Patent Searching and Infringement
21 June 2016
Chris Wilkinson PhD

great ideas come to us
A fundamental requirement of a patent is that it is novel and inventive.

This is assessed based on what was publically known at the date of filing. This is known as the prior art base.

An important component of the prior art base includes published patent applications. Patent databases can be searched to find relevant prior art. Used to assess validity prior to filing. Used by Examiners during patent examination.
The most common form of patent searching is novelty or patentability searching. This attempts to determine what prior art existed at the priority date of the patent.

Freedom to operate searching is a patent search to determine what patents are in force in a specific jurisdiction. Requires detailed assessment of in force patents to determine whether there is a risk of infringement.

Patent databases can also be used as a market research tool. Eg what competitors are active and where opportunities exist. Technical solutions (eg supplement to a literature search).
Novelty searching using keywords

• Break the product or method into separate functional components or steps (features)
• For each feature think of a range of alternative words used to describe it
  – Each applicant chooses how to describe a feature and this generates a diversity of related terms
• Perform searches using different combinations of words from the different functional groups
Example blood pressure sensor using reflected laser diode

- Blood pressure, systolic, diastolic
- Artery/arterial, pulse
- Deflection, reflection, skin surface
- Laser, light, diode, radiation
- Non invasive, remote, surface, external
Keyword Searching Tips

• Often patent searching requires some trial and error to determine appropriate keywords
  – Try reading technical documents, Wikipedia entries, dictionaries, thesaurus etc for ideas

• Finding a relevant patent provides guidance on suitable search terms used in the field
  – Use these to review your choice of search terms

• If you haven’t found something close, you probably haven’t done enough searching…
Free Patent Searching Databases

• Google: [patents.google.com](http://patents.google.com)
  - All US patents and applications, WIPO, EPO, Chinese, Korean (and growing all the time)
  - Full text searching, good interface

• EPO: [worldwide.espacenet.com](http://worldwide.espacenet.com)
  - Comprehensive worldwide coverage
    • over 90 million patent documents
  - Search interface is more limited compared to Google
    • title, abstract, inventors, applicants, etc

  - Very good open source patent searching database
  - Particularly good for biological sequences
**Individual entries** provide information on:

- Related applications
- Full text including machine translations
- Images
- Classification classes
- Cited and citing prior art
- Maintenance data
- Download PDF versions
Measuring pressure in heart or blood vessels

Small-sized disposable pressure transducer apparatus with a temperature ...

Grant US506677A • Toshiyasu Hoshii • Nec Corporation
Priority 1980-05-02 • Filed 1980-05-02 Published 1992-02-11
A blood pressure transducer apparatus having a semiconductor pressure sensor and a temperature compensating circuit mounted on a substrate ... in the laser trimming process and contaminates an outer surface of the semiconductor pressure sensor mounted on the same surface of the substrate.

Disposible and trimmable wireless pressure sensor for medical applications

Grant US705915B1 • James Z. Liu • Honeywell International Inc.
Priority 2004-02-22 • Filed 2004-02-12 Published 2006-06-13
A blood pressure apparatus comprises a display element, a wireless pressure sensor, and a laser trimming mechanism. The pressure sensor is configured to provide a signal corresponding to pressure within the blood监察 apparatus... 

Disposible and trimmable wireless pressure sensor for medical applications

Grant US707091B1 • James Z. Liu • Honeywell International Inc.
Priority 2004-02-22 • Filed 2004-02-12 Published 2006-06-13
An important medical application for a pressure sensor is a blood pressure, and/or intracranial pressure. The method of monitoring pressure in these applications and the laser trimming mechanism... 

Disposible and trimmable wireless pressure sensor

Grant US7146818B1 • James D. Cook • Honeywell International Inc.
Priority 2005-10-18 • Filed 2005-10-18 Published 2007-12-12
An important medical application for a pressure sensor is a blood pressure, and/or intracranial pressure. The method of monitoring pressure in these applications and the laser trimming mechanism... 

Wearable pulse wave velocity blood pressure sensor and methods of...

Grant US7674231B2 • Devin B. McCombie • Massachusetts Institute Of Technology
Priority 2008-08-22 • Filed 2008-08-22 Published 2010-03-09
It is well recognized that ambulatory blood pressure (BP) monitoring by means of wearable sensors has the potential to enable new levels of pressure sensors (one or an array), photoplethysmographs (one or an array), biomaterial measurements; or floretmeters (ultrasound or laser or otherwise).
Optical noninvasive blood pressure sensor and method

Abstract

A blood pressure sensor includes a source of photo-radiation, such as an array of laser diodes. The sensor also includes a two-dimensional, flexible reflective surface. The reflective surface is nominally positioned relative to the radiation source such that the radiation travels in a direction normal to the reflective surface. The reflective surface is placed adjacent to the location on the patient where the blood pressure data is to be acquired. Radiation from the source is reflected off of the reflective surface onto a two-dimensional array of photo-detectors. Systolic and diastolic blood pressure fluctuations in the patient are translated into deflections of the patient’s skin. These deflections cause corresponding deflections in the two dimensional reflective surface. The associated movement of said flexible reflective surface due to blood pulsation causes scattering patterns from said reflective surface to be detected by the two dimensional array of photo-detectors. The output from the array of photo-detectors is calibrated to blood pressure in mmHg during a calibration procedure to obtain a set of calibration relationships for one or more of the individual detectors. The calibration relationships are then used during acquisition of blood pressure data to arrive at blood pressure data.
**Description**

**CROSS-REFERENCE TO RELATED APPLICATION**

This application is related to the patent application filed by the same inventors concurrently herewith, Ser. No. 686,588, entitled "METHOD FOR OBTAINING BLOOD PRESSURE DATA FROM OPTICAL SENSOR," the contents of which are incorporated by reference herein.

**BACKGROUND OF THE INVENTION**

A. Field of the Invention

This invention relates generally to the field of devices used to measure blood pressure. More particularly, the invention relates to a wearable, non-invasive device for accurate and continuous blood pressure data acquisition. The device uses optical techniques for generating blood pressure data. The device either generates and displays the blood pressure data locally or transmits the data via wireless techniques to a base unit for display or transmission to appropriate monitoring equipment.

B. Statement of Related Art

Non-invasive systems for continuous monitoring of blood pressure, for example during anesthesia, have been proposed in the prior art. Representative patents include the patents to Shimosita et al., U.S. Pat. No. 5,105,410; to the patents to Embhuele et al., U.S. Pat. Nos. 4,822,418 and 7,492,416; to Jones et al., U.S. Pat. No. 5,140,390; to Jackson et al., U.S. Pat. No. 4,865,046; and to Patel et al., U.S. Pat. No. 5,165,522. It is also known to use optical sensors as the means to acquire blood pressure data. See the patents to Butterfield et al., U.S. Pat. Nos. 5,006,027, 5,119,391, 5,235,412 and 5,273,546; and to Cowan, U.S. Pat. No. 5,304,174, and to Tenzer et al., U.S. Pat. No. 5,162,529. The above referenced patents are incorporated by reference herein.

**Also Published As**

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**Legal Events**

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**Claims (30)**

We claim:

1. A sensor assembly for acquiring blood pressure data from a patient, comprising:
   - A housing adapted to be placed adjacent to said patient with a hold down force in a location where said blood pressure data is to be acquired during use of said sensor assembly;
   - A source of light-emitting radiation directed to said patient;
   - A two-dimensional, flexible reflective surface, said reflective surface positioned relative to said radiation source such that said radiation travels in a direction normal to said reflective surface, and wherein said blood pressure data is to be acquired during use of said sensor assembly;
   - A two-dimensional array of photo-sensitive elements adjacent to the source of light-emitting radiation and the two-dimensional, flexible reflective surface, said array collecting radiation emitted from said source and reflected off said reflective surface, said two-dimensional array comprising an N×M array of the photo-sensitive elements where both N and M are greater than 1 for at least a portion of the two-dimensional array; and
   - A hold down sensor adapted for measuring said hold down force wherein movement of said flexible reflective surface due to blood pulsations in said patient causes scattering patterns of said radiation from said reflective surface to be detected by said two-dimensional array of photo-sensitive elements, said scattering patterns acquired by said array of photodetectors processed by said sensor assembly or in a remote processing unit into useful blood pressure data for said patient.

**Patent Citations (19)**

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<td>US5535355A</td>
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<td>1994-11-15</td>
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**Cited By (213)**

**Similar Documents**

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**Also Published As**

- EP1204376A4
- JP200359347A1
- DE6003532501
- EP1204376A1
- EP1204376B1
- CA2378116C
- WO2001960924A1
- CA2378146A1
METHOD OF TREATING ARTERIOVENOUS SHUNTS ACCOMPANYING CHRONIC VENOUS INSUFFICIENCY OF LOWER EXTREMITIES

Page bookmark: RU2013140381 (A) - METHOD OF TREATING ARTERIOVENOUS SHUNTS ACCOMPANYING CHRONIC VENOUS INSUFFICIENCY OF LOWER EXTREMITIES

Inventor(s): KHITARJAN ALEKSANDR GEORGEVICH, VELIEV KAMIL’ SAVINOVICH, GUSAREV DMITRIJ ALEKSANDROVICH, LEDENEV ANTON ALEKSANDROVICH

Abstract of RU2543270 (C1)

Translate this text into: [patenttranslate]

FIELD: medicine. SUBSTANCE: laser coagulation of arteriovenous angiodyplasia is preceded by the Intraoperative Doppler measurement of a blood velocity and an arteriovenous shunt diameter. A sphygmomanometer cuff is applied on the shin. A shunt region is located by means of a linear ultrasonic sensor. That is followed by the ultrasound-aided puncture of the arteriovenous shunt. A laser light guide of a diode laser is inserted through a catheter; the cuff pressure is injected until the blood circulation is completely stagnated in the subsurface portion of the arteriovenous shunt. The tissues surrounding the shunt are infiltrated by means of an anaesthetic solution until blood circulation is completely stagnated in the epifacial portion that is followed by laser coagulation. If the shunt diameter is 5 mm or more, the patient is exposed to a laser power of 15 W, and if the diameter is less than 5 mm, a laser power is specified to be 12 W. EFFECT: method enables providing higher effectiveness, reducing therapeutic injuries of the patients with arteriovenous fistulas of the lower extremities, achieving the high aesthetic effect, reducing a pain component by the applicability of adequate power and energy of the laser light.
Blood Test Device

Published: Apr 9, 2013  Family: 11  Non Patent Citations: 8
Cites: 55  Cited: 2  PDF

Abstract

A blood test device using a laser as a puncture member. More specifically, in a blood test device using a laser as a puncture member, the skin can be fixed at a definite position by raising the punctured skin under negative pressure, and thus the skin is brought into close contact with a blood sensor and the laser is focused on the vicinity of the blood sensor face. Thus, it is possible to provide a blood test device of the laser puncture type in which the skin can be surely punctured while giving little pain to a patient.

Claims

1. A blood test apparatus comprising:
   - an apparatus body;
   - a blood sensor that analyzes blood, the blood sensor having a storage that stores blood flowing from punctured skin and comprises an opening;
   - a holder that holds the blood sensor, the holder
Each patent search database has its strengths and weaknesses
  – Experiment with the different databases

Most databases offer structured or advanced searches

Read the help manuals
  – You can perform quite powerful searches if you understand the syntax

Syntax will vary from search engine to search engine
  – Google: OR "="=NOT, "*" only in phrase (laser * sensor)
  – Espacenet: AND, OR, NOT, “one two”, *, ?, #, prox/distance<n, …
  – Lens: field: *, ?, ~, TO, ^, Near/n,
Most patent offices provide online file histories
You can download and read the detailed objections raised by the patent examiners and the responses of patent applicants

IP Australia Auspat

USPTO PAIR:
- http://portal.uspto.gov/pair/PublicPair

EPO Register:
- https://register.epo.org/regviewer?lng=en
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Searching using names

- Applications list the applicant and inventors
  - These fields can then be searched to determine what IP a company of interest has
- Some caution is required
- The current owner may have acquired the patent from the original inventor
  - Assignments are not always recorded or recorded in a separate database, or it may occur after publication
- In the US, at least until quite recently, all applications were filed in the name of the inventors.
  - In most other countries applications are filed in the name of the owners
Patent Classification Systems

- All patent applications are classified based on the technology they relate to facilitate searching
- Several classification systems exist
  - Most have a hierarchical class structure
  - Patents can be classified in multiple classes
  - These are browsable and searchable
- For example the International Patent Classification system developed by WIPO currently includes about 70,000 divisions arranged in a hierarchical class structure
  - A=Health, A61=Medical Science, A61B=Diagnosis
  - A61B 5/00 is measuring for diagnostic purposes
Several Different Classification Systems

- WIPO developed the International Patent Classification (IPC) system
  - Used for PCT applications, and widely used by many national patent offices
- EPO developed an Extended Patent Classification System based on the IPC (ECLA)
  - Roughly doubled the number of IPC classes
- USPTO developed their own independent Patent Classification System
  - Completely different structure to IPC with 400 main classes and subclasses
- In 2013 EPO and USPTO established a Cooperative Classification system based on the ECLA
The Cooperative Classification System

- Developed by EPO and US in 2013 to create a unified system
  - Now also used by China and Korea
- Heavily based on IPC hierarchical structure
  - Around 140,000 divisions, expected to increase to around 200,000 divisions
- Section (one letter A to H and also Y)
  - Class (two digits)
    - Subclass (one letter)
      - Group (one to three digits)
        » Main group and subgroups (at least two digits)
The CPC is searchable or browsable via EPO or USPTO website

- EPO version is tightly linked to Espacenet, so you can copy classes across into the search form

Very worthwhile spending time researching relevant classes

Relevant classes can then be used to limit keyword searches
Cooperative Patent Classification
CPC classes for blood pressure measurements

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Example:

| A61B 5/00 | Detecting, measuring or recording for diagnostic purposes (radiation diagnosis A61B 5/00; diagnosis by ultrasonic, sonic or infrasonic waves A61B 800); Identification of persons (measuring or recording in general subclasses of G01; medical informatics G06F 19/03) |
| A61B 5/02 | Measuring in heart or blood vessels (A61B 5/0005 takes precedence) |
| A61B 5/0108 | (from analysis of pulse wave characteristics) |
| A61B 5/0216 | (of pulse wave amplitude (A61B 5/0225 takes precedence)) |
| A61B 5/0225 | (of pulse wave propagation time) |
| A61B 5/0233 | (by using induced vibration of the blood vessel) |
| A61B 5/0241 | (of apparatus construction, e.g. pump units or housings therefor, cuff, pressure metering systems, arrangements of fluid controls or circuits (A61B 5/0233, A61B 5/0235 take precedence)) |
| A61B 5/0215 | (by means inserted into the body (catheters A61M 25/00)) |
| A61B 5/0252 | (spatially adapted for venous pressure) |
| A61B 5/0254 | (by optical transmission) |
| A61B 5/0256 | (Calibration means) |
| A61B 5/0258 | (provided with two or more sensor elements) |
| A61B 5/0252 | (by applying pressure to close blood vessels, e.g. against the skin; Ophthalmodynamometers) |
| A61B 5/0208 | (by using the Korotkov method) |
| A61B 5/0216 | (Ophthalmodynamometers) |
| A61B 5/0225 | (by using the oscillometric method) |
| A61B 5/0233 | (Oculodriber styled specially adapted therefor (tourniquets A61B 17/132)) |
| A61B 5/0241 | (of small dimensions, e.g. adapted to fingers) |
| A61B 5/0225 | (the pressure being controlled by electric signals, e.g. derived from Korotkov sounds) |
| A61B 5/0255 | (the pressure being controlled by piezoelectric signals, e.g. derived from optical sensors) |
| A61B 5/023 | (the pressure transducers comprising a liquid column) |
Classification Search

Espacenet - Patent search

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Smart search | Advanced search | Classification search

Quick help
- Can I subscribe to an RSS feed of the result list?
- What does the RSS reader do with the result list?
- Can I export my result list?
- What happens if I click on Download covers?
- Why is the number of results sometimes only approximate?
- Why is the list limited to 500 results?
- Can I de-activate the highlighting?
- Why is it that certain documents are sometimes not displayed in the result list?
- Can I sort the result list?
- What happens if I click on the star icon?
- What are XP documents?
- Can I save my query?

Related links

Result list

- Approximately 21,254 results found in the Worldwide database for A61B5/021low as the Cooperative Patent Classification.
- Only the first 500 results are displayed.

Results are sorted by date of upload in database.

1. MONITORING APPARATUS
- Inventor: Nitoguchi, Koichi
- Applicant: Nihon Kohden Corp.
- CPC: A61B1/005
- IPC: A61B5/00
- Publication info: US5019987 (A1) 1999-01-06

2. CONTROLLING HEALTH SCREENING VIA ENTERTAINMENT EXPERIENCES
- Inventor: Deitz Paul Henry
- Applicant: Microsoft Corp.
- CPC: A61B5/042
- IPC: A61B5/00
- Publication info: US5019987 (A1) 1999-01-06

3. REMOTE FLASING DURING INFUSION
- Inventor: Haubert Donald
- Applicant: Carefusion 303 Inc.
- CPC: A61B5/02055
- IPC: A61B5/00
- Publication info: US5019987 (A1) 1999-01-06

4. COVERING FOR AN ENDOPROSTHETIC DEVICE AND METHODS OF USING FOR ANEURYSM TREATMENT
- Inventor: Richter Jacob
- Applicant: Medinol Ltd.
- CPC: A61B5/00
- IPC: A61F2/06
- Publication info: US5019987 (A1) 1999-01-06
Searching guidelines

• Break the problem into functional groups and develop a set of keywords for each feature
• Browse/Search patent classification systems to identify relevant classes
• Try different combinations of keywords and classes
• Scan abstracts and figures looking for potentially relevant documents
  – When you find something close, review your search terms and classes
• Keep a record of what you have searched
Keyword and classification search

1. Optical noninvasive blood pressure sensor and method

Applicant: MOTOROLA INC [US]
CPC: A61B5/021/08 A61B5/021/78 A61B5/021/75 (+3)
IPC: A61B5/00 A61B5/021 A61B5/022 (+2)
Publication info: US6533729 (B1) 2003-03-18
Priority date: 2000-05-10

1 result found in the Worldwide database for:
laser proxidistance<3 diode* reflect* in the title or abstract AND A61B5/021/low as the Cooperative Patent Classification
Optical noninvasive blood pressure sensor and method

Inventor(s):  
KHAIR MOHAMMAD [US]; LOPEZ SALVADOR [US]; NG RICHARD [US]; GHAEM SANJAR [US]; OLSON WILLIAM [US];

Application number:  
US20000569686 20000510

Abstract of US6553729 (B1)

A blood pressure sensor includes a source of photo-radiation, such as an array of laser diodes. The sensor also includes a two-dimensional, flexible reflective surface. The reflective surface is normally positioned relative to the radiation source such that the radiation travels in a direction normal to the reflective surface. The reflective surface is placed adjacent to the location on the patient where the blood pressure data is to be acquired. Radiation from the source is reflected off of the reflective surface onto a two-dimensional array of photo-detectors. Systolic and diastolic blood pressure fluctuations in the patient are translated into deflections of the patient's skin. These deflections cause corresponding deflections in the two dimensional reflective surface. The associated movement of said flexible reflective surface due to blood pulsation causes scattering patterns from said reflective surface to be detected by the two dimensional array of photo-detectors. The output from the array of photo-detectors is calibrated to blood pressure in mmHg during a calibration procedure to obtain a set of calibration relationships for one or more of the individual detectors. The calibration relationships are then used during acquisition of blood pressure data to arrive at blood pressure data.
**Limitations**

- Patent searching is a risk mitigation exercise
- All patent databases have limitations
  - Geographic and temporal coverage
- **Choice of keywords and classes will affect results**
  - Other applicant will use different words to explain the same function/component
  - Patents can be misclassified
- **Applications are published 18 months after filing**
  - Creates an unsearchable dead zone
  - These hidden applications can be used to destroy novelty, and in the US, to support an obviousness rejection
• **Define the legal monopoly of invention**
  – This is what is analysed in Court

• **Claims can be to product or method or both**

• **Often have claims directed to different types**
  – Method, apparatus, system, etc
  – Aim is to catch different infringers (actors) in a system
    • eg transmitter and receiver in a communication system

• **Usually have a hierarchical structure**
  – A broad claim followed by narrower dependent claims
  – This is to create fallback positions in case a main claim is invalidated, or to clearly define infringing behaviour
Understanding Patent Claims

- A patent claim is infringed if someone copies each and every feature of a claim
  - If you can avoid using a single feature, you avoid infringement
- Contributory infringement occurs when you perform most of the steps or produce a component of an infringing product and either
  - tell another party or provide instructions on how to perform the rest of the method or make the final infringing product rest, or
  - you supply a component whose only reasonable use is in an infringing product, or you supply a standard product knowing it will be used in an infringing product
Determining if a claim is infringed

- Often infringement will be determined based on the how specific terms or phrases are interpreted
  - What is the plain meaning of the term
    - Dictionary definition
  - What does the claim mean in the context of the specification
    - eg is “device” unitary?
  - What would the person skilled in the art interpret the term to mean
Infringement and Freedom to Operate

• Infringement occurs if someone copies each and every feature of a claim
• Freedom to Operate searching is performed to determine if a proposed product will infringe someone else’s patent
• This involves searching to
  – find what patents are currently in force in a target jurisdiction, and then
  – analysing the claims to determine if they are infringed
Freedom to Operate Searching

- Freedom to operate searching is a more refined version of novelty searching
- Perform general novelty searching, classification based searching and competitor name searches to identify potential patents of interest
- If a patent appears to be of possible concern, investigate if it is filed in a jurisdiction of interest
  - Check patent families (espacenet)
  - Perform searches in the jurisdiction of interest based on priority document, owners and inventors
Freedom to Operate Analysis

• If you discover a patent of possible concern there are a few formalities checks you should perform
  
• Is the patent still in force?
  – Check status - maintenance fees paid – not lapsed?

• Are any pending related applications?
  – Divisional, continuation, unexamined innovation patents

• Review the claims
  – Read these in the context of the specification
  – Do you include each and every feature?
  – Can you work around it?
Experimental Use (Research) Exemption to Patent Infringement

- Infringing acts done for an experimental purpose are exempt from patent infringement
  - This includes acts to determine the properties or scope of a claim, or to develop improvements or modifications
  - Does not cover use of patented research tools to investigate another patent

- Doesn’t matter if the ultimate aim of the research is to produce a competing product
  - The commercial product must be non infringing

- An exemption also exists for acts done for obtaining regulatory approval
Exemptions to patent infringement

• Certain activities are exempt from patent infringement

• A prior user exemption exists
  – This can occur where a person has secretly used the patented method to make a product prior to the filing of the patent
  – They can continue but they can’t license or assign the rights

• Similarly a person who had taken very definite steps to exploit a patent at the time of filing can continue
  – however the threshold is very high
  – effectively you must have completed the full design and simply awaiting final delivery of components for assembly, or be awaiting final delivery of completed products (eg if manufactured overseas) for sale to customers
Patent Searching for Market Research

- There is a wealth of information available in patent databases
- There are many searchable fields
  - Applicant and inventor names, Classification classes, titles, abstracts, filing dates
- You can use this to perform market research
  - Which entities are active in a particular area
  - What opportunities exist
Patent Landscape maps

• Sophisticated data mining techniques can be applied to databases

• WIPO have an ongoing project to produce reports to examine patenting trends

• Professional searching firms can perform searches and produce sophisticated reports
  • “Themescape” patent landscapes
Figure 4 - Thematic Concept Map of Assistive / Enhancement / Restoration Breakdown of Technology for Assistive Devices and Technologies for Visually and Hearing Impaired Persons
Patent Databases as a Technical Resource

• There are a huge number of published patent applications (> 90 million)

• These can be used as a source of technical information
  – Find solutions to similar problems

• This can be used to supplement marketing information
  – Find out details on how a specific product works
Any Questions?