



TYPE OF R+D RESULT

New technology
New product
New service
New knowledge or skill



COMMERCIAL MATURITY LEVEL

Model or conceptual idea
Proof of concept (design)
Validated in a controlled environment
Validated in a real environment
Successfully implanted



PROTECTION LEVEL

Non- applicable
Patent
Software
Know-how
Utility model

Invention title

Method for clinical assessment of vocal tract of patients with laryngeal pathologies by acoustic evaluation of voice quality

File number Priority date Status Country

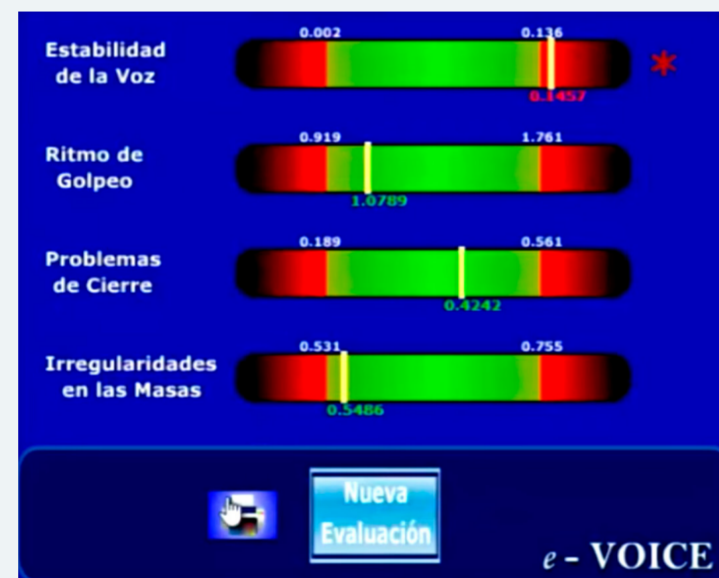
ES2432480_B2
06/01/2012
Granted
Spain

Description of the solution. Problem solved

Voice is the nuclear component of human communication. Considering that almost a third of working people works in jobs where their voices are fundamental tools, caring of alterations or communicative pathologies is becoming more important.

Nowadays, clinical assessment of a patient suffering from a laryngeal pathology consists in using techniques based on direct visual inspection of vocal cords. Generally, specialist physicians use thin tubes, which can be rigid or flexible (known as laryngoscopes or endoscopes) that are invasive and uncomfortable methods for patients.

The solution here proposed is a system (software) for assessing (via web) the voice quality of patients suffering from laryngeal and vocal tract pathologies by a voice recording. It is a very simple non-invasive system, since just few things are needed: a computer, a microphone and internet connection to log to the following website <http://evoice.ulpgc.es/> and, then create a voice recording pronouncing the vowel "a" for 5 seconds.



In less than one minute, the system allows to assess the following parameters:

- Voice stability;
- Closing problems;
- Beat rhythm;
- Irregularities in the mass.

For each one a numeric value is obtained and it is compared with normality ranges. In case any of the assessed aspects is out of these ranges, the system will identify a pathological voice, and in that case, it would be necessary to visit a specialist.

As a result, a report with all the values of the parameters assessed is obtained; and so, the system allows to document the existence of a normal voice or a pathological voice in all its intensity levels. In addition to

this, it is very useful for monitoring patients, because it can verify (objectively) improvements in certain parameters.

Fields of commercial application

These are the target sectors that may be interested in acquiring and exploiting the system:

- Medical equipment manufacturers.
- Pharmaceutical industry.
- Companies specialised in developing or providing voice processing services via internet or mobile devices, such as automated voice or speaker recognition, etc.
- Health insurance industry.
- Private clinics interested in high-tech service differentiation.
- Potential users:
 - Specialized medical professionals: Otolaryngologists, phoniaticians and logopaedists.
 - Medicine professionals: primary health care.
 - Voice rehabilitation professionals: phoniaticians.
 - Voice professionals: broadcasters, singers, teachers, etc.
 - Public healthcare systems and private clinics.

Market opportunity

Between 5% and 7% of the population of industrialised countries suffer from vocal tract disorders that require specialist treatment. This figure increases up to 22.5% in the case of teachers, singers, broadcasters and salespersons since they use voice as their working tool.

Organisms such as the World Health Organization have recognised these pathologies as occupational illnesses. This opens numerous chances for this protocol of tele-assessment that quantifies remotely voice quality, allowing to identify abnormal voice qualities from different origins and at low cost.

In this context, the opportunity lies in offering non-invasive, objective and measurable techniques for evaluating voice quality that improve healthcare quality on medical environment; as well as allow early detection of laryngeal pathologies and assessment of voice quality over time for better progress monitoring.

Examples of applications:

- Early detection: the system can be used in primary health care for outpatient monitoring, in which the patients' voices would be analysed periodically in order to detect laryngeal pathologies in an incipient stage. This type of monitoring could be done in a similar way to control of glucose levels, blood pressure, weight, etc.
- Progress monitoring: the system can be used to

assess the effectiveness of a treatment over time, thus being useful for pharmacological control. It can also be used to evaluate the effectiveness of a specific speech therapy.

- Telemedicine: the evaluation of the state of the voice can be done from any place with internet access, so this service can be useful for those patients who have difficulties to reach to outpatient departments. It can also be integrated in a healthcare model based on telecare.
- Vocal rehabilitation: Patients suffering from vocal pathologies could assess the effectiveness of a specific speech therapy.
- Medical-legal documentation: Results of a surgical intervention could be measured by analysing the patient's voice before and after the surgery.

Competitive advantage

Compared to current systems for detecting laryngeal pathologies existing in the market, the system hereby proposed has the following advantages:

- Accessibility: On-line system available at any time (24/7) and from anywhere (patient's location is not important.) Other systems are used in a local PC.
- Usability: Intuitive an easy-to-use design; assisted by sound and text messages that guide user during the process. Other systems are designed for being used by specialised staff.
- Universality: Patient can speak in any language. Other systems assess sentences in a certain language.
- Acceptability: System does not discriminate patients because of their cultural level, since it does not require to go through reading tests, which contributes to its acceptance among users. In other systems, reading skills condition the test results.
- Autonomy: It does not require the presence of specialised doctors, although they must interpret the resulting assessment. The system proposed has estimated the normality ranges related to different measures, and it does not consist in interpreting graphics, a task that can only be done by perfectly trained professionals.
- Convenience: It does not require any kind of instruments, being therefore non-invasive for patients. This is an advantage of this type of evaluations.
- Objectivity: The procedure is not based on subjective perceptions of voice quality, guaranteeing uniqueness in the resulting assessments. The system developed has been designed to avoid distortions in test results by the assessor.
- Immediacy: The result of this evaluation (previous visit to specialist) is obtained almost in real time in less than a minute.

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- Precision: The clinical studies carried out in medical environment had a success rate in identifying voice pathologies of 98%. These results are highly competitive compared to other products.

Considering the aforementioned advantages, it should be added that this telematic solution can be used for remote diagnostics, that clearly could be implemented in e-health or telemedicine fields. It also has potential for optimising the resources of healthcare systems, both public and private, since it is a valuable tool for the following procedures:

- Screening for detection of laryngeal pathologies in asymptomatic individuals.
- Triage in order to prioritise attention to patients, depending on the urgency of their conditions.

Resources needed to be implemented

Product and services development.

Application references

This systems is patented* and it has been tested in a study of acoustic assessment of vocal tract in clinical environments in cooperation with the Otorhinolaryngology Service of the Hospital Universitario de Gran Canaria "Doctor Negrín" (University Hospital of Gran Canaria "Doctor Negrín"). Also, its relevant social impact has been recognised since it has been used globally, with users registered in different parts of the world.

