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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/864,831	03/25/2014	8682671	N0484.70944US01	7517

91337 7590 03/05/2014
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Darren C. Meyer, Duxbury, MA;
Stephen R. Springer, Needham, MA;
NUANCE COMMUNICATIONS, INC., Burlington, MA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Samsung v. Cerence
IPR2025-00458
Exhibit 1004

PART B -FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

91337
WOLF, GREENFIELD & SACKS, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Eileen MacKenzie (Depositor's name)
Eileen MacKenzie (Signature)
VIA EFS 1-23-14 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01	7517

TITLE OF INVENTION: METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960.00	$0.00		$960.00	01/25/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
M. C. Colucci	2658	

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - [ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - [ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
   1 Wolf, Greenfield & Sacks, P.C.
   2
   3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Nuance Communications, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Burlington, Massachusetts

Please check the appropriate assignee category or categories (will not be printed on the patent): [ ] Individual [X] Corporation or other private group entity [ ] Government

4a. The following fee(s) are submitted:
- [X] Issue Fee
- [ ] Publication Fee (No small entity discount permitted)
- [ ] Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
- [ ] A check is enclosed.
- [X] Payment by credit card. ~~Form PTO-2038 is attached.~~
- [X] The Director is hereby authorized to ~~charge the required fee(s), any deficiency, or~~ credit any overpayment, to Deposit Account Number 23/2825 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- [ ] Applicant certifying micro entity status. See 37 CFR 1.29. NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- [ ] Applicant asserts small entity status. See 37 CFR 1.27. NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- [ ] Applicant changing to regular undiscounted fee status. NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature Elisabeth Hunt Date 1/23/14

Typed or printed name Elisabeth H. Hunt, Ph.D. Registration No. 67,336

Docket No.: N0484.70944US01
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Darren C. Meyer
Application No.:	13/864,831
Confirmation No.:	7517
Filed:	April 17, 2013
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	M. C. Colucci
Art Unit:	2658

Certificate of Electronic Filing Under 37 CFR 1.8
I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).
Dated: 1-23-14 Signature: Eileen MacKenzie

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE UNDER 37 C.F.R. § 1.104(e)

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

Applicant has received the Examiner's Statement of Reasons for Allowance with the Notice of Allowance mailed October 25, 2013, regarding the above-identified application. Entry of the Statement into the record should not be construed as any agreement with or acquiescence in the reasoning stated by the Examiner. The Examiner's Statement was not prepared by the Assignee, and any interpretation with respect to the Examiner's Statement of Reasons for Allowance should not be imputed to the Assignee.

The Examiner's Statement discusses the allowability of independent claims 7, 14 and 21 together rather than individually. In doing so, the Statement describes some of the subject matter of

one independent claim – claim 1. The other independent claims do not all recite limitations corresponding to all of the subject matter described in that paragraph. Claim 21, for example, does not include language reciting, "identifying a first portion of a first text string of the plurality of text strings as differing from a corresponding first portion of a second text string of the plurality of text strings, and a second portion of the first text string as not differing from a corresponding second portion of the second text string; assigning contrastive stress to the identified first portion of the first text string, but not to the identified second portion of the first text string." Accordingly, the Assignee does not interpret the Examiner's reasons for allowance of the claims to be limited by all of the subject matter recited in that paragraph, but rather interprets the Statement only to indicate that each of the claims recites a combination of limitations that distinguishes over the art of record.

The Examiner's Statement contains a number of assertions regarding features allegedly taught by various cited references and limitations of the claims that are believed to be absent in the references. The Assignee believes that it is unnecessary to address these assertions at this time, as the determinative issue is agreement that the claims as a whole patentably distinguish over the art of record. Furthermore, the Assignee notes that the Examiner's Statement discusses several references (e.g., Lyberg, Tarlton, Polanyi) that were not relied on as the basis for any rejection of the claims. The Assignee has not made any assertions in this application regarding the teachings of these references, and the Examiner's statements as to which limitations of the claims distinguish over each of these references should not be attributed to the Assignee.

At page 3, the Examiner's Statement states (emphasis in original):

> The claims are interpreted as follows, for instance the sentence example of the present invention:
>
> "Flight number X was originally scheduled to depart at 8:00 but is now scheduled to depart at 10:00"
>
> i) In this sentence "8:00" is the first portion of a first text string (1,1) and "10:00" is the first portion of a second string (1,2). Both (1,1) and (1,2) **differ**.

> ii) "scheduled to depart" is the second portion of a first string (2,1) and is *also* the second portion of a second string (2,2). Both (2,1) and (2,2) **do NOT differ**.

The Assignee believes that this statement was intended by the Examiner merely to illustrate how a particular example might (in the Examiner's opinion) embody certain claims, and not to suggest that any claim is allowable for any reason other than the language in the claim itself and any claims from which it depends. Furthermore, the Assignee notes that the "sentence example" given by the Examiner's Statement does not accurately correspond to any example given in the specification of the present application. For instance, the example given in FIG. 3A of the specification is, "Flight number 1345 was originally scheduled to depart at 10:45 a.m., but is now scheduled to depart at 11:45 a.m." The specification (page 33, lines 14-20) explains that "'eleven' is the part of '11:45 a.m.' that differs from and contrasts with the 'ten' of '10:45 a.m.' (i.e., the 'forty_five' and the 'a.m.' do not differ or contrast)." It should be appreciated, however, that each of the claims is limited only by the claim language itself, and not by any particular exemplary embodiment provided by the Examiner or set forth in the specification.

The Examiner's Statement continues at pages 4-5 to opine as to how "the principles of reference A" might be applied to the "sentence example" created by the Examiner. These assertions should not be attributed to the Assignee, and while the Assignee agrees that each of the claims of the present application patentably distinguishes over the art of record, the Assignee does not necessarily agree with the Examiner's specific characterization of the reference.

At page 5, the Examiner's Statement asserts that, "[w]hen searching for additional prior art for the limitation as recited in claims 7, 14 and 21 the most relevant topics pertained to material from the same Inventor and Assignee." The Statement does not identify the referenced "material from the same Inventor and Assignee," and the Assignee has not made any assertions in this application regarding these purported references. The Examiner's statement should not be attributed to the Assignee, nor should any agreement with the statement be imputed to the Assignee.

If the Examiner disagrees with any of the foregoing, he is requested to contact the undersigned to discuss how the record may be clarified.

If there is a fee occasioned by this response that is not covered by an enclosed payment, please charge our Deposit Account No. 23/2825 under Docket No. N0484.70944US01 from which the undersigned is authorized to draw.

Dated: 1/23/14

Respectfully submitted,
Nuance Communications, Inc.

By _____

Richard F. Giunta
Registration No.: 36,149
Elisabeth H. Hunt, Ph.D.
Registration No.: 67,336
WOLF, GREENFIELD & SACKS, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
617.646.8000

Electronic Patent Application Fee Transmittal

Application Number:	13864831
Filing Date:	17-Apr-2013
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Filer:	Elisabeth H. Hunt/Eileen MacKenzie
Attorney Docket Number:	N0484.70944US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	18008990
Application Number:	13864831
International Application Number:	
Confirmation Number:	7517
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	91337
Filer:	Elisabeth H. Hunt/Eileen MacKenzie
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US01
Receipt Date:	23-JAN-2014
Filing Date:	17-APR-2013
Time Stamp:	17:41:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$960
RAM confirmation Number	4853
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	N048470944US01-TRN-EHH.PDF	56298 e963143d4c9cc581d53590384ee8ff88fa3fc19c	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	N048470944US01-FEETRN-EHH.PDF	79239 72853380eea8a463a047088cc1b6a3e127d8953d	no	1
Warnings:					
Information:					
3	Issue Fee Payment (PTO-85B)	N048470944US01-ISSFEE-EHH.PDF	100085 612b0748cab55f96dccb0318553bb7e7b644c6e0	no	1
Warnings:					
Information:					
4	Post Allowance Communication - Incoming	N048470944US01-CSRA-EHH.PDF	181536 d74ce70a16191fd8ce381600deb3ac37bcd61c70	no	4
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30590 16341bdec7db98ac4e9127a5d0beb0616129b346	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	447748	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/21 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	

Application Number	13/864,831-Conf. #7517
Filing Date	April 17, 2013
First Named Inventor	Darren C. Meyer
Art Unit	2658
Examiner Name	M. C. Colucci
Attorney Docket Number	N0484.70944US01

ENCLOSURES (*Check all that apply*)

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please identify below):

PART B - FEE(S) TRANSMITTAL

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature	Elisabeth Hunt		
Printed name	Elisabeth H. Hunt, Ph.D.		
Date	1/23/14	Reg. No.	67,336

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 1-23-14 Signature: Eileen MacKenzie

PTO/SB/17 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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FEE TRANSMITTAL

Complete if known	
Application Number	13/864,831-Conf. #7517
Filing Date	April 17, 2013
First Named Inventor	Darren C. Meyer
Examiner Name	M. C. Colucci
Art Unit	2658
Practitioner Docket No.	N0484.70944US01

☐ Applicant asserts small entity status. See 37 CFR 1.27

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously

TOTAL AMOUNT OF PAYMENT ($) 960.00

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☐ Deposit Account Deposit Account Number: 23/2825 Deposit Account Name: Wolf, Greenfield & Sacks, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**Fees Paid ($)**
Utility	280	140*	70	600	300	150	720	360	180	
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	**Undiscounted Fee ($)**	**Small Entity Fee ($)**	**Micro Entity Fee ($)**
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims 20 - 20 or HP = _____ **Extra Claims** x **Fee ($)** _____ = **Fee Paid ($)** _____

HP = highest number of total claims paid for, if greater than 20.

Multiple Dependent Claims **Fee ($)** _____ **Fee Paid ($)** _____

Indep. Claims 3 - 3 or HP = _____ **Extra Claims** x **Fee ($)** _____ = **Fee Paid ($)** _____

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets _____ - 100 = _____ **Extra Sheets** /50 = _____ **Number of each additional 50 or fraction thereof** (round **up** to a whole number) x _____ **Fee ($)** = **Fee Paid ($)** _____

4. OTHER FEE(S) **Fees Paid ($)**

Non-English specification, $130 fee (no small or micro entity discount) _____

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity) _____

Other (e.g., late filing surcharge): 1501 Utility issue fee 960.00

SUBMITTED BY

Signature	Elisabeth Hunt	Registration No. (Attorney/Agent)	67,336	Telephone	617.646.8000
Name (Print/Type)	Elisabeth H. Hunt, Ph.D.			Date	1/23/14

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 1-23-14 Signature: Eileen MacKenzie)

3395637.1

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
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NOTICE OF ALLOWANCE AND FEE(S) DUE

91337 7590 10/25/2013
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

EXAMINER
COLUCCI, MICHAEL C

ART UNIT	PAPER NUMBER
2658	

DATE MAILED: 10/25/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01	7517

TITLE OF INVENTION: METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	01/27/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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91337 7590 10/25/2013
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600 Atlantic Avenue
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Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01	7517

TITLE OF INVENTION: METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	01/27/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
COLUCCI, MICHAEL C	2658	704-260000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29	NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27	NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.	NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01	7517

91337 7590 10/25/2013
Nuance Communications, Inc.
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600 Atlantic Avenue
Boston, MA 02210-2206

EXAMINER
COLUCCI, MICHAEL C

ART UNIT	PAPER NUMBER
2658	

DATE MAILED: 10/25/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and December 31, 2013

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to $0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

Notice of Allowability	Application No. 13/864,831	Applicant(s) MEYER ET AL.	
	Examiner MICHAEL COLUCCI	Art Unit 2658	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *10/13/2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are *7-26*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/MICHAEL COLUCCI/
Primary Examiner, Art Unit 2658

DETAILED ACTION

The terminal disclaimer from 09/26/2013 has been approved.

Allowable Subject Matter

1. Claims 7-26 are allowed.

2. The following is an examiner's statement of reasons for allowance:

After careful review of the amended claims, Examiner believes that the prior art taken alone or in combination fails to teach the complex claim limitations, such as "speech synthesis output" with the following:

"identifying a first portion of a first text string of the plurality of text strings as differing from a corresponding first portion of a second text string of the plurality of text strings, and a second portion of the first text string as not differing from a corresponding second portion of the second text string;

assigning contrastive stress to the identified first portion of the first text string, but not to the identified second portion of the first text string"

All claims were considered in light of the specification and are believed to overcome the current references used for rejection, particularly the closest:

A	US 20090048843 A1	US-PGPUB	NITISAROJ et al.	20090219

B	US 6389396 B1	USPAT	Lyberg	20020514
C	US 20050027523 A1	US-PGPUB	Tarlton et al.	20050203
D	US 7455522 B2	USPAT	Polanyi et al.	20081125
E	US 20020072908 A1	US-PGPUB	Case et al.	20020613

Independent claims 7, 14, and 21 are allowed because while the prior art teaches adding intonation and stress to output synthesis speech, there is limited prior art that teach the specific claim limitations of the present invention. References B-E read upon general stress added to output synthesized speech and the existence of general contrastive stress. The closest reference A teaches contrastive stress similar to the present invention but lacking key portions.

The claims are interpreted as follows, for instance the sentence example of the present invention:

"Flight number X was originally scheduled to depart at 8:00 but is now scheduled to depart at 10:00"

i) In this sentence "8:00" is the first portion of a first text string (1,1) and "10:00" is the first portion of a second string (1,2). Both (1,1) and (1,2) **differ**.

ii) "scheduled to depart" is the second portion of a first string (2,1) and is *also* the second portion of a second string (2,2). Both (2,1) and (2,2) **do NOT differ**.

Now take the closest prior art A) sentence example:

"Tom wants to go there, but Jack doesn't"

i) In this sentence "Tom" is the first portion of a first text string (1,1) and "Jack" is the first portion of a second string (1,2). Both (1,1) and (1,2) **differ**.

ii) "wants to go" is the second portion of a first string (2,1) and "doesn't" is the second portion of a second string (2,2). Both (2,1) and (2,2) **differ**.

If the principles of reference A are applied to the claims the sentence would read as

"Flight number X was originally (2,1) 8:00 (1,1) but is now (2,2) 10:00 (1,2)".

Or

"Flight number X was originally scheduled for (2,1) 8:00 (1,1) but is now scheduled for (2,2) 10:00 (1,2)".

Notice that in either example even with "scheduled for" appearing in both portions, the teachings of A would not allow for its identification. Even if it identify the portion alone would not be the same i.e. does not differ as claimed, that is there could not be a second portion of the first text string that *does not differ* from a corresponding second portion of the second text string in the teachings of reference A. Assuming that A simplifies the goal of the claims, it still doesn't not identify separate sets of differing and non-differing elements in a sentence, but instead will identify traditional contrastive stress for synthesis in its basic form such as one object contrasting another with red flag terms "but", "however". The present invention can perform the operations of reference

A, however reference A cannot handle the operations as defined in the claim language with non-differing portions of text. Even with elements i) as defined above being similar elements ii) will not be performed the same when a sentence even containing non-differing terms is identified, since reference consistently attempts to identify terms that severely contrast. Assuming the sentences are identical being input into A and the present invention, the combination of A-E at best teaches identifying contrastive stress in a strict and basic way for speech synthesis. Therefore the combination of A-E taken in any order fails to teach or suggest the complex claim limitations.

When searching for additional prior art for the limitation as recited in claims 7, 14, and 21 the most relevant topics pertained to material from the same Inventor and Assignee but did not teach or suggest the aforementioned limitation of claims 7, 14, and 21. Further, all claims dependent on claims 7, 14, and 21 are allowed because they further limit their respective parent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Colucci whose telephone number is (571)-270-1847. The examiner can normally be reached on 9:30 am - 6:00 pm, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571)-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL COLUCCI/

Primary Examiner, Art Unit 2658

(571)-270-1847
Examiner FAX: (571)-270-2847

Michael.Colucci@uspto.gov

Notice of References Cited	Application/Control No. 13/864,831	Applicant(s)/Patent Under Reexamination MEYER ET AL.	
	Examiner MICHAEL COLUCCI	Art Unit 2658	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,389,396 B1	05-2002	Lyberg, Bertil	704/258
*	B	US-2002/0072908 A1	06-2002	Case et al.	704/260
*	C	US-6,665,641 B1	12-2003	Coorman et al.	704/260
*	D	US-2004/0030555 A1	02-2004	van Santen, Jan P.H.	704/260
*	E	US-2004/0049391 A1	03-2004	Polanyi et al.	704/271
*	F	US-2004/0197750 A1	10-2004	Donaher et al.	434/236
*	G	US-2005/0027523 A1	02-2005	Tarlton et al.	704/234
*	H	US-7,455,522 B2	11-2008	Polanyi et al.	434/178
*	I	US-2009/0048843 A1	02-2009	NITISAROJ et al.	704/260
*	J	US-7,519,531 B2	04-2009	Acero et al.	704/209
*	K	US-7,565,292 B2	07-2009	Deng et al.	704/260
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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BIB DATA SHEET

CONFIRMATION NO. 7517

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/864,831	04/17/2013 **RULE**	704	2658	N0484.70944US01

APPLICANTS

Darren C. Meyer, Duxbury, MA;
Stephen R. Springer, Needham, MA;
NUANCE COMMUNICATIONS, INC., Burlington, MA

**** CONTINUING DATA ***************************

This application is a CON of 12/853,026 08/09/2010 PAT 8447610
which is a CIP of 12/704,859 02/12/2010

**** FOREIGN APPLICATIONS ****************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

05/21/2013

Foreign Priority claimed	☐ Yes ☑ No		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☐ Yes ☑ No	☐ Met after Allowance				
Verified and Acknowledged	Examiner's Signature	Initials	MA	9	20	3

ADDRESS

Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206
UNITED STATES

TITLE

METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

FILING FEE RECEIVED		
1740	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13864831	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

CPC- SEARCHED

Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner
704	271,260,258,234,209	6/19/2013	MC
434	236,178	6/19/2013	MC

SEARCH NOTES

Search Notes	Date	Examiner
performed an assignee level ODP search, rejection given, contrastive stress assignment to speech is inherent, as in the 4th limitation of claim 1 for instance, to simply contrast with a second string as is well known in the art, the allowalble claim portions of the parent case are unique and identical to the continuation case	6/19/2013	MC
checked for 101 issues, OK, computer system, memory, processor, non-transitory	6/19/2013	MC
searched Microsoft npl	6/19/2013	MC
searched Apple npl	6/19/2013	MC
searched Motorola npl	6/19/2013	MC
searched Nokia npl	6/19/2013	MC
searched Nuance	6/19/2013	MC
searched assignee level ODP, not justified	6/19/2013	MC
searched Dragon, IBM npl	6/19/2013	MC
searched Google scholar	6/19/2013	MC
searched IEEE	6/19/2013	MC
searched ACM	6/19/2013	MC
searched ASE	6/19/2013	MC
checked for 101, ok, structural limitations expicit, and non-transitory	6/19/2013	MC

SEARCH NOTES		
Search Notes	**Date**	**Examiner**
searched EPO, JPO, and Derwent	6/19/2013	MC
searched class/subclass with keyword limitations	6/19/2013	MC
performed forward and backward citation search	10/18/2013	MC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
704	271,260,258,234,209	6/19/2013	MC
434	236,178	6/19/2013	MC

FORM PTO-1449/A and B (modified PTO/SB/08)	APPLICATION NO.: 13/864,831	ATTY. DOCKET NO.: N0484.70944US01
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	FILING DATE: April 17, 2013	CONFIRMATION NO.: 7517
	FIRST NAMED INVENTOR: Darren C. Meyer	
Sheet 1 of 2	GROUP ART UNIT: 2658	EXAMINER: Michael C. Colucci

U.S. PATENT DOCUMENTS

Examiner's Initials #	Cite No.	U.S. Patent Document Number	Kind Code	Name of Patentee or Applicant of Cited Document	Date of Publication or Issue of Cited Document MM-DD-YYYY
		5,652,828		Silverman	07-29-1997
		5,668,926		Karaali et al.	09-16-1997
		5,860,064		Henton	01-12-1999
		6,035,271		Chen	03-07-2000
		6,081,780		Lumelsky	06-27-2000
		6,101,470		Eide et al.	08-08-2000
		6,266,637	B1	Donovan et al.	07-24-2001
		6,345,250		Martin	02-05-2002
		6,389,396		Lyberg	05-14-2002
		6,446,040		Socher et al.	09-03-2002
		6,665,641		Coorman et al.	12-16-2003
		6,810,378		Kochanski et al.	10-26-2004
		6,865,533		Addison et al.	03-08-2005
		7,401,020		Eide	07-15-2008
		7,455,522		Polanyi et al.	11-25-2008
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		7,643,998		Yuen et al.	01-05-2010
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		8,126,716	B2	Dhanakshirur et al.	02-28-2012
		8,447,610		Meyer et al.	05-21-2013
		2002-0072908		Case et al.	06-13-2002
		2002-0133348	A1	Pearson et al.	09-19-2002
		2004-0030555		van Santen	02-12-2004
		2004-0049391		Polanyi et al.	03-11-2004
		2004-0078201	A1	Porter et al.	04-22-2004
		2004-0138887	A1	Rusnak et al.	07-15-2004
		2004-0197750		Donaher et al.	10-07-2004
		2005-0027523		Tarlton et al.	02-03-2005

EXAMINER:	DATE CONSIDERED:
/Michael Colucci/	10/18/2013

EXAMINER: Initial if reference considered, whether or notcitation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

*a copy of this reference is not provided as it was previously cited by or submitted to the office in a prior application, Serial No. 12/704,859, filed February 12, 2010, and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

3143295.1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.C./

FORM PTO-1449/A and B (modified PTO/SB/08) **INFORMATION DISCLOSURE STATEMENT BY APPLICANT**	APPLICATION NO.: 13/864,831	ATTY. DOCKET NO.: N0484.70944US01
	FILING DATE: April 17, 2013	CONFIRMATION NO.: 7517
	FIRST NAMED INVENTOR: Darren C. Meyer	
Sheet 2 of 2	GROUP ART UNIT: 2658	EXAMINER: Michael C. Colucci

		2005-0071163	A1	Aaron et al.	03-31-2005
		2005-0125232		Gadd	06-09-2005
		2007-0043568	A1	Dhanakshirur et al.	02-22-2007
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FOREIGN PATENT DOCUMENTS

Examiner's Initials #	Cite No.	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Translation (Y/N)
		Office/ Country	Number	Kind Code			

OTHER ART — NON PATENT LITERATURE DOCUMENTS

Examiner's Initials #	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	Translation (Y/N)
	*	FORNEY, "The Viterbi Algorithm" Proc. IEEE, v. 61, pp. 268-278, 1973.	
	*	Natural Playback Modules (NPM), Nuance Professional Services, June 2010	
	*	SAON et al., "Maximum Likelihood Discriminant Feature Spaces," 2000, IEEE International Conference on Acoustics, Speech, and Signal Processing, Volume 2, 5-9 June 2000, pages 1129-1132.	

[NOTE – No copies of U.S. patents, published U.S. patent applications, or pending, unpublished patent applications stored in the USPTO's Image File Wrapper (IFW) system, are included. See 37 CFR § 1.98 and 1287OG163. Copies of all other patent(s), publication(s), unpublished, pending U.S. patent applications, or other information listed are provided as required by 37 CFR § 1.98 unless 1) such copies were provided in an IDS in an earlier application that complies with 37 CFR § 1.98, and 2) the earlier application is relied upon for an earlier filing date under 35 U.S.C. § 120.]

EXAMINER: /Michael Colucci/	DATE CONSIDERED: 10/18/2013

EXAMINER: Initial if reference considered, whether or notcitation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

*a copy of this reference is not provided as it was previously cited by or submitted to the office in a prior application, Serial No. 12/704,859, filed February 12, 2010, and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

3143295.1 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.C./

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	44	("20040006468" | "20060074676" | "20060100862" | "20060200351" | "4643450" | "5065317" | "5153913" | "5384893" | "5479564" | "5490234" | "5611002" | "5630013" | "5640490" | "5657426" | "5666466" | "5749064" | "5761637" | "5774854" | "5826234" | "5857173" | "5870709" | "5878396" | "5913193" | "5920840" | "5978764" | "6122616" | "6161091" | "6182037" | "6205456" | "6224383" | "6236963" | "6243677" | "6299452" | "6324507" | "6358055" | "6442519" | "6468084" | "6470308" | "6618699" | "6697778" | "7050975" | "7117148" | "7206741" | "7409346").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/10/18 12:45
L2	140	("2002/0072908" | "2004/0030555" | "2004/0049391" | "2004/0197750" | "2005/0027523" | "2009/0048843" | "6389396" | "6665641" | "7455522" | "7519531" | "7565292").URPN.	USPAT	OR	OFF	2013/10/18 12:45
L3	180	1 2	USPAT	OR	OFF	2013/10/18 12:48
L4	3	3 and contrastive	USPAT	OR	OFF	2013/10/18 12:49
S1	1028123	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with recording$2 recorded	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:23
S2	2067	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:23
S3	99	S2 and ((stress pitch inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:29
S4	20322475	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:29
S5	94	S3 and S4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:29

S6	99	S2 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:29
S7	94	S6 and S4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:29
S8	0	S7 and (contrastive)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:31
S10	8	S7 and (record$4 with concatenat$6 with (stress inflect$6))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:34
S11	2	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress and recording$2).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:04
S12	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:05
S13	2067	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
S14	20322475	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
S15	99	S13 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
S16	94	S15 and S14	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
S17	79	S16 and (record$4 with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
S18	854	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2012/02/18 17:31
S19	254	S18 and concatenat$7	US-PGPUB; USPAT;	OR	OFF	2012/02/18 17:32

			EPO; JPO			
S20	103	S18 and concatenat$7 and stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:32
S21	19	S18 and concatenat$7 and stress and inflect$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:32
S22	16	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:02
S23	2139	@ad<="02122010"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:02
S24	20422792	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:03
S26	14	S22 and S24	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:04
S27	19389	("704").CLAS.	USPAT; USOCR	OR	OFF	2012/07/09 14:06
S29	16	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:11
S30	20422792	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:11
S31	14	S29 and S30	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:11
S32	3303	contrast$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:03
S33	16	contrastive$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:03

S34	16	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:03
S35	11	S34 and (speech near2 synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:11
S36	3	S35 and ((mark$4 annotat$6) near7 stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:42
S37	7	S35 and ((mark$4 annotat$6) same stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:42
S38	0	S35 and (prominen$6 near5 stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:49
S39	2	S35 and (prominen$6 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:50
S40	6	S35 and (mark$4 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 18:08
S41	3	S35 and (mark$4 with stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 18:08
S42	6	S35 and (mark$4 with (intonat$7 stress))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 18:08
S43	903	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2012/07/18 10:26
S44	16	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/18 10:26
S45	2	S43 and S44	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/18 10:26
S46	2	contrastive with stress with synthesi$6	US-PGPUB; USPAT;	OR	OFF	2012/12/18 10:18

			EPO; JPO			
S47	7	contrastive with stress with (text string$2 word$2 syllable$2)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:19
S48	7	S47 and (speech with synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:19
S49	20508719	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:19
S50	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:22
S51	5	S48 and S49	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:22
S52	10	(contrastive with stress) and (speech with synthesi$6) and S49	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:35
S53	3	(contrastive with stress) and (text$1to$1speech) and S49	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:44
S54	14	(contrastive with stress) and S49	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:44
S55	2971	((704/271) or (704/260) or (704/258) or (704/234) or (704/209) or (434/236) or (434/178)).CCLS.	USPAT; USOCR	OR	OFF	2012/12/18 11:16
S56	6	S55 and S54	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 11:16
S57	1148443	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with recording$2 recorded	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S58	2388	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05

S59	109	S58 and ((stress pitch inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S60	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S61	97	S59 and S60	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S62	109	S58 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S63	97	S62 and S60	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S64	0	S63 and (contrastive)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S65	8	S63 and (record$4 with concatenat$6 with (stress inflect$6))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S66	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress and recording$2).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S67	4	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S68	2388	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S69	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S70	109	S68 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05

S71	97	S70 and S69	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S72	80	S71 and (record$4 with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S73	1015	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
S74	304	S73 and concatenat$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S75	119	S73 and concatenat$7 and stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S76	21	S73 and concatenat$7 and stress and inflect$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S77	17	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S78	2139	@ad<="02122010"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S79	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S80	14	S77 and S79	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S81	21323	("704").CLAS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
S82	17	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S83	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05

S84	14	S82 and S83	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S85	3617	contrast$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S86	17	contrastive$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S87	17	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S88	12	S87 and (speech near2 synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S89	4	S88 and ((mark$4 annotat$6) near7 stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S90	8	S88 and ((mark$4 annotat$6) same stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S91	0	S88 and (prominen$6 near5 stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S92	2	S88 and (prominen$6 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S93	7	S88 and (mark$4 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S94	4	S88 and (mark$4 with stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S95	7	S88 and (mark$4 with (intonat$7 stress))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05

S96	1015	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
S97	17	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S98	3	S96 and S97	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S99	3	contrastive with stress with synthesi$6	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S100	8	contrastive with stress with (text string$2 word$2 syllable$2)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S101	8	S100 and (speech with synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S102	4	(((meyer springer).in.) or (nuance).asn.) and (contrastive).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
S103	3109	((704/271) or (704/260) or (704/258) or (704/234) or (704/209) or (434/236) or (434/178)).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05

10/18/2013 12:49:13 PM
C:\East\Workspaces\13864831.wsp

DOCKET NO.: N0484.70944US01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Darren C. Meyer
Application No.:	13/864,831
Confirmation No.:	7517
Filed:	April 17, 2013
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	Michael C. Colucci
Art Unit:	2658

CERTIFICATE OF ELECTRONIC FILING UNDER 37 C.F.R. § 1.8

The undersigned hereby certifies that this paper, along with any paper referred to as being attached or enclosed, is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4), on the 10th day of July, 2013.

Sara J. L. Douglas

MAIL STOP AMNEDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT FILED PURSUANT TO THE DUTY OF DISCLOSURE UNDER 37 C.F.R. §§ 1.56, 1.97 AND 1.98

Madam:

Pursuant to the duty of disclosure under 37 C.F.R. §§ 1.56, 1.97 and 1.98, the Assignee requests consideration of this Information Disclosure Statement.

PART I: Compliance with 37 C.F.R. § 1.97

This Information Disclosure Statement has been filed within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d).

No fee or certification is required.

3143295ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.C./

PART II: Information Cited

The Assignee hereby makes of record in the above-identified application the information listed on the attached form PTO-1449 (modified PTO/SB/08). The order of presentation of the references should not be construed as an indication of the importance of the references.

The Assignee would like to bring to the Examiner's attention the following co-pending applications that may contain subject matter related to this application:

Serial No.	Filing Date	Inventor(s)	Docket No.
13/360,418	January 27, 2012	Dhanakshirur et al.	N0484.70607US01
10/672,374	September 26, 2003	Aaron et al.	N0484.70760US00
12/704,859	February 12, 2010	Meyer et al.	N0484.70900US00
12/853,086	August 9, 2010	Meyer et al.	N0484.70901US00

The co-pending applications identified above may include subject matter which is technically related to subject matter of the present application and may contain claims that recite elements similar to those recited in claims of the present application. In handling prosecution of the above-identified applications, the Examiners for the other applications will assumedly search for relevant prior art and, in some circumstances, take positions about the prior art and/or the interpretation of the claims that may be material to the examination of the present application.

Accordingly, the Assignee respectfully requests that the Examiner review the file histories of the above-identified applications to see whether there is any information that the Examiner believes may be relevant to the prosecution of the present application. It is assumed that the Examiner has access to the file histories of the above-identified applications, and the undersigned does not plan to provide copies of items from these files. However, if the Examiner would like copies of any or all of the information included in the file histories of the above-identified applications, or any other information related to the present application, the Examiner is respectfully requested to contact the undersigned.

3143295A ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.C./

PART III: Explanation of Non-English Language References and Remarks Concerning Other Information Cited

The following are remarks concerning other information cited:

The non patent literature document, "Natural Playback Modules (NPM), Nuance Professional Services," listed on the attached form PTO-1449 (modified PTO/SB/08), describes Natural Playback Modules (NPM), a software package sold in the United States more than one year prior to the filing date of the present application.

PART IV: Remarks

Documents cited anywhere in the Information Disclosure Statement are enclosed unless otherwise indicated. It is respectfully requested that:

1. The Examiner consider completely the cited information, along with any other information, in reaching a determination concerning the patentability of the present claims;
2. The enclosed form PTO-1449 (modified PTO/SB/08) be signed by the Examiner to evidence that the cited information has been fully considered by the United States Patent and Trademark Office during the examination of this application;
3. The citations for the information be printed on any patent which issues from this application.

By submitting this Information Disclosure Statement, the Assignee makes no representation that a search has been performed, of the extent of any search performed, or that more relevant information does not exist.

By submitting this Information Disclosure Statement, the Assignee makes no representation that the information cited in the Statement is, or is considered to be, material to patentability as defined in 37 C.F.R. § 1.56(b).

By submitting this Information Disclosure Statement, the Assignee makes no representation that the information cited in the Statement is, or is considered to be, in fact, prior art as defined by 35 U.S.C. § 102.

Notwithstanding any statements by the Assignee, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

3143295A ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.C./

An early and favorable action is hereby requested.

The Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825 under Docket No. N0484.70944US01 from which the undersigned is authorized to draw.

Respectfully submitted,
Nuance Communications, Inc.

By: _____

Elisabeth H. Hunt, Ph.D., Reg. No. 67,336
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
Telephone: (617) 646-8000

Docket No.: N0484.70944US01
Date: July 10, 2013

/Michael Colucci/ 10/18/2013

3143295ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.C./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13864831	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

CPC							
Symbol						Type	Version
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CPC Combination Sets								
Symbol					Type	Set	Ranking	Version
			/					
			/					

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/MICHAEL COLUCCI/ Primary Examiner.Art Unit 2658 (Primary Examiner)	10/18/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

U.S. Patent and Trademark Office

Part of Paper No. 20131018

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13864831	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED
704	260	G 1 0 L 13 / 00 (2006.01.01)	

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
704	271	260	258	234	209
434	236	178			

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/MICHAEL COLUCCI/ Primary Examiner.Art Unit 2658 (Primary Examiner)	10/18/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

U.S. Patent and Trademark Office

Part of Paper No. 20131018

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13864831	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	7	17	23												
2	8	18	24												
3	9	19	25												
4	10	20	26												
5	11														
6	12														
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8	14														
9	15														
10	16														
11	17														
12	18														
13	19														
14	20														
15	21														
16	22														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/MICHAEL COLUCCI/ Primary Examiner.Art Unit 2658 (Primary Examiner)	10/18/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

U.S. Patent and Trademark Office Part of Paper No. 20131018

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	13/864,831	MEYER ET AL.	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 9/26/13	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

jean proctor

U.S. Patent and Trademark Office

Docket No.: N0484.70944US01
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Darren C. Meyer
Application No.:	13/864,831
Confirmation No.:	7517
Filed:	April 17, 2013
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	M. C. Colucci
Art Unit:	2658

Certificate of Electronic Filing Under 37 CFR 1.8
I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 9/26/2013 Signature: Caitlin Laracy (Caitlin Laracy

RESPONSE TO NON-FINAL OFFICE ACTION UNDER 37 C.F.R. 1.111

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

In response to the Office Action dated June 26, 2013, rejecting claims 7, 14 and 21 on the ground of nonstatutory obviousness-type double patenting over claims 1-6 of U.S. Patent No. 8,447,610, the Assignee submits herewith a terminal disclaimer to overcome the rejection.

Also submitted herewith is a Declaration by the inventors. As all rejections and deficiencies made of record in this application have now been addressed, this application is believed to be in condition for allowance.

3233224.1

A Notice of Allowance is respectfully requested. If the Examiner believes, after considering the foregoing, that the application is not in condition for allowance, the Examiner is requested to call the undersigned at the telephone number indicated below to discuss any outstanding issues.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, the Assignee hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed payment, please charge any deficiency to Deposit Account No. 23/2825 under Docket No. N0484.70944US01, from which the undersigned is authorized to draw.

Dated: September 26, 2013

Respectfully submitted,
Nuance Communications, Inc.

By _____

Richard F. Giunta
Registration No.: 36,149
Elisabeth H. Hunt, Ph.D.
Registration No.: 67,336
WOLF, GREENFIELD & SACKS, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
617.646.8000

PTO/AIA/26 (04-13)
Approved for use through 04/30/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) N0484.70944US01

In re Application of: Darren C. Meyer et al.

Application No.: 13/864,831-Conf. #7517

Filed: April 17, 2013

For: METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

The applicant*, Nuance Communications, Inc., of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 8,447,610 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is empowered to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 67,336

Elisabeth Hunt — Signature
September 26, 2013 — Date

Elisabeth H. Hunt, Ph.D. — Typed or printed name

Agent for Applicant(s) — Title
617.646.8000 — Telephone Number

☒ Terminal disclaimer fee under 37 CFR 1.20(d) is included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 9/26/2013 Signature: Caitlin Laracy (Caitlin Laracy)

3233073.1

DECLARATION (37 C.F.R. § 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. § 1.76)

Title of Invention	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

As the below named inventor, I declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/864,831 filed on April 17th, 2013

☐ As amended on _____ (if applicable);

The above-identified application was made or authorized to be made by me.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

All statements made herein of my own knowledge are true, and all statements made herein on information and belief are believed to be true.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

LEGAL NAME OF SOLE OR FIRST INVENTOR

Inventor one: Darren C. Meyer Date: Aug 26, 2013

Signature: [signature] Citizen of: USA

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor two: Stephen R. Springer Date: 9/25/2013

Signature: [signature] Citizen of: USA

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor three: _____ Date: _____

Signature: _____ Citizen of: _____

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor four: _____ Date: _____

Signature: _____ Citizen of: _____

☐ Additional inventors are being named on _____ additional form(s) attached hereto.

Electronic Patent Application Fee Transmittal

Application Number:	13864831
Filing Date:	17-Apr-2013
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Filer:	Elisabeth H. Hunt/Caitlin Laracy
Attorney Docket Number:	N0484.70944US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Statutory or Terminal Disclaimer	1814	1	160	160
		Total in USD ($)		**160**

Electronic Acknowledgement Receipt

EFS ID:	16966503
Application Number:	13864831
International Application Number:	
Confirmation Number:	7517
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	91337
Filer:	Elisabeth H. Hunt/Caitlin Laracy
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US01
Receipt Date:	26-SEP-2013
Filing Date:	17-APR-2013
Time Stamp:	15:16:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$160
RAM confirmation Number	2099
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	N048470944US01-TRN-EHH.PDF	48993 f613c5bdfb2bdef3dc7bb7fd939578691847 8abf	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	N048470944US01-FEE-EHH.PDF	75439 3efcc055a6c6b885bb7235a3b9ca740921c a2ab8	no	1
Warnings:					
Information:					
3	Amendment/Req. Reconsideration-After Non-Final Reject	N048470944US01-AMN-EHH.PDF	64470 39885ff8d94e6d0784bb889d7f61039d3d1 1a576	no	2
Warnings:					
Information:					
4	Terminal Disclaimer Filed	N048470944US01-TD-EHH.PDF	63137 689110105b2c4249cbad1b1cfa69ab66560 232ae	no	1
Warnings:					
Information:					
5	Oath or Declaration filed	N048470944US01-INVDEC-EHH.PDF	63370 a561ff01484156b0768f2103b64083ecd54d 6344	no	1
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	30438 af24d068c96cf4244e9f7c15a842abb2555b 77c8	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	345847	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/21 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number	13/864,831-Conf. #7517
Filing Date	April 17, 2013
First Named Inventor	Darren C. Meyer
Art Unit	2658
Examiner Name	Michael C. Colucci
Attorney Docket Number	N0484.70944US01

ENCLOSURES (*Check all that apply*)

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [x] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [x] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

Inventor's Oath or Declaration

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature	Elisabeth Hunt		
Printed name	Elisabeth H. Hunt, Ph.D.		
Date	September 26, 2013	Reg. No.	67,336

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: September 26, 2013 Signature: Caitlin Laracy (Caitlin Laracy)

PTO/SB/17 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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FEE TRANSMITTAL

Complete if known	
Application Number	13/864,831-Conf. #7517
Filing Date	April 17, 2013
First Named Inventor	Darren C. Meyer
Examiner Name	Michael C. Colucci
Art Unit	2658
Practitioner Docket No.	N0484.70944US01

☐ Applicant asserts small entity status. See 37 CFR 1.27

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously

TOTAL AMOUNT OF PAYMENT ($) 160.00

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☐ Deposit Account Deposit Account Number: 23/2825 Deposit Account Name: Wolf, Greenfield & Sacks, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**U ($)**	**S ($)**	**M ($)**	**Fees Paid ($)**
Utility	280	140*	70	600	300	150	720	360	180	
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	**Undiscounted Fee ($)**	**Small Entity Fee ($)**	**Micro Entity Fee ($)**
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims 20 - 20 or HP = _____ x _____ = _____ **Fee Paid ($)**

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims 3 - 3 or HP = _____ x _____ = _____ **Fee Paid ($)**

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims **Fee ($)** _____ **Fee Paid ($)** _____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets _____ - 100 = **Extra Sheets** _____ /50 = **Number of each additional 50 or fraction thereof** _____ (round **up** to a whole number) x **Fee ($)** _____ = **Fee Paid ($)** _____

4. OTHER FEE(S) **Fees Paid ($)**

Non-English specification, $130 fee (no small or micro entity discount) _____

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity) _____

Other (e.g., late filing surcharge): 1814 Statutory disclaimer, including terminal ... 160.00

SUBMITTED BY

Signature	Elisabeth Hunt	Registration No. (Attorney/Agent)	67,336	Telephone	617.646.8000
Name (Print/Type)	Elisabeth H. Hunt, Ph.D.			Date	September 26, 2013

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: September 26, 2013 Signature: Caitlin Laracy (Caitlin Laracy)

3263128.1

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01

CONFIRMATION NO. 7517

PUBLICATION NOTICE

OC000000063598064

91337
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

Title:METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

Publication No.US-2013-0231935-A1
Publication Date:09/05/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

FORM PTO-1449/A and B (modified PTO/SB/08)	APPLICATION NO.: 13/864,831	ATTY. DOCKET NO.: N0484.70944US01
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	FILING DATE: April 17, 2013	CONFIRMATION NO.: 7517
	FIRST NAMED INVENTOR: Darren C. Meyer	
Sheet 1 of 2	GROUP ART UNIT: 2658	EXAMINER: Michael C. Colucci

U.S. PATENT DOCUMENTS

Examiner's Initials #	Cite No.	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication or Issue of Cited Document MM-DD-YYYY
		Number	Kind Code		
		5,652,828		Silverman	07-29-1997
		5,668,926		Karaali et al.	09-16-1997
		5,860,064		Henton	01-12-1999
		6,035,271		Chen	03-07-2000
		6,081,780		Lumelsky	06-27-2000
		6,101,470		Eide et al.	08-08-2000
		6,266,637	B1	Donovan et al.	07-24-2001
		6,345,250		Martin	02-05-2002
		6,389,396		Lyberg	05-14-2002
		6,446,040		Socher et al.	09-03-2002
		6,665,641		Coorman et al.	12-16-2003
		6,810,378		Kochanski et al.	10-26-2004
		6,865,533		Addison et al.	03-08-2005
		7,401,020		Eide	07-15-2008
		7,455,522		Polanyi et al.	11-25-2008
		7,519,531		Acero et al.	04-14-2009
		7,565,292		Deng et al.	07-21-2009
		7,643,998		Yuen et al.	01-05-2010
		7,899,672		Qin et al.	03-01-2011
		8,126,716	B2	Dhanakshirur et al.	02-28-2012
		8,447,610		Meyer et al.	05-21-2013
		2002-0072908		Case et al.	06-13-2002
		2002-0133348	A1	Pearson et al.	09-19-2002
		2004-0030555		van Santen	02-12-2004
		2004-0049391		Polanyi et al.	03-11-2004
		2004-0078201	A1	Porter et al.	04-22-2004
		2004-0138887	A1	Rusnak et al.	07-15-2004
		2004-0197750		Donaher et al.	10-07-2004
		2005-0027523		Tarlton et al.	02-03-2005

EXAMINER:	DATE CONSIDERED:

EXAMINER: Initial if reference considered, whether or notcitation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

*a copy of this reference is not provided as it was previously cited by or submitted to the office in a prior application, Serial No. 12/704,859, filed February 12, 2010, and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

3143295.1

FORM PTO-1449/A and B (modified PTO/SB/08)	APPLICATION NO.: 13/864,831	ATTY. DOCKET NO.: N0484.70944US01
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	FILING DATE: April 17, 2013	CONFIRMATION NO.: 7517
	FIRST NAMED INVENTOR: Darren C. Meyer	
Sheet 2 of 2	GROUP ART UNIT: 2658	EXAMINER: Michael C. Colucci

		2005-0071163	A1	Aaron et al.	03-31-2005
		2005-0125232		Gadd	06-09-2005
		2007-0043568	A1	Dhanakshirur et al.	02-22-2007
		2007-0192105	A1	Neeracher et al.	08-16-2007
		2008-0167875	A1	Bakis et al.	07-10-2008
		2009-0048843		Nitisaroj et al.	02-19-2009
		2009-0157385	A1	Tian	06-18-2009
		2010-0100377		Madhavapeddi et al.	04-22-2010
		2011-0202344		Meyer et al.	08-18-2011
		2011-0202345	A1	Meyer et al.	08-18-2011
		2011-0202346	A1	Meyer et al.	08-18-2011
		2012-0130718	A1	Dhanakshirur et al.	05-24-2012

FOREIGN PATENT DOCUMENTS

Examiner's Initials #	Cite No.	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Translation (Y/N)
		Office/ Country	Number	Kind Code			

OTHER ART — NON PATENT LITERATURE DOCUMENTS

Examiner's Initials #	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	Translation (Y/N)
	*	FORNEY, "The Viterbi Algorithm" Proc. IEEE, v. 61, pp. 268-278, 1973.	
	*	Natural Playback Modules (NPM), Nuance Professional Services	
	*	SAON et al., "Maximum Likelihood Discriminant Feature Spaces," 2000, IEEE International Conference on Acoustics, Speech, and Signal Processing, Volume 2, 5-9 June 2000, pages 1129-1132.	

[NOTE – No copies of U.S. patents, published U.S. patent applications, or pending, unpublished patent applications stored in the USPTO's Image File Wrapper (IFW) system, are included. See 37 CFR § 1.98 and 1287OG163. Copies of all other patent(s), publication(s), unpublished, pending U.S. patent applications, or other information listed are provided as required by 37 CFR § 1.98 unless 1) such copies were provided in an IDS in an earlier application that complies with 37 CFR § 1.98, and 2) the earlier application is relied upon for an earlier filing date under 35 U.S.C. § 120.]

EXAMINER:	DATE CONSIDERED:

EXAMINER: Initial if reference considered, whether or notcitation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

*a copy of this reference is not provided as it was previously cited by or submitted to the office in a prior application, Serial No. 12/704,859, filed February 12, 2010, and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

3143295.1

Electronic Acknowledgement Receipt

EFS ID:	16273056
Application Number:	13864831
International Application Number:	
Confirmation Number:	7517
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	91337
Filer:	Elisabeth H. Hunt/Sara Douglas
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US01
Receipt Date:	10-JUL-2013
Filing Date:	17-APR-2013
Time Stamp:	11:44:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	N048470944US01-TRN-EHH.pdf	53489 70ae9053c91daba0f1f72b4e2acaa018ffcaaed3	no	1

Warnings:

Information:

2		N048470944US01-IDS-EHH.pdf	302939 7ae30005ebb040652a9cda3fbe441934d2600073	yes	6

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	4
Information Disclosure Statement (IDS) Form (SB08)	5	6

Warnings:

Information:

Total Files Size (in bytes):	356428

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/21 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	13/864,831-Conf. #7517
Filing Date	April 17, 2013
First Named Inventor	Darren C. Meyer
Art Unit	2658
Examiner Name	Michael C. Colucci
Total Number of Pages in This Submission	
Attorney Docket Number	N0484.70944US01

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [x] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

Form PTO-1449

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature	Elisabeth Hunt		
Printed name	Elisabeth H. Hunt, Ph.D.		
Date	7/10/13	Reg. No.	67,336

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 7/10/13 Signature: Sara J. L. Douglas (Sara J. L. Douglas)

3143506.1

DOCKET NO.: N0484.70944US01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Darren C. Meyer
Application No.:	13/864,831
Confirmation No.:	7517
Filed:	April 17, 2013
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	Michael C. Colucci
Art Unit:	2658

CERTIFICATE OF ELECTRONIC FILING UNDER 37 C.F.R. § 1.8

The undersigned hereby certifies that this paper, along with any paper referred to as being attached or enclosed, is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4), on the 10th day of July, 2013.

Sara J. L. Douglas

MAIL STOP AMNEDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT FILED PURSUANT TO THE DUTY OF DISCLOSURE UNDER 37 C.F.R. §§ 1.56, 1.97 AND 1.98

Madam:

Pursuant to the duty of disclosure under 37 C.F.R. §§ 1.56, 1.97 and 1.98, the Assignee requests consideration of this Information Disclosure Statement.

PART I: Compliance with 37 C.F.R. § 1.97

This Information Disclosure Statement has been filed within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d).

No fee or certification is required.

PART II: Information Cited

The Assignee hereby makes of record in the above-identified application the information listed on the attached form PTO-1449 (modified PTO/SB/08). The order of presentation of the references should not be construed as an indication of the importance of the references.

The Assignee would like to bring to the Examiner's attention the following co-pending applications that may contain subject matter related to this application:

Serial No.	Filing Date	Inventor(s)	Docket No.
13/360,418	January 27, 2012	Dhanakshirur et al.	N0484.70607US01
10/672,374	September 26, 2003	Aaron et al.	N0484.70760US00
12/704,859	February 12, 2010	Meyer et al.	N0484.70900US00
12/853,086	August 9, 2010	Meyer et al.	N0484.70901US00

The co-pending applications identified above may include subject matter which is technically related to subject matter of the present application and may contain claims that recite elements similar to those recited in claims of the present application. In handling prosecution of the above-identified applications, the Examiners for the other applications will assumedly search for relevant prior art and, in some circumstances, take positions about the prior art and/or the interpretation of the claims that may be material to the examination of the present application.

Accordingly, the Assignee respectfully requests that the Examiner review the file histories of the above-identified applications to see whether there is any information that the Examiner believes may be relevant to the prosecution of the present application. It is assumed that the Examiner has access to the file histories of the above-identified applications, and the undersigned does not plan to provide copies of items from these files. However, if the Examiner would like copies of any or all of the information included in the file histories of the above-identified applications, or any other information related to the present application, the Examiner is respectfully requested to contact the undersigned.

PART III: Explanation of Non-English Language References and Remarks Concerning Other Information Cited

The following are remarks concerning other information cited:

The non patent literature document, "Natural Playback Modules (NPM), Nuance Professional Services," listed on the attached form PTO-1449 (modified PTO/SB/08), describes Natural Playback Modules (NPM), a software package sold in the United States more than one year prior to the filing date of the present application.

PART IV: Remarks

Documents cited anywhere in the Information Disclosure Statement are enclosed unless otherwise indicated. It is respectfully requested that:

1. The Examiner consider completely the cited information, along with any other information, in reaching a determination concerning the patentability of the present claims;
2. The enclosed form PTO-1449 (modified PTO/SB/08) be signed by the Examiner to evidence that the cited information has been fully considered by the United States Patent and Trademark Office during the examination of this application;
3. The citations for the information be printed on any patent which issues from this application.

By submitting this Information Disclosure Statement, the Assignee makes no representation that a search has been performed, of the extent of any search performed, or that more relevant information does not exist.

By submitting this Information Disclosure Statement, the Assignee makes no representation that the information cited in the Statement is, or is considered to be, material to patentability as defined in 37 C.F.R. § 1.56(b).

By submitting this Information Disclosure Statement, the Assignee makes no representation that the information cited in the Statement is, or is considered to be, in fact, prior art as defined by 35 U.S.C. § 102.

Notwithstanding any statements by the Assignee, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

An early and favorable action is hereby requested.

The Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825 under Docket No. N0484.70944US01 from which the undersigned is authorized to draw.

Respectfully submitted,
Nuance Communications, Inc.

By: _____

Elisabeth H. Hunt, Ph.D., Reg. No. 67,336
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
Telephone: (617) 646-8000

Docket No.: N0484.70944US01
Date: July 10, 2013

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01	7517

91337 7590 06/26/2013
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

EXAMINER
COLUCCI, MICHAEL C

ART UNIT	PAPER NUMBER
2658	

NOTIFICATION DATE	DELIVERY MODE
06/26/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Patents_eOfficeAction@wolfgreenfield.com
N0484_eOfficeAction@WolfGreenfield.com
IP.Inbox@nuance.com

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No.	Applicant(s)	
	13/864,831	MEYER ET AL.	
	Examiner	Art Unit	
	MICHAEL COLUCCI	2658	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2013*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-6,8,10 and 12-18* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-6,8,10 and 12-18* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *17 April 2013* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 7, 14, and 21 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-6 of U.S. Patent No. 8447610. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 of the instant application includes all of the features of claim 1-6 of U.S. Patent No. 8447610. It would have been obvious to one of ordinary skill in the art to omit the step of.

“generating, using at least one computer system, speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one text string of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other text
of the plurality of text strings”, being that creating contrasting strings is inherent in assigning this type of stress to synthesized speech in order to accomplish the general act, In re Karlson 136 USPQ 184 (1963): "Omission of an element and its function is an obvious expedient if the remaining elements perform the same functions as before"

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 20040049391 A1

US 20020072908 A1

US 20040030555 A1

US 6665641 B1

US 20090048843 A1

US 7565292 B2

US 6389396 B1

US 20050027523 A1

US 7519531 B2

US 20040197750 A1

US 7455522 B2

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL COLUCCI whose telephone number is (571)270-1847. The examiner can normally be reached on 9 am - 6:00 pm , Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571)-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL COLUCCI/

Primary Examiner, Art Unit 2658

(571)-270-1847
Examiner FAX: (571)-270-2847
Michael.Colucci@uspto.gov

Notice of References Cited	Application/Control No. 13/864,831	Applicant(s)/Patent Under Reexamination MEYER ET AL.	
	Examiner MICHAEL COLUCCI	Art Unit 2658	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,389,396 B1	05-2002	Lyberg, Bertil	704/258
*	B	US-2002/0072908 A1	06-2002	Case et al.	704/260
*	C	US-6,665,641 B1	12-2003	Coorman et al.	704/260
*	D	US-2004/0030555 A1	02-2004	van Santen, Jan P.H.	704/260
*	E	US-2004/0049391 A1	03-2004	Polanyi et al.	704/271
*	F	US-2004/0197750 A1	10-2004	Donaher et al.	434/236
*	G	US-2005/0027523 A1	02-2005	Tarlton et al.	704/234
*	H	US-7,455,522 B2	11-2008	Polanyi et al.	434/178
*	I	US-2009/0048843 A1	02-2009	NITISAROJ et al.	704/260
*	J	US-7,519,531 B2	04-2009	Acero et al.	704/209
*	K	US-7,565,292 B2	07-2009	Deng et al.	704/260
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13864831	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

CPC- SEARCHED

Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner
704	271,260,258,234,209	6/19/2013	MC
434	236,178	6/19/2013	MC

SEARCH NOTES

Search Notes	Date	Examiner
performed an assignee level ODP search, rejection given, contrastive stress assignment to speech is inherent, as in the 4th limitation of claim 1 for instance, to simply contrast with a second string as is well known in the art, the allowalble claim portions of the parent case are unique and identical to the continuation case	6/19/2013	MC
checked for 101 issues, OK, computer system, memory, processor, non-transitory	6/19/2013	MC
searched Microsoft npl	6/19/2013	MC
searched Apple npl	6/19/2013	MC
searched Motorola npl	6/19/2013	MC
searched Nokia npl	6/19/2013	MC
searched Nuance	6/19/2013	MC
searched assignee level ODP, not justified	6/19/2013	MC
searched Dragon, IBM npl	6/19/2013	MC
searched Google scholar	6/19/2013	MC
searched IEEE	6/19/2013	MC
searched ACM	6/19/2013	MC
searched ASE	6/19/2013	MC
checked for 101, ok, structural limitations expicit, and non-transitory	6/19/2013	MC

SEARCH NOTES		
Search Notes	**Date**	**Examiner**
searched EPO, JPO, and Derwent	6/19/2013	MC
searched class/subclass with keyword limitations	6/19/2013	MC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
704	271,260,258,234,209	6/19/2013	MC
434	236,178	6/19/2013	MC

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L47	3109	((704/271) or (704/260) or (704/258) or (704/234) or (704/209) or (434/236) or (434/178)).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L46	4	(((meyer springer).in.) or (nuance).asn.) and (contrastive).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L45	8	L44 and (speech with synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L44	8	contrastive with stress with (text string$2 word$2 syllable$2)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L43	3	contrastive with stress with synthesi$6	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L42	3	L40 and L41	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L41	17	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L40	1015	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L39	7	L32 and (mark$4 with (intonat$7 stress))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L38	4	L32 and (mark$4 with stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L37	7	L32 and (mark$4 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L36	2	L32 and (prominen$6 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L35	0	L32 and (prominen$6 near5 stress)	US-PGPUB; USPAT;	OR	OFF	2013/06/19 12:05

			EPO; JPO			
L34	8	L32 and ((mark$4 annotat$6) same stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L33	4	L32 and ((mark$4 annotat$6) near7 stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L32	12	L31 and (speech near2 synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L31	17	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L30	17	contrastive$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L29	3617	contrast$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L28	14	L26 and L27	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L27	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L26	17	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L25	21323	("704").CLAS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L24	14	L21 and L23	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L23	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L22	2139	@ad<="02122010"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L21	17	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L20	21	L17 and concatenat$7 and stress and inflect$7	US-PGPUB; USPAT;	OR	OFF	2013/06/19 12:05

			EPO; JPO			
L19	119	L17 and concatenat$7 and stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L18	304	L17 and concatenat$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L17	1015	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L16	80	L15 and (record$4 with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L15	97	L14 and L13	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L14	109	L12 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L13	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L12	2388	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L11	4	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L10	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress and recording$2).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L9	8	L7 and (record$4 with concatenat$6 with (stress inflect$6))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L8	0	L7 and (contrastive)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L7	97	L6 and L4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L6	109	L2 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L5	97	L3 and L4	US-PGPUB; USPAT;	OR	OFF	2013/06/19 12:05

			EPO; JPO			
L4	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L3	109	L2 and ((stress pitch inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L2	2388	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L1	1148443	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with recording$2 recorded	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05

6/19/2013 12:08:18 PM
C:\East\Workspaces\13864831.wsp

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1148443	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with recording$2 recorded	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L2	2388	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L3	109	L2 and ((stress pitch inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L4	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L5	97	L3 and L4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L6	109	L2 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L7	97	L6 and L4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L8	0	L7 and (contrastive)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L9	8	L7 and (record$4 with concatenat$6 with (stress inflect$6))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L10	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress and recording$2).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L11	4	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L12	2388	(text-to-speech text$2to$2speech (text near1 to near1 speech) (speech near2 synthes$3)) with (recording$2 recorded)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05

L13	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L14	109	L12 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L15	97	L14 and L13	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L16	80	L15 and (record$4 with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L17	1015	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L18	304	L17 and concatenat$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L19	119	L17 and concatenat$7 and stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L20	21	L17 and concatenat$7 and stress and inflect$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L21	17	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L22	2139	@ad<="02122010"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L23	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L24	14	L21 and L23	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L25	21323	("704").CLAS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L26	17	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L27	20577328	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L28	14	L26 and L27	US-PGPUB;	OR	OFF	2013/06/19 12:05

			USPAT; EPO; JPO			
L29	3617	contrast$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L30	17	contrastive$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L31	17	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L32	12	L31 and (speech near2 synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L33	4	L32 and ((mark$4 annotat$6) near7 stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L34	8	L32 and ((mark$4 annotat$6) same stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L35	0	L32 and (prominen$6 near5 stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L36	2	L32 and (prominen$6 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L37	7	L32 and (mark$4 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L38	4	L32 and (mark$4 with stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L39	7	L32 and (mark$4 with (intonat$7 stress))	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L40	1015	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05
L41	17	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L42	3	L40 and L41	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L43	3	contrastive with stress with synthesi$6	US-PGPUB;	OR	OFF	2013/06/19 12:05

			USPAT; EPO; JPO			
L44	8	contrastive with stress with (text string$2 word$2 syllable$2)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L45	8	L44 and (speech with synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L46	4	(((meyer springer).in.) or (nuance).asn.) and (contrastive).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2013/06/19 12:05
L47	3109	((704/271) or (704/260) or (704/258) or (704/234) or (704/209) or (434/236) or (434/178)).CCLS.	USPAT; USOCR	OR	OFF	2013/06/19 12:05

6/19/2013 12:09:58 PM
C:\East\Workspaces\13864831.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13864831	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/19/2013								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01

CONFIRMATION NO. 7517

91337
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

NOTICE

OC000000061402547

Date Mailed: 05/30/2013

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  all
  Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/864,831

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
AMENDMENT A	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
AMENDMENT A	Application Size Fee (37 CFR 1.16(s))									
AMENDMENT A	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
AMENDMENT B	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
AMENDMENT B	Application Size Fee (37 CFR 1.16(s))									
AMENDMENT B	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/864,831	04/17/2013	2658	1740	N0484.70944US01	20	3

CONFIRMATION NO. 7517

FILING RECEIPT

OC000000061402546

91337
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

Date Mailed: 05/30/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Darren C. Meyer, Duxbury, MA;
Stephen R. Springer, Needham, MA;

Applicant(s)

Nuance Communications, Inc., Burlington, MA

Assignment For Published Patent Application

Nuance Communications, Inc., Burlington, MA

Power of Attorney: The patent practitioners associated with Customer Number 91337

Domestic Priority data as claimed by applicant

This application is a CON of 12/853,026 08/09/2010 PAT 8447610
which is a CIP of 12/704,859 02/12/2010

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 05/21/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/864,831**
Projected Publication Date: 09/05/2013

Non-Publication Request: No

Early Publication Request: No

Title

METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

Preliminary Class

704

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/864,831	04/17/2013	Darren C. Meyer	N0484.70944US01

CONFIRMATION NO. 7517

91337
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210-2206

POA ACCEPTANCE LETTER

OC000000061402626

Date Mailed: 05/30/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/30/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/vanderson/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/AIA/80 (07-12)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[x] Practitioners associated with the Customer Number: 91337

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[x] The address associated with Customer Number: 91337

OR

[ ] Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

Nuance Communications, Inc.
One Wayside Road
Burlington, Massachusetts 01803

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	11/8/2012
Name	Leanne J. Fitzgerald, Esq.	Telephone	781 565-4792
Title	Associate General Counsel		

2887608.1

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Nuance Communications, Inc.

Application No./Patent No.: 13/864,831 Filed/Issue Date: April 17, 2013

Titled: METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

Nuance Communications, Inc. (Name of Assignee), a Corporation (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. [x] The assignee of the entire right, title, and interest.

2. [ ] An assignee of less than the entire right, title, and interest (check applicable box):

   [ ] (The extent (by percentage) of its ownership interest is _____ %). Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   [ ] There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. [ ] The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. [ ] The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2, or 3 above (not option 4) is evidence by either (choose **one** of options A or B below):

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. [x] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Darren C. Meyer To: Nuance Communications, Inc.
   The document was recorded in the United States Patent and Trademark Office at Reel 030279, Frame 0314, or for which a copy thereof is attached.

2. From: Stephen R. Springer To: Nuance Communications, Inc.
   The document was recorded in the United States Patent and Trademark Office at Reel 030279, Frame 0314, or for which a copy thereof is attached.

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____ , Frame _____ , or for which a copy thereof is attached.
4. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____ , Frame _____ , or for which a copy thereof is attached.
5. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____ , Frame _____ , or for which a copy thereof is attached.
6. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____ , Frame _____ , or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature	April 30, 2013 Date
Richard F. Giunta Printed or Typed Name	Attorney for Assignee Title or Registration Number

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 30, 2013 Signature: _____ (Jeanne W. Chub)

Electronic Acknowledgement Receipt

EFS ID:	15650363
Application Number:	13864831
International Application Number:	
Confirmation Number:	7517
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	91337
Filer:	Richard F. Giunta/Jeanne Chub
Filer Authorized By:	Richard F. Giunta
Attorney Docket Number:	N0484.70944US01
Receipt Date:	30-APR-2013
Filing Date:	
Time Stamp:	14:23:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	N0484-70944US01-TRN-RFG.pdf	44806 f0c9542a77d4fe4aea413d484163cba86e9694d5	no	1

Warnings:

Information:

2	Power of Attorney	N0484-70944US01-POA-RFG.pdf	52118 08aed703ebe8c4aac51a1c8a68e8ef6275882499	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73.	N0484-70944US01-373c-RFG.pdf	95354 6dd27836282578fa555e21cd7f0d11817755e26a	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	192278	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/21 (07-09)
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	4

Application Number	13/864,831-Conf. #7517
Filing Date	April 17, 2013
First Named Inventor	Darren C. Meyer
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	N0484.70944US01

ENCLOSURES (*Check all that apply*)

- [ ] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [x] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

Statement Under 37 CFR 3.73(c)

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature			
Printed name	Richard F. Giunta		
Date	April 30, 2013	Reg. No.	36,149

Certificate of Electronic Filing Under 37 CFR 1.8

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: April 30, 2013 Signature: _____ (Jeanne W. Chub)

3088850.1

PTO/AIA/15 (03-13)
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UTILITY PATENT APPLICATION TRANSMITTAL

(ONLY FOR NEW NONPROVISIONAL APPLICATIONS UNDER 37 CFR 1.53(B))

Attorney Docket No.	N0484.70944US01
First Named Inventor	Darren C. Meyer
Title	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Commissioner for Patents**
P.O. Box 1450
Alexandria, VA 22313-1450

1. [X] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [X] **Specification** [*Total Pages* 63]
   Both the claims and abstract must start on a new page.
   (See MPEP § 608.01(a) for information on the preferred arrangement)
5. [X] **Drawing(s)** *(35 U.S.C. 113)* [*Total Sheets* 9]
6. **Inventor's Oath or Declaration** [*Total Pages*]
   (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))
   a. [ ] Newly executed (original or copy)
   b. [ ] A copy from a prior application (37 CFR 1.63(d))
7. [X] **Application Data Sheet** **See note below.*
   See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. [ ] **CD-ROM or CD-R**
   In duplicate, large table, or Computer Program *(Appendix)*
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission**
   (if applicable, items a. – c. are required)
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

10. [ ] **Assignment Papers**
    (cover sheet & document(s))
    Name of Assignee
11. [ ] **37 CFR 3.73(c) Statement** *(when there is an assignee)* [ ] **Power of Attorney**
12. [ ] **English Translation Document** *(if applicable)*
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [X] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** *(MPEP § 503) (Should be specifically itemized)*
16. [ ] **Certified Copy of Priority Document(s)** *(if foreign priority is claimed)*
17. [ ] **Nonpublication Request** Under 35 U.S.C.122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [X] Other: Authorization To Permit Access To Application By Participating Offices – (PTO/SB/39)

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

18. CORRESPONDENCE ADDRESS

[X] The address associated with Customer Number: 91337 *OR* [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	Elisabeth Hunt	Date	April 17, 2013
Name (Print/Type)	Elisabeth H. Hunt, Ph.D.	Registration No. (Attorney/Agent)	67,336

3076286.1

PTO/SB/17 (03-13)
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FEE TRANSMITTAL

Complete if known	
Application Number	Not Yet Assigned
Filing Date	Herewith
First Named Inventor	Darren C. Meyer
Examiner Name	Not Yet Assigned
Art Unit	Not Yet Assigned
Practitioner Docket No.	N0484.70944US01

☐ Applicant asserts small entity status. See 37 CFR 1.27

☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously

TOTAL AMOUNT OF PAYMENT ($) 1,740.00

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☐ Deposit Account Deposit Account Number: 23/2825 Deposit Account Name: Wolf, Greenfield & Sacks, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

	FILING FEES			SEARCH FEES			EXAMINATION FEES			
Application Type	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	U ($)	S ($)	M ($)	Fees Paid ($)
Utility	280	140*	70	600	300	150	720	360	180	1,600.00
Design	180	90	45	120	60	30	460	230	115	
Plant	180	90	45	380	190	95	580	290	145	
Reissue	280	140	70	600	300	150	2,160	1,080	540	
Provisional	260	130	65	0	0	0	0	0	0	

* The $140 small entity status filing fee for a utility application is further reduced to $70 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee ($)	Small Entity Fee ($)	Micro Entity Fee ($)
Each claim over 20 (including Reissues)	80	40	20
Each independent claim over 3 (including Reissues)	420	210	105
Multiple dependent claims	780	390	195

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)
20 - 20 or HP =	_____ x	_____ =	_____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
3 - 3 or HP =	_____ x	_____ =	_____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims: Fee ($) _____ Fee Paid ($) _____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $400 ($200 for small entity) ($100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
60 - 100 =	_____ /50 =	_____ (round **up** to a whole number) x	_____ =	_____

4. OTHER FEE(S) Fees Paid ($)

Non-English specification, $130 fee (no small or micro entity discount) _____

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small or micro entity) _____

Other (e.g., late filing surcharge): 1051 Surcharge - Late filing fee, search fee, ... 140.00

SUBMITTED BY					
Signature	Elisabeth Hunt	Registration No. (Attorney/Agent)	67,336	Telephone	617.646.8000
Name (Print/Type)	Elisabeth H. Hunt, Ph.D.			Date	April 17, 2013

3076284.1

METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Application Serial No. 12/704,859, entitled "Method and Apparatus for Providing Speech Output for Speech-Enabled Applications" and filed on February 12, 2010 (now pending), which is incorporated herein by reference in its entirety.

BACKGROUND OF INVENTION

1. Field of Invention

The techniques described herein are directed generally to the field of speech synthesis, and more particularly to techniques for synthesizing speech with contrastive stress.

2. Description of the Related Art

Speech-enabled software applications exist that are capable of providing output to a human user in the form of speech. For example, in an interactive voice response (IVR) application, a user typically interacts with the software application using speech as a mode of both input and output. Speech-enabled applications are used in many different contexts, such as telephone call centers for airline flight information, banking information and the like, global positioning system (GPS) devices for driving directions, e-mail, text messaging and web browsing applications, handheld device command and control, and many others. When a user communicates with a speech-enabled application by speaking, automatic speech recognition is typically used to determine the content of the user's utterance and map it to an appropriate action to be taken by the speech-enabled application. This action may include outputting to the user an appropriate response, which is rendered as audio speech output through some form of speech synthesis (i.e., machine rendering of speech). Speech-enabled applications may also be programmed to output speech prompts to deliver information or instructions to the user, whether in response to a user input or to other triggering events recognized by the running application. Examples of speech-enabled applications also include applications that output prompts as speech but receive user input through non-speech input methods,

applications that receive user input through speech in addition to non-speech input methods, and applications that produce speech output in addition to other non-speech forms of output.

Techniques for synthesizing output speech prompts to be played to a user as part of an IVR dialog or other speech-enabled application have conventionally been of two general forms: concatenated prompt recording and text to speech synthesis. Concatenated prompt recording (CPR) techniques require a developer of the speech-enabled application to specify the set of speech prompts that the application will be capable of outputting, and to code these prompts into the application. Typically, a voice talent (i.e., a particular human speaker) is engaged during development of the speech-enabled application to speak various word sequences or phrases that will be used in the output speech prompts of the running application. These spoken word sequences are recorded and stored as audio recording files, each referenced by a particular filename. When specifying an output speech prompt to be used by the speech-enabled application, the developer designates a particular sequence of audio prompt recording files to be concatenated (e.g., played consecutively) to form the speech output.

FIG. 1A illustrates steps involved in a conventional CPR process to synthesize an example desired speech output 110. In this example, the desired speech output 110 is, "Arriving at 221 Baker St. Please enjoy your visit." Desired speech output 110 could represent, for example, an output prompt to be played to a user of a GPS device upon arrival at a destination with address 221 Baker St. To specify that such an output prompt should be synthesized through CPR in response to the detection of such a triggering event by the speech-enabled application, a developer would enter the output prompt into the application software code. An example of the substance of such code is given in FIG. 1A as example input code 120.

Input code 120 illustrates example pieces of code that a developer of a speech-enabled application would enter to instruct the application to form desired speech output 110 through conventional CPR techniques. Through input code 120, the developer directly specifies which pre-recorded audio files should be used to render each portion of desired speech output 110. In this example, the beginning portion of the speech output, "Arriving at", corresponds to an audio file named "i.arrive.wav", which contains pre-recorded audio of a voice talent speaking the word sequence "Arriving at" at the

beginning of a sentence. Similarly, an audio file named "m.address.hundreds2.wav" contains pre-recorded audio of the voice talent speaking the number "two" in a manner appropriate for the hundreds digit of an address in the middle of a sentence, and an audio file named "m.address.units21.wav" contains pre-recorded audio of the voice talent speaking "twenty-one" in a manner appropriate for the units of an address in the middle of a sentence. These audio files are selected and ordered as a sequence of audio segments 130, which are ultimately concatenated to form the speech output of the speech-enabled application. To specify that these particular audio files be selected for the various portions of the desired speech output 110, the developer of the speech-enabled application enters their filenames (i.e., "i.arrive.wav", "m.address.hundreds2.wav", etc.) into input code 120 in the proper sequence.

For some specific types of desired speech output portions (generally conveying numeric information), such as the address number "221" in desired speech output 110, an application using conventional CPR techniques can also issue a call-out to a separate library of function calls for mapping those specific word types to audio recording filenames. For example, for the "221" portion of desired speech output 110, input code 120 could contain code that calls the name of a specific function for mapping address numbers in English to sequences of audio filenames and passes the number "221" to that function as input. Such a function would then apply a hard coded set of language-specific rules for address numbers in English, such as a rule indicating that the hundreds place of an address in English maps to a filename in the form of "m.address.hundreds_.wav" and a rule indicating that the tens and units places of an address in English map to a filename in the form of "m.address.units__.wav". To make use of such function calls, a developer of a speech-enabled application would be required to supply audio recordings of the specific words in the specific contexts referenced by the function calls, and to name those audio recording files using the specific filename formats referenced by the function calls.

In the example of FIG. 1A, the "Baker" portion of desired speech output 110 does not correspond to any available audio recordings pre-recorded by the voice talent. For example, in many instances it can be impractical to engage the voice talent to pre-record speech audio for every possible street name that a GPS application may eventually need to include in an output speech prompt. For such desired speech output portions that do

not match any pre-recorded audio, speech-enabled applications relying primarily on CPR techniques are typically programmed to issue call-outs (in a program code form similar to that described above for calling out to a function library) to a separate text to speech (TTS) synthesis engine, as represented in portion 122 of example input code 120. The TTS engine then renders that portion of the desired speech output as a sequence of separate subword units such as phonemes, as represented in portion 132 of the example sequence of audio segments 130, rather than a single audio recording as produced naturally by a voice talent.

Text to speech (TTS) synthesis techniques allow any desired speech output to be synthesized from a text transcription (i.e., a spelling out, or orthography, of the sequence of words) of the desired speech output. Thus, a developer of a speech-enabled application need only specify plain text transcriptions of output speech prompts to be used by the application, if they are to be synthesized by TTS. The application may then be programmed to access a separate TTS engine to synthesize the speech output. Some conventional TTS engines produce output audio using concatenative text to speech synthesis, whereby the input text transcription of the desired speech output is analyzed and mapped to a sequence of subword units such as phonemes (or phones, allophones, etc.). The concatenative TTS engine typically has access to a database of small audio files, each audio file containing a single subword unit (e.g., a phoneme or a portion of a phoneme) excised from many hours of speech pre-recorded by a voice talent. Complex statistical models are applied to select preferred subword units from this large database to be concatenated to form the particular sequence of subword units of the speech output.

Other techniques for TTS synthesis exist that do not involve recording any speech from a voice talent. Such TTS synthesis techniques include formant synthesis and articulatory synthesis, among others. In formant synthesis, an artificial sound waveform is generated and shaped to model the acoustics of human speech. A signal with a harmonic spectrum, similar to that produced by human vocal folds, is generated and filtered using resonator models to impose spectral peaks, known as formants, on the harmonic spectrum. The formants are positioned to represent the changing resonant frequencies of the human vocal tract during speech. Parameters such as amplitude of periodic voicing, fundamental frequency, turbulence noise levels, formant frequencies and bandwidths, spectral tilt and the like are varied over time to generate the sound

waveform emulating a sequence of speech sounds. In articulatory synthesis, an artificial glottal source signal, similar to that produced by human vocal folds, is filtered using computational models of the human vocal tract and of the articulatory processes that change the shape of the vocal tract to make speech sounds. Each of these TTS synthesis techniques (e.g., concatenative TTS synthesis, articulatory synthesis and formant synthesis) typically involves representing the input text as a sequence of phonemes, and applying complex models (acoustic and/or articulatory) to generate output sound for each phoneme in its specific context within the sequence.

In addition to sometimes being used to fill in small gaps in CPR speech output, as illustrated in FIG. 1A, TTS synthesis is sometimes used to implement a system for synthesizing speech output that does not employ CPR at all, but rather uses only TTS to synthesize entire speech output prompts, as illustrated in FIG. 1B. FIG. 1B illustrates steps involved in conventional full concatenative TTS synthesis of the same desired speech output 110 that was synthesized using CPR techniques in FIG. 1A. In the TTS example of FIG. 1B, a developer of a speech-enabled application specifies the output prompt by programming the application to submit plain text input to a TTS engine. The example text input 150 is a plain text transcription of desired speech output 110, submitted to the TTS engine as, "Arriving at 221 Baker St. Please enjoy your visit." The TTS engine typically applies language models to determine a sequence of phonemes corresponding to the text input, such as phoneme sequence 160. The TTS engine then applies further statistical models to select small audio files from a database, each small audio file corresponding to one of the phonemes (or a portion of a phoneme, such as a demiphone, or half-phone) in the sequence, and concatenates the resulting sequence of audio segments 170 in the proper sequence to form the speech output.

The concatenative TTS database typically contains a large number of phoneme audio files excised from long recordings of the speech of a voice talent. Each phoneme is typically represented by multiple audio files excised from different times the phoneme was uttered by the voice talent in different contexts (e.g., the phoneme /t/ could be represented by an audio file excised from the beginning of a particular utterance of the word "tall", an audio file excised from the middle of an utterance of the word "battle", an audio file excised from the end of an utterance of the word "pat", two audio files excised from an utterance of the word "stutter", and many others). Statistical models are used by

the TTS engine to select the best match from the multiple audio files for each phoneme given the context of the particular phoneme sequence to be synthesized. The long recordings from which the phoneme audio files in the database are excised are typically made with the voice talent reading a generic script, unrelated to any particular speech-enabled application in which the TTS engine will eventually be employed.

SUMMARY OF INVENTION

One embodiment is directed to a method for providing speech output for a speech-enabled application, the method comprising receiving from the speech-enabled application a text input comprising a text transcription of a desired speech output; generating, using at least one computer system, an audio speech output corresponding to at least a portion of the text input, the audio speech output comprising at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output; and providing the audio speech output for the speech-enabled application.

Another embodiment is directed to apparatus for providing speech output for a speech-enabled application, the apparatus comprising a memory storing a plurality of processor-executable instructions, and at least one processor, operatively coupled to the memory, that executes the instructions to receive from the speech-enabled application a text input comprising a text transcription of a desired speech output; generate an audio speech output corresponding to at least a portion of the text input, the audio speech output comprising at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output; and provide the audio speech output for the speech-enabled application.

Another embodiment is directed to at least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for providing speech output for a speech-enabled application, the method comprising receiving from the speech-enabled application a text input comprising a text transcription of a desired speech output; generating an audio speech output corresponding to at least a portion of the text input, the audio speech output comprising at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output; and providing the audio speech output for the speech-enabled application.

Another embodiment is directed to a method for providing speech output via a speech-enabled application, the method comprising generating, using at least one computer system executing the speech-enabled application, a text input comprising a text transcription of a desired speech output; inputting the text input to at least one speech synthesis engine; receiving from the at least one speech synthesis engine an audio speech output corresponding to at least a portion of the text input, the audio speech output comprising at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output; and providing the audio speech output to at least one user of the speech-enabled application.

Another embodiment is directed to apparatus for providing speech output via a speech-enabled application, the apparatus comprising a memory storing a plurality of processor-executable instructions, and at least one processor, operatively coupled to the memory, that executes the instructions to generate a text input comprising a text transcription of a desired speech output; input the text input to at least one speech synthesis engine; receive from the at least one speech synthesis engine an audio speech output corresponding to at least a portion of the text input, the audio speech output comprising at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output; and provide the audio speech output to at least one user of the speech-enabled application.

Another embodiment is directed to at least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for providing speech output via a speech-enabled application, the method comprising generating a text input comprising a text transcription of a desired speech output; inputting the text input to at least one speech synthesis engine; receiving from the at least one speech synthesis engine an audio speech output corresponding to at least a portion of the text input, the audio speech output comprising at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output; and providing the audio speech output to at least one user of the speech-enabled application.

Another embodiment is directed to a method for use with a speech-enabled application, the method comprising receiving input from the speech-enabled application comprising a plurality of text strings; generating, using at least one computer system,

speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and providing the speech synthesis output for the speech-enabled application.

Another embodiment is directed to apparatus for use with a speech-enabled application, the apparatus comprising a memory storing a plurality of processor-executable instructions, and at least one processor, operatively coupled to the memory, that executes the instructions to receive input from the speech-enabled application comprising a plurality of text strings; generate speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and provide the speech synthesis output for the speech-enabled application.

Another embodiment is directed to at least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for use with a speech-enabled application, the method comprising receiving input from the speech-enabled application comprising a plurality of text strings; generating speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and providing the speech synthesis output for the speech-enabled application.

Another embodiment is directed to a method for generating speech output via a speech-enabled application, the method comprising generating, using at least one computer system executing the speech-enabled application, a plurality of text strings,

each of the plurality of text strings corresponding to a portion of a desired speech output; inputting the plurality of text strings to at least one software module for rendering contrastive stress; receiving output from the at least one software module, the output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

Another embodiment is directed to apparatus for generating speech output via a speech-enabled application, the apparatus comprising a memory storing a plurality of processor-executable instructions, and at least one processor, operatively coupled to the memory, that executes the instructions to generate a plurality of text strings, each of the plurality of text strings corresponding to a portion of a desired speech output; input the plurality of text strings to at least one software module for rendering contrastive stress; receive output from the at least one software module, the output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and generate, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

Another embodiment is directed to at least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for generating speech output via a speech-enabled application, the method comprising generating a plurality of text strings, each of the plurality of text strings corresponding to a portion of a desired speech output; inputting the plurality of text strings to at least one software module for rendering contrastive stress; receiving output from the at least one software module, the output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at

least one rendering of at least one other of the plurality of text strings; and generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings are not intended to be drawn to scale. In the drawings, each identical or nearly identical component that is illustrated in multiple figures is represented by a like numeral. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

FIG. 1A illustrates an example of conventional concatenated prompt recording (CPR) synthesis;

FIG. 1B illustrates an example of conventional text to speech (TTS) synthesis;

FIG. 2 is a block diagram of an exemplary system for providing speech output for a speech-enabled application, in accordance with some embodiments of the present invention;

FIGs. 3A and 3B illustrate examples of analysis of text input in accordance with some embodiments of the present invention;

FIG. 4 is a flow chart illustrating an exemplary method for providing speech output for a speech-enabled application, in accordance with some embodiments of the present invention;

FIG. 5 is a flow chart illustrating an exemplary method for providing speech output for a speech-enabled application, in accordance with some embodiments of the present invention;

FIG. 6 is a flow chart illustrating an exemplary method for use with a speech-enabled application, in accordance with some embodiments of the present invention;

FIG. 7 is a flow chart illustrating an exemplary method for providing speech output via a speech-enabled application, in accordance with some embodiments of the present invention; and

FIG. 8 is a block diagram of an exemplary computer system on which aspects of the present invention may be implemented.

DETAILED DESCRIPTION

Applicants have recognized that conventional speech output synthesis techniques for speech-enabled applications suffer from various drawbacks. Conventional CPR techniques, as discussed above, require a developer of the speech-enabled application to hard code the desired output speech prompts with the filenames of the specific audio files of the prompt recordings that will be concatenated to form the speech output. This is a time consuming and labor intensive process requiring a skilled programmer of such systems. This also requires the speech-enabled application developer to decide, prior to programming the application's output speech prompts, which portions of each prompt will be pre-recorded by a voice talent and which will be synthesized through call-outs to a TTS engine. Conventional CPR techniques also require the application developer to remember or look up the appropriate filenames to code in each portion of the desired speech output that will be produced using a prompt recording. In addition, the resulting code (e.g., input code 120 in FIG. 1A) is not easy to read or to intuitively associate with the words of the speech output, which can lead to frustration and wasted time during programming, debugging and updating processes.

By contrast, conventional TTS techniques allow the speech-enabled application developer to specify desired output speech prompts using plain text transcriptions. This results in a relatively less time consuming programming process, which may require relatively less skill in programming. However, the state of the art in TTS synthesis technology typically produces speech output that is relatively monotone and flat, lacking the naturalness and emotional expressiveness of the naturally produced human speech that can be provided by a recording of a speaker speaking a prompt. For instance, Applicants have recognized that conventional TTS synthesis systems do not synthesize speech with contrastive stress, in which a particular emphasis pattern is applied in speech to words or syllables that are meant to contrast with each other. Human speakers naturally apply contrastive stress to emphasize a word or syllable contrary to its normal accentuation, in order to contrast it with an alternative word or syllable or to focus attention on it. A common example is the stress often given by human speakers to the normally unstressed words "of", "by" and "for" in the sequence, "government of the people, by the people, for the people". In this example, the contrastive stress pattern applied to the three prepositions, in which each of them may be particularly emphasized,

draws the attention of the listener to the differences between them, and to the importance of those differences to the meaning of the sentence.

Contrastive stress can be an important tool in human understanding of meaning as conveyed by spoken language; however, conventional automatic speech synthesis technologies have not taken advantage of contrastive stress as an opportunity to improve intelligibility, naturalness and effectiveness of machine generated speech. Applicants have recognized that a primary focus of many automated information systems is to provide numerical values and other specific datums to users, who in turn often have preconceived expectations about the kind of information they are likely to hear. Information can often be lost in the stream of output audio when a large number of words must be output to collect necessary parameters from the user and to set the context of the system's response. Applicants have appreciated, therefore, that a system that can highlight that although the user expected to hear "*this*", the actual value is "*that*", may allow the user to hear and process the information more easily and successfully.

Applicants have further recognized that the process of conventional TTS synthesis is typically not well understood by developers of speech-enabled applications, whose expertise is in designing dialogs for interactive voice response (IVR) applications (for example, delivering flight information or banking assistance) rather than in complex statistical models for mapping acoustical features to phonemes and phonemes to text, for example. In this respect, Applicants have recognized that the use of conventional TTS synthesis to create output speech prompts typically requires speech-enabled application developers to rely on third-party TTS engines for the entire process of converting text input to audio output, requiring that they relinquish control of the type and character of the speech output that is produced.

In accordance with some embodiments of the present invention, techniques are provided that enable the process of speech-enabled application design to be simple while providing naturalness of the speech output and improved emulation of human speech prosody. In particular, some embodiments provide techniques for accepting as input plain text transcriptions of desired speech output, and rendering the text as synthesized speech with contrastive stress. During user interaction with a speech-enabled application, the application may provide to a synthesis system an input text transcription of a desired speech output, and the synthesis system may analyze the text input to

determine which portion(s) of the speech output should carry contrastive stress. In some embodiments, the application may include tags in the text input to identify tokens or fields that should contrast with each other, and the synthesis system may analyze those tags to determine which portions of the speech output should carry contrastive stress. In some embodiments, the synthesis system may automatically identify which tokens (e.g., words) should contrast with each other without any tags being included in the text input. From among the tokens that contrast with each other, the synthesis system may further specifically identify which word(s) and/or syllable(s) should carry the contrastive stress. For example, if a plurality of tokens in a text input contrast with each other, one, some or all of those tokens may be stressed when rendering the speech output. In some embodiments, after identifying which word(s) and/or syllable(s) should carry contrastive stress, the synthesis system may apply the contrastive stress to the identified word(s) and/or syllable(s) through increased pitch, amplitude and/or duration, or in any other suitable manner.

The aspects of the present invention described herein can be implemented in any of numerous ways, and are not limited to any particular implementation techniques. Thus, while examples of specific implementation techniques are described below, it should be appreciated that the examples are provided merely for purposes of illustration, and that other implementations are possible.

One illustrative application for the techniques described herein is for use in connection with an interactive voice response (IVR) application, for which speech may be a primary mode of input and output. However, it should be appreciated that aspects of the present invention described herein are not limited in this respect, and may be used with numerous other types of speech-enabled applications other than IVR applications. In this respect, while a speech-enabled application in accordance with embodiments of the present invention may be capable of providing output in the form of synthesized speech, it should be appreciated that a speech-enabled application may also accept and provide any other suitable forms of input and/or output, as aspects of the present invention are not limited in this respect. For instance, some examples of speech-enabled applications may accept user input through a manually controlled device such as a telephone keypad, keyboard, mouse, touch screen or stylus, and provide output to the user through speech. Other examples of speech-enabled applications may provide

speech output in certain instances, and other forms of output, such as visual output or non-speech audio output, in other instances. Examples of speech-enabled applications include, but are not limited to, automated call-center applications, internet-based applications, device-based applications, and any other suitable application that is speech enabled.

An exemplary synthesis system 200 for providing speech output for a speech-enabled application 210 in accordance with some embodiments of the present invention is illustrated in FIG. 2. As discussed above, the speech-enabled application may be any suitable type of application capable of providing output to a user 212 in the form of speech. In accordance with some embodiments of the present invention, the speech-enabled application 210 may be an IVR application; however, it should be appreciated that aspects of the present invention are not limited in this respect.

Synthesis system 200 may receive data from and transmit data to speech-enabled application 210 in any suitable way, as aspects of the present invention are not limited in this respect. For example, in some embodiments, speech-enabled application 210 may access synthesis system 200 through one or more networks such as the Internet. Other suitable forms of network connections include, but are not limited to, local area networks, medium area networks and wide area networks. It should be appreciated that speech-enabled application 210 may communicate with synthesis system 200 through any suitable form of network connection, as aspects of the present invention are not limited in this respect. In other embodiments, speech-enabled application 210 may be directly connected to synthesis system 200 by any suitable communication medium (e.g., through circuitry or wiring), as aspects of the invention are not limited in this respect. It should be appreciated that speech-enabled application 210 and synthesis system 200 may be implemented together in an embedded fashion on the same device or set of devices, or may be implemented in a distributed fashion on separate devices or machines, as aspects of the present invention are not limited in this respect. Each of synthesis system 200 and speech-enabled application 210 may be implemented on one or more computer systems in hardware, software, or a combination of hardware and software, examples of which will be described in further detail below. It should also be appreciated that various components of synthesis system 200 may be implemented together in a single physical system or in a distributed fashion in any suitable combination of multiple physical

systems, as aspects of the present invention are not limited in this respect. Similarly, although the block diagram of FIG. 2 illustrates various components in separate blocks, it should be appreciated that one or more components may be integrated in implementation with respect to physical components and/or software programming code.

Speech-enabled application 210 may be developed and programmed at least in part by a developer 220. It should be appreciated that developer 220 may represent a single individual or a collection of individuals, as aspects of the present invention are not limited in this respect. In some embodiments, when speech output is to be synthesized using CPR techniques, developer 220 may supply a prompt recording dataset 230 that includes one or more audio recordings 232. Prompt recording dataset 230 may be implemented in any suitable fashion, including as one or more computer-readable storage media, as aspects of the present invention are not limited in this respect. Data, including audio recordings 232 and/or any metadata 234 associated with audio recordings 232, may be transmitted between prompt recording dataset 230 and synthesis system 200 in any suitable fashion through any suitable form of direct and/or network connection(s), examples of which were discussed above with reference to speech-enabled application 210.

Audio recordings 232 may include recordings of a voice talent (i.e., a human speaker) speaking the words and/or word sequences selected by developer 220 to be used as prompt recordings for providing speech output to speech-enabled application 210. As discussed above, each prompt recording may represent a speech sequence, which may take any suitable form, examples of which include a single word, a prosodic word, a sequence of multiple words, an entire phrase or prosodic phrase, or an entire sentence or sequence of sentences, that will be used in various output speech prompts according to the specific function(s) of speech-enabled application 210. Audio recordings 232, each representing one or more specified prompt recordings (or portions thereof) to be used by synthesis system 200 in providing speech output for speech-enabled application 210, may be pre-recorded during and/or in connection with development of speech-enabled application 210. In this manner, developer 220 may specify and control the content, form and character of audio recordings 232 through knowledge of their intended use in speech-enabled application 210. In this respect, in some embodiments, audio recordings 232 may be specific to speech-enabled application 210. In other embodiments, audio

recordings 232 may be specific to a number of speech-enabled applications, or may be more general in nature, as aspects of the present invention are not limited in this respect. Developer 220 may also choose and/or specify filenames for audio recordings 232 in any suitable way according to any suitable criteria, as aspects of the present invention are not limited in this respect.

Audio recordings 232 may be pre-recorded and stored in prompt recording dataset 230 using any suitable technique, as aspects of the present invention are not limited in this respect. For example, audio recordings 232 may be made of the voice talent reading one or more scripts whose text corresponds exactly to the words and/or word sequences specified by developer 220 as prompt recordings for speech-enabled application 210. The recording of the word(s) spoken by the voice talent for each specified prompt recording (or portion thereof) may be stored in a single audio file in prompt recording dataset 230 as an audio recording 232. Audio recordings 232 may be stored as audio files using any suitable technique, as aspects of the present invention are not limited in this respect. An audio recording 232 representing a sequence of contiguous words to be used in speech output for speech-enabled application 210 may include an intact recording of the human voice talent speaker speaking the words consecutively and naturally in a single utterance. In some embodiments, the audio recording 232 may be processed using any suitable technique as desired for storage, reproduction, and/or any other considerations of speech-enabled application 210 and/or synthesis system 200 (e.g., to remove silent pauses and/or misspoken portions of utterances, to mitigate background noise interference, to manipulate volume levels, to compress the recording using an audio codec, etc.), while maintaining the sequence of words desired for the prompt recording as spoken by the voice talent.

Developer 220 may also supply metadata 234 in association with one or more of the audio recordings 232. Metadata 234 may be any data about the audio recording in any suitable form, and may be entered, generated and/or stored using any suitable technique, as aspects of the present invention are not limited in this respect. Metadata 234 may provide an indication of the word sequence represented by a particular audio recording 232. This indication may be provided in any suitable form, including as a normalized orthography of the word sequence, as a set of orthographic variations of the word sequence, or as a phoneme sequence or other sound sequence corresponding to the

word sequence, as aspects of the present invention are not limited in this respect. Metadata 234 may also indicate one or more constraints that may be interpreted by synthesis system 200 to limit or express a preference for the circumstances under which each audio recording 232 or group of audio recordings 232 may be selected and used in providing speech output for speech-enabled application 210. For example, metadata 234 associated with a particular audio recording 232 may constrain that audio recording 232 to be used in providing speech output only for a certain type of speech-enabled application 210, only for a certain type of speech output, and/or only in certain positions within the speech output. Metadata 234 associated with some other audio recordings 232 may indicate that those audio recordings may be used in providing speech output for any matching text, for example in the absence of audio recordings with metadata matching more specific constraints associated with the speech output. Metadata 234 may also indicate information about the voice talent speaker who spoke the associated audio recording 232, such as the speaker's gender, age or name. Further examples of metadata 234 and its use by synthesis system 200 are provided below.

In some embodiments, developer 220 may provide multiple pre-recorded audio recordings 232 as different versions of speech output that can be represented by a same textual orthography. In one example, developer 220 may provide multiple audio recordings for different word versions that can be represented by the same orthography, "20". Such audio recordings may include words pronounced as "twenty", "two zero" and "twentieth". Developer 220 may also provide metadata 234 indicating that the first version is to be used when the orthography "20" appears in the context of a natural number, that the second version is to be used in the context of spelled-out digits, and that the third version is to be used in the context of a date. Developer 220 may also provide other audio recording versions of "twenty" with particular inflections, such as an emphatic version, with associated metadata indicating that they should be used in positions of contrastive stress, or preceding an exclamation mark in a text input. It should be appreciated that the foregoing are merely some examples, and any suitable forms of audio recordings 232 and/or metadata 234 may be used, as aspects of the present invention are not limited in this respect.

To accommodate CPR synthesis of speech with contrastive stress, in some embodiments developer 220 (or any other suitable entity) may provide one or more audio

recording versions of a word spoken with a particular type of emphasis or stress, meant to contrast it with another word of a similar type or function within the same utterance. For example, developer 220 may provide another audio recording version of the word "twenty" taken from an utterance like, "Not nineteen, but twenty." In such an utterance, the voice talent speaker may have particularly emphasized the number "twenty" to distinguish and contrast it from the other number "nineteen" in the utterance. Such contrastive stress may be a stress or emphasis of a greater degree than would normally be applied to the same word when it is not being distinguished or contrasted with another word of like type, function and/or subject matter. For example, the speaker may apply contrastive stress to the word "twenty" by increasing the target pitch (fundamental frequency), loudness (sound amplitude or energy), and/or length (duration) of the main stressed syllable of the word, or in any other suitable way. In this example, the word "twenty", and specifically its syllable of main lexical stress "twen-", is said to "carry" contrastive stress, by exhibiting an increased pitch, amplitude, and/or duration target during the syllable "twen-". Other voice quality parameters may also be brought into play in human production of contrastive stress, such as amplitude of the glottal voicing source, level of aspiration noise, glottal constriction, open quotient, spectral tilt, level of breathiness, etc.

When providing an audio recording 232 of a word carrying contrastive stress, developer 220 may in some embodiments provide associated metadata 234 that identifies the audio recording 232 as particularly suited for use in rendering a portion of a speech output that is assigned to carry contrastive stress. In some embodiments, metadata 234 may label the audio recording as generally carrying contrastive stress. Alternatively or additionally, metadata 234 may specifically indicate that the audio recording has increased pitch, amplitude, duration, and/or any other suitable parameter, relative to other audio recordings with the same textual orthography. In some embodiments, metadata 234 may even indicate a quantitative measure of the maximum fundamental frequency, amplitude, etc., and/or the duration in units of time, of the audio recording and/or the syllable in the audio recording carrying contrastive stress. Alternatively or additionally, metadata 234 may indicate a quantitative measure of the difference in any of such parameters between the audio recording with contrastive stress and one or more other audio recordings with the same textual orthography. It should be appreciated that

metadata 234 may indicate that an audio recording is intended for use in rendering speech to carry contrastive stress in any suitable way, as aspects of the present invention are not limited in this respect.

In accordance with some embodiments of the present invention, prompt recording dataset 230 may be physically or otherwise integrated with synthesis system 200, and synthesis system 200 may provide an interface through which developer 220 may provide audio recordings 232 and associated metadata 234 to prompt recording dataset 230. In accordance with other embodiments, prompt recording dataset 230 and any associated audio recording input interface may be implemented separately from and independently of synthesis system 200. In some embodiments, speech-enabled application 210 may also be configured to provide an interface through which developer 220 may specify templates for text inputs to be generated by speech-enabled application 210. Such templates may be implemented as text input portions to be accordingly fit together by speech-enabled application 210 in response to certain events. In one example, developer 220 may specify a template including a carrier prompt, "Flight number _____ was originally scheduled to depart at _____, but is now scheduled to depart at _____." The template may indicate that content prompts, such as a particular flight number and two particular times of day, should be inserted by the speech-enabled application in the blanks in the carrier prompt to generate a text input to report a change in a flight schedule. The interface may be programmed to receive the input templates and integrate them into the program code of speech-enabled application 210. However, it should be appreciated that developer 220 may provide and/or specify audio recordings, metadata and/or text input templates in any suitable way and in any suitable form, with or without the use of one or more specific user interfaces, as aspects of the present invention are not limited in this respect.

In some embodiments, synthesis system 200 may utilize speech synthesis techniques other than CPR to generate synthetic speech with contrastive stress. For example, synthesis system 200 may employ TTS techniques such as concatenative TTS, formant synthesis, and/or articulatory synthesis, as will be described in detail below, or any other suitable technique. It should be appreciated that synthesis system may apply any of various suitable speech synthesis techniques to the inventive methods of generating synthetic speech with contrastive stress described herein, either individually

or in any of various combinations. In this respect, it should be appreciated that one or more components of synthesis system 200 as illustrated in FIG. 2 may be omitted in some embodiments in accordance with the present disclosure. For example, in embodiments in which synthesis system 200 employs only synthesis techniques other than CPR, prompt recording dataset 230 with its audio recordings 232 may not be implemented as part of the system. In other embodiments, prompt recording dataset 230 may be supplied for instances in which it is desired for synthesis system 200 to employ CPR techniques to synthesize some speech outputs, but techniques other than CPR may be employed in other instances to synthesize other speech outputs. In still other embodiments, a combination of CPR and one or more other synthesis techniques may be employed to synthesize various portions of individual speech outputs.

During run-time, which may occur after development of speech-enabled application 210 and/or after developer 220 has provided at least some audio recordings 232 that will be used in speech output in a current session, a user 212 may interact with the running speech-enabled application 210. When program code running as part of the speech-enabled application requires the application to output a speech prompt to user 212, speech-enabled application may generate a text input 240 that includes a literal or word-for-word text transcription of the desired speech output. Speech-enabled application 210 may transmit text input 240 (through any suitable communication technique and medium) to synthesis system 200, where it may be processed. In the embodiment of FIG. 2, the input is first processed by front-end component 250. It should be appreciated, however, that synthesis system 200 may be implemented in any suitable form, including forms in which front-end and back-end components are integrated rather than separate, and in which processing steps may be performed in any suitable order by any suitable component or components, as aspects of the present invention are not limited in this respect.

Front-end 250 may process and/or analyze text input 240 to determine the sequence of words and/or sounds represented by the text, as well as any prosodic information that can be inferred from the text. Examples of prosodic information include, but are not limited to, locations of phrase boundaries, prosodic boundary tones, pitch accents, word-, phrase- and sentence-level stress or emphasis, contrastive stress and the like. In particular, in accordance with some embodiments of the present disclosure,

front-end 250 may be programmed to process text input 240 to identify one or more portions of text input 240 that should be rendered with contrastive stress to contrast with one or more other portions of text input 240. Exemplary details of such processing are provided below.

Front-end 250 may be implemented as any suitable combination of hardware and/or software in any suitable form using any suitable technique, as aspects of the present invention are not limited in this respect. In some embodiments, front-end 250 may be programmed to process text input 240 to produce a corresponding normalized orthography 252 and a set of markers 254. Front-end 250 may also be programmed to generate a phoneme sequence 256 corresponding to the text input 240, which may be used by synthesis system 200 in selecting one or more matching audio recordings 232 and/or in synthesizing speech output using one or more forms of TTS synthesis. Numerous techniques for generating a phoneme sequence are known, and any suitable technique may be used, as aspects of the present invention are not limited in this respect.

Normalized orthography 252 may be a spelling out of the desired speech output represented by text input 240 in a normalized (e.g., standardized) representation that may correspond to multiple textual expressions of the same desired speech output. Thus, a same normalized orthography 252 may be created for multiple text input expressions of the same desired speech output to create a textual form of the desired speech output that can more easily be matched to available audio recordings 232. For example, front-end 250 may be programmed to generate normalized orthography 252 by removing capitalizations from text input 240 and converting misspellings or spelling variations to normalized word spellings specified for synthesis system 200. Front-end 250 may also be programmed to expand abbreviations and acronyms into full words and/or word sequences, and to convert numerals, symbols and other meaningful characters to word forms, using appropriate language-specific rules based on the context in which these items occur in text input 240. Numerous other examples of processing steps that may be incorporated in generating a normalized orthography 252 are possible, as the examples provided above are not exhaustive. Techniques for normalizing text are known, and aspects of the present invention are not limited to any particular normalization technique. Furthermore, while normalizing the orthography may provide the advantages discussed above, not all embodiments are limited to generating a normalized orthography 252.

Markers 254 may be implemented in any suitable form, as aspects of the present invention are not limited in this respect. Markers 254 may indicate in any suitable way the locations of various lexical, syntactic and/or prosodic boundaries and/or events that may be inferred from text input 240. For example, markers 254 may indicate the locations of boundaries between words, as determined through tokenization of text input 240 by front-end 250. Markers 254 may also indicate the locations of the beginnings and endings of sentences and/or phrases (syntactic or prosodic), as determined through analysis of the punctuation and/or syntax of text input 240 by front-end 250, as well as any specific punctuation symbols contributing to the analysis. In addition, markers 254 may indicate the locations of peaks in emphasis or contrastive stress, or various other prosodic patterns, as determined through semantic and/or syntactic analysis of text input 240 by front-end 250, and/or as indicated by one or more mark-up tags included in text input 240. Markers 254 may also indicate the locations of words and/or word sequences of particular text normalization types, such as dates, times, currency, addresses, natural numbers, digit sequences and the like. Numerous other examples of useful markers 254 may be used, as aspects of the present invention are not limited in this respect.

Markers 254 generated from text input 240 by front-end 250 may be used by synthesis system 200 in further processing to render text input 240 as speech. For example, markers 254 may indicate the locations of the beginnings and endings of sentences and/or syntactic and/or prosodic phrases within text input 240. In some embodiments, some audio recordings 232 may have associated metadata 234 indicating that they should be selected for portions of a text input at particular positions with respect to sentence and/or phrase boundaries. For example, a comparison of markers 254 with metadata 234 of audio recordings 232 may result in the selection of an audio recording with metadata indicating that it is for phrase-initial use for a portion of text input 240 immediately following a [begin phrase] marker. In a similar example utilizing concatenative TTS synthesis, phoneme audio recordings excised from speech of a voice talent at and/or near the beginning of a phrase may be used to render a portion of text input 240 immediately following a [begin phrase] marker. In examples utilizing articulatory and/or formant synthesis, acoustic and/or articulatory parameters may be manipulated in various ways based on phrase markers, for example to cause the pitch to

continuously decrease in rendering a portion of text input 240 leading up to an [end phrase] marker.

In addition, markers 254 may be generated to indicate the locations of pitch accents and other forms of stress and/or emphasis in text input 240, such as portions of text input 240 identified by front-end 250 to be rendered with contrastive stress. In embodiments employing CPR synthesis, markers 254 may be compared with metadata 234 to select audio recordings with appropriate inflections for such locations. When a marker or set of markers is generated to indicate that a word, token or portion of a token from text input 240 is to be rendered to carry contrastive stress, one or more audio recordings with matching metadata may be selected to render that portion of the speech output. As described above, matching metadata may indicate that the selected audio recording is for use in rendering speech carrying contrastive stress, and/or may indicate pitch, amplitude, duration and/or other parameter values and/or characteristics making the selected audio recording appropriate for use in rendering speech carrying contrastive stress. Similarly, in embodiments employing TTS synthesis, parameters such as pitch, amplitude and duration may be appropriately controlled, designated and/or manipulated at the phoneme, syllable and/or word level to render with contrastive stress portions of text input 240 designated by markers 254 as being assigned to carry contrastive stress.

Once normalized orthography 252 and markers 254 have been generated from text input 240 by front-end 250, they may serve as inputs to CPR back-end 260 and/or TTS back-end 270. CPR back-end 260 may also have access to audio recordings 232 in prompt recording dataset 230, in any of various ways as discussed above. CPR back-end 260 may be programmed to compare normalized orthography 252 and markers 254 to the available audio recordings 232 and their associated metadata to select an ordered set of matching selected audio recordings 262. In some embodiments, CPR back-end 260 may also be programmed to compare the text input 240 itself and/or phoneme sequence 256 to the audio recordings 232 and/or their associated metadata 234 to match the desired speech output to available audio recordings 232. In such embodiments, CPR back-end 260 may use text input 240 and/or phoneme sequence 256 in selecting from audio recordings 232 in addition to or in place of normalized orthography 252. As such, it should be appreciated that, although generation and use of normalized orthography 252 may provide the advantages discussed above, in some embodiments any or all of

normalized orthography 252 and phoneme sequence 256 may not be generated and/or used in selecting audio recordings.

CPR back-end 260 may be programmed to select appropriate audio recordings 232 to match the desired speech output in any suitable way, as aspects of the present invention are not limited in this respect. For example, in some embodiments CPR back-end 260 may be programmed on a first pass to select the audio recording 232 that matches the longest sequence of contiguous words in the normalized orthography 252, provided that the audio recording's metadata constraints are consistent with the normalized orthography 252, markers 254, and/or any annotations received in connection with text input 240. On subsequent passes, if any portions of normalized orthography 252 have not yet been matched with an audio recording 232, CPR back-end 260 may select the audio recording 232 that matches the longest word sequence in the remaining portions of normalized orthography 252, again subject to metadata constraints. Such an embodiment places a priority on having the largest possible individual audio recording used for any as-yet unmatched text, as a larger recording of a voice talent speaking as much of the desired speech output as possible may provide a most natural sounding speech output. However, not all embodiments are limited in this respect, as other techniques for selecting among audio recordings 232 are possible.

In another illustrative embodiment, CPR back-end 260 may be programmed to perform the entire matching operation in a single pass, for example by selecting from a number of candidate sequences of audio recordings 232 by optimizing a cost function. Such a cost function may be of any suitable form and may be implemented in any suitable way, as aspects of the present invention are not limited in this respect. For example, one possible cost function may favor a candidate sequence of audio recordings 232 that maximizes the average length of all audio recordings 232 in the candidate sequence for rendering the speech output. Optimization of such a cost function may place a priority on selecting a sequence with the largest possible audio recordings on average, rather than selecting the largest possible individual audio recording on each pass through the normalized orthography 252. Another example cost function may favor a candidate sequence of audio recordings 232 that minimizes the number of concatenations required to form a speech output from the candidate sequence. It should be appreciated

that any suitable cost function, selection algorithm, and/or prioritization goals may be employed, as aspects of the present invention are not limited in this respect.

However matching audio recordings 232 are selected by CPR back-end 260, the result may be a set of one or more selected audio recordings 262, each selected audio recording in the set corresponding to a portion of normalized orthography 252, and thus to a corresponding portion of the text input 240 and the desired speech output represented by text input 240. The set of selected audio recordings 262 may be ordered with respect to the order of the corresponding portions in the normalized orthography 252 and/or text input 240. In some embodiments, for contiguous selected audio recordings 262 from the set that have no intervening unmatched portions in between, CPR back-end 260 may be programmed to perform a concatenation operation to join the selected audio recordings 262 together end-to-end. In other embodiments, CPR back-end 260 may provide the set of selected audio recordings 262 to a different concatenation/streaming component 280 to perform any required concatenations to produce the speech output. Selected audio recordings 262 may be concatenated using any suitable technique (many of which are known in the art), as aspects of the present invention are not limited in this respect.

If any portion(s) of normalized orthography 252 and/or text input 240 are left unmatched by processing performed by CPR back-end 260 (e.g., if there are one or more portions of normalized orthography 252 for which no matching audio recording 232 is available), synthesis system 200 may in some embodiments be programmed to transmit an error or noncompliance indication to speech-enabled application 210. In other embodiments, synthesis system 200 may be programmed to synthesize those unmatched portions of the speech output using TTS back-end 270. TTS back-end 270 may be implemented in any suitable way. As described above with reference to FIG. 1B, such techniques are known in the art and any suitable technique may be used. TTS back-end 270 may employ, for example, concatenative TTS synthesis, formant TTS synthesis, articulatory TTS synthesis, and/or any other text to speech synthesis technique as is known in the art or as may later be discovered, as aspects of the present invention are not limited in this respect.

In some embodiments, TTS back-end 270 may be used by synthesis system 200 to synthesize entire speech outputs, rather than only portions for which no matching

audio recording 232 is available. As discussed above, it should be appreciated that various embodiments according to the present disclosure may employ CPR synthesis and/or TTS synthesis either individually or in any suitable combination. In this respect, some embodiments of synthesis system 200 may omit either CPR back-end 260 or TTS back-end 270, while other embodiments of synthesis system 200 may include both back-ends and may utilize either or both of the back-ends in synthesizing speech outputs.

TTS back-end 270 may receive as input phoneme sequence 256 and markers 254. In some embodiments using concatenative TTS synthesis techniques, statistical models may be used to select a small audio file from a dataset accessible by TTS back-end 270 for each phoneme in the phoneme sequence for the desired speech output. The statistical models may be computed to select an appropriate audio file for each phoneme given the surrounding context of adjacent phonemes given by phoneme sequence 256 and nearby prosodic events and/or boundaries given by markers 254. It should be appreciated, however, that the foregoing is merely an example, and any suitable TTS synthesis technique, including for example articulatory and/or formant synthesis, may be employed by TTS back-end 270, as aspects of the present invention are not limited in this respect. In various embodiments, TTS back-end 270 may be programmed to control synthesis parameters such as pitch, amplitude and/or duration to generate appropriate renderings of phoneme sequence 256 to speech based on markers 254. For instance, TTS back-end 270 may be programmed to synthesize speech output with pitch, fundamental frequency, amplitude and/or duration parameters increased in portions labeled by markers 254 as carrying contrastive stress. TTS back-end 270 may be programmed to increase such parameters for portions carrying contrastive stress, as compared to baseline levels that would be used for those portions of the speech output if they were not carrying contrastive stress.

In some embodiments, when both CPR and TTS synthesis techniques are utilized in various instances by synthesis system 200, a voice talent who recorded generic speech from which phonemes were excised for TTS back-end 270 may also be engaged to record the audio recordings 232 provided by developer 220 in prompt recording dataset 230. In other embodiments, a voice talent may be engaged to record audio recordings 232 who has a similar voice to the voice talent who recorded generic speech for TTS back-end 270 in some respect, such as a similar voice quality, pitch, timbre, accent,

speaking rate, spectral attributes, emotional quality, or the like. In this manner, distracting effects due to changes in voice between portions of a desired speech output synthesized using audio recordings 232 and portions synthesized using TTS synthesis may be mitigated.

Selected audio recordings 262 output by CPR back-end 260 and/or TTS audio segments 272 produced by TTS back-end 270 may be input to a concatenation/streaming component 280 to produce speech output 290. Speech output 290 may be a concatenation of selected audio recordings 262 and/or TTS audio segments 272 in an order that corresponds to the desired speech output represented by text input 240. Concatenation/streaming component 280 may produce speech output 290 using any suitable concatenative technique (many of which are known), as aspects of the present invention are not limited in this respect. In some embodiments, such concatenative techniques may involve smoothing processing using any of various suitable techniques as known in the art; however, aspects of the present invention are not limited in this respect. In embodiments and/or instances in which a single audio representation of an entire speech output is provided by a selected audio recording 262 or a TTS audio segment 272, or in which concatenation processes were already performed by CPR back-end 260 or TTS back-end 270, no further concatenation may be necessary, and concatenation/streaming component 280 may simply stream the speech output 290 as received from either back-end.

In some embodiments, concatenation/streaming component 280 may store speech output 290 as a new audio file and provide the audio file to speech-enabled application 210 in any suitable way. In other embodiments, concatenation/streaming component 280 may stream speech output 290 to speech-enabled application 210 concurrently with producing speech output 290, with or without storing data representations of any portion(s) of speech output 290. Concatenation/streaming component 280 of synthesis system 200 may provide speech output 290 to speech-enabled application 210 in any suitable way, as aspects of the present invention are not limited in this respect.

Upon receiving speech output 290 from synthesis system 200, speech-enabled application 210 may play speech output 290 in audible fashion to user 212 as an output speech prompt. Speech-enabled application 210 may cause speech output 290 to be

played to user 212 using any suitable technique(s), as aspects of the present invention are not limited in this respect.

Further description of some functions of a synthesis system (e.g., synthesis system 200) in accordance with some embodiments of the present invention is given with reference to examples illustrated in FIGs. 3A and 3B. FIG. 3A illustrates exemplary processing steps that may be performed by synthesis system 200 in accordance with some embodiments of the present invention to synthesize an illustrative desired speech output, i.e., "Flight number 1345 was originally scheduled to depart at 10:45 a.m., but is now scheduled to depart at 11:45 a.m." Text input 300 is an exemplary text string that speech-enabled application 210 may generate and submit to synthesis system 200, to request that synthesis system 200 provide a synthesized speech output rendering this desired speech output as audio speech. As shown in FIG. 3A, text input 300 is read across the top line of the top portion of FIG. 3A, continuing at label "A" to the top line of the middle portion of FIG. 3A, and continuing further at label "E" to the top line of the bottom portion of FIG. 3A. In some embodiments, text input 300 may include a literal, word-for-word, plain text transcription of the desired speech output, i.e., "Flight number 1345 was originally scheduled to depart at 1045A, but is now scheduled to depart at 1145A." As shown, the text transcription may contain such numerical/symbolic notation and/or abbreviations as are normally and often used in transcribing speech in literal fashion to text. In addition, in some embodiments, text input 300 may include one or more annotations or tags added to mark up the text transcription, such as "say-as" tags 302 and 304. Speech-enabled application 210 may generate this text input 300 in accordance with the execution of program code supplied by the developer 220, which may direct speech-enabled application 210 to generate a particular text input 300 corresponding to a particular desired speech output in one or more particular circumstances. It should be appreciated that speech-enabled application 210 may be programmed to generate text inputs for desired speech outputs in any suitable way, as aspects of the present invention are not limited in this respect. Also, speech-enabled application 210 may be programmed to generate a text input in any suitable form that specifies a desired speech output, including forms that do not include annotations or tags and forms that do not include plain text transcriptions, as aspects of the present invention are not limited in this respect.

For the example given in FIG. 3A, speech-enabled application 210 may be an IVR application designed to communicate airline flight information to users, or any other suitable speech-enabled application. For example, a user may place a call over the telephone or through the Internet and interact with speech-enabled application 210 to get status information for a flight of interest to the user. The user may indicate, using speech or another information input method, an interest in obtaining flight status information for flight number 1345. In response to this user input, speech-enabled application 210 may be programmed (e.g., by developer 220) to look up flight departure information for flight 1345 in a table, database or other data set accessible by speech-enabled application 210. If the data returned by this look-up or search indicates that the flight has been delayed, speech-enabled application 210 may be programmed to access a certain carrier prompt, e.g., "Flight number _____ was originally scheduled to depart at _____, but is now scheduled to depart at _____." Speech-enabled application 210 may be programmed to enter the flight number requested by the user (e.g., "1345") in the first blank field of the carrier prompt, the original time of departure returned from the data look-up (e.g., "1045A") in the second blank field of the carrier prompt, and the new time of departure returned from the data look-up (e.g., "1145A") in the third blank field of the carrier prompt.

FIG. 3A illustrates one example of a text input 300 that may be generated by an exemplary speech-enabled application 210 in accordance with its programming by a developer 220. In particular, FIG. 3A provides an example text input 300 that may be generated by speech-enabled application 210 and transmitted to synthesis system 200 to be rendered as speech with an appropriately applied pattern of contrastive stress. It should be appreciated that numerous and varied other examples of text inputs, corresponding to numerous and varied other desired speech outputs, may be generated by airline flight information applications or speech-enabled applications in numerous other contexts, for use in synthesizing speech with contrastive stress, as aspects of the present invention are not limited to any particular examples of desired speech outputs, text inputs, or application domains. Any suitable speech-enabled application 210 may be programmed by a developer 220 to generate any suitable text input in any suitable way, e.g., through simple and easy-to-implement programming code based on the plain text of

carrier prompts and content prompts to be combined to form a complete desired speech output, or in other ways.

Accordingly, developer 220 may develop speech-enabled application 210 in part by entering plain text transcription representations of desired speech outputs into the program code of speech-enabled application 210. As shown in FIGs. 3A and 3B, such plain text transcription representations may contain such characters, numerals, and/or other symbols as necessary and/or preferred to transcribe desired speech outputs to text in a literal manner. Developer 220 may also enter program code to direct speech-enabled application 210 to add one or more annotations or tags to mark up one or more portions of the plain text transcription. It should be appreciated, however, that speech-enabled application 210 may be developed in any suitable way and may represent desired speech outputs in any suitable form, including forms without annotations, tags or plain text transcription, as aspects of the present invention are not limited in this respect.

In some embodiments, synthesis system 200 may be programmed and/or configured to analyze text input 300 and appropriately render text input 300 as speech, without requiring the input to specify the filenames of appropriate audio recordings for use in the synthesis, or any filename mapping function calls to be hard coded into speech-enabled application 210 and the text input it generates. In embodiments employing CPR synthesis, synthesis system 200 may select audio recordings 232 from the prompt recording dataset 230 provided by developer 220, and may make selections in accordance with constraints indicated by metadata 234 provided by developer 220. Developer 220 may thus retain a measure of deterministic control over the particular audio recordings used to synthesize any desired speech output, while also enjoying ease of programming, debugging and/or updating speech-enabled application 210 at least in part using plain text. In some embodiments, developer 220 may be free to directly specify a filename for a particular audio recording to be used should an occasion warrant such direct specification; however, developer 220 may be free to also choose plain text representations at any time. In embodiments employing only TTS synthesis, developer 220 may also use plain text representations of desired speech output for synthesis, without need for supplying audio recordings 232.

In some embodiments, developer 220 may program speech-enabled application 210 to include with text input 300 one or more annotations, or tags, to constrain the audio

recordings 232 that may be used to render various portions of text input 300, or to similarly constrain the output of TTS synthesis of text input 300. For example, text input 300 includes an annotation 302 indicating that the number "1345" should be interpreted and rendered in speech as appropriate for a flight number. In this example, annotation 302 is implemented in the form of a World Wide Web Consortium Speech Synthesis Markup Language (W3C SSML) "say-as" tag, with an "interpret-as" attribute whose value is "flightnumber". Here, "flightnumber" is referred to as the "say-as" type, or "text normalization type", of the number "1345" in this text input. SSML tags are an example of a known type of annotation that may be used in accordance with some embodiments of the present invention. However, it should be appreciated that any suitable form of annotation may be employed to indicate a desired type (e.g., a text normalization type) of one or more words in a desired speech output, as aspects of the present invention are not limited in this respect.

Upon receiving text input 300 from speech-enabled application 210, synthesis system 200 may process text input 300 through front-end 250 to generate normalized orthography 310 and markers 320, 330 and 340. Normalized orthography 310 is read across the second line of the top portion of FIG. 3A, continuing at label "B" to the second line of the middle portion of FIG. 3A, and continuing further at label "F" to the second line of the bottom portion of FIG. 3A. Sentence/phrase markers 320 are read across the third line of the top portion of FIG. 3A, continuing at label "C" to the third line of the middle portion of FIG. 3A, and continuing further at label "G" to the third line of the bottom portion of FIG. 3A. Text normalization type markers 330 are read across the fourth line of the top portion of FIG. 3A, continuing at label "D" to the fourth line of the middle portion of FIG. 3A, and continuing further at label "H" to the fourth line of the bottom portion of FIG. 3A. Stress markers 340 are read across the bottom line of the bottom portion of FIG. 3A.

As discussed above with reference to FIG. 2, normalized orthography 310 may represent a conversion of text input 300 to a standard format for use by synthesis system 200 in subsequent processing steps. For example, normalized orthography 310 represents the word sequence of text input 300 with capitalizations, punctuation and annotations removed. In addition, the numerals "1345" in text input 300 are converted to the word forms "thirteen_forty_five" in normalized orthography 310, the time "1045A"

in text input 300 is converted to the word forms "ten_forty_five_a_m" in normalized orthography 310, and the time "1145A" in text input 300 is converted to the word forms "eleven_forty_five_a_m" in normalized orthography 310.

In converting the numerals "1345", for example, to word forms, synthesis system 200 may make note of annotation 302 and render the numerals in appropriate word forms for a flight number, in accordance with its programming. Thus, for example, synthesis system 200 may be programmed to convert numerals "1345" with text normalization type "flightnumber" to the word form "thirteen_forty_five" rather than "one_thousand_three_hundred_forty_five", the latter perhaps being more appropriate for other contexts (e.g., numerals with text normalization type "currency"). If an annotation is not provided for one or more numerals, words or other character sequences in text input 300, in some embodiments the synthesis system 200 may attempt to infer a type of the corresponding words in the desired speech output from the semantic and/or syntactic context in which they occur. For example, in text input 300, the numerals "1345" may be inferred to correspond to a flight number because they are preceded by the words "Flight number". It should be appreciated that types of words or tokens (e.g., text normalization types) in a text input may be determined using any suitable techniques from any information that may be explicitly provided in the text input, including associated annotations, or may be inferred from the content of the text input, as aspects of the present invention are not limited in this respect.

Although certain indications such as capitalization, punctuation and annotations may be removed from normalized orthography 310, syntactic, prosodic and/or word type information represented by such indications may be conveyed through markers 320, 330 and 340. For example, sentence/phrase markers 320 include [begin sentence] and [end sentence] markers that may be derived from the capitalization of the initial word "Flight" and the period punctuation mark in text input 300. Sentence/phrase markers 320 also include [begin phrase] and [end phrase] markers that may be derived in part from the comma punctuation mark following "1045A", and in part from other syntactic considerations. In addition, text normalization type markers 330 include [begin flight number] and [end flight number] markers derived from "say-as" tag 302, as well as [begin time] and [end time] markers derived from "say-as" tags 304. Although not shown in FIG. 3A, examples of other markers that may be generated are markers that

indicate the locations of boundaries between words, which may be useful in generating normalized orthography 310 (e.g., with correctly delineated words), selecting audio recordings (e.g., from input text 300, normalized orthography 310 and/or a generated phoneme sequence with correctly delineated words), and/or generating any appropriate TTS audio segments, as discussed above.

In addition, various markers may indicate the locations of prosodic boundaries and/or events, such as locations of phrase boundaries, prosodic boundary tones, pitch accents, word-, phrase- and sentence-level stress or emphasis, and the like. The locations and labels for such markers may be determined, for example, from punctuation marks, annotations, syntactic sentence structure and/or semantic analysis. As a particular example, synthesis system 200 may generate stress markers 340 to delineate one or more portions of text input 300 and/or normalized orthography 310 that have been identified by synthesis system 200 as portions to be rendered to carry contrastive stress.

In the example of FIG. 3A, the [begin stress] and [end stress] markers 340 delineate the word "eleven" within the time "11:45 a.m." as the specific portion of the speech output that should carry contrastive stress. In this example, "11:45 a.m.", the new time of the flight departure, contrasts with "10:45 a.m.", the original time of the flight departure. Specifically, "eleven" is the part of "11:45 a.m." that differs from and contrasts with the "ten" of "10:45 a.m." (i.e., the "forty_five" and the "a.m." do not differ or contrast). By carrying contrastive stress specifically on the word "eleven" (more particularly, on the syllable "-lev-", which is the syllable of main lexical stress in the word "eleven"), the resulting synthetic speech output may draw a listener's focus to the contrasting part of the sentence, and cause the listener to pay attention to the important difference between the "ten" of the original time and the "eleven" of the new time. (In some examples, contrastive stress in speech may be regarded as an aural equivalent to placing visual emphasis on portions of text, e.g., "Flight number 1345 was originally scheduled to depart at ten forty-five a.m., but is now scheduled to depart at **eleven** forty-five a.m.") Rendering the synthetic speech output with the appropriate contrastive stress may also cause the speech output to sound more natural and more like human speech, making listeners/users more comfortable with using the speech-enabled application.

Synthesis system 200 may be programmed to identify one or more specific portions of text input 300 and/or normalized orthography 310 to be assigned to carry

contrastive stress, and to delineate those portions with markers 340, thereby assigning them to carry contrastive stress, using any suitable technique, which may vary depending on the form and/or content of text input 300. In some embodiments, speech-enabled application 210 may be programmed (e.g., by developer 220) to mark-up text input 300 with annotations or tags that label two or more fields of the text input for which a contrastive stress pattern is desired. In one example, as illustrated in FIG. 3A, speech-enabled application 210 may be programmed to indicate a desired contrastive stress pattern using the "detail" attribute 306 of an SSML "say-as" tag. By setting the "detail" attribute of a plurality of tagged fields of the same text normalization type to "contrastive", speech-enabled application 210 may indicate to synthesis system 200 that it is desired for those fields to contrast with each other through a contrastive stress pattern. It should be appreciated that use of such a "contrastive" tag may provide additional capabilities not offered by existing annotations such as, for example, the SSML <emphasis> tag; whereas the <emphasis> tag allows only for specification of a generic emphasis level to be applied to a single isolated field, a "contrastive" tag in accordance with some embodiments of the present invention may allow for indication of a desired *contrastive* stress pattern to be applied in the context of two or more fields of the same text normalization type, with the level of emphasis to be assigned to portions of each field to be determined by an appropriate contrastive stress pattern applied to those fields in combination. In the example of FIG. 3A, the two fields "1045A" and "1145A" are tagged with the same text normalization type "time" and the detail attribute value "contrastive", indicating that the two times should be contrasted with each other. It should be appreciated that "detail" attributes and SSML "say-as" tags are only one example of annotations that may be used by speech-enabled application to label text fields for which contrastive stress patterns are desired, and any suitable annotation technique may be used, as aspects of the present invention are not limited in this respect.

By applying a contrastive stress pattern to two or more fields in a text input of the same text normalization type, synthesis system 200 may achieve an accurate imitation of a particular set of known patterns in human prosody. As discussed above, humans apply some forms of contrastive stress to draw attention and focus to the differences between syllables, words or word sequences of similar type and/or function that are meant to contrast in an utterance. In the example of FIG. 3A, "1045A" and "1145A" are both

times of day; moreover, they are both times of departure associated with the same flight, flight number 1345. 10:45 a.m. was the original time of departure and 11:45 a.m. is the new time of departure; thus, in a defined sense, the two times are alternatives to each other. The difference between the two times is important information to highlight to the user/listener, who may benefit from having his/her attention drawn to the fact that an original time is being updated to a new time. By confirming that the two fields of text input 300 that are tagged as "contrastive" are of the same text normalization type (e.g., "time"), synthesis system 200 may determine that this type of contrastive stress pattern is appropriate.

Identification of the text normalization type of fields tagged as "contrastive" may in some embodiments aid synthesis system 200 in identifying portions of a text input that are meant to contrast with each other, as well as the relationships between such portions. For instance, another example desired speech output could be, "Flight number 1345, originally scheduled to depart at 10:45 a.m., has been changed to flight number 13**67**, now scheduled to depart at **11**:45 a.m." An example text input generated by speech-enabled application 210 for this example desired speech output could be: "Flight number <say-as interpret-as="flightnumber" detail="contrastive">1345</say-as>, originally scheduled to depart at <say-as interpret-as="time" detail="contrastive">1045A</say-as>, has been changed to flight number <say-as interpret-as="flightnumber" detail="contrastive">1367</say-as>, now scheduled to depart at <say-as interpret-as="time" detail="contrastive">1145A</say-as>." Although all four fields, "1345", "1045A", "1367" and "1145A", are tagged as "contrastive", it would be clear to a human speaker that not all four fields should contrast with each other. Rather, the flight numbers "1345" and "1367" contrast with each other, and the times "10:45 a.m." and "11:45 a.m." contrast with each other. Thus, by identifying fields tagged with the same text normalization type in addition to the "contrastive" detail attribute, synthesis system 200 may appropriately apply one contrastive stress pattern to the flight numbers "1345" and "1367" and a separate contrastive stress pattern to the times "1045A" and "1145A"

Examples of text normalization types of text input fields to which synthesis system 200 may apply contrastive stress patterns include, but are not limited to, alphanumeric sequence, address, Boolean value (true or false), currency, date, digit sequence, fractional number, proper name, number, ordinal number, telephone number,

flight number, state name, street name, street number, time and zipcode types. It should be appreciated that, although many examples of text normalization types involve numeric data, other examples are directed to non-numeric fields (e.g., names, or any other suitable fields of textual information) that may also be contrasted with each other in accordance with some embodiments of the present invention. It should also be appreciated that any suitable text normalization type(s) may be utilized by speech-enabled application 210 and/or synthesis system 200, as aspects of the present invention are not limited in this respect.

If at any time synthesis system 200 receives a text input with a field tagged as "contrastive" that is not of the same text normalization type as any other field within the text input, in some embodiments synthesis system 200 may be programmed to ignore the "contrastive" tag and render that portion of the speech output without contrastive stress. Alternatively, if synthesis system 200 can infer through analysis of the format and/or syntax of the portion of the text input labeled by the tag that the labeled text normalization type is obviously in error, synthesis system 200 may substitute a more appropriate text normalization type that matches that of another field labeled "contrastive". In some embodiments, synthesis system 200 may be programmed to return an error or warning message to speech-enabled application 210, indicating that "contrastive" tags apply only to a plurality of fields of the same text normalization type. However, in some embodiments, synthesis system 200 may be programmed to apply a contrastive stress pattern to any fields tagged as "contrastive", regardless of whether they are of the same text normalization type, following processing steps similar to those described below for fields of matching text normalization types. Also, in some embodiments, synthesis system 200 may apply a pattern of contrastive stress without reference to any text normalization tags at all, as aspects of the present invention are not limited in this respect.

In some embodiments, synthesis system 200 may be programmed with a number of contrastive stress patterns from which it may select and apply to portions of a text input in accordance with various criteria. Returning to the example of FIG. 3A, synthesis system 200 may identify "1045A" and "1145A" as two fields of text input 300 for which a contrastive stress pattern is desired in any suitable way, e.g., by determining that they are both tagged as the same text normalization type and both tagged as

"contrastive". In some embodiments, synthesis system 200 may be programmed to render both of the two fields with contrastive stress, since they are both tagged as "contrastive". In some other embodiments, synthesis system 200 may be programmed to apply a contrastive stress pattern in which only the second of two contrasting fields (i.e., "1145A") is rendered with stress. In yet other embodiments, synthesis system 200 may be programmed to render both of two contrasting fields with contrastive stress in some situations, and to render only one or the other of two contrasting fields with contrastive stress in other situations, according to various criteria. In some embodiments, synthesis system 200 may be programmed to render both fields with contrastive stress, but to apply a different level of stress to each field, as will be discussed below. For example, in some embodiments synthesis system 200 may be programmed to generate the output, "Flight number 1345 was originally scheduled to depart at *10:45 a.m.*, but is now scheduled to depart at ***11:45 a.m.***," with the "10:45 a.m." rendered with anticipatory contrastive stress of the same or a different level as the stress applied to "11:45 a.m." In some embodiments, speech-enabled application 210 may be programmed to include one or more annotations in text input 300 to indicate which particular contrastive stress pattern is desired and/or what specific levels of stress are desired in association with individual contrasting fields. It should be appreciated, however, that the foregoing are merely examples, and particular contrastive stress patterns may be indicated and/or selected in any suitable way according to any suitable criteria, as aspects of the present invention are not limited in this respect.

In some embodiments, synthesis system 200 may select an appropriate contrastive stress pattern for a plurality of contrasting fields based at least in part on the presence and type of one or more linking words and/or word sequences that indicate an appropriate contrastive stress pattern. In the example of FIG. 3A, synthesis system 200 may be programmed to recognize the words / word sequences "originally", "but" and "is now" as linking words / word sequences (or equivalently, tokens / token sequences) associated either individually or in combination with one or more contrastive stress patterns. In some embodiments, a pattern of two contrasting fields of the same normalization type, in certain combinations with one or more linking tokens such as "originally", "but" and "is now", may indicate to synthesis system 200 that the two fields do indeed contrast, and that contrastive stress is appropriate. Such an indication may

bolster the separate indication given by the "contrastive" tag, and/or may be used by synthesis system 200 instead of referring to the "contrastive" tag, both for text inputs that contain such tags and for text inputs that do not.

In some embodiments, the particular linking tokens identified by synthesis system 200 and their syntactic relationships to the contrasting fields may be used by synthesis system 200 to select a particular contrastive stress pattern to apply to the fields. For instance, in the example of FIG. 3A, synthesis system 200 may select a contrastive stress pattern in which only the second time, "11:45 a.m.", is rendered with contrastive stress, based on the fact that the linking token "originally" precedes the time "1045A" in the same clause and the linking tokens "but is now" precede the time "1145A" in the same clause, indicating that "11:45 a.m." is the new time that should be emphasized to distinguish it from the original time. However, the foregoing is merely one example; in other embodiments, synthesis system 200 may associate the same syntactic structure between the linking tokens and contrasting fields with a different contrastive stress pattern, such as one in which both fields are rendered with contrastive stress (i.e., incorporating anticipatory stress on the first field), in accordance with its programming. It should be appreciated that synthesis system 200 may be programmed to associate linking tokens and relationships between linking tokens and contrasting fields in text inputs in any suitable way, and in some embodiments synthesis system 200 may be programmed to select contrastive stress patterns and identify fields to be rendered with contrastive stress without any reference to linking tokens, as aspects of the present invention are not limited in this respect.

Examples of linking tokens / token sequences that may be identified by synthesis system 200 and used by synthesis system 200 in identifying fields and/or tokens to be rendered with contrastive stress include, but are not limited to, "originally", "but", "is now", "or", "and", "whereas", "as opposed to", "as compared with", "as contrasted with" and "versus". Translations of such linking tokens into other languages, and/or other linking tokens unique to other languages, may also be used in some embodiments. It should be appreciated that synthesis system 200 may be programmed to utilize any suitable list of any suitable number of linking tokens / token sequences, including no linking tokens at all in some embodiments, as aspects of the present invention are not limited in this respect. In some embodiments, fields and/or tokens to be rendered with

contrastive stress may also or alternatively be identified based on part-of-speech sequences that establish a repeated pattern with one element different. Some exemplary patterns are as follows:

"the <adjective> <nounphrase> is <value>: the <different adjective> <same nounphrase> is <different value>". Example: "the red smoking jacket is $42; the blue smoking jacket is ***$52***".

"<any three words> <value of a certain type>; <up to 'n' words that do not include a value of any type> <two of the three words with a different word of the same part of speech> <different value of the same type>". Examples: "Out of all my favorite vacations, I guess I'd rate skiing in Aspen 4 stars, but if you really want something extraordinary, I'd go with skiing in Vail: ***5*** stars." "Out of all my favorite vacations, I guess I'd rate skiing in Aspen 4 stars, but if you really want something extraordinary, I'd go with bowling in Aspen: ***5*** stars."

In some embodiments, developer 220 may be informed of the list of linking tokens / token sequences that can be recognized by synthesis system 200, and/or may be informed of the particular mappings of syntactic patterns of linking tokens and contrasting fields to particular contrastive stress patterns utilized by synthesis system 200. In such embodiments, developer 220 may program speech-enabled application 210 to generate text input with carrier prompts using the same linking tokens and syntactic patterns to achieve a desired contrastive speech pattern in the resulting synthetic speech output. In other embodiments, developer 220 may provide his own list to synthesis system 200 with linking tokens / token sequences and/or syntactic patterns involving linking tokens, and synthesis system 200 may be programmed to utilize the developer-specified linking tokens and/or pattern mappings in identifying fields or tokens to be rendered with contrastive stress and/or in selecting contrastive stress patterns. In yet other embodiments, a list of linking tokens and/or syntactic patterns of synthesis system 200 may be combined with a list supplied by developer 220. It should be appreciated that developer 220, speech-enabled application 210 and synthesis system 200 may coordinate linking tokens and/or linking token syntactic pattern mappings in any suitable way using any suitable technique(s), as aspects of the present invention are not limited in this respect.

In some embodiments, once synthesis system 200 has identified a plurality of fields of the text input to which a contrastive stress pattern should be applied (e.g., based on tags included in the text input as generated by speech-enabled application 210) and has identified one or more particular ones of those fields to be rendered with contrastive stress (e.g., by selecting and applying a particular contrastive stress pattern), synthesis system 200 may further identify the specific portion(s) of those field(s) to be rendered to actually carry the contrastive stress. That is, synthesis system 200 may identify which particular word(s) and/or syllable(s) will carry contrastive stress in the synthetic speech output through increased pitch, amplitude, duration, etc., based on an identification of the salient differences between the contrasting fields.

As described above, in the example of FIG. 3A, in some embodiments synthesis system 200 may identify "1045A" and "1145A" as two fields of text input 300 for which a contrastive stress pattern is desired, based on "contrastive" tags 306. Further, in some illustrative embodiments, synthesis system 200 may identify "1145A" as the specific field to be rendered with contrastive stress, because it is second in the order of the contrasting fields, because of a syntactic pattern involving linking tokens, or in any other suitable way. It should be appreciated from the foregoing, however, that synthesis system 200 may also in some embodiments be programmed to identify "1045A" as a field to be rendered with contrastive stress, at the same or a different level of emphasis as "1145A". In some embodiments, the entire token "1145A" may be identified to carry contrastive stress, while in other embodiments synthesis system 200 may next proceed to identify only one or more specific portions of the field "1145A" to be rendered to carry contrastive stress. As discussed above, the portion that should be stressed contrastively in this example is the word "eleven", and specifically the syllable of main lexical stress "-lev-" in the word "eleven", since "eleven" is the portion of the time "11:45 a.m." that differs from the other time "10:45 a.m."

In some embodiments, synthesis system 200 may identify the specific sub-portion(s) of one or more fields or tokens that should carry contrastive stress by comparing the normalized orthography of the field(s) or token(s) identified to be rendered with contrastive stress to the normalized orthography of the other contrasting field(s) or token(s), and determining which specific portion or portions differ. In some situations, an entire field may differ from another field with which it contrasts (e.g., as

"10:45" differs from "8:30"). In such situations, synthesis system 200 may be programmed in some embodiments to assign all word portions within the field to carry contrastive stress. In some embodiments, the level of stress assigned to a field or token that differs entirely from another field or token with which it contrasts may be lower than that assigned to fields or tokens for which only one or more portions differ. Because the differences between fields that differ entirely from each other may already be more salient to a listener without need for much contrastive stress, in some embodiments synthesis system 200 may be programmed to assign only light emphasis to such a field, or to not assign any emphasis to the field at all. However, it should be appreciated that the foregoing are merely examples, and synthesis system 200 may be programmed to apply any suitable contrastive stress pattern to contrasting fields that differ entirely from each other, including patterns with levels of emphasis similar to those of patterns applied to fields in which only portions differ, as aspects of the present invention are not limited in this respect.

However, in the example of FIG. 3A, synthesis system 200 may compare the normalized orthography "eleven_forty_five_a_m" to the normalized orthography "ten_forty_five_a_m_" to determine that "eleven" is the portion that differs. As a result, synthesis system 200 may assign the word "eleven" to carry contrastive stress. This may be done in any suitable way. For example, by looking up the word "eleven" in a dictionary, database, table or other lexical stress data set accessible to synthesis system 200, synthesis system 200 may determine that "-lev-" is the syllable of main lexical stress of the word "eleven", and may assign the syllable "-lev-" to carry contrastive stress through increased pitch, amplitude and/or duration targets.

It should be appreciated that synthesis system 200 may determine a particular syllable of main stress within a word assigned to carry contrastive stress in any suitable way using any suitable technique, as aspects of the present invention are not limited in this respect. In some embodiments, particularly those using CPR synthesis, synthesis system 200 may not identify a specific syllable to carry contrastive stress at all, but may simply assign an entire word (regardless of how many syllables it contains) to carry contrastive stress. An audio recording with appropriate metadata labeling it for use in rendering the word with contrastive stress may then be used to synthesize the entire word, without need for identifying a specific syllable that carries the stress. In some

embodiments, however, situations may arise in which synthesis system 200 identifies a particular syllable to be rendered to carry contrastive stress, independent of which is the syllable of main lexical stress in any dictionary. For example, synthesis system 200 may identify a different syllable to carry stress in the word "nineteen" when it is being contrasted with the word "eighteen" (i.e., when the first syllable differs) than when it is being contrasted with the word "ninety" (i.e., when the second syllable differs).

Identifying specific portions of one or more fields or tokens to be rendered to carry contrastive stress through a comparison of normalized orthography in some embodiments may provide the advantage that the portions that differ can be readily identified in terms of their spoken word forms as they will be rendered in the speech output. In the example text input 300 of FIG. 3A, "1045A" and "1145A" textually differ only in one digit (i.e., the "0" of "1045A" differs from the "1" of "1145A"). However, the portions of the speech output that contrast are actually "ten" and "eleven", not "zero" and "one". This is readily apparent from a comparison of the normalized orthographies "ten_forty_five_a_m" and "eleven_forty_five_a_m", and synthesis system 200 may in some embodiments identify the portion "eleven" to carry contrastive stress directly from the normalized orthography representation 310 of the text input. However, it should be appreciated that not all embodiments are limited to comparison of normalized orthographies. For example, in some embodiments, synthesis system 200 may be programmed to identify differing portions of contrasting fields directly from phoneme sequence 256 and/or text input 300, using rules specific to particular text normalization types. For text input fields of the form "1045A" and "1145A" with text normalization type "time", synthesis system 200 may be programmed to compare the first two digits separately as one word, the second two digits separately as one word, and the final letter separately as denoting specifically "a.m." or "p.m.", for example. It should be appreciated that synthesis system 200 may be programmed to identify portions of contrasting fields or tokens that differ using various different techniques in various embodiments, as aspects of the present invention are not limited to any particular technique in this respect.

Having identified one or more specific portions (e.g., words or syllables) within normalized orthography 310 and/or text input 300 to be rendered to carry contrastive stress, synthesis system 200 may generate stress markers 340 to delineate and label those

portions for further synthesis processing. In the example of FIG. 3A, stress markers 340 include [begin stress] and [end stress] markers that mark the word "eleven" as assigned to carry contrastive stress. In subsequent stages of processing in embodiments using CPR synthesis, stress markers 340 may be compared with metadata 234 of audio recordings 232 to select one or more audio recordings labeled as appropriate for use in rendering the word "eleven" as speech carrying contrastive stress. As discussed above, a matching audio recording may in some embodiments simply be labeled by metadata as "emphasized", "contrastive" or the like. In other embodiments, metadata associated with a matching audio recording may indicate specific information about the pitch, fundamental frequency, amplitude, duration and/or other voice quality parameters involved in the production of contrastive stress, examples of which were given above.

In some embodiments using concatenative TTS synthesis, metadata associated with individual phoneme (or phone, allophone, diphone, syllable, etc.) audio recordings may also be compared with stress markers 340 in synthesizing the delineated portion of text input 300 and/or normalized orthography 310 as speech carrying contrastive stress. Similar to metadata 234 associated with audio recordings 232, metadata associated with phoneme recordings may also indicate that the recorded phoneme is "emphasized", or may indicate qualitative and/or quantitative information about pitch, fundamental frequency, amplitude, duration, etc. In concatenative TTS synthesis, a parameter (e.g., fundamental frequency, amplitude, duration) target may be set by synthesis system 200 for a particular phoneme within the word carrying contrastive stress, e.g., for the vowel of the syllable of main lexical stress. Contours for each of the parameters may then be set over the course of the other phonemes being concatenated to form the word, with the contrastive stress target phoneme exhibiting a local maximum in the selected parameter(s), and the other concatenated phonemes having parameter values increasing up to and decreasing down from that local maximum. It should be appreciated, however, that the foregoing description is merely exemplary, and any suitable technique(s) may be used to implement contrastive stress in concatenative TTS synthesis, as aspects of the present invention are not limited in this respect.

Similarly, in embodiments using non-concatenative synthesis techniques such as articulatory or formant synthesis, synthesis parameter contours may be generated by synthesis system 200, such that a local maximum occurs during the syllable carrying

contrastive stress in one or more appropriate parameters such as fundamental frequency, amplitude, duration, and/or others as described above. Audio speech output may then be generated using these synthesis parameter contours. In some embodiments, in specifying synthesis parameter contours for generating the speech output as a whole, synthesis system 200 may be programmed to make one or more other portions of the speech output prosodically compatible with the one or more portions carrying contrastive stress. For instance, in the example of FIG. 3A, if a local maximum in fundamental frequency (related to pitch) is set to occur during the word "eleven" carrying contrastive stress, the fundamental frequency contour during the portion of the speech output leading up to the word "eleven" (i.e., during the words "depart at", or other surrounding words) may be set to an increasing slope that meets up with the increased contour during "eleven" such that no discontinuities result in the overall contour. Synthesis system 200 may be programmed to generate such parameter contours in any form of TTS synthesis in a way that emulates human prosody in utterances with contrastive stress. It should be appreciated that the foregoing description is merely exemplary, and any suitable technique(s) may be used to implement contrastive stress in TTS synthesis, as aspects of the present invention are not limited in this respect.

In CPR synthesis, audio recordings 232 selected to render portions of the speech output other than those carrying contrastive stress may also be selected to be prosodically compatible with those rendering portions carrying contrastive stress. Such selection may be made by synthesis system 200 in accordance with metadata 234 associated with audio recordings 232. In the example of FIG. 3A, an audio recording 232 may be selected for the portion of the carrier prompt, "but is now scheduled to depart at," to be prosodically compatible with the following word carrying contrastive stress. Developer 220 may supply an audio recording 232 of this portion of the carrier prompt, with metadata 234 indicating that it is meant to be used in a position immediately preceding a token rendered with contrastive stress. Such an audio recording may have been recorded from the speech of a voice talent who spoke the phrase with contrastive stress on the following word. In so doing, the voice talent may have placed an increased pitch, fundamental frequency, amplitude, duration, etc. target on the word carrying contrastive stress, and may have naturally produced the preceding carrier phrase with increasing parameter contours to lead up to the maximum target. It should be appreciated, however, that the

foregoing description is merely exemplary, and any suitable technique(s) may be used to implement contrastive stress in CPR synthesis, as aspects of the present invention are not limited in this respect.

It should be appreciated that the foregoing are merely examples, and that a system such as synthesis system 200 may generate synthetic speech with contrastive stress using various different processing methods in various embodiments in accordance with the present disclosure. Having identified one or more portions of a text input to be rendered to carry contrastive stress through any suitable technique as described herein, it should be appreciated that synthesis system 200 may utilize any available synthesis technique to generate an audio speech output with the identified portion(s) carrying contrastive stress, including any of the various synthesis techniques described herein or any other suitable synthesis techniques. In addition, synthesis system 200 may identify the portion(s) to be rendered to carry contrastive stress using any suitable technique, as aspects of the present invention are not limited to any particular technique for identifying locations of contrastive stress.

For example, in some alternative embodiments, a synthesis system such as synthesis system 200 may identify portions of a text input to be rendered as speech with contrastive stress without reference to any annotations or tags included in the text input. In such embodiments, developer 220 need not program speech-enabled application 210 to generate any annotations or mark-up, and speech-enabled application 210 may generate text input corresponding to desired speech output entirely in plain text. An example of such a text input is text input 350, illustrated in FIG. 3B. As shown in FIG. 3B, text input 350 is read across the top line of the top portion of FIG. 3B, continuing at label "A" to the top line of the middle portion of FIG. 3B, and continuing further at label "E" to the top line of the bottom portion of FIG. 3B.

In this example, the desired speech output is, "The time is currently 9:42 a.m. Would you like to depart at 10:30 a.m., 11:30 a.m., or 12:30 p.m.?" Text input 350 corresponds to a plain text transcription of this desired speech output without any added annotations or mark-up. The notation for the times of day in the example of FIG. 3B is different from that in the example of FIG. 3A. It should be appreciated that any of various abbreviations and/or numerical and/or symbolic notation conventions may be used by speech-enabled application 210 in generating text input containing a text

transcription of a desired speech output, as aspects of the present invention are not limited in this respect.

In this example, speech-enabled application 210 may be, for instance, an IVR application at a kiosk in a train station, with which a user interacts through speech to purchase a train ticket. Such a speech-enabled application 210 may be programmed to generate text input 350 in response to a user indicating a desire to purchase a ticket for a particular destination and/or route for the current day. Text input 300 may be generated by inserting appropriate content prompts into the blank fields in a carrier prompt, "The time is currently _____. Would you like to depart at _____, _____, or _____?" Speech-enabled application 210 may be programmed, for example, to determine the current time of day, and the times of departure of the next three trains departing after the current time of day on the desired route, and to insert these times as content prompts in the blank fields of the carrier prompt. Speech-enabled application 210 may transmit the text input 350 thus generated to synthesis system 200 to be rendered as synthetic speech.

Synthesis system 200 may be programmed, e.g., through a tokenizer implemented as part of front-end 250, to parse text input 350 into a sequence of individual tokens on the order of single words. In the illustration of FIG. 3B, the individual parsed tokens are represented as separated by white space in the normalized orthography 360. As shown in FIG. 3B, normalized orthography 360 is read across the second line of the top portion of FIG. 3B, continuing at label "B" to the second line of the middle portion of FIG. 3B, and continuing further at label "F" to the second line of the bottom portion of FIG. 3B. Thus, in this example, "The time is currently" is parsed into four separate tokens, and the time "9:42 a.m." is parsed into a single token with normalized orthography "nine_forty_two_a_m". It should be appreciated, however, that synthesis system 200 may be programmed to tokenize text input 350 using any suitable tokenization technique in accordance with any suitable tokenization rules and/or criteria, as aspects of the present invention are not limited in this respect.

A tokenizer of synthesis system 200 may also be programmed, in accordance with some embodiments of the present invention, to analyze the tokens that it parses to infer their text normalization type. For example, a tokenizer of synthesis system 200 may be programmed to determine that "9:42 a.m.", "10:30 a.m.", "11:30 a.m." and "12:30 p.m." in text input 350 are of the "time" text normalization type based on their

syntax (e.g., one or two numerals, followed by a colon, followed by two numerals, followed by "a.m." or "p.m."). It should be appreciated that a tokenizer of synthesis system 200 may be programmed to identify tokens as belonging to any suitable text normalization type (examples of which were given above) using any suitable technique according to any suitable criteria, as aspects of the present invention are not limited in this respect. Also, although an example has been described in which tokenization and text normalization type identification functionalities are implemented in a tokenizer component within front-end 250 of synthesis system 200, it should be appreciated that many different structural architectures of synthesis system 200 are possible, including arrangements in which tokenization and text normalization type identification are implemented in the same or separate modules, together with or separate from front-end 250 or any other component of synthesis system 200. Either or both of the tokenization and text normalization type identification functionalities may be implemented on the same processor or processors as other components of synthesis system 200 or on different processor(s), and may be implemented in the same physical system or different physical systems, as aspects of the present invention are not limited in this respect.

Having identified the text normalization types of tokens of text input 350, synthesis system 200 may, e.g., through front-end 250, generate text normalization type markers 380 to mark portions of text input 350 of certain text normalization types. As shown in FIG. 3B, text normalization type markers 380 are read across the fourth line of the top portion of FIG. 3B, continuing at label "D" to the fourth line of the middle portion of FIG. 3B, and continuing further at label "H" to the fourth line of the bottom portion of FIG. 3B. Example text normalization type markers 380 include [begin time] and [end time] markers for each of the four times of day contained in text input 350. Using similar processing as described above with reference to the example of FIG. 3A, in the example of FIG. 3B synthesis system 200 may also, e.g., through front-end 250, generate sentence/phrase markers 370. As shown in FIG. 3B, sentence/phrase markers 370 are read across the third line of the top portion of FIG. 3B, continuing at label "C" to the third line of the middle portion of FIG. 3B, and continuing further at label "G" to the third line of the bottom portion of FIG. 3B.

Once synthesis system 200 has identified the text normalization types of the tokens of text input 350, it may identify a plurality of tokens in text input 350 of the

same text normalization type. As discussed above, tokens or fields of the same text normalization type may be candidates for contrastive stress patterns to be applied, in certain circumstances. In the example text input 350 of FIG. 3B, the four tokens "9:42 a.m.", "10:30 a.m.", "11:30 a.m." and "12:30 p.m." are of the same text normalization type, "time". However, only the three times "10:30 a.m.", "11:30 a.m." and "12:30 p.m." are meant to contrast with each other, as they are a set of alternative times for departure, and a listener's attention may benefit from being drawn to the differences between them to make a selection among them. The first time, "9:42 a.m.", is the current time, and is separate from and does not participate in the contrastive pattern between the other three times.

In some embodiments, synthesis system 200 may be programmed to identify which tokens of the same text normalization type should participate in a contrastive stress pattern with each other, and which should not, based on syntactic patterns that may involve one or more linking tokens or sequences of tokens. In the example of FIG. 3B, synthesis system 200 may be programmed to identify the word "or" as a linking token associated with one or more patterns of contrastive stress, and/or the syntactic pattern "_____, _____ or _____" as associated with one or more specific patterns of contrastive stress. Thus, based on their positions in the syntax of text input 350 in relation to the linking token "or", the times "10:30 a.m.", "11:30 a.m." and "12:30 p.m." may be identified by synthesis system 200 as a plurality of fields to which a contrastive stress pattern should be applied, to the exclusion of the separate time "9:42 a.m.". Other examples of linking tokens that may be recognized by synthesis system 200 have been provided above; it should be appreciated that synthesis system 200 may identify tokens to which contrastive stress patterns are to be applied with reference to any suitable linking token(s) or sequence(s) of linking tokens and/or any suitable syntactic patterns involving linking tokens or not involving linking tokens, as aspects of the present invention are not limited in this respect.

As discussed above, in some embodiments, synthesis system 200 may select a particular contrastive stress pattern to apply to a plurality of contrasting tokens or fields based on their ordering and/or their syntactic relationships to various identified linking tokens in the text input. In some examples, as discussed above, a selected contrastive stress pattern may involve different levels of stress or emphasis applied to different ones

of the contrasting tokens. In the example of FIG. 3B, synthesis system 200 may apply a contrastive stress pattern that assigns different levels of contrastive stress to each of the tokens "10:30 a.m." (stress level 1), "11:30 a.m." (stress level 2), and "12:30 p.m." (stress level 3). The result of such a contrastive stress pattern may be that the first of three items that contrast is emphasized slightly, the second of the three contrasting items is emphasized more, and the third of the three items is emphasized even more, to highlight the compounding differences between the three. However, this is merely one example, and it should be appreciated that synthesis system 200 may be programmed to apply any suitable contrastive stress pattern (including evenly applied stress) to contrasting tokens of the same text normalization type according to any suitable criteria, as aspects of the present invention are not limited in this regard.

Having identified the three tokens of text input 350 to which a contrastive stress pattern is to be applied, synthesis system 200 may in some embodiments proceed to identify the specific portion(s) of the contrasting tokens and/or their normalized orthography to be rendered to actually carry the contrastive stress, through processing similar to that described above with reference to the example of FIG. 3A. In the example of FIG. 3B, the "ten", "eleven" and "twelve" of the times "10:30", "11:30" and "12:30" are the portions that differ; therefore, synthesis system 200 may identify these portions as the specific words to carry contrastive stress through increased pitch, amplitude, duration and/or other appropriate parameters as discussed above. In addition, the "p.m." portion of "12:30 p.m." differs from the two preceding "a.m." portions; therefore, synthesis system 200 may identify the "p.m." portion as another to carry contrastive stress. Synthesis system 200 may then generate stress markers 390, using any suitable technique for generating markers, to mark the portions "ten", "eleven", "twelve" and "p.m." that are assigned to carry contrastive stress. As shown in FIG. 3B, stress markers 390 are read across the bottom line of the middle portion of FIG. 3B, continuing at label "I" to the bottom line of the bottom portion of FIG. 3B.

As illustrated in the example of FIG. 3B, stress markers 390 include "stress1", "stress2" and "stress3" labels to mark the three different levels of stress or emphasis assigned by synthesis system 200 to the different contrasting tokens of text input 350. As discussed above, such markers may in various embodiments be compared with metadata to select appropriate audio recordings for rendering the different tokens using

CPR synthesis, or used to generate appropriate pitch, amplitude, duration, etc. targets during the portions carrying contrastive stress for use in TTS synthesis. The resulting synthetic audio speech output may speak the three contrasting tokens with different levels of emphasis, as embodied through increasing levels of intensity of selected voice and/or synthesis parameters. For example, the "ten" in "10:30 a.m." may be rendered as speech with a slightly increased pitch, amplitude and/or duration than the baseline level that would be used in the absence of contrastive stress; the "eleven" in "11:30 a.m." may be rendered as speech with higher increased pitch, amplitude and/or duration; and the "twelve" and the "p.m." in "12:30 p.m." may be rendered as speech with the highest increased pitch, amplitude and/or duration relative to the baseline.

It should be appreciated that any suitable amount(s) of pitch, amplitude and/or duration increases, and/or other synthesis parameter variations, may be used to generate speech carrying contrastive stress, as aspects of the present invention are not limited in this respect. In one example, synthesis system 200 may be programmed to generate speech carrying contrastive stress using the following changes relative to standard, unemphasized synthetic speech: for moderate emphasis, one semitone increase in pitch, three decibel increase in amplitude, and 10% increase in spoken output duration; for strong emphasis: two semitone increase in pitch, 4.5 decibel increase in amplitude, and 20% increase in spoken output duration.

Other techniques for identifying one or more portions of a text input to carry contrastive stress in the corresponding synthetic speech output are possible, as aspects of the present invention are not limited in this respect. In the foregoing, examples have been provided in which the speech-enabled application 210 and its developer 220 need do little analysis of a desired speech output to identify portions to be rendered with contrastive stress. In some embodiments, as discussed above, speech-enabled application 210 may generate nothing but a plain text transcription of a desired speech output with no indication of where contrastive stress is desired, and all the work of identifying locations of contrastive stress and appropriate contrastive stress patterns may be performed by synthesis system 200. In some embodiments, speech-enabled application 210 may include one or more indications (e.g., through SSML mark-up tags, or in other suitable ways) of the text normalization types of various fields, and it may be up to synthesis system 200 to identify which fields apply to a contrastive stress pattern.

In other embodiments, speech-enabled application 210 may include one or more indications of fields of the same text normalization type for which a contrastive stress pattern is specifically desired, and synthesis system 200 may proceed to identify the specific portions of those fields to be rendered to carry contrastive stress. However, it should be appreciated that other embodiments are also contemplated, for example in which speech-enabled application 210 shoulders even more of the processing load in marking up a text input for rendering with contrastive stress.

In some embodiments, speech-enabled application 210 may itself be programmed to identify the specific portions of contrasting fields or tokens to be rendered to actually carry contrastive stress. In such embodiments, many of the functions described above as being performed by synthesis system 200 may be programmed into speech-enabled application 210 to be performed locally. For example, in some embodiments, speech-enabled application 210 may be programmed to identify tokens of the same text normalization type within a desired speech output, identify appropriate contrastive stress patterns to be applied to the contrasting tokens, identify portions of the tokens that differ, and assign specific portions on the order of single words or syllables to carry contrastive stress. Speech-enabled application 210 may be programmed to mark these specific portions using one or more annotations or tags, and to transmit the marked-up text input to synthesis system 200 for rendering as audio speech through CPR and/or TTS synthesis. Such embodiments may require more complex programming of speech-enabled application 210 by developer 220, but may allow for a simpler synthesis system 200 when the work of assigning contrastive stress is already done locally on the client side (i.e., at speech-enabled application 210).

In yet other embodiments, all processing to synthesize speech output with contrastive stress may be performed locally at a speech-enabled application. For example, in some embodiments, a developer may supply a speech-enabled application with access to a dataset of audio prompt recordings for use in CPR synthesis, and may program the speech-enabled application to construct output speech prompts by concatenating specific prompt recordings that are hard-coded by the developer into the programming of the speech-enabled application. For implementing contrastive stress in accordance with some embodiments of the present invention, the speech-enabled

application may be programmed to issue call-outs to a library of function calls that deal with applying contrastive stress to restricted sequences of text.

In some embodiments, when a speech-enabled application identifies a plurality of fields of a desired speech output of the same text normalization type for which a contrastive stress pattern is desired, the application may be programmed to issue a call-out to a function for applying contrastive stress to those fields. For example, the speech-enabled application may pass the times "10:45 a.m." and "11:45 a.m." as text parameters to a function programmed to map the two times to sequences of audio recordings that contrast with each other in a contrastive stress pattern. The function may be implemented using any suitable techniques, for example as software code stored on one or more computer-readable storage media and executed by one or more processors, in connection with the speech-enabled application. The function may be programmed with some functionality similar to that described above with reference to synthesis system 200, for example to use rules specific to the current language and text normalization type to convert the plurality of text fields to word forms and identify portions that differ between them. The function may then assign contrastive stress to be carried by the differing portions.

In some embodiments, a function as described above may return to the speech-enabled application one or more indications of which portion(s) of the plurality of fields should be rendered to carry contrastive stress. Such indications may be in the form of markers, mark-up tags, and/or any other suitable form, as aspects of the present invention are not limited in this respect. After receiving such indication(s) returned from the function call, the speech-enabled application may then select appropriate audio recordings from its prompt recording dataset to render the fields as speech with accordingly placed contrastive stress. In other embodiments, the function itself may select appropriate audio recordings from the prompt recording dataset to render the plurality of fields as speech with contrastive stress as described above, and return the filenames of the selected audio recordings or the audio recordings themselves to the speech-enabled application proper. The speech-enabled application may then concatenate the audio recordings returned by the function call (e.g., the content prompts) with the other audio recordings hard-coded into the application (e.g., the carrier prompts) to form the completed synthetic speech output with contrastive stress.

FIG. 4 illustrates an exemplary method 400 for use by synthesis system 200 or any other suitable system for providing speech output for a speech-enabled application in accordance with some embodiments of the present invention. Method 400 begins at act 405, at which text input may be received from a speech-enabled application. At act 410, the text input may be tokenized, i.e., parsed into individual tokens on the order of single words. At act 420, the text normalization types of at least some of the tokens of the text input may be identified. Examples of text normalization types that may be recognized by the synthesis system have been provided above. As discussed above, text normalization types of various tokens may be identified with reference to annotations or tags included in the text input by the speech-enabled application that specifically identify the text normalization types of the associated tokens, or the text normalization types may be inferred by the synthesis system based on the format and/or syntax of the tokens. At act 430, a normalized orthography corresponding to the text input may be generated. As discussed above, the normalized orthography may represent a standardized spelling out of the words included in the text input, which for some tokens may depend on their text normalization type.

At act 440, at least one set of tokens of the same text normalization type may be identified, based on the text normalization types identified in act 420. As discussed above, a set of tokens of the same text normalization type in a text input may be candidates for application of a contrastive stress pattern; however, not all tokens of the same text normalization type within a text input may participate in the same contrastive stress pattern. In some embodiments, tokens for which a contrastive stress pattern is to be applied may be specifically designated by the speech-enabled application through one or more annotations, such as SSML "say-as" tags with a "detail" attribute valued as "contrastive". In other embodiments, the synthesis system may identify which tokens are to participate in a contrastive stress pattern based on their syntactic relationships with each other and any appropriate linking tokens identified within the text input.

One or more linking tokens in the text input may be identified at act 450. Examples of suitable linking tokens have been provided above. As discussed above, linking tokens may be used in the processing performed by the synthesis system when they appear in certain syntactic patterns with relation to tokens of the same text normalization type. From such patterns, the synthesis system may identify which of the

tokens of the same text normalization type are to participate in a contrastive stress pattern, if such tokens were not specifically designated as "contrastive" by one or more indications (e.g., annotations) included in the text input. In addition, based on the order of the tokens to which a contrastive stress pattern is to be applied, and/or based on any linking tokens identified and/or their syntactic patterns, synthesis system may select a particular contrastive stress pattern to apply to the contrasting tokens. As discussed above, the particular contrastive stress pattern selected may involve rendering only one, some or all of the contrasting tokens with contrastive stress, and/or may involve assigning different levels of stress to different ones of the contrasting tokens. Thus, based on the selected contrastive stress pattern, one or more of the tokens may be identified at act 460 to be rendered with contrastive stress.

At act 470, the token(s) to be rendered with contrastive stress, and/or their normalized orthography, may be compared with the other token(s) to which the contrastive stress pattern is applied, to identify the specific portion(s) of the token(s) that differ. At act 480, a level of contrastive stress may be determined for each portion that differs from a corresponding portion of the other token(s) and/or their normalized orthography. If a token to be rendered with contrastive stress differs in its entirety from the other contrasting token(s), then light emphasis may be applied to the entire token, or no stress may be applied to the token at all. If some portions of the token differ from one or more other contrasting tokens and some do not, then a level of contrastive stress may be assigned to be carried by each portion that differs. In some embodiments, the same level of emphasis may be assigned to any portion of the speech output carrying contrastive stress. However, in some embodiments, different levels of contrastive stress may be assigned to different contrasting tokens and/or portions of contrasting tokens, based on the selected contrastive stress pattern, as discussed in greater detail above.

At act 490, markers may be generated to delineate the portions of the text input and/or normalized orthography assigned to carry contrastive stress, and/or to indicate the level of contrastive stress assigned to each such portion. At act 492, the markers may be used, in combination with the text input, normalized orthography and/or a corresponding phoneme sequence, in further processing by the synthesis system to synthesize a corresponding audio speech output. As discussed above, any of various synthesis techniques may be used, including CPR, concatenative TTS, articulatory or formant

synthesis, and/or others. Each portion of the text input labeled by the markers as carrying contrastive stress may be appropriately rendered as audio speech carrying contrastive stress, in accordance with the synthesis technique(s) used. The resulting speech output may exhibit increased parameters such as pitch, fundamental frequency, amplitude and/or duration during the portion(s) carrying contrastive stress, in relation to the baseline values of such parameters that would be exhibited by the same speech output if it were not carrying contrastive stress. In addition, other portions of the speech output, not carrying contrastive stress, may be rendered to be prosodically compatible with the portion(s) carrying contrastive stress, as described in further detail above. Method 400 may then end at act 494, at which the speech output thus produced with contrastive stress may be provided for the speech-enabled application.

It should be appreciated from the foregoing descriptions that some embodiments in accordance with the present disclosure are directed to a method 500 for providing speech output for a speech-enabled application, as illustrated in FIG. 5. Method 500 may be performed, for example, by a synthesis system such as synthesis system 200, or any other suitable system, machine and/or apparatus. Method 500 begins at act 510, at which text input may be received from a speech-enabled application. The text input may comprise a text transcription of a desired speech output. At act 520, speech output rendering the text input with contrastive stress may be generated. The speech output may include audio speech output corresponding to at least a portion of the text input, including at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output. Method 500 ends at act 530, at which the speech output may be provided for the speech-enabled application.

It should further be appreciated that some embodiments are directed to a method 600 for use with a speech-enabled application, as illustrated in FIG. 6. Method 600 may be performed, for example, by a system executing a function to which the speech-enabled application passes fields of text representing portions of a desired speech output to be contrasted with each other, or by any other suitable system, machine and/or apparatus. Method 600 begins at act 610, at which input comprising a plurality of text strings may be received from a speech-enabled application. At act 620, speech synthesis output corresponding to the plurality of text strings may be generated. The output may identify a plurality of audio recordings to render the text strings as speech with a

contrastive stress pattern. As discussed above, the contrastive stress pattern may involve applying stress to one, some or all of the plurality of text strings, such that one or more identified audio recordings corresponding to one, some or all of the plurality of text strings carry contrastive stress. Thus, at least one of the plurality of audio recordings may be selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings. As discussed above, the output may identify the audio recordings by returning their filenames to the speech-enabled application, by returning the audio recordings themselves to the speech-enabled application, by returning new data formed by concatenating the audio recordings to the speech-enabled application, or in any other suitable way, as aspects of the present invention are not limited in this respect. Method 600 ends at act 630, at which the output may be provided for the speech-enabled application.

In addition, it should be appreciated that some embodiments in accordance with the present disclosure are directed to a method 700 for providing speech output via a speech-enabled application, as illustrated in FIG. 7. Method 700 may be performed, for example, by a system executing a speech-enabled application such as speech-enabled application 210, or by any other suitable system, machine and/or apparatus. Method 700 begins at act 710, at which a text input may be generated. The text input may include a text transcription of a desired speech output. In some embodiments, the text input may also include one or more indications, such as SSML tags or any other suitable indication(s), that a contrastive stress pattern is desired in association with at least one portion of the text input. In some embodiments, generating such indication(s) may include identifying a plurality of fields of the text input for which the contrastive stress pattern is desired, and/or identifying one or more specific portions of the text input to be rendered to actually carry the contrastive stress. In some embodiments, identifying such specific portion(s) to carry contrastive stress may be performed by passing the plurality of fields for which the contrastive stress pattern is desired to a function that performs the identification.

At act 720, the generated text input may be input to one or more speech synthesis engines. At act 730, speech output corresponding to at least a portion of the text input may be received from the speech synthesis engine(s). The speech output may include

audio speech output including at least one portion carrying contrastive stress to contrast with at least one other portion of the audio speech output. Method 700 ends at act 740, at which the audio speech output may be provided to one or more user(s) of the speech-enabled application.

A synthesis system for providing speech output for a speech-enabled application in accordance with the techniques described herein may take any suitable form, as aspects of the present invention are not limited in this respect. An illustrative implementation using one or more computer systems 800 that may be used in connection with some embodiments of the present invention is shown in FIG. 8. The computer system 800 may include one or more processors 810 and one or more tangible, non-transitory computer-readable storage media (e.g., memory 820 and one or more non-volatile storage media 830, which may be formed of any suitable non-volatile data storage media). The processor 810 may control writing data to and reading data from the memory 820 and the non-volatile storage device 830 in any suitable manner, as the aspects of the present invention described herein are not limited in this respect. To perform any of the functionality described herein, the processor 810 may execute one or more instructions stored in one or more computer-readable storage media (e.g., the memory 820), which may serve as tangible, non-transitory computer-readable storage media storing instructions for execution by the processor 810.

The above-described embodiments of the present invention can be implemented in any of numerous ways. For example, the embodiments may be implemented using hardware, software or a combination thereof. When implemented in software, the software code can be executed on any suitable processor or collection of processors, whether provided in a single computer or distributed among multiple computers. It should be appreciated that any component or collection of components that perform the functions described above can be generically considered as one or more controllers that control the above-discussed functions. The one or more controllers can be implemented in numerous ways, such as with dedicated hardware, or with general purpose hardware (e.g., one or more processors) that is programmed using microcode or software to perform the functions recited above.

In this respect, it should be appreciated that one implementation of various embodiments of the present invention comprises at least one tangible, non-transitory

computer-readable storage medium (e.g., a computer memory, a floppy disk, a compact disk, and optical disk, a magnetic tape, a flash memory, circuit configurations in Field Programmable Gate Arrays or other semiconductor devices, etc.) encoded with one or more computer programs (i.e., a plurality of instructions) that, when executed on one or more computers or other processors, performs the above-discussed functions of various embodiments of the present invention. The computer-readable storage medium can be transportable such that the program(s) stored thereon can be loaded onto any computer resource to implement various aspects of the present invention discussed herein. In addition, it should be appreciated that the reference to a computer program which, when executed, performs the above-discussed functions, is not limited to an application program running on a host computer. Rather, the term computer program is used herein in a generic sense to reference any type of computer code (e.g., software or microcode) that can be employed to program a processor to implement the above-discussed aspects of the present invention.

Various aspects of the present invention may be used alone, in combination, or in a variety of arrangements not specifically discussed in the embodiments described in the foregoing and are therefore not limited in their application to the details and arrangement of components set forth in the foregoing description or illustrated in the drawings. For example, aspects described in one embodiment may be combined in any manner with aspects described in other embodiments.

Also, embodiments of the invention may be implemented as one or more methods, of which an example has been provided. The acts performed as part of the method(s) may be ordered in any suitable way. Accordingly, embodiments may be constructed in which acts are performed in an order different than illustrated, which may include performing some acts simultaneously, even though shown as sequential acts in illustrative embodiments.

Use of ordinal terms such as "first," "second," "third," etc., in the claims to modify a claim element does not by itself connote any priority, precedence, or order of one claim element over another or the temporal order in which acts of a method are performed. Such terms are used merely as labels to distinguish one claim element having a certain name from another element having a same name (but for use of the ordinal term).

The phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including," "comprising," "having," "containing", "involving", and variations thereof, is meant to encompass the items listed thereafter and additional items.

Having described several embodiments of the invention in detail, various modifications and improvements will readily occur to those skilled in the art. Such modifications and improvements are intended to be within the spirit and scope of the invention. Accordingly, the foregoing description is by way of example only, and is not intended as limiting. The invention is limited only as defined by the following claims and the equivalents thereto.

What is claimed is:

CLAIMS

1. A method for use with a speech-enabled application, the method comprising:

receiving input from the speech-enabled application comprising a plurality of text strings;

generating, using at least one computer system, speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and

providing the speech synthesis output for the speech-enabled application.

2. Apparatus for use with a speech-enabled application, the apparatus comprising:

a memory storing a plurality of processor-executable instructions; and

at least one processor, operatively coupled to the memory, that executes the instructions to:

receive input from the speech-enabled application comprising a plurality of text strings;

generate speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and

provide the speech synthesis output for the speech-enabled application.

3. At least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for use with a speech-enabled application, the method comprising:

receiving input from the speech-enabled application comprising a plurality of text strings;

generating speech synthesis output corresponding to the plurality of text strings, the speech synthesis output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and

providing the speech synthesis output for the speech-enabled application.

4. A method for generating speech output via a speech-enabled application, the method comprising:

generating, using at least one computer system executing the speech-enabled application, a plurality of text strings, each of the plurality of text strings corresponding to a portion of a desired speech output;

inputting the plurality of text strings to at least one software module for rendering contrastive stress;

receiving output from the at least one software module, the output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and

generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

5. Apparatus for generating speech output via a speech-enabled application, the apparatus comprising:

a memory storing a plurality of processor-executable instructions; and

at least one processor, operatively coupled to the memory, that executes the instructions to:

generate a plurality of text strings, each of the plurality of text strings corresponding to a portion of a desired speech output;

input the plurality of text strings to at least one software module for rendering contrastive stress;

receive output from the at least one software module, the output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and

generate, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

6. At least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for generating speech output via a speech-enabled application, the method comprising:

generating a plurality of text strings, each of the plurality of text strings corresponding to a portion of a desired speech output;

inputting the plurality of text strings to at least one software module for rendering contrastive stress;

receiving output from the at least one software module, the output identifying a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render at least one portion of at least one of the plurality of text strings as speech carrying contrastive stress, to contrast with at least one rendering of at least one other of the plurality of text strings; and

generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

ABSTRACT

Techniques for generating synthetic speech with contrastive stress. In one aspect, a speech-enabled application generates a text input including a text transcription of a desired speech output, and inputs the text input to a speech synthesis system. The synthesis system generates an audio speech output corresponding to at least a portion of the text input, with at least one portion carrying contrastive stress, and provides the audio speech output for the speech-enabled application. In another aspect, a speech-enabled application inputs a plurality of text strings, each corresponding to a portion of a desired speech output, to a software module for rendering contrastive stress. The software module identifies a plurality of audio recordings that render at least one portion of at least one of the text strings as speech carrying contrastive stress. The speech-enabled application generates an audio speech output corresponding to the desired speech output using the audio recordings.

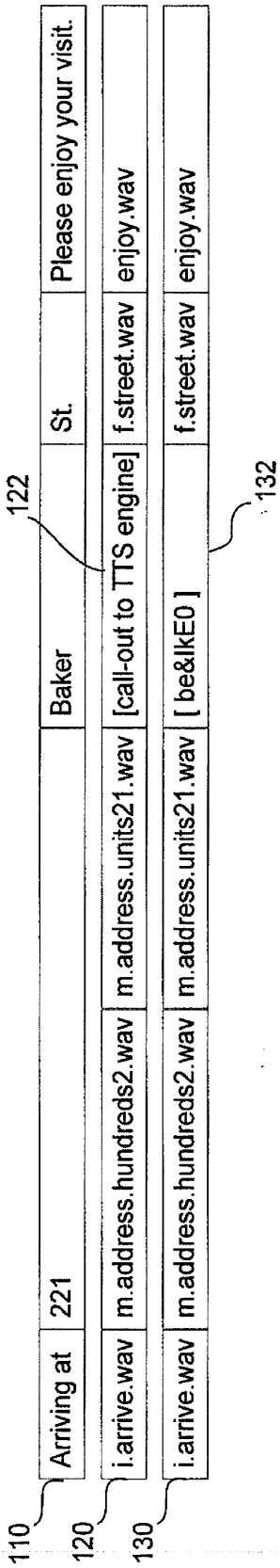


FIG. 1A (Prior Art)

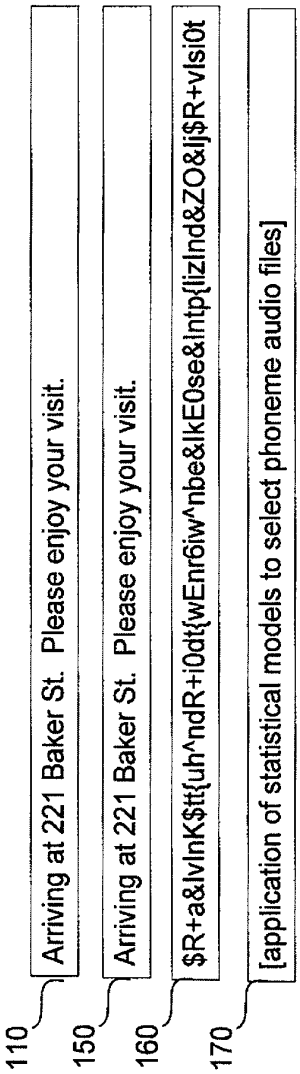
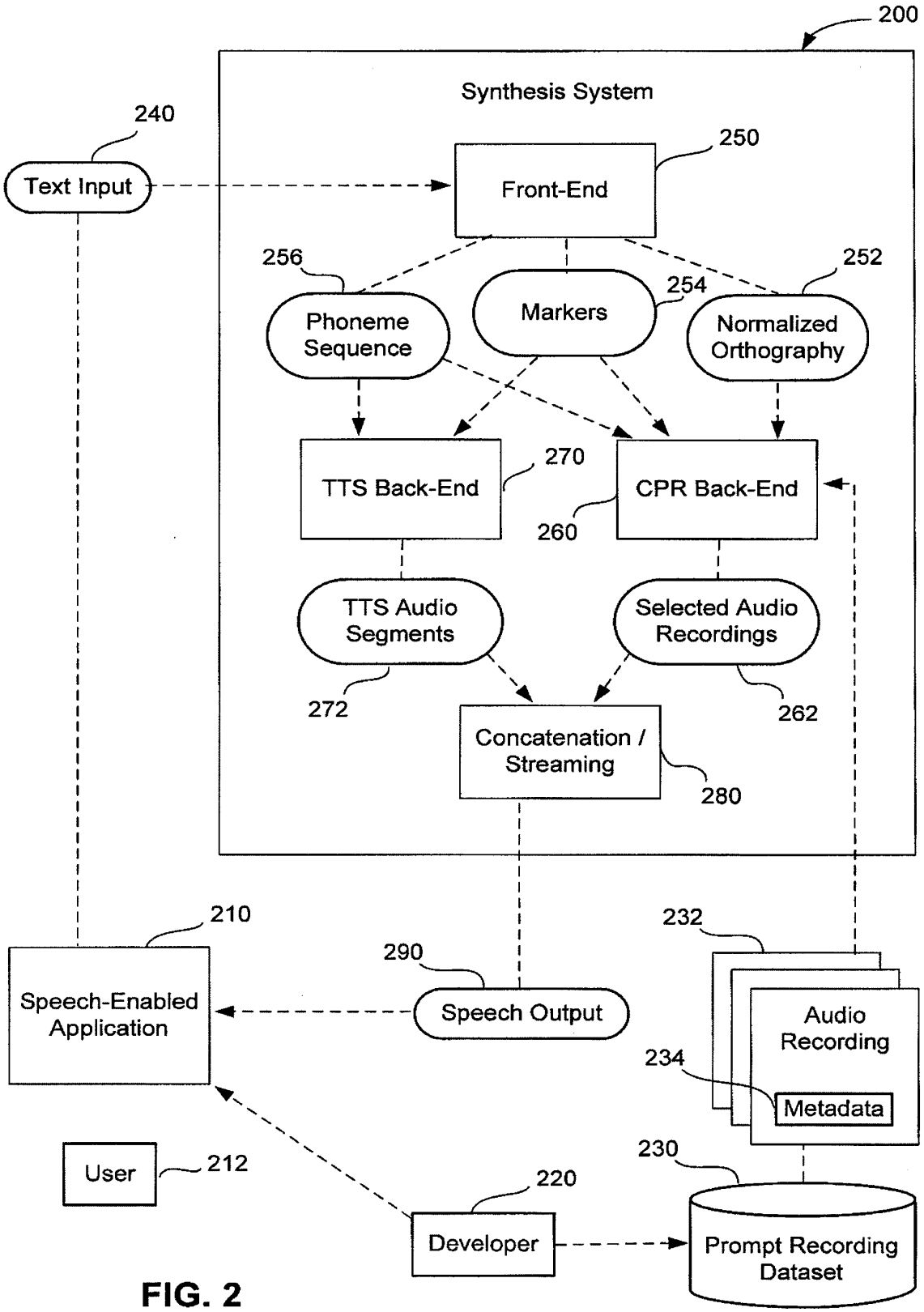


FIG. 1B (Prior Art)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Phoneme Sequence
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Normalized Orthography
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TTS Back-End
CPR Back-End
260
TTS Audio Segments
Selected Audio Recordings
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262
Concatenation / Streaming
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Speech Output
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Audio Recording
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User
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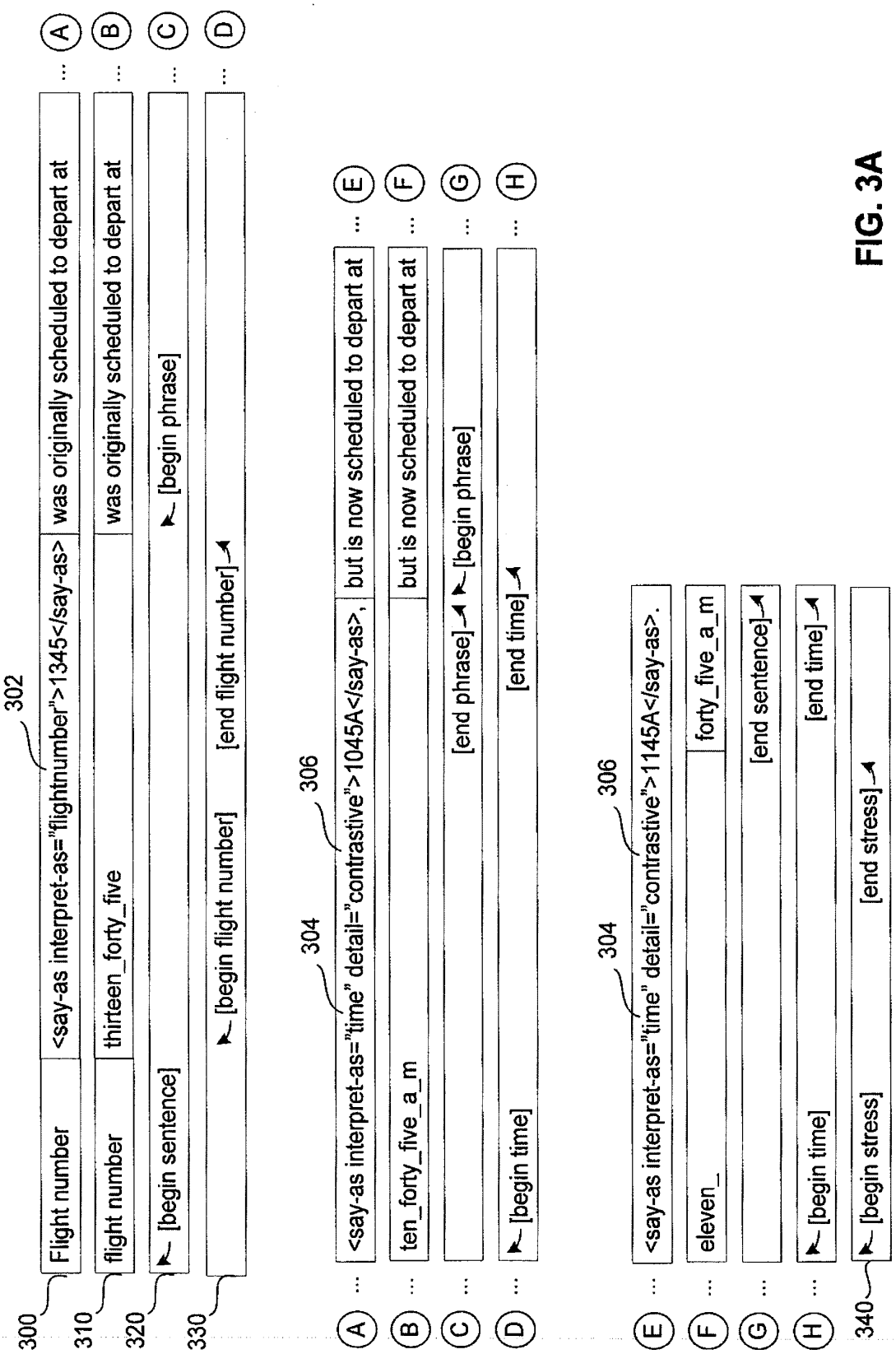
220
Developer
Prompt Recording Dataset

FIG. 2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[end stress]
340

FIG. 3A

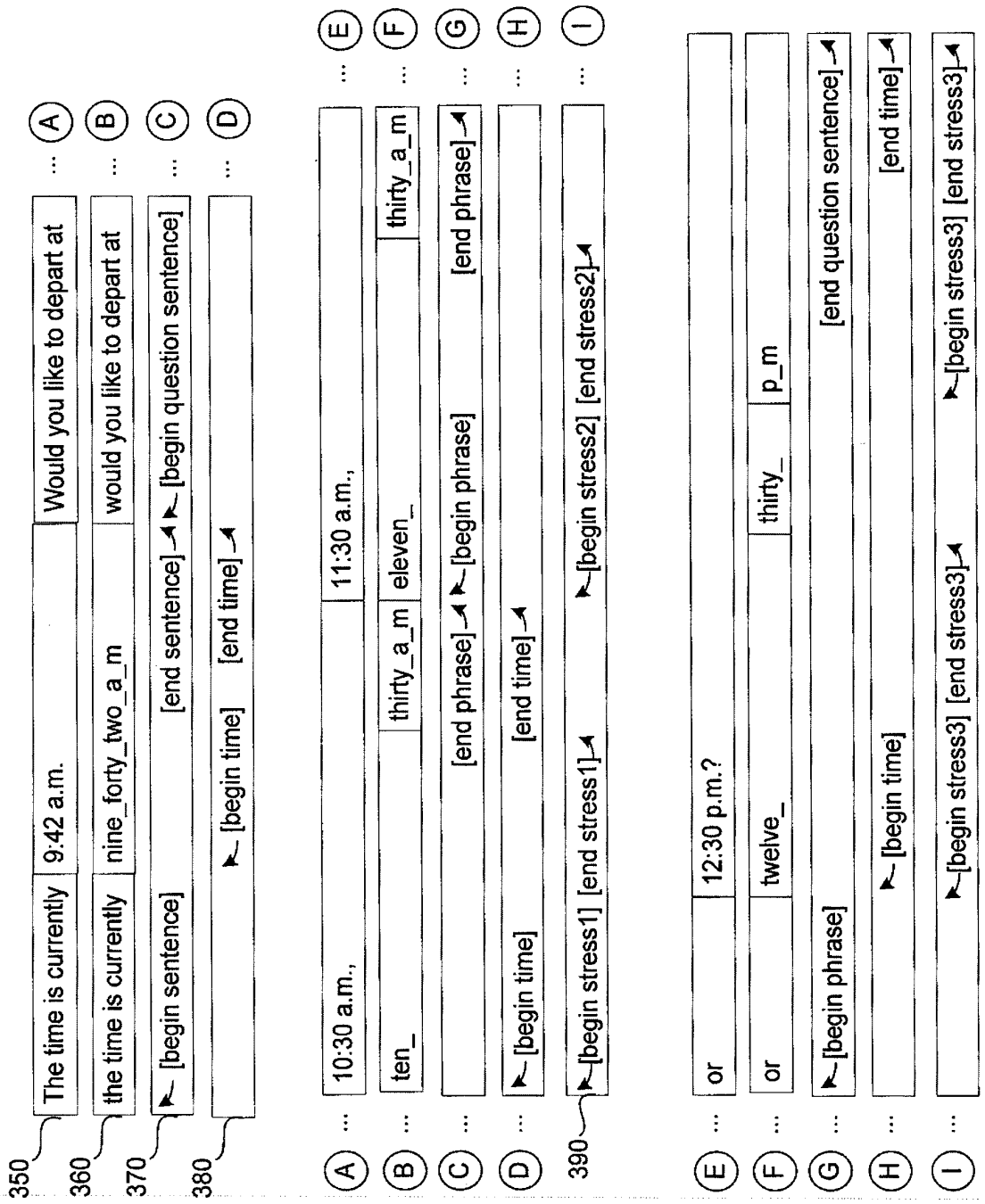
350
360
370
380
390
The time is currently
9:42 a.m.
Would you like to depart at
the time is currently
nine_forty_two_a_m
would you like to depart at
[begin sentence]
[end sentence]
[begin question sentence]
[begin time]
[end time]
10:30 a.m.,
11:30 a.m.,
ten_
thirty_a_m
eleven_
thirty_a_m
[end phrase]
[begin phrase]
[end phrase]
[begin time]
[end time]
[begin stress1]
[end stress1]
[begin stress2]
[end stress2]
or
12:30 p.m.?
or
twelve_
thirty_
p_m
[begin phrase]
[end question sentence]
[begin time]
[end time]
[begin stress3]
[end stress3]
[begin stress3]
[end stress3]
A
B
C
D
E
F
G
H
I

FIG. 3B

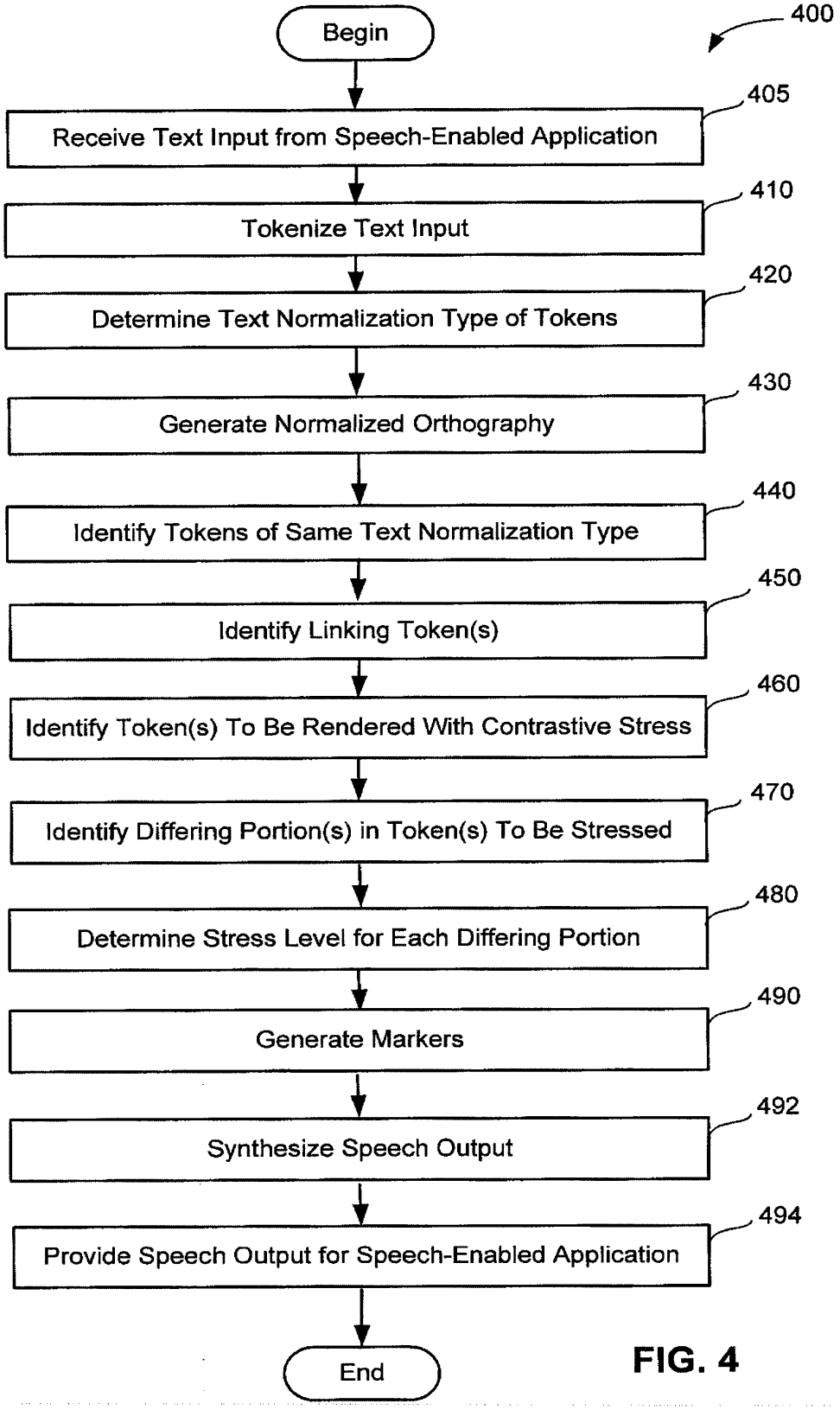
400
Begin
405
Receive Text Input from Speech-Enabled Application
410
Tokenize Text Input
420
Determine Text Normalization Type of Tokens
430
Generate Normalized Orthography
440
Identify Tokens of Same Text Normalization Type
450
Identify Linking Token(s)
460
Identify Token(s) To Be Rendered With Contrastive Stress
470
Identify Differing Portion(s) in Token(s) To Be Stressed
480
Determine Stress Level for Each Differing Portion
490
Generate Markers
492
Synthesize Speech Output
494
Provide Speech Output for Speech-Enabled Application
End

FIG. 4

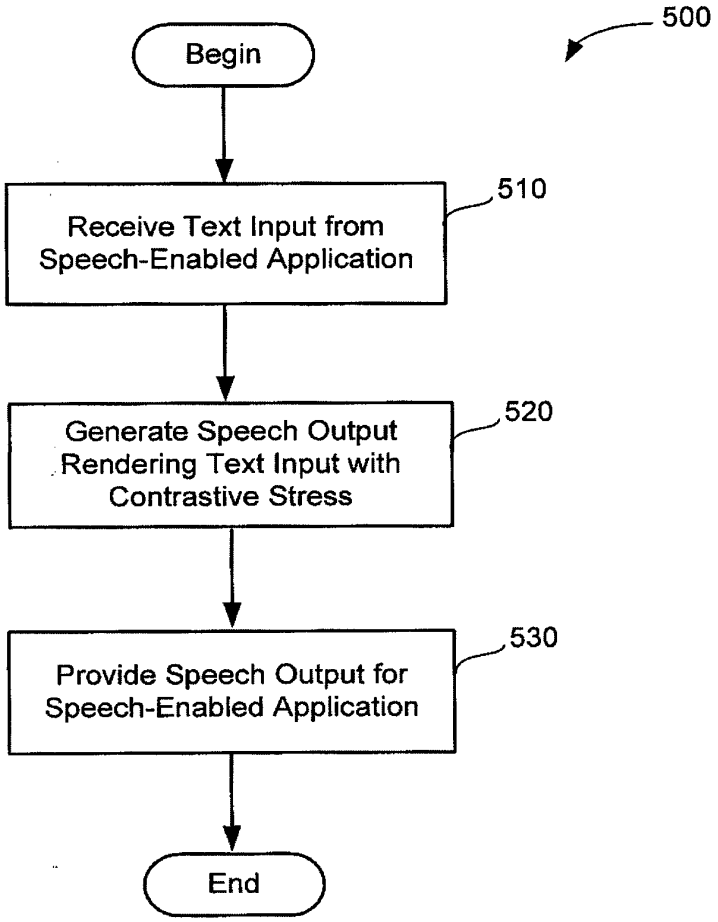
500
Begin
Receive Text Input from Speech-Enabled Application
510
Generate Speech Output Rendering Text Input with Contrastive Stress
520
Provide Speech Output for Speech-Enabled Application
530
End

FIG. 5

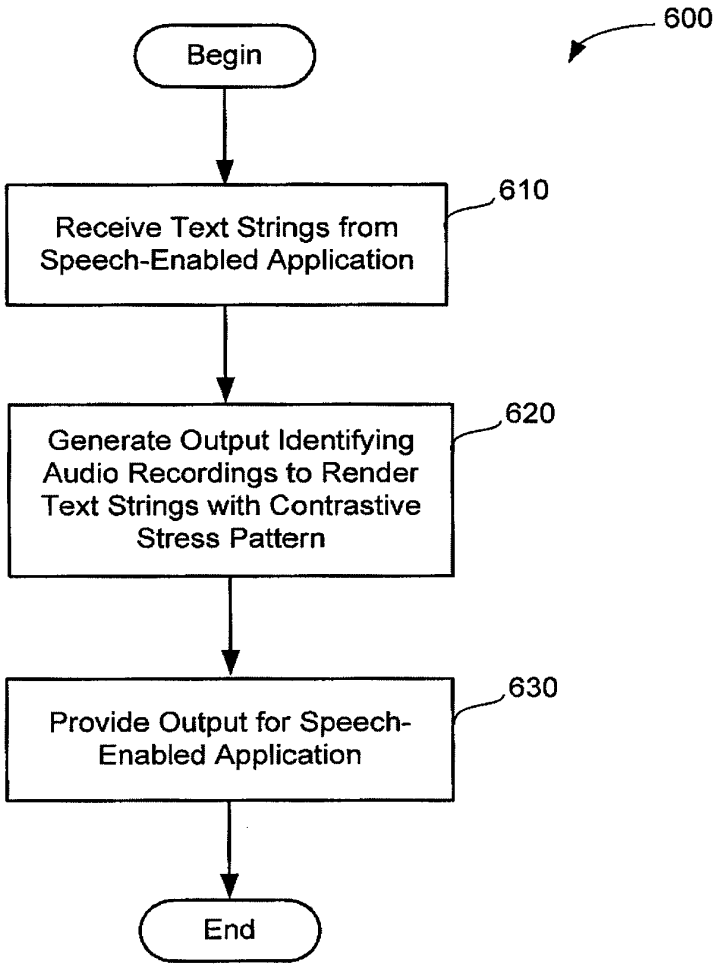
600
Begin
610
Receive Text Strings from Speech-Enabled Application
620
Generate Output Identifying Audio Recordings to Render Text Strings with Contrastive Stress Pattern
630
Provide Output for Speech-Enabled Application
End

FIG. 6

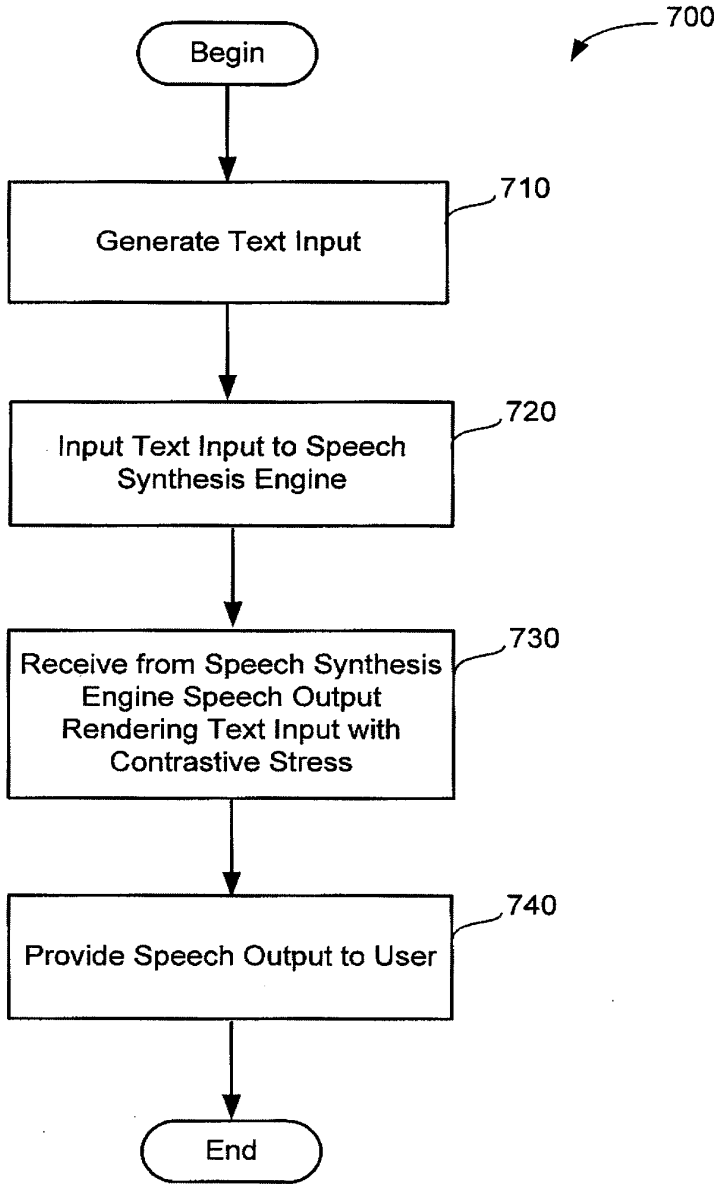
700
Begin
710
Generate Text Input
720
Input Text Input to Speech Synthesis Engine
730
Receive from Speech Synthesis Engine Speech Output Rendering Text Input with Contrastive Stress
740
Provide Speech Output to User
End

FIG. 7

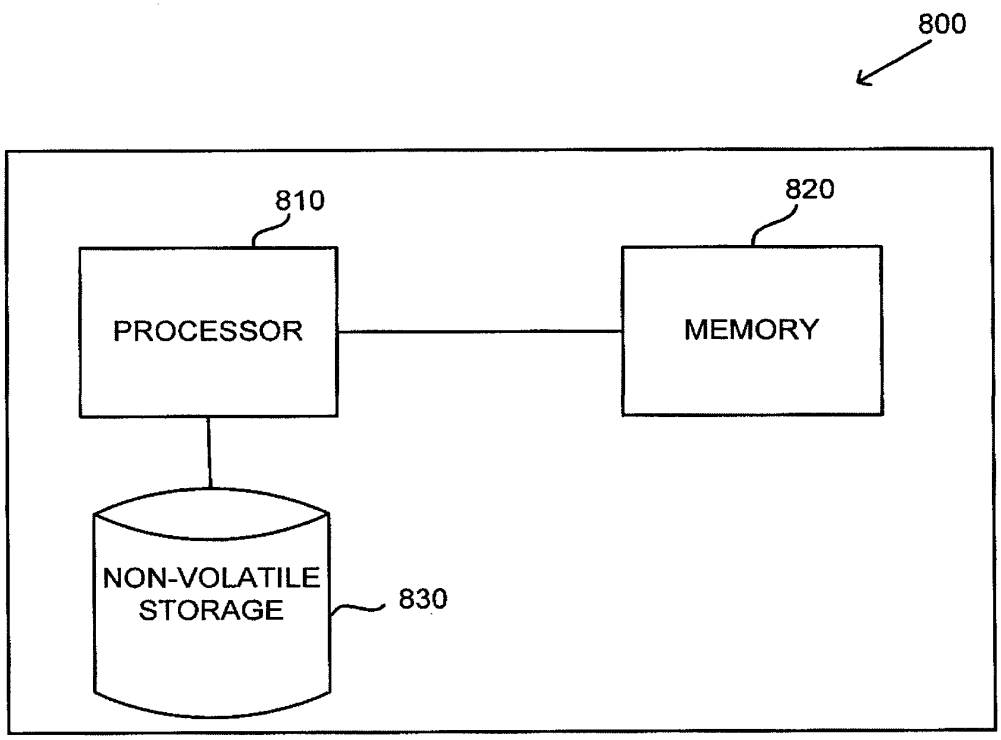

FIG. 8

Application Data Sheet

Inventor Information

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Postal or Zip Code of mailing address::	02492

Correspondence Information

Correspondence Customer Number::	91337

Application Information

Application Type::	Regular
Subject Matter::	Utility
CD-ROM or CD-R?::	None
Sequence submission?::	None
Computer Readable Form (CRF)?::	No
Title::	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Attorney Docket Number::	N0484.70944US01
Request for Early Publication?::	No
Request for Non-Publication?::	No
Small Entity?::	No

Petition included?::	No
Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2::	No
Authorization to Permit Access to the Instant Application by the Participating Offices::	Yes

Representative Information

Representative Customer Number:: 91337

Domestic Priority Information

Application::	Continuity Type::	Parent Application::	Parent Filing Date::
This Application	Continuation of	12/853026	08/09/10
12/853026	Continuation-in-part of	12/704859	02/12/10

Foreign Priority Information

Applicant Information

Applicant Number::	1
Applicant Type::	Assignee
Organization Name::	Nuance Communications, Inc.
Street of mailing address::	One Wayside Road

City of mailing address::	Burlington
State or Province of mailing address::	MA
Postal or Zip Code of mailing address::	01803

Non-Applicant Assignee Information

Signature:

Signature	Elisabeth Hunt	Date	4/17/13
Name (Print/Type)	Elisabeth H. Hunt, Ph.D.	Registration No. (Attorney/Agent)	67,336

Docket No.: N0484.70944US01
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer et al.
Application No.:	Not Yet Assigned
Confirmation No.:	Not Yet Assigned
Filed:	Concurrently Herewith
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	Not Yet Assigned
Art Unit:	Not Yet Assigned

Certificate of Electronic Filing Under 37 CFR 1.8
I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: 04/17/2013 Signature: Caitlin Laracy (Caitlin Laracy)

FIRST PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

INTRODUCTORY COMMENTS

Prior to examination on the merits, please amend the above-identified U.S. patent application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 3 of this paper

Remarks begin on page 8 of this paper.

3066383.1

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph under "CROSS-REFERENCE TO RELATED APPLICATIONS" on page 1, lines 5-8, of the specification with the following amended paragraph:

This application is a continuation of U.S. Application Serial No. 12/853,026, entitled "Method and Apparatus for Generating Synthetic Speech with Contrastive Stress" and filed on August 9, 2010, which is incorporated herein by reference in its entirety. U.S. Application Serial No. 12/853,026 is a continuation-in-part of U.S. Application Serial No. 12/704,859, entitled "Method and Apparatus for Providing Speech Output for Speech-Enabled Applications" and filed on February 12, 2010 (now pending), which is incorporated herein by reference in its entirety.

AMENDMENTS TO THE CLAIMS

The Assignee submits below a complete listing of the current claims, including marked-up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing. This listing of claims replaces all prior versions and listings of claims in the application:

1-6. (Canceled)

7. A method for use with a speech-enabled application, the method comprising:

receiving, from the speech-enabled application, input comprising a plurality of text strings;

identifying a first portion of a first text string of the plurality of text strings as differing from a corresponding first portion of a second text string of the plurality of text strings, and a second portion of the first text string as not differing from a corresponding second portion of the second text string;

assigning contrastive stress to the identified first portion of the first text string, but not to the identified second portion of the first text string;

generating, using at least one computer system, speech synthesis output to render the plurality of text strings as speech having the assigned contrastive stress; and

providing the speech synthesis output for the speech-enabled application.

8. The method of claim 7, wherein the identifying comprises identifying the first portion of the first text string as differing from the corresponding first portion of the second text string based at least in part on a normalized orthography of the first and second text strings.

9. The method of claim 7, wherein the first and second text strings represent different numerical fields within a larger text string.

10. The method of claim 9, wherein the numerical fields are selected from the group consisting of: currency fields, date fields, digit sequence fields, number fields, fractional number fields, ordinal

number fields, telephone number fields, flight number fields, street number fields, time fields, and zipcode fields.

11. The method of claim 7, wherein the receiving comprises receiving the first and second text strings as first and second parameters passed to a function called by the speech-enabled application to render the first and second text strings with a contrastive stress pattern.

12. The method of claim 7, wherein the speech synthesis output comprises identification of a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render the first portion of the first text string as speech carrying contrastive stress.

13. The method of claim 7, wherein the speech synthesis output comprises an indication of the identified first portion of the first text string as being assigned contrastive stress.

14. At least one non-transitory computer-readable storage medium encoded with a plurality of computer-executable instructions that, when executed, perform a method for use with a speech-enabled application, the method comprising:

receiving, from the speech-enabled application, input comprising a plurality of text strings;

identifying a first portion of a first text string of the plurality of text strings as differing from a corresponding first portion of a second text string of the plurality of text strings, and a second portion of the first text string as not differing from a corresponding second portion of the second text string;

assigning contrastive stress to the identified first portion of the first text string, but not to the identified second portion of the first text string;

generating speech synthesis output to render the plurality of text strings as speech having the assigned contrastive stress; and

providing the speech synthesis output for the speech-enabled application.

15. The at least one non-transitory computer-readable storage medium of claim 14, wherein the identifying comprises identifying the first portion of the first text string as differing from the corresponding first portion of the second text string based at least in part on a normalized orthography of the first and second text strings.

16. The at least one non-transitory computer-readable storage medium of claim 14, wherein the first and second text strings represent different numerical fields within a larger text string.

17. The at least one non-transitory computer-readable storage medium of claim 16, wherein the numerical fields are selected from the group consisting of: currency fields, date fields, digit sequence fields, number fields, fractional number fields, ordinal number fields, telephone number fields, flight number fields, street number fields, time fields, and zipcode fields.

18. The at least one non-transitory computer-readable storage medium of claim 14, wherein the receiving comprises receiving the first and second text strings as first and second parameters passed to a function called by the speech-enabled application to render the first and second text strings with a contrastive stress pattern.

19. The at least one non-transitory computer-readable storage medium of claim 14, wherein the speech synthesis output comprises identification of a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render the first portion of the first text string as speech carrying contrastive stress.

20. The at least one non-transitory computer-readable storage medium of claim 14, wherein the speech synthesis output comprises an indication of the identified first portion of the first text string as being assigned contrastive stress.

21. A method for generating speech output via a speech-enabled application, the method comprising:

generating, using at least one computer system executing the speech-enabled application, a plurality of text strings, each of the plurality of text strings corresponding to a portion of a desired speech output;

inputting the plurality of text strings to at least one software module configured to identify a first portion of a first text string of the plurality of text strings as differing from a corresponding first portion of a second text string of the plurality of text strings, and a second portion of the first text string as not differing from a corresponding second portion of the second text string;

receiving, from the at least one software module, speech synthesis output to render the plurality of text strings with contrastive stress assigned to the identified first portion of the first text string, but not to the identified second portion of the first text string; and

generating, using the speech synthesis output, an audio speech output corresponding to the desired speech output.

22. The method of claim 21, wherein the at least one software module is configured to identify the first portion of the first text string as differing from the corresponding first portion of the second text string based at least in part on a normalized orthography of the first and second text strings.

23. The method of claim 21, wherein the first and second text strings represent different numerical fields within a larger text string.

24. The method of claim 23, wherein the numerical fields are selected from the group consisting of: currency fields, date fields, digit sequence fields, number fields, fractional number fields, ordinal number fields, telephone number fields, flight number fields, street number fields, time fields, and zipcode fields.

25. The method of claim 21, wherein the inputting comprises passing the first and second text strings as first and second parameters to a function called by the speech-enabled application to render the first and second text strings with a contrastive stress pattern.

26. The method of claim 21, wherein the speech synthesis output comprises identification of a plurality of audio recordings to render the plurality of text strings as speech, at least one of the plurality of audio recordings being selected to render the first portion of the first text string as speech carrying contrastive stress.

REMARKS

The Assignee has herein amended the specification to recite that the present application is a continuation of U.S. Patent Application Serial No. 12/853,026, which is a continuation-in-part of U.S. Application Serial No. 12/704,859. The Assignee has further canceled claims 1-6 and added claims 7-26. No new matter has been added.

If there is a fee occasioned by this response that is not covered by an enclosed payment, please charge any deficiency to our Deposit Account No. 23/2825 under Docket No. N0484.70944US01 from which the undersigned is authorized to draw.

Dated: 4/17/13

Respectfully submitted,
Nuance Communications, Inc.

By _____

Richard F. Giunta
Registration No.: 36,149
Elisabeth H. Hunt, Ph.D.
Registration No.: 67,336
WOLF, GREENFIELD & SACKS, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
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Doc Code: PD.TO.AUTH
Document Description: Authorization to access Appl. by Trilateral Office

PTO/SB/39 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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AUTHORIZATION TO PERMIT ACCESS TO APPLICATION BY PARTICIPATING OFFICES

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

COMPLETE IF KNOWN	
Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Darren C. Meyer
Attorney Docket Number	N0484.70944US01
Title (Required)	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

The undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h).

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 USC 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

This written authorization should be submitted prior to the filing of a subsequent foreign application, in which priority is claimed to the above-identified patent application, with any intellectual property office (e.g., the EPO, JPO, KIPO, or DAS Accessing Office). However, if applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application, this written authorization should not be filed.

No fee will be charged under 37 CFR 1.19(b)(1)for providing a participating intellectual property office with an electronic copy of the above-identified application.

This form must be signed by an authorized party in accordance with 37 CFR 1.14(c).

Signature	April 17, 2013 Date
Elisabeth H. Hunt, Ph.D. Printed or Typed Name	617.646.8000 Telephone Number
Agent for Applicants Title	67,336 Registration Number, if applicable

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Filer:	Elisabeth H. Hunt/Caitlin Laracy
Attorney Docket Number:	N0484.70944US01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Late Filing Fee for Oath or Declaration	1051	1	140	140
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1740**

Electronic Acknowledgement Receipt

EFS ID:	15544500
Application Number:	13864831
International Application Number:	
Confirmation Number:	7517
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	91337
Filer:	Elisabeth H. Hunt/Caitlin Laracy
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US01
Receipt Date:	17-APR-2013
Filing Date:	
Time Stamp:	16:31:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1740
RAM confirmation Number	3642
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Transmittal of New Application	N048470944US01-TRN-EHH.PDF	59034 cb3bcaede0a2a745f8c7b159abf340b9dd10f01c	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	N048470944US01-FEE-EHH.PDF	61153 920dc53f37d7081a2a8c2a6958dbf2c866321470	no	1
Warnings:					
Information:					
3		N048470944US01-UTLAPL-EHH.PDF	3504760 455272ba554a734ef229e5fc594c11a9b1f4937b	yes	63
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	59	
	Claims		60	62	
	Abstract		63	63	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	N048470944US01-DRW-EHH.PDF	225095 d6517dcabd6a5b0ad32756f5e1591db099fe877f	no	9
Warnings:					
Information:					
5	Application Data Sheet	N048470944US01-ADS-EHH.PDF	68373 dccf421dd4de1283b70a2bf806ba10de2aa4e9e4	no	5
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
6		N048470944US01-PAMN-EHH.PDF	267236 5a1174d8684427e24c1a4116b30f64a35a5a0b29	yes	8
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Preliminary Amendment		1	1	
	Specification		2	2	

	Claims		3	7	
	Applicant Arguments/Remarks Made in an Amendment		8	8	
Warnings:					
Information:					
7	Authorization to access Appl. by Trilateral Office	N048470944US01-PRIAUT-EHH.PDF	59359 69a728d47143f50ebe887f356f140b11dfbcf50d	no	1
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Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	36817 0884b0fced9cb3f3550d07034b2e8bc2579fb802	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4281827		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/864,831	Filing Date 04/17/2013	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT

04/17/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	**0**

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/TAMMY L. ACREE/

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