidad Politécnica de Madrid
Inventors	Francisco Aparicio Izquierdo, Santiago Tapia Fernández, Felipe Jiménez Alonso
Situation	Filed

This invention consists in a method of operation and an electronic device that implements it for dead man systems in cars. It is based on the use of the driver activity as an additional form (to the usual form of a switch) to deactivate the dead man warning. A random component is also introduced in the activation time added to the usual periodic activation. In general, both the method and the device solve distraction problems that could come up during conventional dead man action when the driver is performing a driving that requires his full attention.



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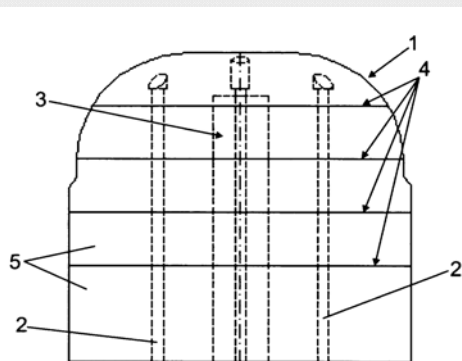
**P200802743**

**Multi-channel phantom of orientable magnetic dipoles for magnetoencephalography**

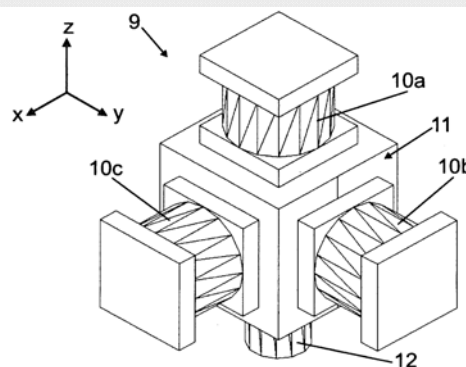
Application Date	26/09/2008
Owner	Universidad Politécnica de Madrid
Inventors	José Javier Serrano Olmedo, Francisco del Pozo Guerrero, Antonio Poley Gómez
Situation	Granted

Multi-channel phantom of orientable magnetic dipoles for magnetoencephalography comprising:

- A simulated head (1), divided into horizontal portions (5), with a hole (3) for the guidance of the cables that excite the magnetic field generators (9) and housing (2) to accommodate the set screws of the horizontal portions (5), these having holes (7) for fixing the generators (9).
- A generator (9) per each channel of the phantom, comprising three coils (10a, 10b, 10c) on a support (11) in coordinate directions (z, y, x) with a lower stem (12) that starts from the support (11) for its fixing in a hole (7) of a horizontal portion (5), each of the coils (10a, 10b, 10c) being excited by an exciting current signal ( $B_z(t)$ ,  $B_y(t)$ ,  $B_x(t)$ ), with the coil (10a) opposite the lower stem (12) producing the vertical component z of the magnetic dipole, and the other two coils (10b, 10c) producing the components (x, y) in the plane of the horizontal portion (5).



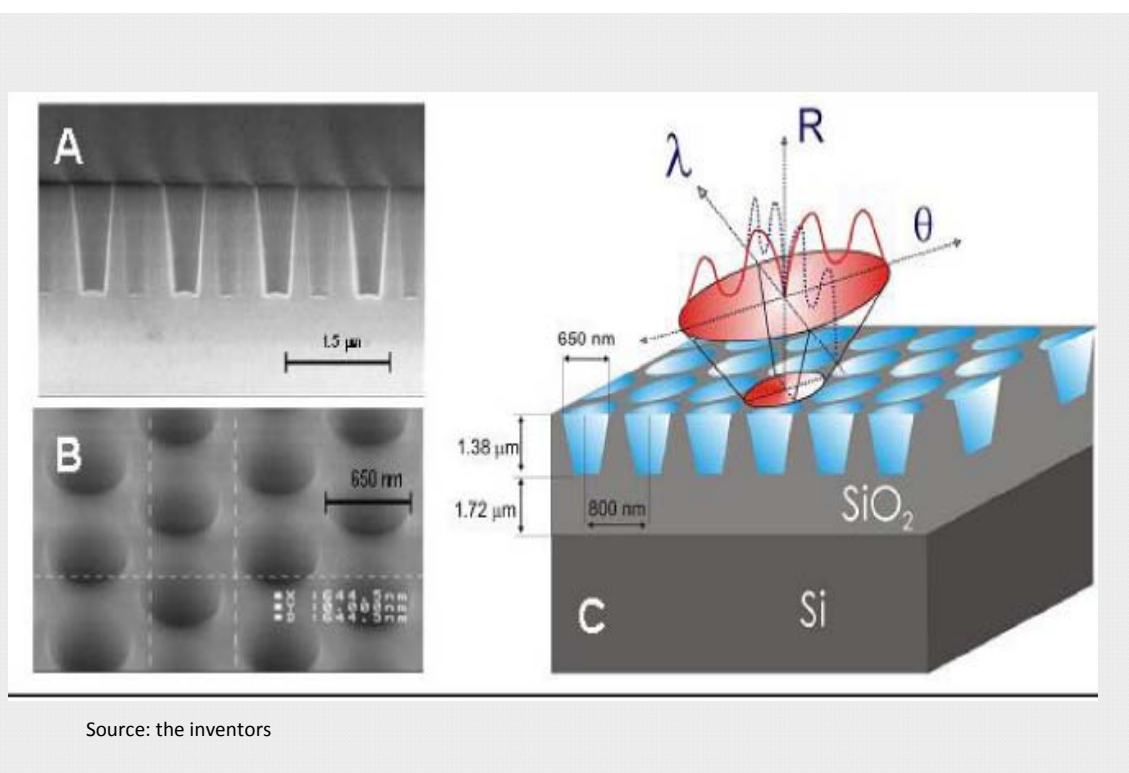
**FIG. 3B**



**FIG. 5**

**P200802565****Optical detection system for high sensitivity label-free bioassay**

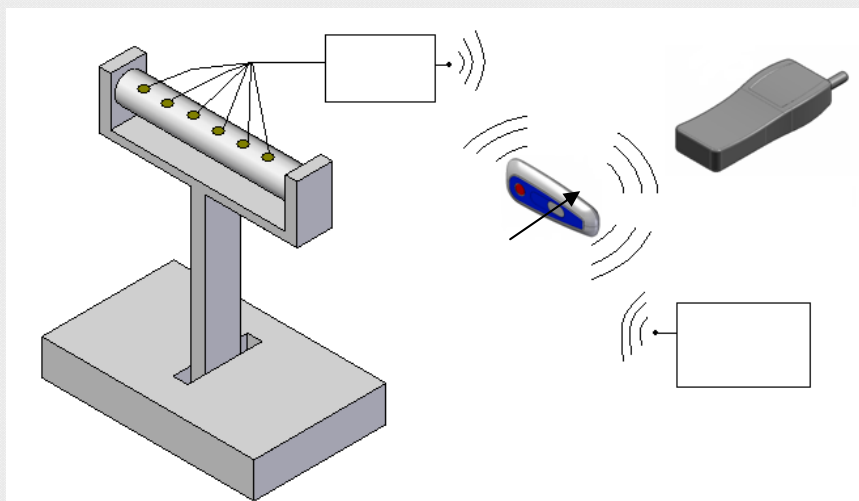
Application Date	05/09/2008
Owner	Universidad Politécnica de Madrid
Inventors	Miguel Morales Furio, María Fé Laguna Heras, Miguel Holgado Bolaños, Rafael Casquel del Campo, Carlos Luis Molpeceres Álvarez, José Luis Ocaña Moreno
Situation	Filed and internationally extended; not published yet



**P200800905****Deadman switch for safe driving**

Application Date	02/04/2008
Owner	Universidad Politécnica de Madrid
Inventors	Antonio Barrientos Cruz, Pilar Lafont Morgado, Julio Muñoz García, Andrés Díaz Lantada, Héctor Lorenzo Yustos, Javier Echávarri Otero, José Luis Muñoz Sanz, Juan Manuel Muñoz Guijosa, Pedro Luis Castedo Cepeda, Roberto González Herranz, Jesús Latorre Escribano, José Miguel Ramón López, Alexander Martínez Álvarez
Situation	Filed

The present invention describes a safe device for driving in dead or sleeping man situations comprising handles for manual control of vehicles or machines over which a network of piezoelectric and pyroelectric sensors is distributed. Information from these sensors is managed by the control electronics using a behavioral model for the assessment of risk situations. The abovementioned electronics enables sending control signals to elements that act on the user to alert him or on the vehicle or machine to return to a safety situation. It is particularly useful to avoid deliberate deactivation attempts by the user, which are the cause of many train accidents.

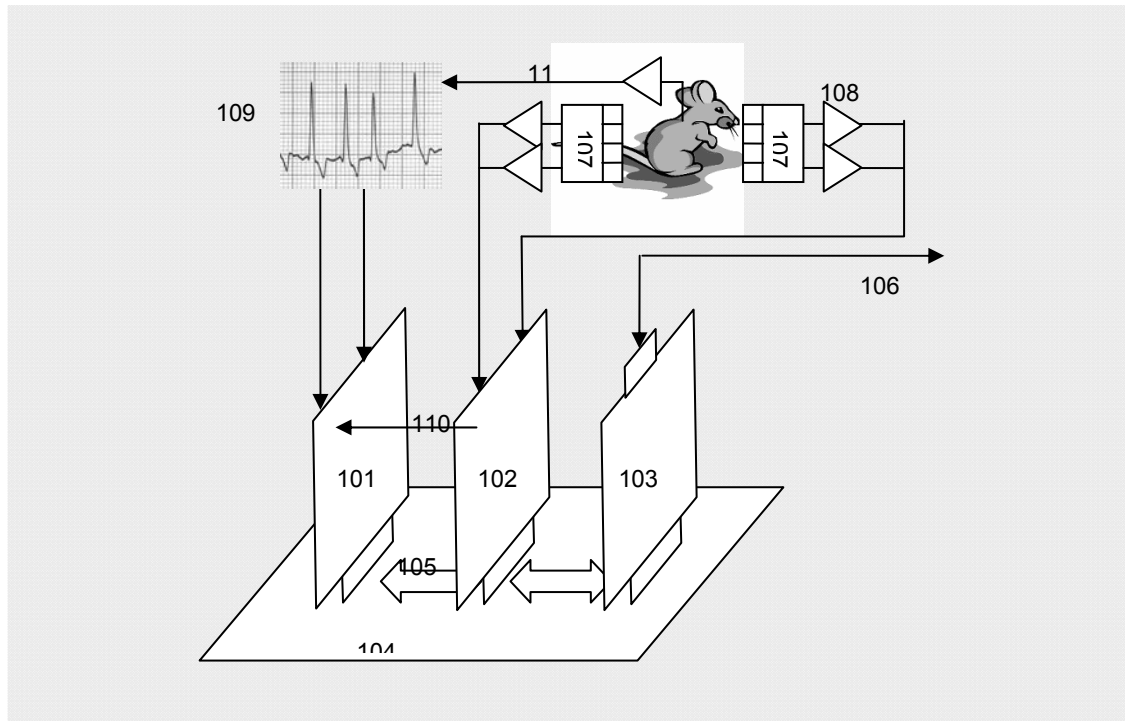


**P200702836**

## Data acquisition apparatus for gamma-radiation emission computed tomography and its functioning

Application Date	25/10/2007
Owner	Universidad Politécnica de Madrid and Fundación para la Investigación Biomédica del Hospital Gregorio Marañón
Inventors	Pedro Guerra Gutiérrez, Giancarlo Sportelli, Andrés de Santos Lleó, Manuel Desco Menéndez, Juan José Vaquero López
Situation	Filed

This invention describes the acquisition electronics of a gamma-radiation emission tomography system, which encompasses two related nuclear medicine techniques: single photon emission-computed tomography (SPECT) and positron emission tomography (PET), with a reduced number of gamma cameras and a minimum deadtime, and that integrates all processing electronics for radiation characterization and resolution of time matches in a single electronic device. This invention simplifies the accurate clock distribution to all elements of the system and reduces the problems derived from the time synchronization of all elements at a single time base. It also achieves cost reduction, compared to an analog system; attains size reduction and simplifies the calibration process of the final equipment.

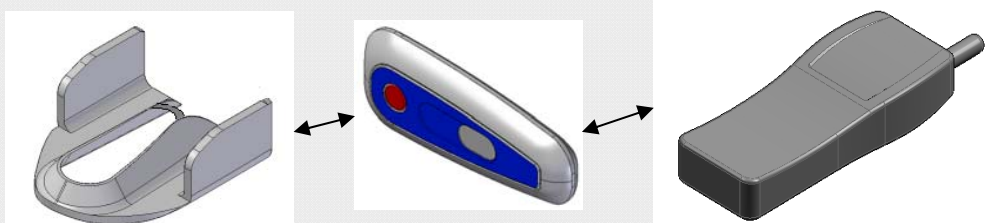




**P200702079****System for the detection and treatment of bruxism and other occlusal pathologies**

Application Date	25/07/2007
Owner	Universidad Politécnica de Madrid
Inventors	Pilar Lafont Morgado, Héctor Lorenzo Yustos, Andrés Díaz Lantada, Julio Muñoz García, Javier Echávarri Otero, Juan Manuel Muñoz Guijosa, M <sup>a</sup> del Socorro Martín Muela, Antonio Barrientos Cruz, Roberto González Herranz, Pedro Luis Castedo Cepeda, Eduardo Crespo Bonet, Alexander Martínez Álvarez
Situation	Filed and internationally extended

System capable of intraoral detection of bruxism activity and other occlusal pathologies, as well as the transmission to portable electronic elements, which act on the patient as a consequence of their ability to analyze and interpret the information received so as to encourage the cessation of the bruxism activity. The extraoral action is carried out by means of elements capable of emitting acoustic, light or vibration signals, at its option, which may be of variable intensity or progressive, warning the patient of an undesirable behavior. The intraoral action stops bruxism activity through the provision of drugs, supply of bitter substances and/or application of electrical or vibratory stimuli.



**P200603149****Active annuloplasty system for the progressive treatment of cardiovascular pathologies**

Application Date	13/12/2006
Owner	Universidad Politécnica de Madrid
Inventors	Pilar Lafont Morgado, Andrés Díaz Lantada, Julio Muñoz García, Héctor Lorenzo Yustos, Pedro Ortego García, Juan Manuel Muñoz Guijosa, Javier Echávarri Otero, María del Pilar Leal Wiña, José Luis Hernández Riesco, Antonio Jiménez Ramos, Jesús Latorre Escribano, Ignacio Rada Martínez
Situation	Granted and internationally extended

The invention relates to a teleoperated active annuloplasty system which can be used for the controlled, progressive, reversible and postoperative treatment of mitral insufficiency and other cardiovascular pathologies that can be corrected with the use of annuloplasty rings. The invention is based on the use of a shape-memory actuator ring which can be heated using external devices in order to activate the shape-memory effect which produces the geometric change intended to reduce mitral insufficiency. The prosthesis includes control electronics which receive external commands and act accordingly. The inventive means enable reversible, progressive step-by-step actuation, thereby providing a more controlled method generating less haemodynamic instability and intended for the treatment of various valve diseases.



**P200602647**

## **Method of space positioning of cylindrical objects by means of analysis of images**

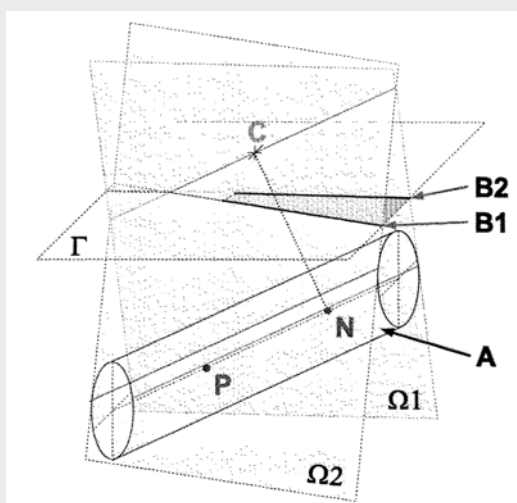
Application Date	18/10/2006
Owner	Universidad Politécnica de Madrid
Inventors	Alicia Cano González, Francisco del Pozo Guerrero, Enrique Javier Gómez Aguilera, Francisco Javier Gaya Moreno, Pablo Lamata de la Orden, María Elena Hernando Pérez
Situation	Granted and internationally extended

This invention consists of a method to determine the space position of a cylindrical object based on the processing of the image caught by only one camera. This new method only needs the information of the video images caught by the camera, its field of view and the diameter of the cylinder. The 3D position of the cylindrical object is obtained by an analysis of its cross section and the edges of the cylinder projected on the caught image.

This method is very useful in the field of laparoscopy surgery (which usually uses cylindrical devices) with three applications:

- 1) The automatic analysis of operations to obtain evaluation parameters of them.
- 2) The applications of increased reality to guide the surgeon.
- 3) The computer assisted intelligent systems of surgery.

In addition, this method of positioning can be useful in other industrial sectors as industrial production, control or robotics.

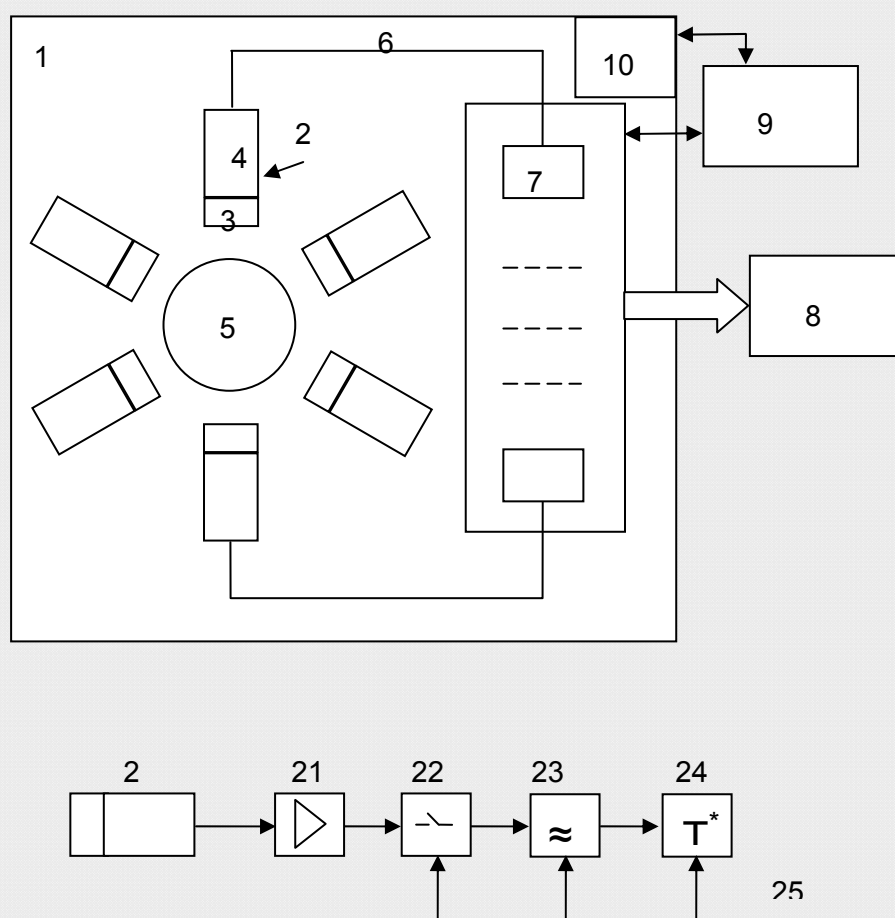


**P200601820**

## Auto-calibration method for the precise measurement of time

Application Date	06/07/2006
Owner	Universidad Politécnica de Madrid
Inventors	Andrés de Santos Lleó, Pedro Guerra Gutiérrez
Situation	Filed

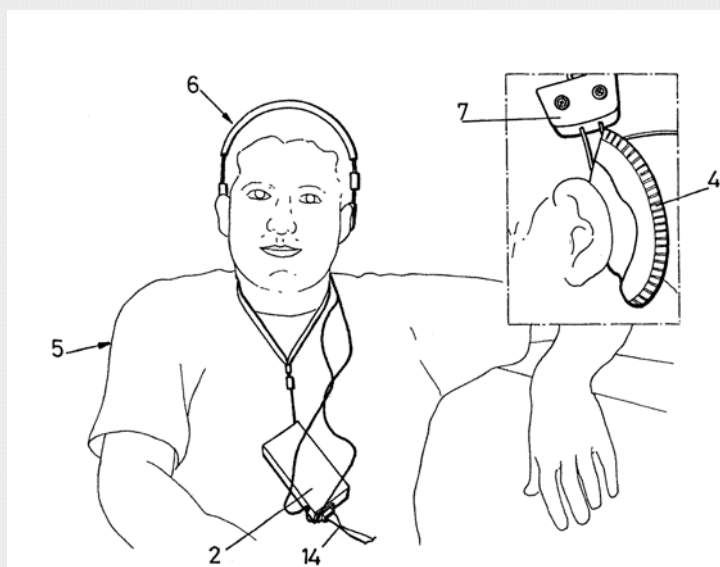
This invention is related with high resolution time measurement, and particularly with the calibration of a system for measurement of time that associates a temporary timestamp to an asynchronous event. A possible example of application consists in the correction of the time instant in which a photon impacts the detection system, essential process for the detection of pairs of coincident photons in positron emission tomography.



**P200600147****Method for real-time monitoring of alert level based on brain waves and device for the implementation thereof**

Application Date	24/01/2006
Owner	Universidad Politécnica de Madrid
Inventors	Robin Gerardo Álvarez Rueda, Francisco del Pozo Guerrero, Jesús Fernández León
Situation	Granted

The method of this invention is based on the capture of the electroencephalography (EEG) signal of the subject through a EEG recording system (1) and by means of three dry electrodes (4) through which a monopolar mode recording to any of the C3, C4, Cz, O1 and O2 sites of the cerebral cortex is carried out. The recorded EEG signal is filtered, then proceeding to the recording of the subject's alpha rhythm in relaxation state. Once this alpha performance is determined, EEG thereof is recorded under any activity being carried out, then proceeding to the amplitude standardization, with respect to its maximum value, of the recorded EEG spectrums. Then a second spectrum standardization is carried out on the basis of the subject's previously recorded particular alpha performance. From such spectrum, a new variable is determined from the ratio between power over the band around personal alpha rhythm (or personal higher band (PHB)) and power in the band around personal alpha rhythm (or personal alpha band (PAB)) (PHB/PAB) which enables the differentiation of the alert level by simple thresholding.

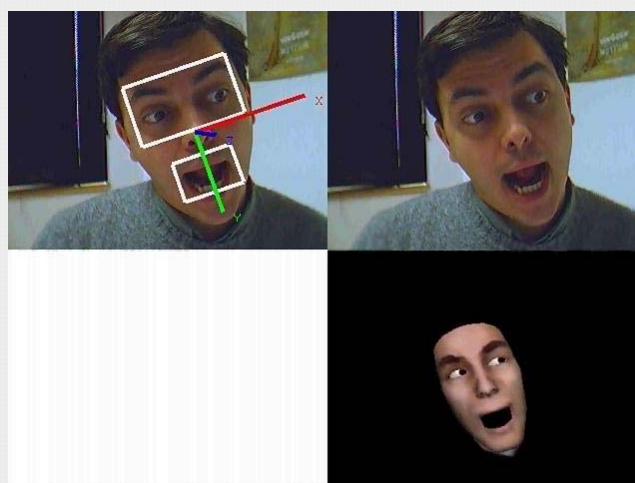
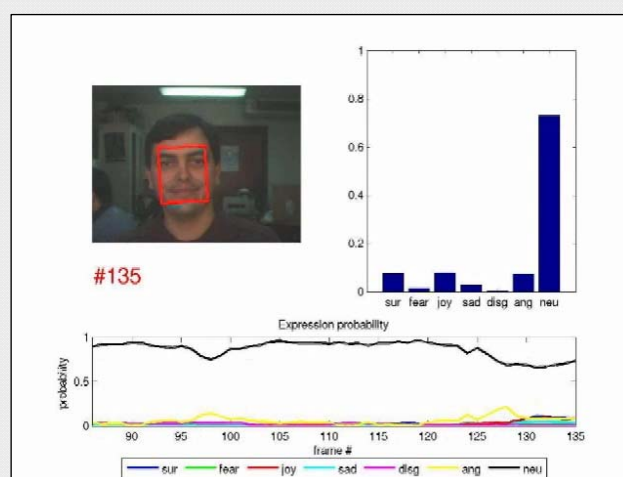


**P200500912**

## System for the detection and verification of people identity through their facial features

Application Date	15/04/2005
Owner	Universidad Politécnica de Madrid and Universidad Rey Juan Carlos
Inventors	Jorge Antonio Ruiz Mayor, Enrique Cabello Pardos, Cristina Conde Vilda, Luis Pastor Pérez, Susana Mata Fernández
Situation	Granted

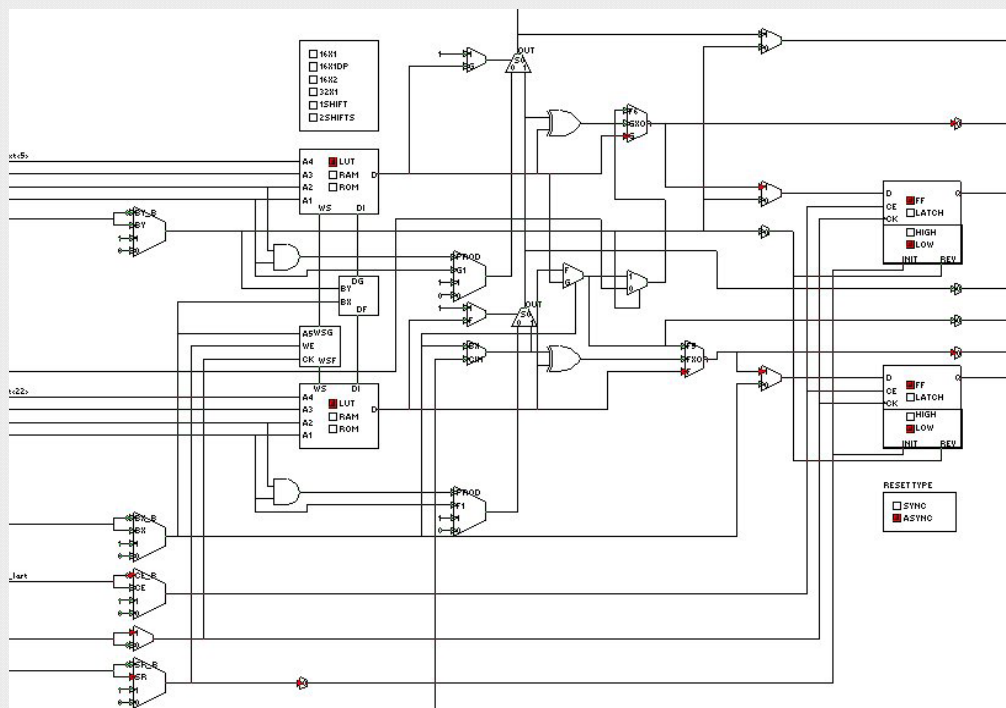
The invention consists in a system for the detection and verification of people identity through their facial features. The problem of human face verification may be summarized as the task of verifying if a given name matches an observed face, by using only facial features, and without making use of other elements (voice, fingerprints, signature, DNA, etc.).



**P200401381****Auto-calibration and high-resolution system for time measurement based on a programmable logic device**

Application Date	08/06/2004
Owner	Universidad Politécnica de Madrid
Inventors	Andrés de Santos Lleó, Pedro Guerra Gutiérrez
Situation	Granted

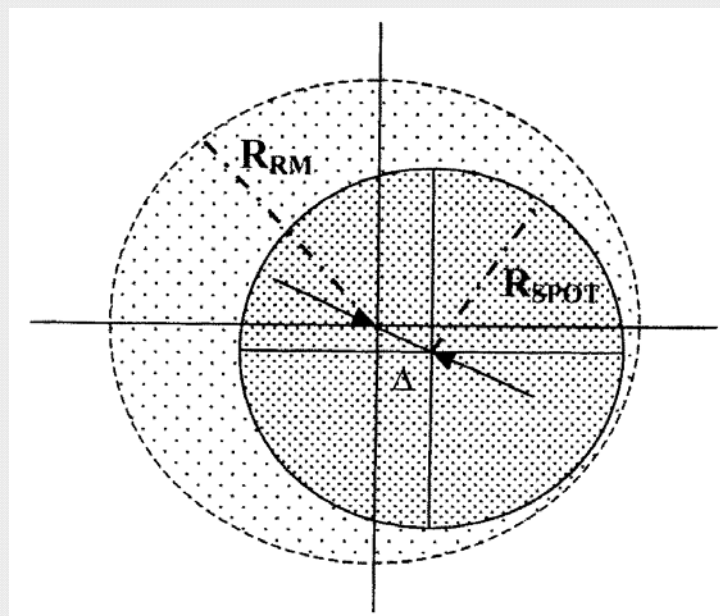
The present invention is related to high resolution time measurement. Specifically it exploits the architectural properties of modern and low cost programmable logic devices (FPGAs) to create a Vernier delay line within the device that enables the generation of a timestamp for every detected asynchronous event. This invention is applicable in the generation of accurate timestamps associated to a non-periodic event. An specific application is the obtention of the timestamp that is essential for tailoring a time coincidence window in positron emission tomography.



**P200302104****DNA microarray multi-resolution scanner system**

Application Date	08/09/2003
Owner	Universidad Politécnica de Madrid
Inventors	Andrés de Santos Lleó, José Luis Sánchez López
Situation	Granted

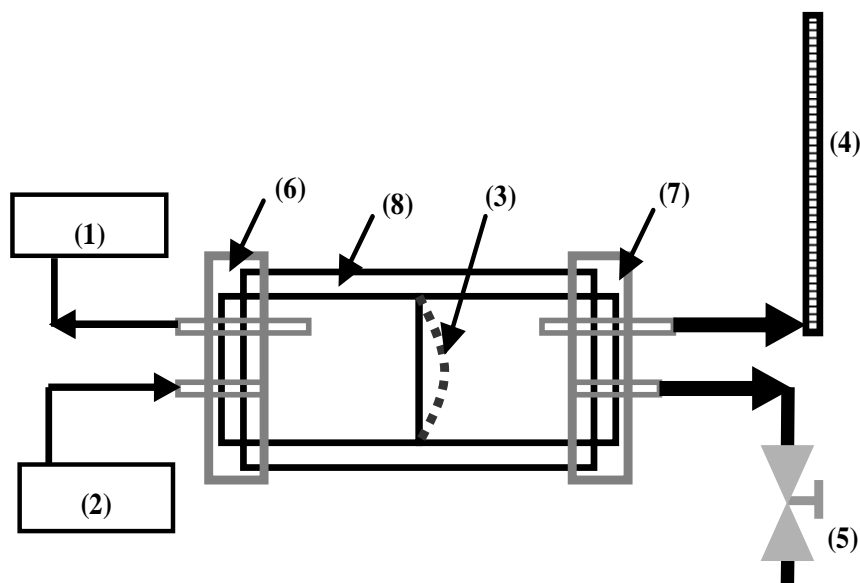
This invention combines several scanning modes, with different resolution degrees, in order to get and analyse images from devices such as the DNA or protein microarrays: Its main application accordingly being the acquisition of images from biochemical or genetic experiments carried out with microarrays. It has two systems: a short focal length optical system is devoted to the acquisition while a long focal length one performs the tracking. Mostly of the image from a microarray does not need to be explored in high resolution, so the novelty of this technology is based on this characteristic, since it only concentrates in the areas with useful information.



**P200301737****Instrument for characterizing the mechanical properties of a flexible membrane**

Application Date	23/07/2003
Owner	Universidad Politécnica de Madrid
Inventors	Gracián Triviño Barros
Situation	Granted

The invention consists of an instrument for measuring the deformation of a flexible membrane when a pressure over its surface is applied. From the curve press-deformation obtained, the study of the mechanical characteristics of the material is done. The device is especially useful for membranes submerged into liquid to which a pressure is uniformly applied.

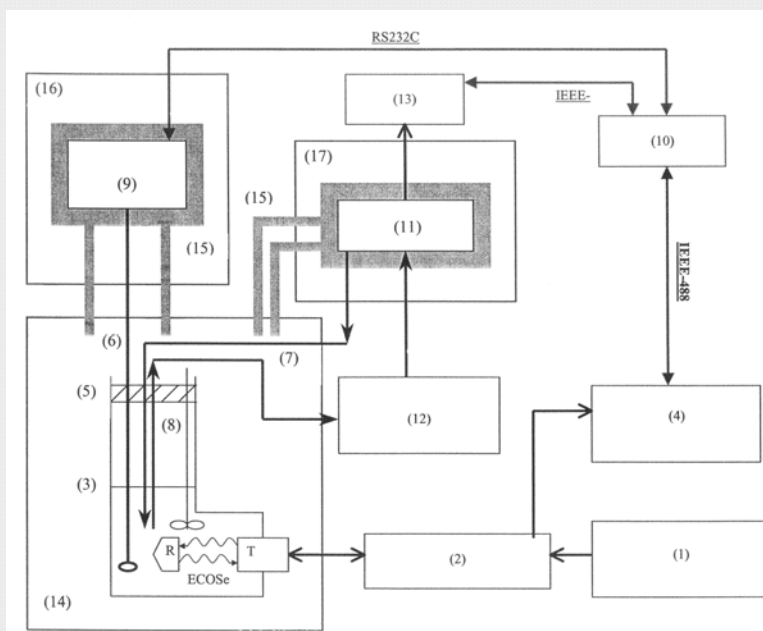


**P200101592**

**Technique and method for continuous, simultaneous and automatic measurement of sound speed and density in liquids and solutions**

Application Date	06/07/2001
Owner	Universidad Politécnica de Madrid and Universidad Complutense de Madrid
Inventors	Sergio López Gregorio, Mariano Ruiz González, Elena Junquera González, Emilio Aicart Sospedra
Situation	Granted

The automatic technique for continuous measurement of sound speed and density in liquids and solutions consists in a set of instruments (Figure 1) that, properly coupled and communicated via IEEE-488 and RS232C Interfaces, allow the digitization of ultrasonic signals emitted by a transducer and the computerization of sound speed and density measurements. With this procedure, these properties are obtained with high accuracy, as a statistical average of a large number of measurements for each sample, and in a wide range of concentrations, the whole thing using only 9 mL of substance. The whole measurement process is automatically controlled by a personal computer, using software also developed in this invention for the equipment used, but easily adaptable to other digital equipment.



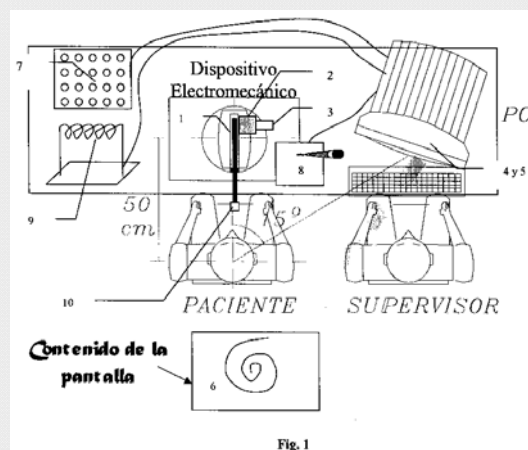
**P200000257**

**System for the objective measurement of pathological tremor by patterns that apply virtual forces**

Application Date	07/02/2000
Owner	Universidad Politécnica de Madrid
Inventors	Adrián Mora Casas, Antonio Barrientos Cruz, Manuel Ferre Pérez, Roberto González Herranz, José Luis Martínez Pérez, Rafael García de Sola
Situation	Granted

This invention consists in a system made up of a device and a method for the objective measurement of pathological tremor in human limbs (hands or fingers). This system carries out three-dimensional recordings of the limb's movements (position, velocity, acceleration), while the patient performs a series of proposed-and-controlled-by-the-system actions. This system is capable of exerting controlled virtual forces which interfere with the movement, thus facilitating the study of the effects that static charges, frictions or other types of forces have on the system, and providing criteria for tremor evaluation in addition to morphology and frequency data.

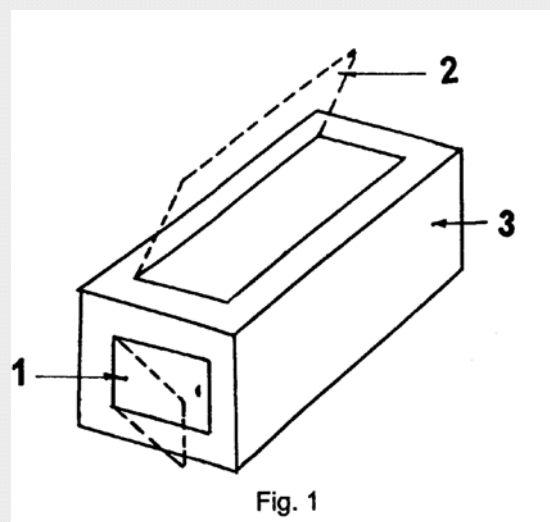
This system is composed by: jointed electromechanical device (1) with movement sensors (3) and engines for exerting virtual forces (2). Computer (4) and software (5), which processes movement signals and generates orders for the engines. Movement patterns or actions (6) to be performed. Computer peripheral devices (7, 8 y 9) necessary to complete some patterns.



## P9901997 Minirefrigerator for carrying insulin

Application Date	07/09/1999
Owner	Universidad Politécnica de Madrid
Inventors	José Antonio Arribas Torres, Ramiro Álvarez Santos, Roberto Sanz Prieto
Situation	Granted

This technology consists in the use of solid-state semiconductor cells as a cooling element of an isothermal container, for the construction of portable refrigerators with programmable and controlled temperature, with heat evacuation to outside, with power sourcing of 12V dc so as to be portable. It may also run on other tensions from electricity networks, as well as stay out of network by incorporating cartridges cold packs. This technology may be applied in the manufacturing of appliances, components and auxiliary devices that employ the techniques for keeping containers isotherm for the conservation and transportation of perishable items. It enables the construction of very small mini-refrigerators that are not feasible to achieve using conventional technologies (liquid refrigerant compressors), making this invention ideal for the transportation of insulin.



**P9701940**

**Telephone line interface for the development of interactive voice applications based on speech recognition and synthesis**

Application Date	16/09/1997
Owner	Universidad Politécnica de Madrid
Inventors	Andrés de Santos Lleó, José Colas Pasamontes, Javier Ferreiros López, José Manuel Pardo Muñoz
Situation	Granted

This technology consists in a card intended to be connected to a personal computer, PC type, capable of interacting with a telephone line (of the Switched Telephone Network). It has such characteristics that offers all the possibilities required for the development and implementation of interactive voice applications which make use of speech recognition and synthesis: audio input/output for speech recognition cards, speech coding/compression and text-speech conversion; as well as the possibility of detecting telephone line states, picking up/hanging up automatically, multi-frequency tone detection, monitoring of the audio signal which travels through the line and echo attenuation. All these functions can be controlled from a personal computer, PC type, through the driver which has also been developed. The card consists of the following basic elements: (1) control block, (2) telephone duplexer with level adaptation and simple echo attenuator (Hybrid Return), (3) multi-frequency tone detector and decoder, (4) call tone detector, (5) hang-up detector (line polarity), (6) signal adapters for earphones and tape recorder recording, and (7) relay activation.

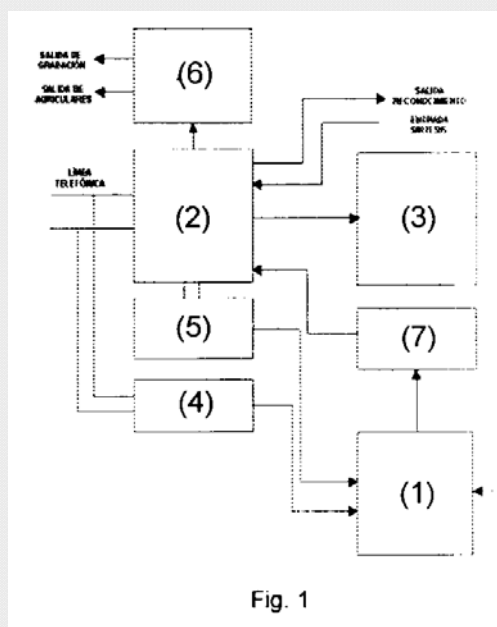


Fig. 1

**P9701150**

**System for photovoltaic remote supply by means of optical fibre for implantable medical devices**

Application Date	28/05/1997
Owner	Universidad Politécnica de Madrid and Universidad Politécnica de Cataluña
Inventors	Carlos Algora del Valle, Luis Castañer Muñoz
Situation	Granted and internationally extended

Energy supply system for implantable medical devices. The energy supply is produced by means of the electricity generated by a photovoltaic converter which converts the light arriving via the optical fibre from areas outside the subject. This allows continuous operation of the implanted devices and makes it possible to develop future high-consumption devices as it eliminates the energy limitations which characterize current batteries.

The system consists of a light source (1) outside the patient's body, an optical fibre (3) which extends from a surface point on the patient to the implantable device (4) and a photovoltaic converter (5) located inside the device to which the optical fibre reaches. Finally, a conditioning stage (6) is responsible for adjusting the electrical power generated by the photovoltaic converter to the requirements of the remaining components (7) of the implantable device.

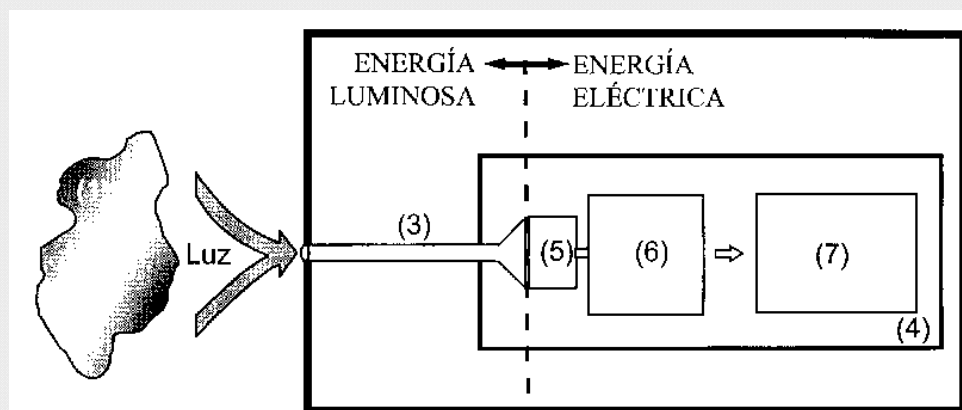


Fig. 1

**P9602208****Computer-controlled electronic system design and procedure, for carrying out aerial pure-tone audiometries in a manual and automatic way**

Application Date	17/10/1996
Owner	Universidad Politécnica de Madrid
Inventors	Manuel Recuero López, Juan Sancho Gil, Constantino Gil González, Jorge Grundman Isla, Javier Jiménez Ramos, David Antonio Pérez Herrero
Situation	Granted

The invention consists in an electronic device, based on DSPs (A), which is connected to a personal computer. The device interprets the orders it receives from the computer to generate the audiologic signals of suitable frequency and level, acting on a calibrated attenuator (B). All the operating process is carried out from a personal computer which is communicated with the device through RS 232. The device allows aerial pure-tone audiometries to be carried out, meeting all the technical and procedure specifications requirable for audiometers type IV according to IEC 645 rule (rule elaborated by the International Electrotechnical Commission, organization for the standardization in the electrical and electronic fields and related technologies). It also has software for audiometry's performance and management, with an important data base for the storage thereof.



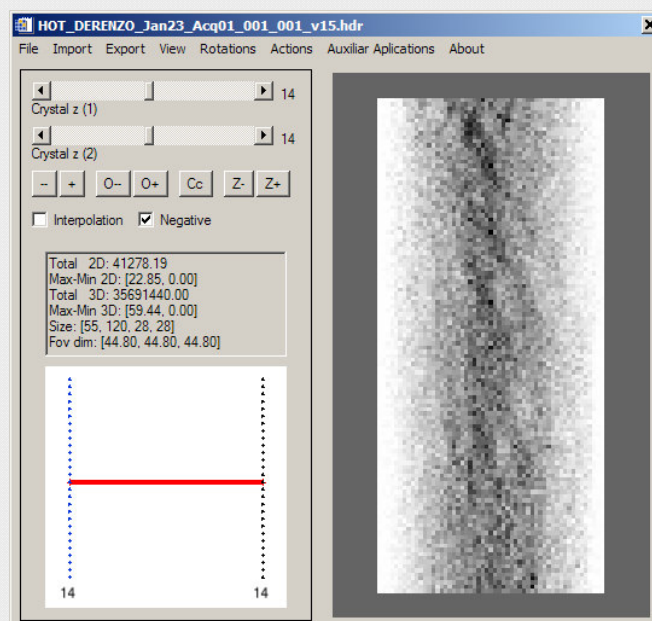
Source: UPM

**M-004537-2009**

**BIT-OSEMrec 1.0: Biomedical Image Technology – Ordered Subsets  
Expectation Maximization reconstruction**

Application Date	26/05/2009
Owner	Universidad Politécnica de Madrid
Authors	Juan Ortuño Fisac, Georgios Kontaxakis Antoniadis, Andrés Santos Lleó
Situation	Applied

Software for statistical reconstruction of volumetric images from data provided by a high-resolution PET scanner (positron emission tomography) for small laboratory animals.



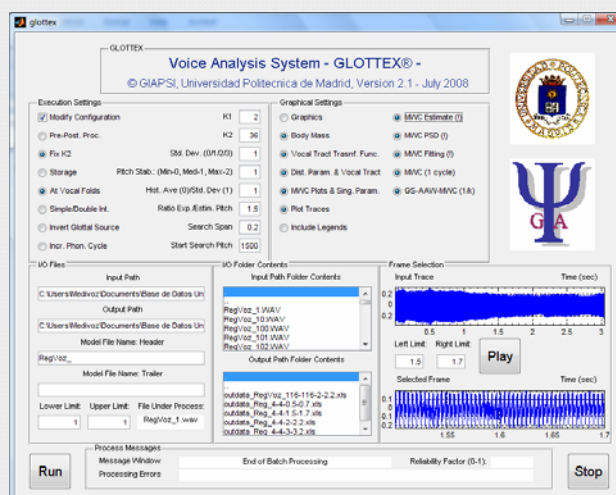
*Fig. 1: Detail of the main window of this software application.*

## M-006038-2008 Glottex Voice Analysis System

Application Date	04/08/2008
Owner	Universidad Politécnica de Madrid
Authors	Pedro Gómez Vilda, Roberto Fernández-Baíllo Gallego, Víctor Nieto Lluis, Victoria Rodellar Biarge, Agustín Álvarez Marquina, Rafael Martínez Olalla
Situation	Applied

Glottex is a software application for voice analysis and extraction of biometric parameters based on the study of the glottal source. Due to its characteristics Glottex is specially designed for application in the following fields:

- Physiological: The information extracted from the vocal tract and glottal source allows the establishment of correlates on the biomechanics of the vocal folds.
- Clinical: It allows a study of the voice from the standpoint of quality and the clinic. It is a useful tool for screening for speech pathology and vocal folds.
- Rehabilitation, vocal pedagogy and singing: As it is possible to establish correlates with glottic mechanics and vocal tract characteristics, the tool allows evaluating the course of rehabilitation treatments and to find vocal gestures and techniques to assist a teacher or speech therapist in the vocal pedagogy of the professionals of the voice.
- Forensic: The parameters extracted from the vocal tract and glottal source are an essential tool in the work of forensic acoustics.



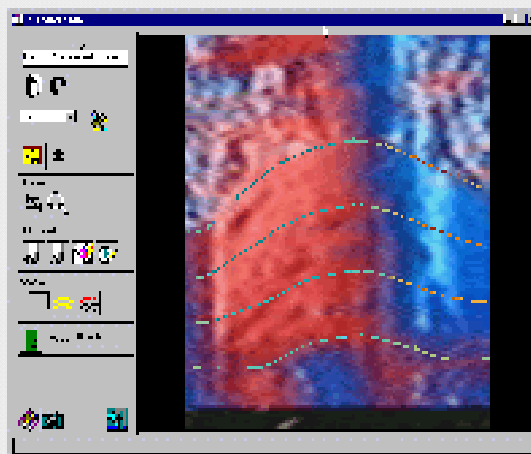
**Fig. 1:** Picture of the panel which controls the graphical information that is sought. In this example all options are disabled.

## M-003351-2008

### CUSQ: Cardio US/Quantification 2.1

Application Date	28/04/2008
Owner	Universidad Politécnica de Madrid and Fundación para la Investigación Biomédica del Hospital Gregorio Marañón
Authors	María Jesús Ledesma-Carbayo, Andrés Santos Lleó, Manuel Desco Menéndez
Situation	Applied

Software for visualizing and quantifying echocardiography studies, which enables the automation of the quantitative analysis of myocardial perfusion and regional myocardial motion.



*Fig. 1: Detail of the main window of this software application.*

**M-007576-2003**

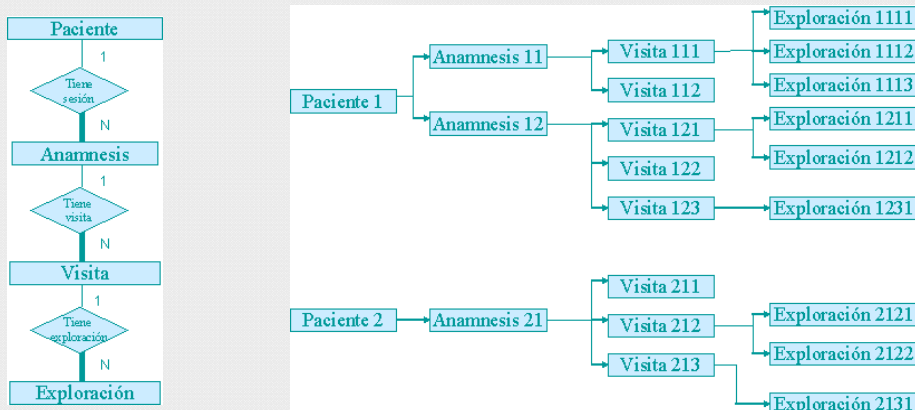
**MedivozCaptura: System for patient database management and capture of audio, electroglotography and laryngoscopy signals applicable in oto-rhino-laryngology, phoniatry and speech therapy**

Application Date	03/10/2003
Owner	Universidad Politécnica de Madrid
Authors	Juan Ignacio Godino Llorente, Santiago Aguilera Navarro, Pedro Gómez Vilda, Víctor Osma Ruiz, Nicolás Sáenz Lechón, Juan Ignacio Cobeta Marco
Situation	Granted; exclusive license in Spain and Portugal

MedivozCaptura covers a gap in the field of management tools for voice clinics, including a powerful interface that allows storage of patient data, anamnesis, medical visits and examinations, and enabling the standardization of anamnesis and examinations, including jointly, digital sound and image. So MedivozCaptura is designed according to the following premises:

1. It allows the creation of a database for storing features related to the patient, both affiliation and clinical history and anamnesis. It is always approached from the standpoint of the treatment of vocal pathology.
2. It allows for standardization of the main vocal characteristics, to facilitate intra- and inter-bases comparison and share information between different professionals.
3. It enables the capture and digitization of video signals (stroboscopy, rhinofibrolaryngoscopy or any other), audio (voice) and patient electroglottography for its observation and further analysis and use as digitalized signal.
4. Thanks to the easiness of signal export in .avi and .wav format (for audio-video and electroglottography respectively), it is feasible to edit and work with them in any other editing program.

**Fig. 1:** Conceptual structure of MedivozCaptura database. It can be observed that each patient can have "N" anamnesis associated, each anamnesis "M" visits, and each visit "P" medical examinations.



## M-5927-2002

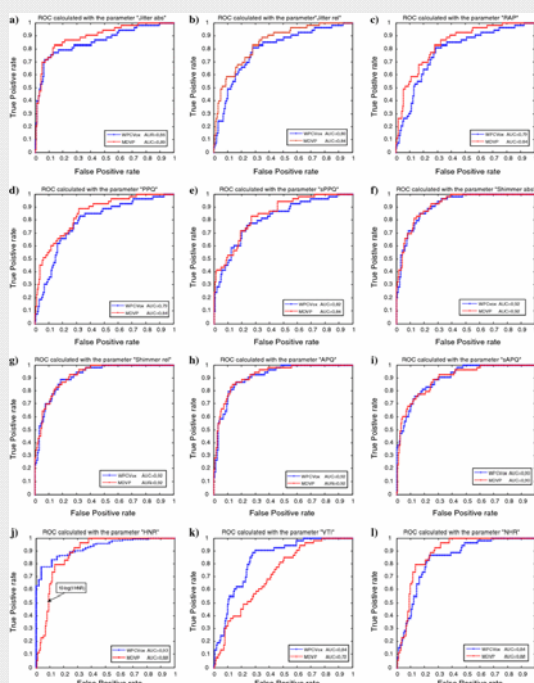
**WPCVOX: Tool developed for the parametric extraction and acoustic analysis of voice aimed at the study of voice quality for medical purposes**

Application Date	23/07/2002
Owner	Universidad Politécnica de Madrid
Authors	Santiago Aguilera Navarro, Juan Ignacio Godino Llorente, Juan José Martín Álvarez, Borja Ibarz Gabardós
Situation	Granted; exclusive license in Spain and Portugal

WPCVox is a useful tool in evaluating voice quality as it facilitates parameterization and graphic representation of the evolution of its parameters through a simple and easy-to-use visual interface.

In oto-rhino-laryngology, speech apparatus pathologies are examined by fibroscopy techniques and acoustic studies of voice signal, which are traditionally based on the study on the waveform, spectrogram and cepstrum. To evaluate voice quality subjectively it is also necessary to extract other parameters such as harmonics-to-noise ratio, normalized noise energy, the jitter, the shimmer, and many others.

Other parameterization tools currently on the market base the analysis on the extraction and calculation of parameters as average values over an integration time period. This approach is complemented in WPCVox together with the representation of the time evolution thereof.



**Fig. 1:** Receiver operating characteristic curves for the parameters extracted with MDVP and WPCVox; **a** jitt abs; **b** jitt rel; **c** RAP; **d** PPQ; **e** sPPQ; **f** shimmer abs; **g** shimmer rel; **h** APQ; **i** sAPQ; **j** HNR; **k** VTI; **l** NHR.