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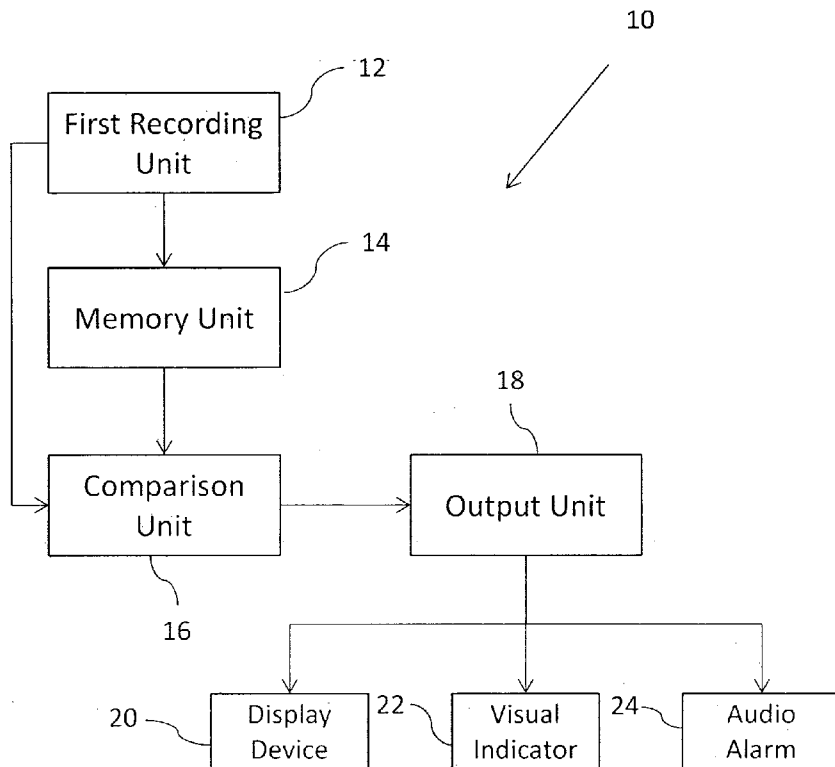
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(54) Title: METHOD AND SYSTEM FOR VERIFYING IDENTITY OF A PERSON



(57) Abstract: A method and system for verifying the identity of person using the voice of person have been provided. The system includes a recording unit, a memory device, a comparison unit and an output unit. The voice samples of the person appearing for an evaluation test of a selection process are recorded at the two separate instances and then compared using the comparison unit to check the identity of the person. The result of the comparison unit is then displayed on the output unit. A method of using the person verification system has also been disclosed.

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METHOD AND SYSTEM FOR VERIFYING IDENTITY OF A PERSON

BACKGROUND

5 Field of the invention

The present invention relates to a method and a system for verifying the identity of a person. More particularly, the present invention relates to the method and system for verifying the identity of the person in a process
10 using voice recognition.

Description of the related art

The selection of a right candidate for a particular job or selection of a right
15 person for a university/organization is always given as high importance. The selection involves multiple rounds of test/interviews. Sometimes, it is not always feasible for the candidate/person to physically present for the interview, test or the selection process. With the evolvement of the technology, a telephone based interviews, assessments (telephone based
20 and otherwise) in remote locations and selection process have become common these days. The telephone based method has been used by organizations/colleges/universities frequently for hiring the right candidates.

25 In addition to above scenario, there are various organizations/universities, outsource the hiring of their right candidate/person, preferably, for initial level shortlisting of the candidates. The general process includes, the outsourcing agency conducts the multiple level of examination of the person based on the requirement of the organization. They shortlist the
30 candidates and send them to organizations/universities for further rounds of interviews/selection process.

In yet another scenario, an assessment test is taken remotely for the evaluation for a course. This includes telephone-based tests taken at homes or computer based tests taken remotely for MOOCs (massively
5 online Open Courseware)

Few cases have been observed in the past, when the person who gave the interview over the telephone or taken the test at a remote location is different from the person who appeared for physical selection process or
10 who was actually designated to take the test. The organization also wants to make sure that the person who has been shortlisted by the outsourcing agency is the same person who appeared for the selection process. Thus a need exists to remotely check the identity of the person over a communications network. It needs to be checked that the same person
15 who has appeared for the telephonic interview or test is finally joining the organization.

Few methods and systems have been used in the past to check the identity of the person. For example, many user identification systems
20 comprise simple password systems, where the user provides a password, or keypunches in a multi-character alphanumeric code to obtain access to the system. In another example, photo based verifying techniques have also been used, but they are not reliable.

25 While various other techniques have been used in the past, there is still room for the development and innovation. Thus a need persists for the further contributions in this field of the technology.

SUMMARY

30

An object of the present invention is to provide a system and method for verifying the identity of a person based on a speaker recognition system

Another object of the present invention is to provide a system and method to compare and assess the voice samples of the person recorded at
5 separate instances of a process.

Embodiments of the invention provide a system for verifying the identity of a person. The system includes a recording unit for recording a first sample
10 of voice of the person at a first instance, a memory unit for storing the voice recorded at the first instance, a comparison unit and an output unit. The first instance is an instance at which the person appears for an evaluation test in a process for the first time. The comparison unit compares a second sample of voice recorded at a second instance with
15 the first sample of voice recorded at the first instance to provide a result on the output unit.

BRIEF DESCRIPTION OF DRAWINGS

20 The features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. Embodiments of the present invention will hereinafter be described in conjunction with the appended drawings provided to illustrate and not to limit the scope of the claims, wherein like designations denote like elements, and in which:

25

Fig. 1 shows a block diagram of a system for verifying the identity of a person, in accordance with various embodiments of the present invention; and

Fig. 2 is a flowchart showing the steps involved in verifying the identity of the person using the system described in Fig. 1 in accordance with various embodiments of the present invention.

5 DETAILED DESCRIPTION OF EMBODIMENTS

As used in the specification and claims, the singular forms “a”, “an” and “the” include plural references unless the context clearly dictates otherwise. For example, the term “an article” may include a plurality of
10 articles unless the context clearly dictates otherwise.

There may be additional components described in the foregoing application that are not depicted on one of the described drawings. In the event such a component is described, but not depicted in a drawing, the
15 absence of such a drawing should not be considered as an omission of such design from the specification.

As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments
20 are merely exemplary of the invention, which can be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately
25 detailed structure. Further, the terms and phrases used herein are not intended to be limiting but rather to provide an understandable description of the invention.

A block diagram of a system 10 for verifying the identity of a person is
30 shown in **Fig. 1**, in accordance with various embodiments of the present invention. The system 10 is configured to verify the identity of the person if

an interview, a selection process or a test requires the involvement of the person more than once. The system 10 is also configured to verify that the same person is joining the organization/university who has gone through the selection process. The person appearing for the process may be a student taking a test from a remote location, a candidate for job application, a student for entry in the institute/university or any other person which needs to be verified for any process.

The system 10 includes a recording unit 12, a memory unit 14, a comparison unit 16 and an output unit 18 as shown in Fig. 1. It should be appreciated that the system 10 is not limited only to the components which are described herein. The system 10 may include more or less components in various other embodiments of the present invention.

The recording unit 12 is configured to record a first voice sample of the person appearing for an evaluation test of a selection process. The first instance is defined as an instance at which the person is appeared for the evaluation test for the first time. At the first instance, the person is asked to provide one or more voice samples.

The input of the voice sample is provided through at least one of a microphone, a landline telephone, a mobile phone or any other similar communication devices. The voice samples may be recorded at regular intervals or recorded continuously.

The voice samples in each instance can be recorded by at least one or combination of the following means: reading a given text provided to the person and speaking it; listening the speech by an evaluator and repeating it by the person; speaking anything by the person as per his/her wish; speaking on a particular topic given by the evaluator; or any other topic

chosen by the person himself/herself or voice samples captured during an evaluation test.

At the first instance, the person is asked to go through the evaluation test.

5 The evaluation test at the first instance is at least one of the following: a computer based test, a paper-pencil based subjective test, a multiple choice based test, a simulation based test, an interview, a simulation, a voice based test activated from a computer, and an IVR based test or a mix of above mentioned tests. The evaluation test can be performed either
10 before the recording of the first sample of voice at the first instance, after the recording of the first sample of voice at the first instance or simultaneously with the recording of the first sample of voice at the first instance.

15 The first sample of voice recorded at the first instance is stored in the memory unit 14. A particular reference number is given corresponding to the particular person appearing for the selection process. The reference number is used for future reference for the person. A database is created inside the memory unit 14 of the system. The database contains the voice
20 samples of everyone who has appeared for the selection process.

The recording unit 12 is also used to record a second sample of voice of the person at a second instance. It should be appreciated that a separate recording unit may also be used at the second instance in an embodiment
25 of the disclosure. The second instance is an instance at which the person reappears for the selection process. In an example, the second instance is defined as the person appears for 2nd or 3rd or further evaluations as a part of the selection process. In another example, the second instance is referred as the person is going to join an organization/university after
30 successfully qualifying the evaluation test taken by an outsourcing agency.

The evaluation test was conducted by the outsourcing agency at the first instance.

5 The comparison unit 16 receives input from the memory unit 14 and the recording unit 12. The comparison unit 16 is configured to compare the second sample of voice recorded at the second instance with the first sample of voice stored in the memory unit 14. The output of the comparison unit 16 is given to the output unit 18.

10 In an embodiment of the disclosure, the output unit 18 is provided as at least one of a display device 20, a visual indicator 22, an IVR based indicator (automated or manual call), through an SMS, through an MIS on the internet or an audio alarm 24. The output unit 18 indicates the result of comparison performed by the comparison unit 16. The visual indicator 22
15 may include lights of various colour representing different outputs.

The output unit 18 indicates 'YES' if the voice sample recorded at the second instance matches with the voice sample recorded at the first instance. The output unit 18 indicates 'NO', if the voice sample recorded at
20 the second instance does not match with the voice sample recorded at the first instance. The output unit 18 indicates 'MORE SAMPLE NEEDED' if the comparison unit 16 is not able to compare the voice samples recorded at the first instance and the second instance. In any other possibilities, the output unit 18 can also indicate 'CAN'T SAY'. In the visual indicator 22,
25 colour codes are defined to indicate 'YES', 'NO', 'MORE SAMPLE NEEDED' and 'CAN'T SAY, for example, Green for 'YES', Red for 'NO' etc. In case the voice samples are not matched by the comparison unit 16, the person may also be asked again to record the voice samples and match. The output unit 18 can also provide a subjective or objective
30 confidence measure on the correctness of the output at the second

instance. The same person may be verified more than once after the first instance.

The matching of voice samples recorded at the first instance and the
5 second instance can be performed automatically or manually or by both
means. The comparison unit 16 uses an algorithm for matching the voice
samples recorded at the instances. The algorithm is based on one or more
of the following: speech processing, speech analysis, speech recognition,
speaker recognition and identification, crowdsourcing, machine learning or
10 pattern recognition. It should be appreciated that any other matching
technique can also be used for matching the voice samples.

In another embodiment of the invention, the system 10 is also used for
verifying the identity of a student giving test/examination from a remote
15 location. In this case, the student is asked to take the test at home on a
phone/computer at the first instance. The student is asked to record the
first sample of voice at home. The first sample of voice is saved in the
memory unit 14. At the later stage i.e. at the second instance, when the
student is present in the school, teacher can ask the student to record the
20 second sample of voice of the student. The comparison unit 16 matches
the first sample of voice and the second sample of voice of the student to
verify that the student who was assigned for the test took it.

Fig. 2 shows a flow chart 100 indicating the steps involved for verifying
25 identity of the person using the system 10, in accordance with various
embodiment of the invention. At step 102, a first sample of voice of the
person is recorded at a first instance using the recording unit 12. At step
104, the person is appeared for the evaluation test for a selection process
for the first time. It should be appreciated that the step 102 and 104 can
30 be performed in any order. It should also be appreciated that the step 102
and 104 can also be performed simultaneously. At step 106, the first

sample of voice recorded at step 102 are saved in a memory unit 14. The step 106 can be performed automatically or manually or by mix of both automatically and manually by an evaluator. At step 108, the second sample of voice of the person is recorded at a second instance. The
5 second instance is an instance at which the person reappears for the selection process. At step 110, the first sample of voice recorded at the first instance is compared with the second sample of voice recorded at the second instance by the comparison unit 16. And finally at step 112, the results of the comparison unit 16 are indicated at the output unit 18.

10

In an embodiment of the invention, the algorithm may also use other information, biometric or otherwise, about the person or the two instances to establish a match between more than two appearances of a person.

15

In an illustrative embodiment of the invention, the person takes an interactive voice response (IVR) based evaluation test of spoken English at the first instance. The IVR based test is conducted by dialing in a phone number using a landline or mobile phone. The voice sample is recorded from the person's speech during the evaluation test. At the second
20 instance, the person comes for further evaluation process for a job or educational institution admission, either by being shortlisted through the scores of the first test or otherwise. The person, at the second instance, again calls a number and provides a voice sample. Both the voice samples from the first instance and the second instance are matched
25 automatically and the match or deviance output is provided by one or more of the following: phone, computer database, otherwise.

30

In another illustrative embodiment of the invention, the person takes computer based test, which may or may not be a speech based test, in the first instance. The person provides a voice sample by speaking in a
30 microphone or over a phone call by dialing a number just before, just after

or during the test. At the second instance, the person comes for further evaluation process for a job or educational institution admission, either by being shortlisted through the scores of the first test or otherwise. The person, at the second instance, again calls a number and provides a voice sample. Both the voice samples are matched automatically and the match or deviance output is provided by one or more of the following: phone, computer database, otherwise.

The present invention has been described herein with reference to a particular embodiment for a particular application. Although selected embodiments have been illustrated and described in detail, it may be understood that various substitutions and alterations are possible. Those having ordinary skill in the art and access to the present teachings may recognize additional various substitutions and alterations are also possible without departing from the spirit and scope of the present invention, and as defined by the following claims.

WHAT IS CLAIMED IS:

1. A system for verifying identity of a person, the system comprising:
 - a recording unit for recording a first sample of voice of the person at
5 a first instance, wherein the first instance is an instance at which the
person appears for an evaluation test for the first time in a process;
 - a memory unit for storing the first sample of voice recorded at the
first instance;
 - a comparison unit configured to compare a second sample of voice
10 of the person recorded at a second instance with the first sample of
voice, wherein the second instance is an instance at which the person
reappears in the process; and
 - an output unit for indicating a result of the comparison performed by
the comparison unit.
- 15 2. The system of claim 1, wherein the process is at least one of a
recruitment process of a candidate appearing for a job, a university
admission process, and taking an examination by a student from a
remote location.
- 20 3. The system of claim 1, wherein the evaluation test is one of a computer
based test, a tablet based test, a paper-pencil based subjective or
multiple choice based test, a simulation based test, an interview, a
simulation, a voice based test activated from a computer, an IVR based
25 test and a mix of these.
4. The system of claim 1, wherein the first sample of voice at the first
instance and second sample of voice at the second instance are
captured by at least one of reading a given text and speaking, listening
30 to a speech and repeating, speaking anything that the person wishes,

speaking on a given topic or voice samples captured during the evaluation process conversation.

- 5 5. The system of claim 1, wherein the first recording unit is at least one of a microphone, mobile phone, and a landline telephone.
- 10 6. The system of claim 1, wherein the first sample of voice at the first instance and second sample of voice at the second instance are captured by at least one of reading a given text and speaking, listening to a speech and repeating, speaking anything that the person wishes, speaking on a given topic or voice samples captured during the evaluation process conversation.
- 15 7. The system of claim 1, wherein the result is at least one of a Yes, No, Cannot say or More sample needed.
8. The system of claim 1, wherein the result is indicative of the confidence measure of the person at the second instance.
- 20 9. A method for verifying identity of a person, the method comprising:
 recording a first sample of voice of the person at a first instance using a recording unit, wherein the first instance is an instance at which the person appears for an evaluation test of a selection process for the first time;
 saving the first sample of voice recorded at the first instance in a memory unit;
 recording a second sample of voice of the person at a second instance, wherein the second instance is an instance at which the person reappears for the selection process;

comparing the first sample of voice recorded at the first instance and the second sample of voice recorded at the second instance using a comparison unit; and

5 indicating a result of the comparison performed by the comparison unit on an output unit.

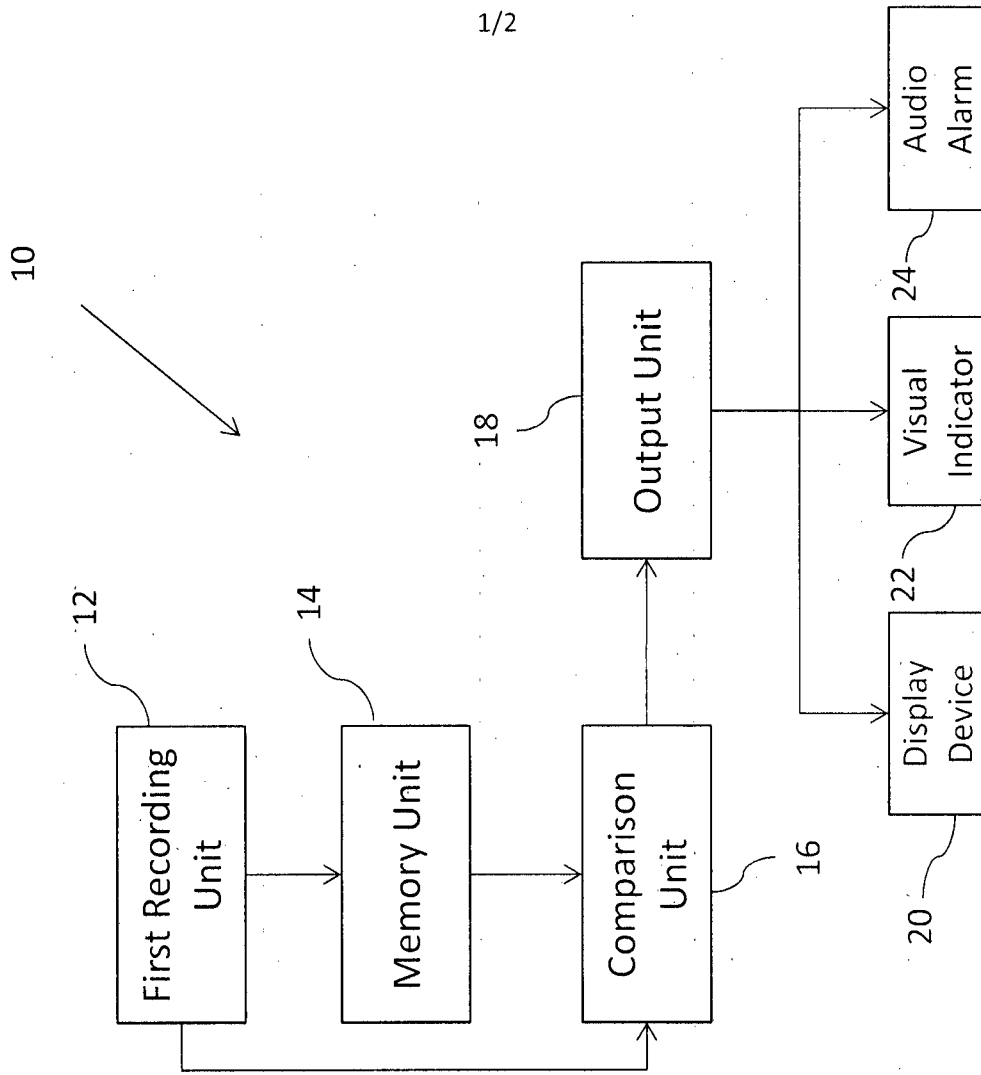
10. A system for verifying identity of a student taking an examination from a remote location, the system comprising:

10 a recording unit for recording a first sample of voice of the student at a first instance, wherein the first instance is an instance at which the student appears for the examination at the remote location;

a memory unit for storing the first sample of voice recorded at the first instance;

15 a comparison unit configured to compare a second sample of voice of the student recorded at a second instance with the first sample of voice, wherein the second instance is an instance at which the student is present in a school, college or training institution; and

20 an output unit for indicating a result of the comparison performed by the comparison unit.



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Fig. 1

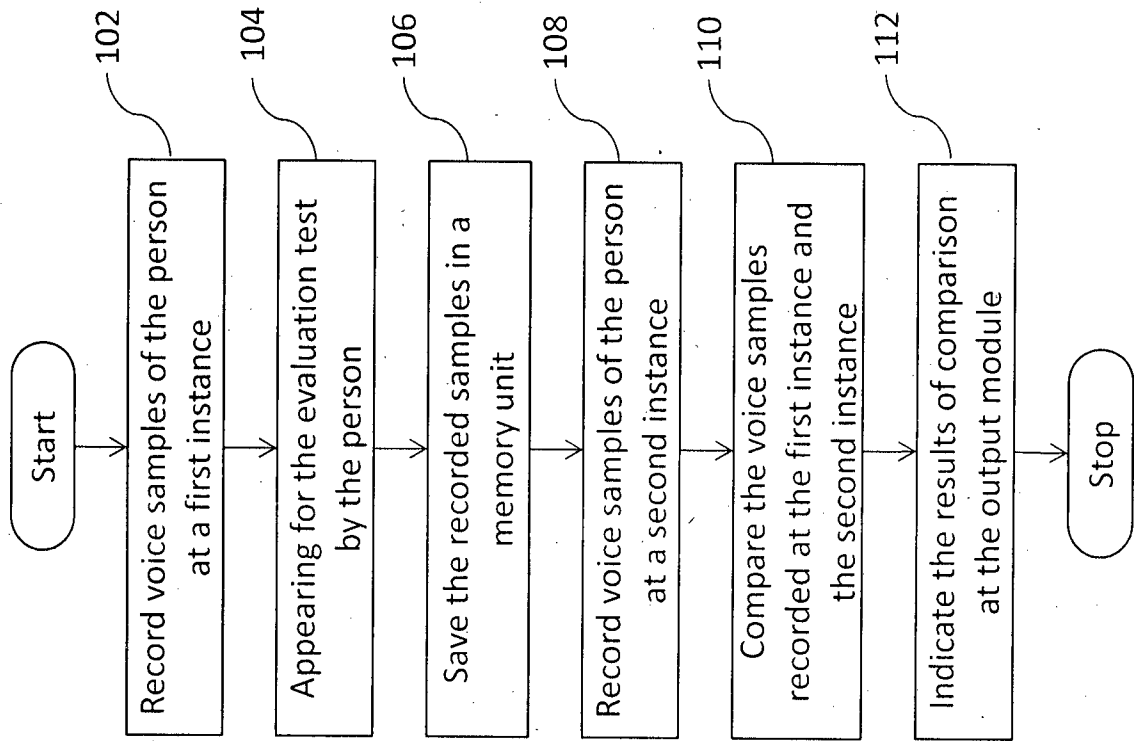


Fig. 2

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INTERNATIONAL SEARCH REPORT

International application No PCT/IN2013/000449

A. CLASSIFICATION OF SUBJECT MATTER INV. G10L17/00 ADD. G06F21/32 G09B5/00 G07C9/00 H04L29/06				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) G10L G06F G09B G07C H04L G06Q H04M				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 2002/087893 A1 (SHPIRO ZEEV [IL] ET AL) 4 July 2002 (2002-07-04) paragraphs [0010], [0032] - [0038], [0047] figures 2,4 -----	1-10		
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<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.</td> <td style="width: 50%; border: none;"><input checked="" type="checkbox"/> See patent family annex.</td> </tr> </table>			<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.	<input checked="" type="checkbox"/> See patent family annex.
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.	<input checked="" type="checkbox"/> See patent family annex.			
* Special categories of cited documents :				
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search	Date of mailing of the international search report			
15 October 2013	23/10/2013			
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Geißler, Christian			

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Information on patent family members

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