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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	05/21/2013	8447610	N0484.70944US00	5017

91337 7590 05/01/2013
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 40 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;

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 1013

FORM PTO-1449/A and B (modified PTO/SB/08) **INFORMATION DISCLOSURE STATEMENT BY APPLICANT**	APPLICATION NO.: 12/853,026	ATTY. DOCKET NO.: N0484.70944US00
	FILING DATE: August 9, 2010	CONFIRMATION NO.: 5017
	APPLICANT: Darren C. Meyer et al.	
Sheet 1 of 1	GROUP ART UNIT: 2626	EXAMINER: R. Dorvil

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
		6,446,040		Socher et al.	09-03-2002
		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
		7,899,672		Qin et al.	03-01-2011
		2002/0133348	A1	Pearson et al.	09-19-2002
20040138887		~~2004/013887~~	A1	Rusnak et al.	07-15-2004
		2007/0192105	A1	Neeracher et al.	08-16-2007

Change(s) applied to document, /D.H.P./ 2/21/2012

FOREIGN PATENT DOCUMENTS

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

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 4 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.	

EXAMINER: /Michael Colucci/	DATE CONSIDERED: 12/20/2012

EXAMINER: Initial if reference considered, whether or not citation 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.

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

*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. __ , filed __ , and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

[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.]

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
Nuance Communications, Inc.
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.

Caitlin Laracy	(Depositor's name)
Caitlin Laracy	(Signature)
4/09/2013	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

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

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	no	$1,780.00	$300.00		$2,080.00	04/09/2013

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	(B) RESIDENCE: (CITY and STATE OR COUNTRY)
Nuance Communications, Inc.	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
- [X] 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)
- [ ] a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- [ ] b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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 April 9, 2013

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

Docket No.: N0484.70944US00
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer et al.
Application No.:	12/853,026
Confirmation No.:	5017
Filed:	August 9, 2010
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: 4/09/2013 Signature: Caitlin Laracy (Caitlin Laracy)

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:

The Assignee has received the Examiner's Statement of Reasons for Allowance with the Notice of Allowance mailed January 9, 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 1-6 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. Claims 4-6, for example, do not include language reciting, "identifying a first portion of a first text string of the plurality of text strings that differs 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 that does not differ 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 (i.e., Lyberg, Tarlton and 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 1-6 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. N0484.70944US00 from which the undersigned is authorized to draw.

Dated: 4/9/13

Respectfully submitted,
Nuance Communications, Inc.

By _____

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

2975087.1

Electronic Patent Application Fee Transmittal

Application Number:	12853026
Filing Date:	09-Aug-2010
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:	N0484.70944US00

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	1780	1780
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**2080**

Electronic Acknowledgement Receipt

EFS ID:	15473114
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
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:	N0484.70944US00
Receipt Date:	09-APR-2013
Filing Date:	09-AUG-2010
Time Stamp:	16:27:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2080
RAM confirmation Number	3115
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	N048470944US00-TRN-EHH.PDF	42627 e173dcca97e62a74b1ad3329822ce2a332583102	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	N048470944US00-FEE-EHH.PDF	66728 72a6fa71002231e58f53c29cb896ff4a04591235	no	1
Warnings:					
Information:					
3	Issue Fee Payment (PTO-85B)	N048470944US00-ISSFEE-EHH.PDF	77888 5f2c5ff1e89674e7f2f096ca167b15ddca94762e	no	1
Warnings:					
Information:					
4	Post Allowance Communication - Incoming	N048470944US00-CSRA-EHH.PDF	161922 97f09958d6ed0a7118eaa5e7c1a4de9e2a9c43b7	no	4
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32122 9fc08d60defbe0cd6ece57dca9f23b3c0fe5b182	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	381287	

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	

Application Number	12/853,026-Conf. #5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Art Unit	2658
Examiner Name	M. C. Colucci
Attorney Docket Number	N0484.70944US00

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	April 9, 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: April 9, 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
Under the Paperwork Reduction Act of 1995, no person are required to respond to a collection of information unless it displays a valid OMB control number

FEE TRANSMITTAL

Complete if known	
Application Number	12/853,026-Conf. #5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Examiner Name	M. C. Colucci
Art Unit	2658
Practitioner Docket No.	N0484.70944US00

☐ 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 ($) 2,080.00

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 15 - 20 or HP = _____ x _____ = _____ **Fee Paid ($)**

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

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

Indep. Claims 6 - 6 or HP = _____ x _____ = _____ **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 1,780.00

1504 Publication fee for early, voluntary, or normal ... 300.00

SUBMITTED BY					
Signature		Registration No. (Attorney/Agent)	67,336	Telephone	617.646.8000
Name (Print/Type)	Elisabeth H. Hunt, Ph.D.			Date	April 9, 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: April 9, 2013 Signature: Caitlin Laracy (Caitlin Laracy)

3065578.1

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	6

Application Number	12/853,026-Conf. #5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Art Unit	2658
Examiner Name	M. C. Colucci
Attorney Docket Number	N0484.70944US00

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)
- [x] 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):

Copy of Notice to File Corrected Application Papers

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature			
Printed name	Richard F. Giunta		
Date	February 14, 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: February 14, 2013 Signature: _____ (Jeanne W. Chub)

2995785.1

Docket No.: N0484.70944US00
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer et al.
Application No.:	12/853,026
Confirmation No.:	5017
Filed:	August 9, 2010
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: February 14, 2013 Signature: (Jeanne W. Chub)

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

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

Dear Madam:

The Notice to File Corrected Application Papers mailed February 6, 2013 (hereafter the "Notice") states that missing information must be provided on a number of pages in the specification. As discussed below, there is no missing information in the application to be provided. Thus, the undersigned contacted the telephone number listed at the bottom of the Notice, and spoke to a service representative who reviewed the cited portions of the specification, and suggested that the Assignee file a paper explaining that there is no missing information to be added. The service request number in connection with that call is 1-254055779.

The Notice indicates that there is missing information at each of pages 3, 19, 29, 46 and 48. As explained separately below, none of these pages includes missing information.

The objection to page 3 appears to relate to the file names "m.address.hundreds_.wav" and "m.address.units__.wav." As described in the specification, the characters enclosed within the quotation marks form the file name for a file. As described in the specification, the quoted file names illustrate the "form" of particular file names, wherein the underscore represents any digit. Thus, there is no missing information to be added in place of the underscores, as the quoted form of the file name is intended to represent a number of different file names, and there is no particular information to be added. Thus, there is no missing information to include.

On pages 19 and 29, it is believed that the objection relates to the very same example of the template carrier prompt, i.e., "Flight number _____was originally scheduled to depart at _____, but is now scheduled to depart at _____." As described at page 19, lines 14-20, the quoted language represents a template including a carrier prompt that includes "blanks" that are represented by the underscores. Thus, there is no information in the carrier prompt in the template where the underscore characters are present, and they are used within the quotation marks illustrating the template to denote that there are blanks in the corresponding portions of the carrier prompt. Thus, there is no information to be added. Again, the portion of page 29 that is believed to be objected to is precisely the same template carrier prompt in quotations.

Pages 46 and 48 include another example of a template carrier prompt including "blank fields." (Specification, page 46, line 8). Thus, once again, there is no missing information in the template carrier prompt, and the underscores are used to denote blank fields. Thus, there is no information to be added. The quoted portion at page 48 is identical to the last portion of the template carrier prompt quoted on page 46.

As should be appreciated from the foregoing, there is no missing information in the specification, and it is believed that no additions to the specification are required or even appropriate. Therefore, it is respectfully requested that the assertion that the application includes deficiencies be withdrawn, and that the application move to issuance. Given that no amendments are made in this response, no new matter is added to the application.

If there are any questions concerning the foregoing, please contact the undersigned at the telephone number listed below.

Dated: February 14, 2013

Respectfully submitted,

By_____

Richard F. Giunta
Registration No.: 36,149
WOLF, GREENFIELD & SACKS, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
617.646.8000

2995786.1

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 12853026
Applicant : Meyer
Filing Date : 08/09/2010
Date Mailed : 02/06/2013

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given 1 month(s) from the mail date of this Notice, or the time remaining from the Notice of Allowance and Fee(s) Due, whichever is longer, within which to respond.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED. **This period for reply is NOT extendable under 37 CFR 1.136(a).**

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee,Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Daxa Patel/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 12853026

IDENTIFICATION OF APPLICATION DEFICIENCIES

☐ Applicant must provide legible text for the following item(s).

- ☐ Specification filed , page(s) .
- ☐ Claims filed , claim(s) .
- ☐ Oath/declaration filed .
- ☐ Other: .

☒ Applicant must provide missing information on the following page(s) of the specification by amending the specification to add the missing text. No new matter may be added. Pages 3, 19, 29, 46 and 48, please provide the missing data, (please see blank line_____).

☐ The specification refers to one or more applications by attorney docket number and does not show the U.S. application number(s). Applicant must supply the U.S. application number in place of each attorney docket number.

☐ Applicant must provide an Abstract of the Disclosure.

☐ Applicant has submitted a DECLARATION (37 CFR 1.63) FOR A UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) (e.g., form PTO/SB/01A). The Application Data Sheet, however, is not present with the filed application. Applicant must submit an Application Data Sheet or file a new oath or declaration (e.g., PTO/SB/01) executed by the inventors and containing the information required in 37 CFR 1.63.

☐ Applicant must provide an executed declaration.

☐ Applicant must provide the missing page(s) of the oath/declaration or Application Data Sheet filed

☐ Applicant must provide a declaration signed by inventor(s) .

☐ The oath/declaration filed shows non-initialed and/or non-dated alterations. Applicant must file a new oath/declaration in compliance with 37 CFR 1.67(a).

☐ Applicant(s) in the latest-filed oath/declaration or Application Data Sheet (ADS) did not show the inventor's residence at all, or did not show both a city and state in the U.S. inventor's residence, or did not show both a city and country in the non-U.S. inventor's residence. Applicant must supply an oath/declaration or Application Data Sheet (ADS) that shows each U.S. inventor's city and state of residence and each non-U.S. inventor's city and country of residence.

Electronic Acknowledgement Receipt

EFS ID:	14957541
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
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:	N0484.70944US00
Receipt Date:	14-FEB-2013
Filing Date:	09-AUG-2010
Time Stamp:	11:27:39
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	N0484-70944US00-TRN-RFG.pdf	43087 25206713fefbb7bf2db0edb4be69d3577554dc77	no	1

Warnings:

Information:

2	Post Allowance Communication - Incoming	N0484-70944US00-NFCP-RFG.pdf	192669 3e8f2642bc7b106483acd1c14a42a9248755598d	no	5
Warnings:					
Information:					
			Total Files Size (in bytes):	235756	

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.

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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

91337 7590 02/06/2013
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
02/06/2013	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)

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 12853026
Applicant : Meyer
Filing Date : 08/09/2010
Date Mailed : 02/06/2013

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

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See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee,Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

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Publication Branch
Office of Data Management
(571) 272-4200

Application No. 12853026

IDENTIFICATION OF APPLICATION DEFICIENCIES

☐ Applicant must provide legible text for the following item(s).

- ☐ Specification filed , page(s) .
- ☐ Claims filed , claim(s) .
- ☐ Oath/declaration filed .
- ☐ Other: .

☒ Applicant must provide missing information on the following page(s) of the specification by amending the specification to add the missing text. No new matter may be added. Pages 3, 19, 29, 46 and 48, please provide the missing data, (please see blank line_____).

☐ The specification refers to one or more applications by attorney docket number and does not show the U.S. application number(s). Applicant must supply the U.S. application number in place of each attorney docket number.

☐ Applicant must provide an Abstract of the Disclosure.

☐ Applicant has submitted a DECLARATION (37 CFR 1.63) FOR A UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76) (e.g., form PTO/SB/01A). The Application Data Sheet, however, is not present with the filed application. Applicant must submit an Application Data Sheet or file a new oath or declaration (e.g., PTO/SB/01) executed by the inventors and containing the information required in 37 CFR 1.63.

☐ Applicant must provide an executed declaration.

☐ Applicant must provide the missing page(s) of the oath/declaration or Application Data Sheet filed

☐ Applicant must provide a declaration signed by inventor(s) .

☐ The oath/declaration filed shows non-initialed and/or non-dated alterations. Applicant must file a new oath/declaration in compliance with 37 CFR 1.67(a).

☐ Applicant(s) in the latest-filed oath/declaration or Application Data Sheet (ADS) did not show the inventor's residence at all, or did not show both a city and state in the U.S. inventor's residence, or did not show both a city and country in the non-U.S. inventor's residence. Applicant must supply an oath/declaration or Application Data Sheet (ADS) that shows each U.S. inventor's city and state of residence and each non-U.S. inventor's city and country of residence.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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NOTICE OF ALLOWANCE AND FEE(S) DUE

91337 7590 01/09/2013
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: 01/09/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

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

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1770	$300	$0	$2070	04/09/2013

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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.

PTOL-85 (Rev. 02/11)

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 7590 01/09/2013
Nuance Communications, Inc.
c/o Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 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.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

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

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1770	$300	$0	$2070	04/09/2013

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)
❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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.

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

91337 7590 01/09/2013
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: 01/09/2013

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 137 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 137 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.

Notice of Allowability	Application No.	Applicant(s)	
	12/853,026	MEYER ET AL.	
	Examiner	Art Unit	
	MICHAEL COLUCCI	2658	

-- 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 *10/25/2012*.

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 *1-6,8,10 and 12-18*. 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).
   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

Allowable Subject Matter

1. Claims 1-6, 8, 10, and 12-18 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 that differs 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 that does not differ 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 1-6 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 1-6 the most relevant topics pertained to material from the same Inventor and Assignee but did not teach or suggest the aforementioned limitation of claims 1-6 .Further, all claims dependent on claims 1-6 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. 12/853,026	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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L11	6	10 and 9	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 11:16
L10	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
L9	14	(contrastive with stress) and 4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:44
L8	3	(contrastive with stress) and (text$1to$1speech) and 4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:44
L7	10	(contrastive with stress) and (speech with synthesi$6) and 4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:35
L6	5	3 and 4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:22
L5	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:22
L4	20508719	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:19
L3	7	2 and (speech with synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:19
L2	7	contrastive with stress with (text string$2 word$2 syllable$2)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:19
L1	2	contrastive with stress with synthesi$6	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/12/18 10:18
S45	2	S43 and S44	US-PGPUB; USPAT; EPO; JPO	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
S43	903	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2012/07/18 10:26
S42	6	S35 and (mark$4 with (intonat$7 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

S40	6	S35 and (mark$4 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 18:08
S39	2	S35 and (prominen$6 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:50
S38	0	S35 and (prominen$6 near5 stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:49
S37	7	S35 and ((mark$4 annotat$6) same stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:42
S36	3	S35 and ((mark$4 annotat$6) near7 stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:42
S35	11	S34 and (speech near2 synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:11
S34	16	contrastive$3 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
S32	3303	contrast$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:03
S31	14	S29 and S30	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
S29	16	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:11
S27	19389	("704").CLAS.	USPAT; USOCR	OR	OFF	2012/07/09 14:06
S26	14	S22 and S24	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:04
S24	20422792	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:03
S23	2139	@ad<="02122010"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:02
S22	16	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:02

12/18/2012 11:17:47 AM
C:\East\Workspaces\12853026.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12853026	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2658

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
704	260	G	1	0	L	13 / 08 (2006.01.01)					

CROSS REFERENCE(S)

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

☐ 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	1	11	17												
5	2	12	18												
9	3														
13	4														
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3	13														
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7	15														
8	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 15	
/MICHAEL COLUCCI/ Primary Examiner.Art Unit 2658 (Primary Examiner)	12/18/2012 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 4

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12853026	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2626

SEARCHED

Class	Subclass	Date	Examiner
704	260	2/18/2012	MC
704	260	7/18/2012	MC
704	271,260,258,234,209	12/18/2012	MC
434	236,178	12/18/2012	MC

SEARCH NOTES

Search Notes	Date	Examiner
performed an assignee level ODP search, not warranted, closest case does not involve actual recordings in the claim language. It is not obvious to substitute actual recordings from a database with on the fly synthesized speech	2/18/2012	MC
checked for 101 issues, OK, computer system, memory, processor, non-transitory	2/18/2012	MC
searched 704/260 with keyord limitations	2/18/2012	MC
searched Microsoft npl	7/18/2012	MC
searched Apple npl	7/18/2012	MC
searched Motorola npl	7/18/2012	MC
searched Nokia npl	7/18/2012	MC
searched 704/260 with keyword limitations	7/18/2012	MC
searched Nuance	12/18/2012	MC
searched assignee level ODP, not justified	12/18/2012	MC
searched Dragon, IBM npl	12/18/2012	MC
searched Google scholar	12/18/2012	MC
searched IEEE	12/18/2012	MC
searched ACM	12/18/2012	MC
searched ASE	12/18/2012	MC
checked for 101, ok, structural limitations expicit, and non-transitory	12/18/2012	MC
searched EPO, JPO, and Derwent	12/18/2012	MC

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
704	271,260,258,234,209	12/18/2012	MC
434	236,178	12/18/2012	MC

FORM PTO-1449/A and B (modified PTO/SB/08) **INFORMATION DISCLOSURE STATEMENT BY APPLICANT**	APPLICATION NO.: 12/853,026	ATTY. DOCKET NO.: N0484.70944US00
	FILING DATE: August 9, 2010	CONFIRMATION NO.: 5017
	APPLICANT: Darren C. Meyer et al.	
Sheet 1 of 1	GROUP ART UNIT: 2626	EXAMINER: R. Dorvil

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
		6,446,040		Socher et al.	09-03-2002
		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
		7,899,672		Qin et al.	03-01-2011
		2002/0133348	A1	Pearson et al.	09-19-2002
		2004/013887	A1	Rusnak et al.	07-15-2004
		2007/0192105	A1	Neeracher et al.	08-16-2007

FOREIGN PATENT DOCUMENTS

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

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 4 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.	

EXAMINER: /Michael Colucci/	DATE CONSIDERED: 12/20/2012

EXAMINER: Initial if reference considered, whether or not citation 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.

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

*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. __ , filed __ , and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

[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.]

Docket No.: N0484.70944US00
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer et al.
Application No.:	12/853,026
Confirmation No.:	5017
Filed:	August 9, 2010
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	M. C. Colucci
Art Unit:	2626

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: 10/25/12 Signature: Judy Daley)

AMENDMENT IN RESPONSE TO NON-FINAL OFFICE ACTION

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

Dear Madam:

INTRODUCTORY COMMENTS

In response to the Office Action dated July 25, 2012, please amend the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

2799106.1

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. (Currently amended) A method for use with a speech-enabled application, the method comprising:

receiving, [[input]] 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 that differs 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 that does not differ 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 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~~ the first portion of ~~at least one~~ the first text string ~~of the plurality of text strings~~ as speech carrying contrastive stress, to contrast with ~~at least one~~ the rendering of ~~at least one other~~ the second text string; ~~of the plurality of text strings;~~ and

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

2. (Currently amended) 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, configured to execute the instructions to:

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

identify a first portion of a first text string of the plurality of text strings that differs 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 that does not differ from a corresponding second portion of the second text string;

assign contrastive stress to the identified first portion of the first text string, but not to the identified second portion of the first text string;

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~~ the first portion of ~~at least one~~ the first text string ~~of the plurality of text strings~~ as speech carrying contrastive stress, to contrast with ~~at least one~~ the rendering of ~~at least one other~~ the second text string; ~~of the plurality of text strings;~~ and

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

3. (Currently amended) 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, input comprising a plurality of text strings;

identifying a first portion of a first text string of the plurality of text strings that differs 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 that does not differ 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 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~~ the first portion of ~~at least one~~ the first text string ~~of the plurality of text strings~~ as speech carrying contrastive stress, to contrast with ~~at least one~~ the rendering of ~~at least one other~~ the second text string; ~~of the plurality of text strings;~~ and

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

4. (Currently amended) 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, wherein a first portion of a first text string of the plurality of text strings differs 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 does not differ from a corresponding second portion of the second text string;

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~~ the first portion of ~~at least one of the plurality of text strings~~ the first text string as speech carrying contrastive stress, to contrast with ~~at least one~~ the rendering of ~~at least one other of the plurality of text strings~~ the second text string, and at least one other of the plurality of audio recordings being selected to render the second portion of the first text string as speech not carrying contrastive stress; and

generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

5. (Currently amended) 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, configured to execute 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, wherein a first portion of a first text string of the plurality of text strings differs 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 does not differ from a corresponding second portion of the second text string;

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~~ the first portion of ~~at least one of the plurality of text strings~~ the first text string as speech carrying contrastive stress, to contrast with ~~at least one~~ the rendering of ~~at least one other of the plurality of text strings~~ the second text string, and at least one other of the plurality of audio recordings being selected to render the second portion of the first text string as speech not carrying contrastive stress; and

generate, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

6. (Currently amended) 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, wherein a first portion of a first text string of the plurality of text strings differs 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 does not differ from a corresponding second portion of the second text string;

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~~ the first portion of ~~at least one of the plurality of text strings~~ the first text string as speech carrying contrastive stress, to contrast with ~~at least one~~ the rendering of ~~at least one other of the plurality of text strings~~ the second text string, and at least one other of the plurality of audio recordings being selected to render the second portion of the first text string as speech not carrying contrastive stress; and

generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output.

7. (Canceled)

8. (Currently amended) The method of claim [[7]] 1, wherein the identifying comprises identifying the ~~at least one~~ first portion of the ~~at least one~~ first text string that differs from the corresponding ~~at least one~~ first portion of the ~~at least one other~~ second text string based at least in part on a normalized orthography of the ~~plurality of~~ first and second text strings.

9. (Canceled)

10. (Currently amended) The apparatus of claim [[9]] 2, wherein the at least one processor is configured to execute the instructions to identify the ~~at least one~~ first portion of the ~~at least one~~ first text string that differs from the corresponding ~~at least one~~ first portion of the ~~at least one other~~ second text string based at least in part on a normalized orthography of the ~~plurality of~~ first and second text strings.

11. (Canceled)

12. (Currently amended) The at least one non-transitory computer-readable storage medium of claim [[11]] 3, wherein the identifying comprises identifying the ~~at least one~~ first portion of the ~~at least one~~ first text string that differs from the corresponding ~~at least one~~ first portion of the ~~at least one other~~ second text string based at least in part on a normalized orthography of the ~~plurality of~~ first and second text strings.

13. (New) The method of claim 1, wherein the first and second text strings represent different numerical fields within a larger text string.

14. (New) The method of claim 1, 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.

15. (New) The apparatus of claim 2, wherein the first and second text strings represent different numerical fields within a larger text string.

16. (New) The apparatus of claim 2, wherein the at least one processor is configured to execute the instructions to receive 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.

17. (New) The at least one non-transitory computer-readable storage medium of claim 3, wherein the first and second text strings represent different numerical fields within a larger text string.

18. (New) The at least one non-transitory computer-readable storage medium of claim 3, 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.

REMARKS

In response to the Office Action dated July 25, 2012, the Assignee of the present application (Nuance Communications, Inc.) respectfully requests reconsideration. Claims 1-12 were previously pending in this application. By this amendment, claims 7, 9, and 11 are canceled without prejudice or disclaimer. Claims 1-6, 8, 10 and 12 have been amended herein. Claims 13-18 have been added. No claims have been canceled. As a result, claims 1-6, 8, 10 and 12-18 are currently pending for examination, with claims 1-6 being independent. No new matter has been added.

Support for newly added claims 13, 15 and 17 can be found in the specification at least at page 35, line 10 – page 36, line 3. Support for new claims 14, 16 and 18 can be found at least at page 52, lines 3-17.

Rejections Under 35 U.S.C. § 103

The Office Action rejects claims 1-12 under 35 U.S.C. § 103(a) as purportedly being obvious over Case et al. (U.S. Patent Application Publication No. 2002/0072908) in view of Nitisaroj et al. (U.S. Patent Application Publication No. 2009/0048843). The Assignee respectfully traverses each of these rejections.

I. Discussion of Some Embodiments

Some embodiments described in the present application relate to synthesizing speech with contrastive stress. (Page 1: lines 12-14.) In some embodiments, a speech-enabled application such as an interactive voice response (IVR) application may deliver information or otherwise interact with a user by outputting prompts rendered as audio speech. (Page 1: lines 17-32.) In one specific example described in the specification, an airline speech-enabled application may output a prompt stating, "Flight number 1345 was originally scheduled to depart at 10:45 a.m., but is now scheduled to depart at 11:45 a.m.," in synthesized speech. (Page 28: lines 5-9.)

In some embodiments, a speech-enabled application may be programmed to synthesize a prompt such as the example given above, using contrastive stress to focus the user's attention on the difference(s) between alternative words or fields within the prompt that are particularly important because of their difference(s). (Page 11, line 26 – page 12, line 2; page 12, lines 28-30.) For instance, for the example above, the speech-enabled application may be programmed to use contrastive stress to render the output prompt as, "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.," with contrastive stress on the "eleven" to draw attention to the difference between 11:45 a.m. and 10:45 a.m. (Page 33: lines 26-28.) As illustrated in this example, in some embodiments the contrastive stress may be applied in a particular way; given two fields of the output prompt that should contrast with each other, the portion(s) of the text fields that differ from each other and the portion(s) that do not differ may be identified. Between "10:45 a.m." and "11:45 a.m.," the "ten" and the "eleven" are portions that differ, but the "forty-five a.m." portions do not differ. In some embodiments, contrastive stress may be assigned to a portion that differs between the two fields, but not to a portion that does not differ. Thus, for example, the "eleven" may be rendered with contrastive stress in "**eleven** forty-five a.m.," but not the "forty-five a.m.," which does not differ between the two fields. (Page 33: lines 14-24.)

The foregoing discussion is provided to assist the Examiner in appreciating some applications for various inventive aspects of the present disclosure. However, this discussion may not apply to each of the independent claims, and the language of the independent claims may differ in material respects from the discussion provided above. Thus, the Assignee respectfully requests that careful consideration be given to the language of each of the independent claims and that each be addressed on its own merits, without relying on the discussion provided above. In this respect, the Assignee does not rely on the discussion provided above to distinguish any of the claims over the cited art. Rather, the Assignee relies only upon the language of the claims themselves and the arguments related specifically thereto.

II. Discussion of Case

Case relates to converting text-to-voice by concatenating human voice recordings. (Case: ¶¶ 3, 5.) As the Office Action (page 3) acknowledges, Case does not relate to contrastive stress and makes no mention of applying contrastive stress in synthesizing speech.

III. Discussion of Nitisaroj

Nitisaroj relates to annotating text to specify how it is to be pronounced as synthesized speech. (Nitisaroj: Abstract.) "Operative words" are annotated to be given prominence, and contrastive pronouns are designated as operative words. (Nitisaroj: ¶¶59, 86.) In explaining what the term "contrastive" means, Nitisaroj discusses an example sentence that a human might say: "Tom wants to go there, but Jack doesn't," in which "Tom" and "Jack" are contrastive items. (Nitisaroj: ¶ 76.) However, Nitisaroj's text annotation system only marks *pronouns* as contrastive, and there is no description of any capability of the system to apply contrastive stress to proper nouns like "Tom" and "Jack." (Nitisaroj: FIG. 3; ¶¶ 79, 86.)

IV. Independent Claims 1-3 Patentably Distinguish over Any Combination of the Cited Art.

Each of independent claims 1-3 recites, *inter alia*, "identify[ing] a first portion of a first text string… that differs from a corresponding first portion of a second text string…, and a second portion of the first text string that does not differ from a corresponding second portion of the second text string;" and "assign[ing] contrastive stress to the identified first portion of the first text string, but not to the identified second portion of the first text string." These independent claims thus recite assigning contrastive stress to the portion of a text string that *differs* from another text string, but not to the portion of the text string that ***does not** differ* from the other text string. Neither Case nor Nitisaroj discloses or suggests at least these limitations of independent claims 1-3.

The Office Action (page 3) concedes that Case fails to teach rendering any portion of any of the text strings as speech carrying contrastive stress, and thus Case necessarily also fails to disclose or suggest assigning contrastive stress to one portion of a text string and not to another portion.

In the rejection of previously presented claims 7, 9 and 11, the Office Action (page 7) asserts that Nitisaroj applies stress to "Tom" and "Jack" in the sentence, "Tom wants to go there, but Jack doesn't." In making this citation, the Office Action appears to be asserting that "Tom" and "Jack" are text string portions that differ from each other and that are assigned contrastive stress. However, this does not meet the above-quoted limitations of independent claims 1-3, which recite identifying corresponding portions of two text strings that differ from each other, and corresponding portions of the two text strings that do not differ from each other, and assigning contrastive stress to the portions that differ and not to the portions that do not differ.

In the sentence, "Tom wants to go there, but Jack doesn't," every word differs from every other word. Nitisaroj's system does not do any analysis of two text strings to identify corresponding portions of the text strings that differ and corresponding portions that do not differ. If "Tom" and "Jack" are identified as contrastive, it is not because "Tom" and "Jack" differ from each other while other text string portions do not differ; rather, everything in the sentence differs from everything else, and there can be no analysis to identify what differs and what doesn't. In fact, the Office Action fails to cite any description in Nitisaroj of identifying text string portions that differ from each other and text string portions that ***do not*** differ from each other. Moreover, Nitisaroj does not describe identifying *corresponding* portions of *two text strings* that differ or don't differ from each other.

Furthermore, the sentence, "Tom wants to go there, but Jack doesn't," is not actually a sentence that Nitisaroj's system would annotate with contrastive stress. As discussed above, Nitisaroj only provides this sentence as an example of something a *human* might say with contrastive items. (Nitisaroj: ¶ 76.) In fact, the rules by which Nitisaroj's text annotation system mark contrastive items only apply to stressed pronouns, and do not accommodate marking proper nouns like "Tom" and "Jack" as contrastive. (Nitisaroj: FIG. 3; ¶¶ 79, 86.) The Office Action's assertion that Nitisaroj discloses assigning contrastive stress to be rendered in speech synthesis output for the "Tom" and "Jack" example is thus incorrect. Even if it were correct, however, as discussed above, it would not meet the limitations of independent claims 1-3.

Thus, neither Case nor Nitisaroj discloses or suggests at least the above-discussed limitations of independent claims1-3. For at least these reasons, each of claims 1-3 patentably distinguishes over any combination of the cited art, and withdrawal of the rejections of these claims is respectfully requested.

Each of claims 8, 10 and 12 depends from an independent claim discussed above, and is allowable for at least the same reasons. Accordingly, withdrawal of the rejections of these claims is respectfully requested.

V. Independent Claims 4-6 Patentably Distinguish over Any Combination of the Cited Art.

Each of independent claims 4-6 recites, *inter alia*, "a first portion of a first text string… differs from a corresponding first portion of a second text string…, and a second portion of the first text string does not differ from a corresponding second portion of the second text string," and "at least one of the plurality of audio recordings [is] selected to render the first portion of the first text string as speech carrying contrastive stress,… and at least one other of the plurality of audio recordings [is] selected to render the second portion of the first text string as speech not carrying contrastive stress."

As should be clear from the foregoing discussion of Case and Nitisaroj, these references, whether alone or in combination, fail to disclose or suggest at least the above-quoted limitations of independent claims 4-6. Therefore, each of claims 4-6 patentably distinguishes over any combination of the cited art, and withdrawal of the rejections of these claims is respectfully requested.

New Claims 13-18

Each of newly added claims 13-18 depends from an independent claim discussed above, and is allowable based at least on its dependency. Accordingly, allowance of these claims is respectfully requested.

General Comments on Dependent Claims

Because each of the dependent claims depends from a base claim that is believed to be in condition for allowance, the Assignee believes that it is unnecessary at this time to argue the further distinguishing features of all of the dependent claims. However, the Assignee does not necessarily concur with the interpretation of the dependent claims as set forth in the Office Action, nor does the Assignee concur that the basis for the rejection of any of the dependent claims is proper. Therefore, the Assignee reserves the right to specifically address in the future the further patentability of the dependent claims not specifically addressed herein.

CONCLUSION

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. N0484.70944US00, from which the undersigned is authorized to draw.

Dated: October 25, 2012

Respectfully submitted,
Nuance Communications, Inc.

By: _____

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Electronic Acknowledgement Receipt

EFS ID:	14079717
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
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/Judy Daley
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US00
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	N048470944US00-TRN-EHH.pdf	109995 704369165c986b24dcd6f6e0fafb99c7c4753b3c	no	1

Warnings:

Information:

2		N048470944US00-AMN-EHH.pdf	1138376 bb08a9d6bde94c4acd3e37029813cdc67ed52591	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	14

Warnings:

Information:

Total Files Size (in bytes):	1248371

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)

Application Number	12/853,026-Conf. #5017
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First Named Inventor	Darren C. Meyer
Art Unit	2626
Examiner Name	M. C. Colucci
Total Number of Pages in This Submission	
Attorney Docket Number	N0484.70944US00

ENCLOSURES (*Check all that apply*)

- [ ] 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
- [ ] 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
- [ ] Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature	Elisabeth Hunt		
Printed name	Elisabeth H. Hunt		
Date	10/25/12	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: 10/25/12 Signature: Judy Daley)

2799105.1

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	
12/853,026	08/09/2010	☐ To be Mailed

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 10/25/2012	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $ =		OR	X $62=	0
Independent (37 CFR 1.16(h))	* 6	Minus	***6	= 0	X $ =		OR	X $250=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ 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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/YOLANDA CHADWICK/

This collection of information is required by 37 CFR 1.16. 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, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

91337 7590 07/25/2012
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
2626	

NOTIFICATION DATE	DELIVERY MODE
07/25/2012	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)	
	12/853,026	MEYER ET AL.	
	Examiner	Art Unit	
	MICHAEL COLUCCI	2626	

-- 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 *23 May 2012*.

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) *1-12* 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) *1-12* 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 _____ 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

Response to Arguments

1. Applicant's arguments, see Remarks, filed 05/23/2012 as consistent with Interview from 05/21/2012, with respect to the rejection(s) of claim(s) 1-6 under 35 USC 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of NITISAROJ et al. US 20090048843 A1 (hereinafter NITISAROJ). Examiner has incorporated NITISAROJ to utilize contrastive stress as a type of stress to identify in Case, wherein identifying contrasting terms in a sentence allows for suitable intonation applied to contrastive terms for increased stress while ignoring the surrounding terms. Case is the closest reference found thus far, however other references are pertinent and are listed in the conclusion section of this office action. See rejection below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Case et al. US 20020072908 A1 (hereinafter Case) in view of NITISAROJ et al. US 20090048843 A1 (hereinafter NITISAROJ).

Re claims 1-3, Case teaches a method for use with a speech-enabled application (0005 well known IVR and speech applications), the method comprising:

receiving input from the speech-enabled application comprising a plurality of text strings (Fig. 1 element 14 text input);

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,

providing the speech synthesis output for the speech-enabled application (0099-0100 parse, assign inflection value, concatenate, synthesize text to speech).

However Case fails to teach at least one text string 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;

NITISAROJ teaches increases in stress for intonation for constrictive stress in sentences when a contrasting term is identified, such that contrastive items can be found in sentences or elements of a sentence which are in a relationship of syntactic contrast to one another, for example "Tom" and "Jack" are contrastive items in the sentence "Tom wants to go there, but Jack doesn't". In common human speech contrastive items often receive intonation prominence, wherein markers of contrast are

not given any type of intonation changes (e.g. "but", "however", "on the other hand"), but contrastive items will (e.g. **"Tom" (stress)** wants to go there, *but(marker)* **"Jack" (stress)** doesn't (NITISAROJ 0076, 0079 with 0059 and Fig. 3-4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Case to incorporate at least one text string 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 as taught by NITISAROJ to allow for the identification of specific types of stress in Case, such as contrastive stress, wherein contrast markers (e.g. "but", "however", "on the other hand") can identify contrast sentences and given intonation, inflection, pitch, etc changes to contrasting items while not effecting surrounding words including the marker term that identifies a contrasting sentence.

Re claim 4-6, Case teaches a method for generating speech output via a speech-enabled application (0005 well known IVR and speech applications), 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 (Fig. 1 element 14 text input and element 12 with 18 prior to synthesis, such as output in Fig. 23-25 with modified 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 (Well-known Fig. 1 element 14 text input against digital voice library 12 using voice recordings to output inflections for each word in a sentence at Fig. 23-25 at 0099-0100 parse, assign inflection value, concatenate, synthesize text to speech),

generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output (0099-0100 parse, assign inflection value, concatenate, synthesize text to speech).

However, Case fails to teach inputting the plurality of text strings to at least one software module for rendering contrastive stress;

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

NITISAROJ teaches increases in stress for intonation for constrictive stress in sentences when a contrasting term is identified, such that contrastive items can be found in sentences or elements of a sentence which are in a relationship of syntactic contrast to one another, for example "Tom" and "Jack" are contrastive items in the sentence "Tom wants to go there, but Jack doesn't". In common human speech contrastive items often receive intonation prominence, wherein markers of contrast are not given any type of intonation changes (e.g. "but", "however", "on the other hand"), but

contrastive items will (e.g. **"Tom" (stress)** wants to go there, *but(marker)* **"Jack" (stress)** doesn't (NITISAROJ 0076, 0079 with 0059 and Fig. 3-4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Case to incorporate inputting the plurality of text strings to at least one software module for rendering contrastive stress and 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 as taught by NITISAROJ to allow for the identification of specific types of stress in Case, such as contrastive stress, wherein contrast markers (e.g. "but", "however", "on the other hand") can identify contrast sentences and given intonation, inflection, pitch, etc changes to contrasting items while not effecting surrounding words including the marker term that identifies a contrasting sentence.

Re claims 7, 9, and 11, Case fails to teach the method of claim 1, wherein the generating comprises:

identifying at least one first portion of the at least one text string that differs from a corresponding at least one first portion of the at least one other text string, and at least one second portion of the at least one text string that does not differ from a corresponding at least one second portion of the at least one other text string; and

assigning contrastive stress to be rendered in at least one first portion of the speech synthesis output corresponding to the identified at least one first portion of the at least one text string, but not to be rendered in at least one second portion of the speech synthesis output corresponding to the identified at least one second portion of the at least one text string.

NITISAROJ teaches increases in stress for intonation for constrictive stress in sentences when a contrasting term is identified, such that contrastive items can be found in sentences or elements of a sentence which are in a relationship of syntactic contrast to one another, for example "Tom" and "Jack" are contrastive items in the sentence "Tom wants to go there, but Jack doesn't". In common human speech contrastive items often receive intonation prominence, wherein markers of contrast are not given any type of intonation changes (e.g. "but", "however", "on the other hand"), but contrastive items will (e.g. **"Tom" (stress)** wants to go there, *but(marker)* **"Jack" (stress)** doesn't (NITISAROJ 0076, 0079 with 0059 and Fig. 3-4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Case to incorporate identifying at least one first portion of the at least one text string that differs from a corresponding at least one first portion of the at least one other text string, and at least one second portion of the at least one text string that does not differ from a corresponding at least one second portion of the at least one other text string; and

assigning contrastive stress to be rendered in at least one first portion of the speech synthesis output corresponding to the identified at least one first portion of the at

least one text string, but not to be rendered in at least one second portion of the speech synthesis output corresponding to the identified at least one second portion of the at least one text string as taught by NITISAROJ to allow for the identification of specific types of stress in Case, such as contrastive stress, wherein contrast markers (e.g. "but", "however", "on the other hand") can identify contrast sentences and given intonation, inflection, pitch, etc changes to contrasting items while not effecting surrounding words including the marker term that identifies a contrasting sentence.

Re claims 8, 10, and 12, Case fails to teach the method of claim 7, wherein the identifying comprises identifying the at least one first portion of the at least one text string that differs from the corresponding at least one first portion of the at least one other text string based at least in part on a normalized orthography of the plurality of text strings.

NITISAROJ teaches increases in stress for intonation for constrictive stress in sentences when a contrasting term is identified, such that contrastive items can be found in sentences or elements of a sentence which are in a relationship of syntactic contrast to one another, for example "Tom" and "Jack" are contrastive items in the sentence "Tom wants to go there, but Jack doesn't". In common human speech contrastive items often receive intonation prominence, wherein markers of contrast are not given any type of intonation changes (e.g. "but", "however", "on the other hand"), but

contrastive items will (e.g. **"Tom" (stress)** wants to go there, *but(marker)* **"Jack" (stress)** doesn't (NITISAROJ 0076, 0079 with 0059 and Fig. 3-4).

Further NITISAROJ explicitly teaches normalized text as input and further normalization by marking and modifying pitch (NITISAROJ 0080 with Fig. 1 & 0049).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Case to incorporate identifying the at least one first portion of the at least one text string that differs from the corresponding at least one first portion of the at least one other text string based at least in part on a normalized orthography of the plurality of text strings as taught by NITISAROJ to allow for the identification of specific types of stress in Case, such as contrastive stress, wherein contrast markers (e.g. "but", "however", "on the other hand") can identify contrast sentences and given intonation, inflection, pitch, etc changes to contrasting items while not effecting surrounding words including the marker term that identifies a contrasting sentence, wherein normalized text is input and further normalized to a particular speaker to correspond to his/her pitch range when synthesizing response speech (NITISAROJ 0080 with Fig. 1 & 0049).

Conclusion

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

US 20040030555 A1

US 6665641 B1

US 6389396 B1

US 20040049391 A1

US 20050027523 A1

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 2626

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

Notice of References Cited	Application/Control No. 12/853,026	Applicant(s)/Patent Under Reexamination MEYER ET AL.	
	Examiner MICHAEL COLUCCI	Art Unit 2626	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-6,665,641 B1	12-2003	Coorman et al.	704/260
*	C	US-2004/0030555 A1	02-2004	van Santen, Jan P.H.	704/260
*	D	US-2004/0049391 A1	03-2004	Polanyi et al.	704/271
*	E	US-2005/0027523 A1	02-2005	Tarlton et al.	704/234
*	F	US-2009/0048843 A1	02-2009	NITISAROJ et al.	704/260
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12853026	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2626

✓	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	02/18/2012	07/18/2012							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7		✓							
	8		✓							
	9		✓							
	10		✓							
	11		✓							
	12		✓							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	2	4 and L5	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/18 10:26
L5	16	contrastive$3 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/18 10:26
L4	903	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2012/07/18 10:26
S42	6	S35 and (mark$4 with (intonat$7 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
S40	6	S35 and (mark$4 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 18:08
S39	2	S35 and (prominen$6 same stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:50
S38	0	S35 and (prominen$6 near5 stress)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:49
S37	7	S35 and ((mark$4 annotat$6) same stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:42
S36	3	S35 and ((mark$4 annotat$6) near7 stress$3)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:42
S35	11	S34 and (speech near2 synthesi$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:11
S34	16	contrastive$3 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
S32	3303	contrast$5 near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 17:03
S31	14	S29 and S30	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
S29	16	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:11
S27	19389	("704").CLAS.	USPAT; USOCR	OR	OFF	2012/07/09 14:06
S26	14	S22 and S24	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:04
S24	20422792	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:03
S23	2139	@ad<="02122010"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:02
S22	16	contrastive near7 stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/07/09 14:02

7/ 18/ 2012 10:27:03 AM
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12853026	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2626

SEARCHED

Class	Subclass	Date	Examiner
704	260	2/18/2012	MC
704	260	7/18/2012	MC

SEARCH NOTES

Search Notes	Date	Examiner
performed an assignee level ODP search, not warranted, closest case does not involve actual recordings in the claim language. It is not obvious to substitute actual recordings from a database with on the fly synthesized speech	2/18/2012	MC
checked for 101 issues, OK, computer system, memory, processor, non-transitory	2/18/2012	MC
searched 704/260 with keyord limitations	2/18/2012	MC
searched Microsoft npl	7/18/2012	MC
searched Apple npl	7/18/2012	MC
searched Motorola npl	7/18/2012	MC
searched Nokia npl	7/18/2012	MC
searched 704/260 with keyword limitations	7/18/2012	MC

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Docket No.: N0484.70944US00
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer et al.
Application No.:	12/853,026
Confirmation No.:	5017
Filed:	August 9, 2010
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	M. C. Colucci
Art Unit:	2626

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: 5/23/12 Signature: Judy Daley)

AMENDMENT IN 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:

INTRODUCTORY COMMENTS

In response to the Office Action mailed February 23, 2012, please amend the above-identified patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 7 of this paper.

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. (Currently amended) 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 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 string of the plurality of text strings; and

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

2. (Currently amended) 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~~ configured to execute 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 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 string of the plurality of text strings; and

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

3. (Currently amended) 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 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 string of the plurality of text strings; and

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

4. (Original) 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. (Currently amended) 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~~ configured to execute 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. (Original) 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.

7. (New) The method of claim 1, wherein the generating comprises:

identifying at least one first portion of the at least one text string that differs from a corresponding at least one first portion of the at least one other text string, and at least one second portion of the at least one text string that does not differ from a corresponding at least one second portion of the at least one other text string; and

assigning contrastive stress to be rendered in at least one first portion of the speech synthesis output corresponding to the identified at least one first portion of the at least one text string, but not to be rendered in at least one second portion of the speech synthesis output corresponding to the identified at least one second portion of the at least one text string.

8. (New) The method of claim 7, wherein the identifying comprises identifying the at least one first portion of the at least one text string that differs from the corresponding at least one first portion of the at least one other text string based at least in part on a normalized orthography of the plurality of text strings.

9. (New) The apparatus of claim 2, wherein the at least one processor is configured to execute the instructions to generate the speech synthesis output at least in part by:

identifying at least one first portion of the at least one text string that differs from a corresponding at least one first portion of the at least one other text string, and at least one second portion of the at least one text string that does not differ from a corresponding at least one second portion of the at least one other text string; and

assigning contrastive stress to be rendered in at least one first portion of the speech synthesis output corresponding to the identified at least one first portion of the at least one text string, but not to be rendered in at least one second portion of the speech synthesis output corresponding to the identified at least one second portion of the at least one text string.

10. (New) The apparatus of claim 9, wherein the at least one processor is configured to execute the instructions to identify the at least one first portion of the at least one text string that differs from the corresponding at least one first portion of the at least one other text string based at least in part on a normalized orthography of the plurality of text strings.

11. (New) The at least one non-transitory computer-readable storage medium of claim 3, wherein the generating comprises:

identifying at least one first portion of the at least one text string that differs from a corresponding at least one first portion of the at least one other text string, and at least one second portion of the at least one text string that does not differ from a corresponding at least one second portion of the at least one other text string; and

assigning contrastive stress to be rendered in at least one first portion of the speech synthesis output corresponding to the identified at least one first portion of the at least one text string, but not to be rendered in at least one second portion of the speech synthesis output corresponding to the identified at least one second portion of the at least one text string.

12. (New) The at least one non-transitory computer-readable storage medium of claim 11, wherein the identifying comprises identifying the at least one first portion of the at least one text string that differs from the corresponding at least one first portion of the at least one other text string based at least in part on a normalized orthography of the plurality of text strings.

REMARKS

In response to the Office Action mailed February 23, 2012, the Assignee of the present application (Nuance Communications, Inc.) respectfully requests reconsideration. Claims 1-6 were previously pending in this application. Claims 1-3 and 5 have been amended herein. Claims 7-12 have been added. No claims have been canceled. As a result, claims 1-12 are currently pending for examination, with claims 1-6 being independent. No new matter has been added.

Interview Summary

The Assignee's representatives, Elisabeth H. Hunt and Richard F. Giunta, thank Examiner Colucci for the courtesies extended in granting and conducting a telephone interview on May 15, 2012. A full summary of the substance of the telephone interview is provided below. If the Examiner disagrees with anything in this interview summary, he is invited to contact the undersigned to discuss how the record may be clarified.

During the telephone interview, the Assignee's representatives discussed with the Examiner the meaning of the term "contrastive stress," as recited in each of the independent claims of the present application. "Contrastive stress" is a term of art, whose meaning is explained in detail in the specification, e.g., at pages 11-12. An example of a sentence with contrastive stress is illustrated in FIG. 3A and is described in detail in the specification at pages 28-44: "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." (see page 33, lines 26-28). In this example, the "eleven" contrasts with the "ten" and is spoken with contrastive stress to call attention to the difference between 10:45 and 11:45.

The Examiner questioned whether the term "contrastive stress" could be read on any form of stress that differs between one word and any other word. The Assignee's representatives pointed out that such an interpretation would not be consistent with how the term "contrastive stress" is generally understood in the art. Contrastive stress is a particular type of stress, and not every type of stress is contrastive stress.

The Case reference, for example, makes no mention of contrastive stress. Case's system merely converts text to voice with inflection and emphasis, but describes no capability for generating contrastive stress. The example sentence processed in Case is, "A woman in her early twenties sits alone in a small, windowless room at the University of Hope's LifeFeelings Research Institute in Argentina." Case: FIG. 23; ¶ 109. In this example, the word "Hope's" is determined to be the most important and therefore is given the highest inflection/pitch value. The Assignee's representatives explained during the telephone interview that although this may be a type of stress, it is not contrastive stress, and the Examiner agreed.

During the interview, the Examiner further agreed that the rejections under 35 U.S.C. § 102 over Case would be withdrawn, because the type of inflection disclosed in Case is not contrastive stress, and Case does not disclose all limitations of any of the claims for at least this reason.

To ensure a complete written record, each of the rejections is addressed further below.

Rejections Under 35 U.S.C. § 102

The Office Action rejects claims 1-6 under 35 U.S.C. § 102(b) as purportedly being anticipated by Case et al. (U.S. Patent Application Publication No. 2002/0072908). The Assignee respectfully traverses each of these rejections.

Each of independent claims 1-3 recites, *inter alia*, "generat[ing]… speech synthesis output identifying a plurality of audio recordings…, 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 string of the plurality of text strings" (emphasis added). Each of independent claims 4-6 recites, *inter alia*, "receiv[ing]… output identifying a plurality of audio recordings…, 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" (emphasis added).

As discussed above and as the Examiner agreed during the telephone interview, Case does not describe rendering any text as speech carrying **contrastive stress**, and does not meet the limitations of any of the independent claims for at least this reason. Accordingly, withdrawal of the rejections of claims 1-6 is respectfully requested.

New Claims 7-12

Each of newly added claims 7-12 depends from an independent claim discussed above, and is allowable based at least on its dependency. Accordingly, allowance of these claims is respectfully requested.

Because each of these dependent claims depends from a base claim that is believed to be in condition for allowance, the Assignee believes that it is unnecessary at this time to argue the further distinguishing features of all of the dependent claims. The Assignee reserves the right to specifically address in the future the further patentability of the dependent claims not specifically addressed herein.

CONCLUSION

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. N0484.70944US00, from which the undersigned is authorized to draw.

Dated: 5/23/12

Respectfully submitted,
Nuance Communications, Inc.

By Elisabeth Hunt

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617.646.8000

2614156.1

Electronic Acknowledgement Receipt

EFS ID:	12851772
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
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/Judy Daley
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US00
Receipt Date:	23-MAY-2012
Filing Date:	09-AUG-2010
Time Stamp:	19:34:27
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	Transmittal Letter	N048470944US00-TRN-EHH.pdf	103443 618f2979466a07c79456140a75549f1246a52dc5	no	1

Warnings:

Information:

2		N048470944US00-AMN-EHH.pdf	727058 f95cf7ef005c5a89b1722f08f4af1b9643b1402c	yes	10

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	6
Applicant Arguments/Remarks Made in an Amendment	7	10

Warnings:

Information:

Total Files Size (in bytes):	830501

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
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	11

Application Number	12/853,026-Conf. #5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Art Unit	2626
Examiner Name	M. C. Colucci
Attorney Docket Number	N0484.70944US00

ENCLOSURES (*Check all that apply*)

- [ ] 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
- [ ] 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
- [ ] Other Enclosure(s) (please Identify below):

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	5/23/12	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: 5/23/12 Signature: Judy Daley)

2669969.1

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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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 12/853,026	Filing Date 08/09/2010	☐ To be Mailed

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **05/23/2012**

	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 12	Minus	** 20	= 0	X $ =		OR	X $60=	0
Independent (37 CFR 1.16(h))	* 6	Minus	***6	= 0	X $ =		OR	X $250=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**0**

AMENDMENT

	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ 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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/MOLIKI MAY/

This collection of information is required by 37 CFR 1.16. 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, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

91337 7590 05/21/2012
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
2626	

NOTIFICATION DATE	DELIVERY MODE
05/21/2012	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)

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	12/853,026	MEYER ET AL.	
	Examiner	Art Unit	
	MICHAEL COLUCCI	2626	

All participants (applicant, applicant's representative, PTO personnel):

(1) *MICHAEL COLUCCI*.

(2) *RICHARD GIUNTA*.

(3) *ELISABETH HUNT*.

(4)_____.

Date of Interview: *15 May 2012*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☐103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *Case*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

An agreement has been reached that the claim language is not entirely taught by the cited reference and therefore the rejection must be withdrawn, however a new search and analysis must be conducted..

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/MICHAEL COLUCCI/ Primary Examiner, Art Unit 2626	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
12/853,026		2626	

OC000000053388239

Correspondence Address/Fee Address Change

The following fields have been set to Customer Number 91337 on 04/05/2012

- **Correspondence Address**

The address of record for Customer Number 91337 is:

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

PART 1 - ATTORNEY/APPLICANT COPY

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00	5017

23628 7590 02/23/2012
WOLF GREENFIELD & SACKS, P.C.
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

EXAMINER
COLUCCI, MICHAEL C

ART UNIT	PAPER NUMBER
2626	

MAIL DATE	DELIVERY MODE
02/23/2012	PAPER

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.

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No.	Applicant(s)	
	12/853,026	MEYER ET AL.	
	Examiner	Art Unit	
	MICHAEL COLUCCI	2626	

-- 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 _____.

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 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 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 09 August 2010 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

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Case et al. US 20020072908 A1 (hereinafter Case).

Re claims 1-3, Case teaches a method for use with a speech-enabled application (0005 well known IVR and speech applications), the method comprising:

receiving input from the speech-enabled application comprising a plurality of text strings (Fig. 1 element 14 text input);

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 (Well-known Fig. 1 element 14 text input against digital voice library 12 using voice recordings to output inflections for each word in a sentence at Fig. 23-25 at 0099-0100 parse, assign inflection value, concatenate, synthesize text to speech);

providing the speech synthesis output for the speech-enabled application (0099-0100 parse, assign inflection value, concatenate, synthesize text to speech).

Re claim 4-6, Case teaches a method for generating speech output via a speech-enabled application (0005 well known IVR and speech applications), 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 (Fig. 1 element 14 text input and element 12 with 18 prior to synthesis, such as output in Fig. 23-25 with modified stress);

inputting the plurality of text strings to at least one software module for rendering contrastive stress (module to perform Fig. 23-25,);

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 (Well-known Fig. 1 element 14 text input against digital voice library 12 using voice recordings to output inflections for each word in a sentence at Fig. 23-25 at 0099-0100 parse, assign inflection value, concatenate, synthesize text to speech);

generating, using the plurality of audio recordings, an audio speech output corresponding to the desired speech output (0099-0100 parse, assign inflection value, concatenate, synthesize text to speech).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. 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 2626

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

Notice of References Cited	Application/Control No. 12/853,026	Applicant(s)/Patent Under Reexamination MEYER ET AL.	
	Examiner MICHAEL COLUCCI	Art Unit 2626	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0072908 A1	06-2002	Case et al.	704/260
*	B	US-6,665,641 B1	12-2003	Coorman et al.	704/260
*	C	US-2004/0030555 A1	02-2004	van Santen, Jan P.H.	704/260
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BIB DATA SHEET

CONFIRMATION NO. 5017

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/853,026	08/09/2010 **RULE**	704	2626	N0484.70944US00

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

**** CONTINUING DATA ***************************
This application is a CIP of 12/704,859 02/12/2010

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
08/17/2010

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	MA	9	6	6
Verified and Acknowledged	/MICHAEL C COLUCCI/ Examiner's Signature	Initials				

ADDRESS
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		
1750	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

BIB (Rev. 05/07).

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12853026	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2626

SEARCHED

Class	Subclass	Date	Examiner
704	260	2/18/2012	MC

SEARCH NOTES

Search Notes	Date	Examiner
performed an assignee level ODP search, not warranted, closest case does not involve actual recordings in the claim language. It is not obvious to substitute actual recordings from a database with on the fly synthesized speech	2/18/2012	MC
checked for 101 issues, OK, computer system, memory, processor, non-transitory	2/18/2012	MC
searched 704/260 with keyord limitations	2/18/2012	MC

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L11	19	8 and concatenat$7 and stress and inflect$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:32
L10	103	8 and concatenat$7 and stress	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:32
L9	254	8 and concatenat$7	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:32
L8	854	(704/260).CCLS.	USPAT; USOCR	OR	OFF	2012/02/18 17:31
L7	79	L6 and (record$4 with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
L6	94	L5 and L4	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
L5	99	L3 and ((stress inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
L4	20322475	@ad<="20100212"	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:30
L3	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
L2	3	(((meyer springer).in.) or (nuance).asn.) and (contrastive and stress).clm.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 17:05
L1	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
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
S8	0	S7 and (contrastive)	US-PGPUB;	OR	OFF	2012/02/18 15:31

			USPAT; EPO; JPO			
S7	94	S6 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
S5	94	S3 and S4	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
S3	99	S2 and ((stress pitch inflect$7 pitch) with concatenat$6)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2012/02/18 15:29
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
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

2/18/2012 5:32:26 PM
C:\East\Workspaces\12853026.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12853026	MEYER ET AL.
	Examiner	**Art Unit**
	MICHAEL COLUCCI	2626

✓	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	02/18/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								

FORM PTO-1449/A and B (modified PTO/SB/08) **INFORMATION DISCLOSURE STATEMENT BY APPLICANT**	APPLICATION NO.: 12/853,026	ATTY. DOCKET NO.: N0484.70944US00
	FILING DATE: August 9, 2010	CONFIRMATION NO.: 5017
	APPLICANT: Darren C. Meyer et al.	
Sheet 1 of 1	GROUP ART UNIT: 2626	EXAMINER: R. Dorvil

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
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		7,401,020		Eide	07-15-2008
		7,899,672		Qin et al.	03-01-2011
		2002/0133348	A1	Pearson et al.	09-19-2002
		2004/013887	A1	Rusnak et al.	07-15-2004
		2007/0192105	A1	Neeracher et al.	08-16-2007

FOREIGN PATENT DOCUMENTS

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

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.	

EXAMINER: /Michael Colucci/	DATE CONSIDERED: 02/18/2012

EXAMINER: Initial if reference considered, whether or not citation 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. __ , filed __ , and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

[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.]

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

FORM PTO-1449/A and B (modified PTO/SB/08)	APPLICATION NO.: 12/853,026	ATTY. DOCKET NO.: N0484.70944US00
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	FILING DATE: August 9, 2010	CONFIRMATION NO.: 5017
	APPLICANT: Darren C. Meyer et al.	
Sheet 1 of 1	GROUP ART UNIT: 2626	EXAMINER: R. Dorvil

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		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
		6,446,040		Socher et al.	09-03-2002
		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
		7,899,672		Qin et al.	03-01-2011
		2002/0133348	A1	Pearson et al.	09-19-2002
		2004/013887	A1	Rusnak et al.	07-15-2004
		2007/0192105	A1	Neeracher et al.	08-16-2007

FOREIGN PATENT DOCUMENTS

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

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.	

EXAMINER:	DATE CONSIDERED:

EXAMINER: Initial if reference considered, whether or not citation 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. __ , filed __ , and relied upon for an earlier filing date under 35 U.S.C. 120 (continuation, continuation-in-part, and divisional applications).

[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.]

Electronic Acknowledgement Receipt

EFS ID:	11968165
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	23628
Filer:	Elisabeth H. Hunt/Trish McDonald
Filer Authorized By:	Elisabeth H. Hunt
Attorney Docket Number:	N0484.70944US00
Receipt Date:	31-JAN-2012
Filing Date:	09-AUG-2010
Time Stamp:	17:57:12
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	Transmittal Letter	N048470944US00-TRN-EHH.PDF	98794 a97e5aadac1aafd037a351d9608af5bf55d27b54	no	1

Warnings:

Information:

2		N048470944US00-IDS-EHH.PDF	425514 d2549659020efb889cd1e2e1cf018bcb9fc0641b	yes	5
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	4	
	Information Disclosure Statement (IDS) Form (SB08)		5	5	
Warnings:					
Information:					
3	Non Patent Literature	FORNEY_The_Viterbi_Algorithm_1973.PDF	1759929 282ebf3e9b2a50c01e18f0191163e4bb988d645f	no	11
Warnings:					
Information:					
4	Non Patent Literature	Natural_Playback_Modules_NPM_Nuance.PDF	631220 e6aafe08dc561dbc3ef1d8a70eb3779a37f6eaf7	no	5
Warnings:					
Information:					
5	Non Patent Literature	SAON_MaximumLikelihoodDiscriminantFeature_2000.PDF	507116 1cab7cc28f1926458933d25cf592a511f5b8a99e	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	3422573		

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	12/853,026-Conf. #5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Art Unit	2626
Examiner Name	Not Yet Assigned
Attorney Docket Number	N0484.70944US00

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):

Copies of Non-Patent Literature References (3)

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	1/31/12	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: 1/31/12 Signature: Lisa A. Edwards

2574478.1

DOCKET NO.: N0484.70944US00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer
Serial No.:	12/853,026
Confirmation No.:	5017
Filed:	August 9, 2010
For:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
Examiner:	R. Dorvil
Art Unit:	2626

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 3rd day of January, 2012.

Mail Stop Amendment
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

Dear Madam:

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

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

This Information Disclosure Statement has been filed before the mailing of a first Office Action on the merits in the above-identified case.

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 hereby makes the following additional information of record in the above-identified application.

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.
11/207,292	August 19, 2005	Dhanakshirur et al.	N0484.70607US00
13/360,418	January 27, 2012	Dhanakshirur et al.	N0484.70607US01
10/672,374	September 26, 2003	Aaron et al.	N484.70760US00
12/704,859	February 12, 2010	Meyer et al.	N484.70900US00

The above-identified co-pending applications may include subject matter that 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 connection with prosecution of the above-identified co-pending applications, the Examiner for the co-pending applications will assumedly search for relevant prior art and, in some circumstances, may take positions about the prior art and/or the claims that may be material to the examination of the present application.

Accordingly, the Examiner in the present application is requested to review the file histories of the above-identified co-pending 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. However, if the Examiner would like a copy of any or all of the information included in the file histories of the above-identified applications, or any other information related to this application, the Examiner is asked to contact the undersigned representative.

PART III 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 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. N0484.70944US00 from which the undersigned is authorized to draw.

Dated: 1/31/12

Respectfully submitted,
Nuance Communications, Inc.

By: _____

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

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
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00

CONFIRMATION NO. 5017

23628
WOLF GREENFIELD & SACKS, P.C.
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

PUBLICATION NOTICE

OC000000049395598

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

Publication No.US-2011-0202345-A1
Publication Date:08/18/2011

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

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
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00

CONFIRMATION NO. 5017

23628
WOLF GREENFIELD & SACKS, P.C.
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

POA ACCEPTANCE LETTER

OC000000043982672

Date Mailed: 10/18/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/07/2010.

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.

/fstephanos/

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

PTO/SB/80 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
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.

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(b).

I hereby appoint:

[x] Practitioners associated with the Customer Number: 23628

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(b).

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

[x] The address associated with Customer Number: 23628

OR

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

Assignee Name and Address:
Nuance Communications, Inc.
One Wayside Road
Burlington, MA 01803

A copy of this form, together with a statement under 37 CFR 3.73(b) (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(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, 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	[signature]	Date	05-02-09
Name	Leanne J. Fitzgerald	Telephone	781-565-5000
Title	Associate General Counsel – Intellectual Property		

1592212.1

Electronic Acknowledgement Receipt

EFS ID:	8582100
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	23628
Filer:	Richard F. Giunta/Danielle Calder
Filer Authorized By:	Richard F. Giunta
Attorney Docket Number:	N0484.70944US00
Receipt Date:	07-OCT-2010
Filing Date:	09-AUG-2010
Time Stamp:	16:11:55
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	N048470944US00-TRN-RFG.PDF	46740 d26c22306cba35a34640d130cf09d7ee56e03e3a	no	1

Warnings:

Information:

2	Assignee showing of ownership per 37 CFR 3.73(b).	N048470944US00-373-RFG.PDF	57081 d7ff0cfc2b5849fa0ca2b5962341a370e53612bc	no	1
Warnings:					
Information:					
3	Power of Attorney	N048470944US00-POA-RFG.PDF	51193 61f0794ac10190effe8a23a95905b2c6cf5e359a	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	155014	

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	3

Application Number	12/853,026-Conf. #5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Art Unit	2626
Examiner Name	Not Yet Assigned
Attorney Docket Number	N0484.70944US00

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(b)

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature			
Printed name	Richard F. Giunta		
Date	October 7, 2010	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 § 1.6(a)(4).

Dated: October 7, 2010 Signature: _____)

2117136.1

PTO/SB/96 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trad emark 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.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Nuance Communications, Inc.

Application No./Patent No.: 12/853,026 Filed/Issue Date: August 9, 2010

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

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

states that it is:

1. [X] the assignee of the entire right, title, and interest in;

2. [ ] an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or

3. [ ] an assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made) the patent application/patent identified above by virtue of either:

A. [X] 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 024809 , Frame 0818 , or for which a copy thereof is attached.

OR

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

1. 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.

2. 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.

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.

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

[X] As required by 37 CFR 3.73(b)(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	October 7, 2010 Date
Richard F. Giunta Printed or Typed Name	Attorney for Assignee Title

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 § 1.6(a)(4).

Dated: October 7, 2010 Signature: Danielle Calder)

2117137.1

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
12/853,026	08/09/2010	Darren C. Meyer	N0484.70944US00

CONFIRMATION NO. 5017

23628
WOLF GREENFIELD & SACKS, P.C.
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

NOTICE

OC000000043087880

Date Mailed: 08/18/2010

NOTICE OF INFORMAL APPLICATION

This application is considered to be informal since it does not comply with the regulations for the reason(s) indicated below. The period within to correct the informalities noted below and avoid abandonment is set in the accompanying Office action.

Items Required To Avoid Processing Delays:

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

A new oath or declaration, identifying this application number, or, if appropriate, an application data sheet (37 CFR 1.76), is required. The oath or declaration does not comply with 37 CFR 1.63 in that it:

- does not identify the complete mailing or post office address of each inventor.

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	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/853,026	08/09/2010	2626	1750	N0484.70944US00	6	6

CONFIRMATION NO. 5017

23628
WOLF GREENFIELD & SACKS, P.C.
600 ATLANTIC AVENUE
BOSTON, MA 02210-2206

FILING RECEIPT

OC000000043087878

Date Mailed: 08/18/2010

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**

Applicant(s)

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

Assignment For Published Patent Application

Nuance Communications, Inc., Burlington, MA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CIP of 12/704,859 02/12/2010

Foreign Applications

If Required, Foreign Filing License Granted: 08/17/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/853,026**

Projected Publication Date: 08/18/2011

Non-Publication Request: No

Early Publication Request: No

Title

METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS

Preliminary Class

704

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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).

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	12/853,026; Conf. # 5017
Filing Date	August 9, 2010
First Named Inventor	Darren C. Meyer
Art Unit	N/A
Examiner Name	Not Yet Assigned
Total Number of Pages in This Submission	
Attorney Docket Number	N0484.70944US00

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
- [ ] Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	WOLF, GREENFIELD & SACKS, P.C.		
Signature			
Printed name	Richard F. Giunta		
Date	8/12/10	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 § 1.6(a)(4).

Dated: Aug 12, 2010 Signature: Danielle Palder

2059658.1

DOCKET NO.: N0484.70944US00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Darren C. Meyer
Serial No.:	12/853,026
Confirmation No.:	5017
Filed:	August 9, 2010
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 § 1.6(a)(4).

Dated: August 12, 2010 Signature: Danielle Calder

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

STATEMENT FILED PURSUANT TO THE DUTY OF DISCLOSURE UNDER 37 CFR §§1.56, 1.97 AND 1.98

Sir:

Pursuant to the duty of disclosure under 37 C.F.R. §§1.56, 1.97 and 1.98, the Applicant 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 Applicant would like to bring to the Examiner's attention the following co-pending applications:

Serial No.	Filing Date	Inventor(s)	Atty. Docket No.
12/853,086	**08/09/2010**	**Darren C. Meyer**	**N0484.70901US00**

The above-identified co-pending application shares a common specification with the present application. In connection with prosecution of the above-identified co-pending application, the Examiner for the co-pending application will assumedly search for relevant prior art and, in some circumstances, may take positions about the prior art and/or the claims that may be material to the examination of the present application.

Accordingly, the Examiner in the present application is requested to review the file history of the above-identified co-pending application 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 history of the above-identified application. However, if the Examiner would like a copy of any or all of the information included in the file history of the above-identified application, the Examiner is asked to contact the undersigned representative.

PART III: 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 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 Applicant 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 Applicant 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 Applicant 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 Applicant, 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.

Respectfully submitted,

By: _____

Richard F. Giunta, Reg. No. 36,149
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2206
Telephone: (617) 646-8000

Docket No.: N0484.70944US00
Date: August 12, 2010
xNDDx

Electronic Acknowledgement Receipt

EFS ID:	8209929
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	23628
Filer:	Richard F. Giunta/Danielle Calder
Filer Authorized By:	Richard F. Giunta
Attorney Docket Number:	N0484.70944US00
Receipt Date:	12-AUG-2010
Filing Date:	
Time Stamp:	17:15:50
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	N048470944US00-TRN-RFG.PDF	44872 c7e6210258cea456f76a74b51f653d5f063d0b06	no	1

Warnings:

Information:

2	Transmittal Letter	N048470944US00-IDS-RFG.PDF	111324 afc5900ff7cf100cfed95eabfe2220f01f1e909f	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	156196	

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/05 (08-08)
Approved for use through 06/30/2010. 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.

UTILITY PATENT APPLICATION TRANSMITTAL

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

Attorney Docket No.	N0484.70944US00
First 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** (e.g., PTO/SB/17)
2. [ ] **Applicant claims small entity status.** See 37 CFR 1.27.
3. [X] **Specification** [*Total Pages* 63]
   Both the claims and abstract must start on a new page
   (For information on the preferred arrangement, see MPEP 608.01(a))
4. [X] **Drawing(s)** *(35 U.S.C. 113)* [*Total Sheets* 9]
5. **Oath or Declaration** [*Total Sheets* 2]
   a. [X] Newly executed (original or copy)
   b. [ ] A copy from a prior application (37 CFR 1.63(d))
   (for continuation/divisional with Box 18 completed)
   i. [ ] DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. [X] **Application Data Sheet.** See 37 CFR 1.76
7. [ ] **CD-ROM or CD-R** in duplicate, large table or Computer Program *(Appendix)*
   [ ] Landscape Table on CD
8. **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

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

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:*
[ ] Continuation [ ] Divisional [X] Continuation-in-part (CIP) of prior application No.: 12/704859
Prior application information: Examiner Not Yet Assigned *Art Unit:* N/A

19. CORRESPONDENCE ADDRESS

[X] The address associated with Customer Number: 23628 *OR* [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature		Date	8/9/10
Name (Print/Type)	Richard F. Giunta	Registration No. (Attorney/Agent)	36,149

2047111.1

PTO/SB/17 (10-08)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no person are required to respond to a collection of information unless it displays a valid OMB control number

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2009

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 1,750.00

Complete if Known	
Application Number	Not Yet Assigned
Filing Date	
First Named Inventor	Darren C. Meyer
Examiner Name	Not Yet Assigned
Art Unit	N/A
Attorney Docket No.	N0484.70944US00

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 underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
Application Type	**Fee ($)**	**Small Entity Fee ($)**	**Fee ($)**	**Small Entity Fee ($)**	**Fee ($)**	**Small Entity Fee ($)**	**Fees Paid ($)**
Utility	330	165	540	270	220	110	1,090.00
Design	220	110	100	50	140	70	
Plant	220	110	330	165	170	85	
Reissue	330	165	540	270	650	325	
Provisional	220	110	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	**Fee ($)**	**Small Entity Fee ($)**
Each claim over 20 (including Reissues)	52	26
Each independent claim over 3 (including Reissues)	220	110
Multiple dependent claims	390	195

Total Claims	- 20 or HP =	**Extra Claims**	x **Fee ($)**	= **Fee Paid ($)**
6				

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

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

Indep. Claims	- 3 or HP =	**Extra Claims**	x **Fee ($)**	= **Fee Paid ($)**
6		3	220.00	660.00

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 $270 ($135 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).

Total Sheets	- 100 =	**Extra Sheets**	/50 =	**Number of each additional 50 or fraction thereof**	(round **up** to a whole number) x	**Fee ($)**	=	**Fee Paid ($)**
54								

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

Non-English Specification, $130 fee (no small entity discount)

Other (e.g., late filing surcharge): _____

SUBMITTED BY					
Signature		Registration No. (Attorney/Agent)	36,149	Telephone	617.646.8000
Name (Print/Type)	Richard F. Giunta			Date	8/9/10

2047110.1

Application Data Sheet

Application Information

Application Type::	Regular
Subject Matter::	Utility
Suggested Group Art Unit::	N/A
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::	N0484.70944US00
Request for Early Publication?::	No
Request for Non-Publication?::	No
Small Entity?::	No
Petition included?::	No
Secrecy Order in Parent Appl.?::	No

Applicant Information

Applicant Authority Type::	Inventor
Primary Citizenship Country::	US
Status::	Full Capacity
Given Name::	Darren
Middle Name::	C.
Family Name::	Meyer
City of Residence::	Duxbury
State or Province of Residence::	MA
Country of Residence::	US

Applicant Authority Type::	Inventor
Primary Citizenship Country::	US
Status::	Full Capacity
Given Name::	Stephen
Middle Name::	R.
Family Name::	Springer
City of Residence::	Needham
State or Province of Residence::	MA
Country of Residence::	US

Correspondence Information

Correspondence Customer Number::	23628

Representative Information

Representative Customer Number::	23628

Domestic Priority Information

Application::	Continuity Type::	Parent Application::	Parent Filing Date::
This Application	Continuation-in-part of	12/704859	02/12/10

Foreign Priority Information

Assignee Information

Assignee 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

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.

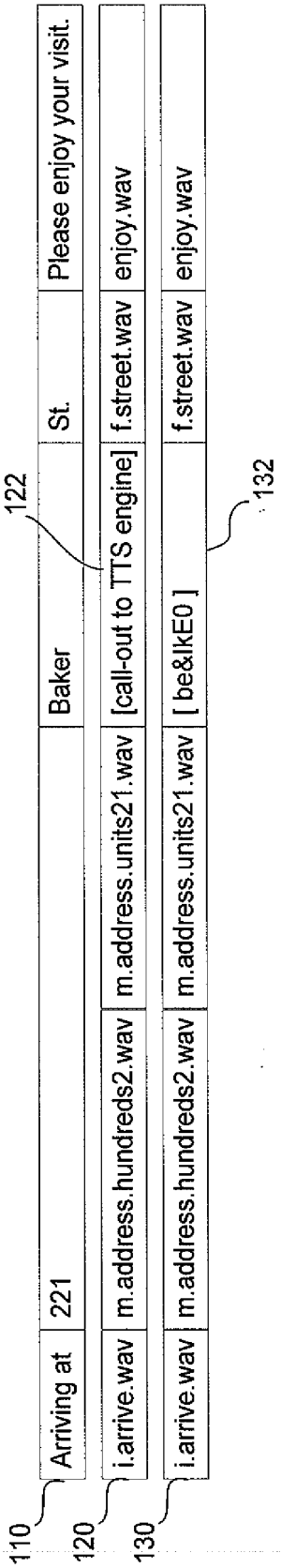


FIG. 1A (Prior Art)

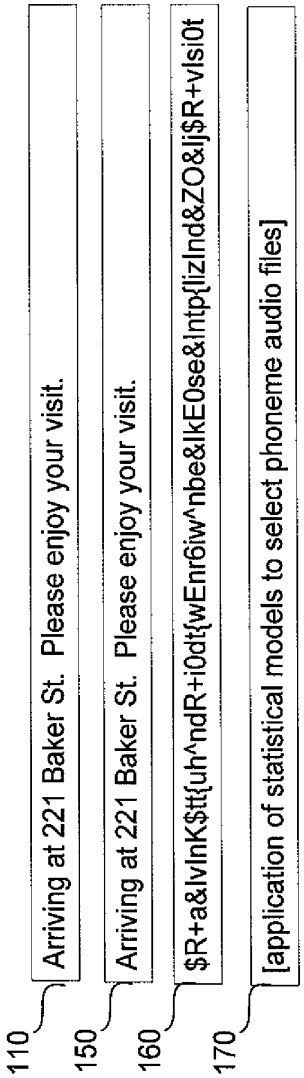
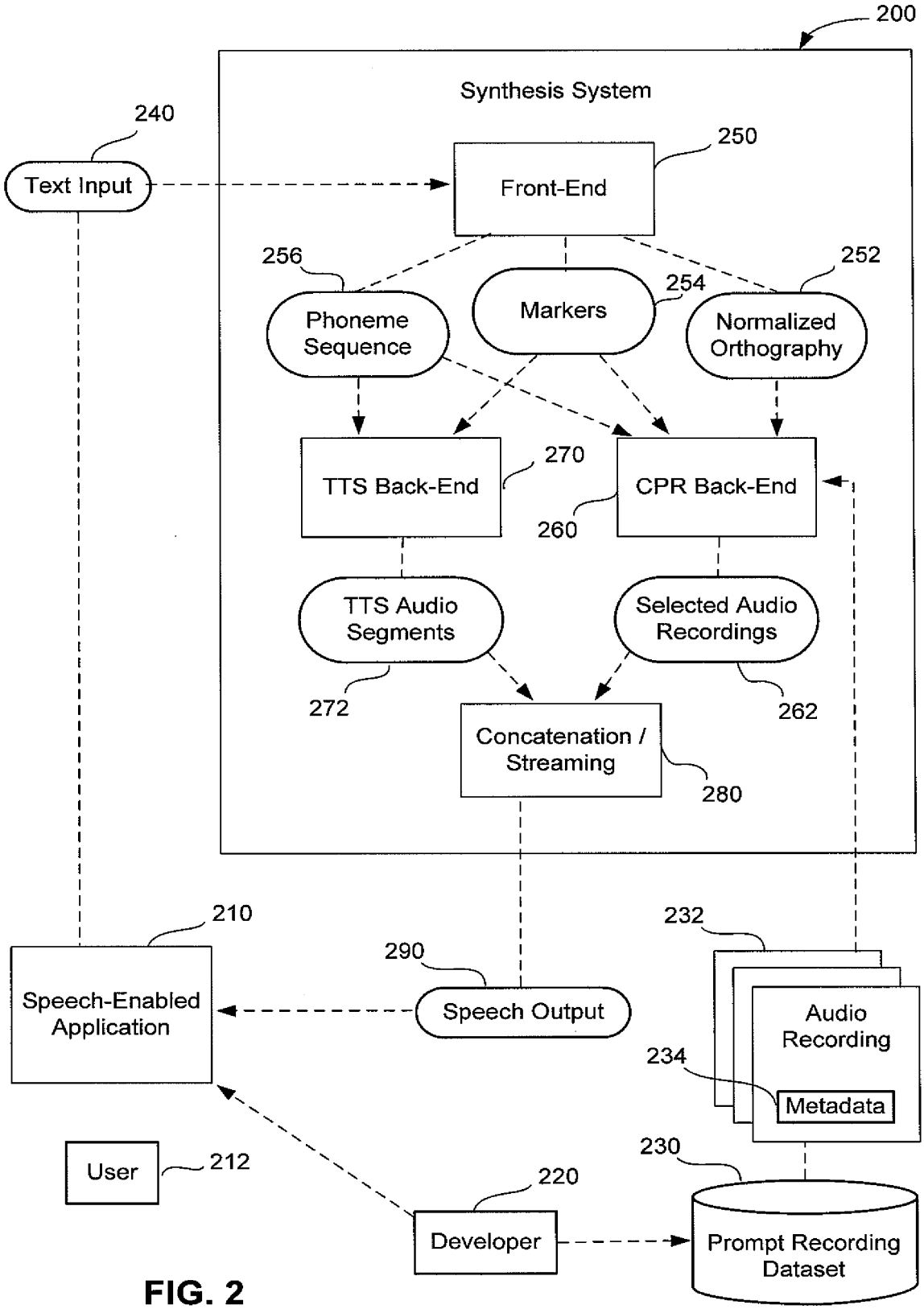


FIG. 1B (Prior Art)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Synthesis System
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Text Input
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Front-End
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Phoneme Sequence
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Markers
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Normalized Orthography
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TTS Back-End
CPR Back-End
260
TTS Audio Segments
Selected Audio Recordings
272
262
Concatenation / Streaming
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Speech-Enabled Application
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Speech Output
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Audio Recording
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Metadata
User
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230
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Developer
Prompt Recording Dataset

FIG. 2

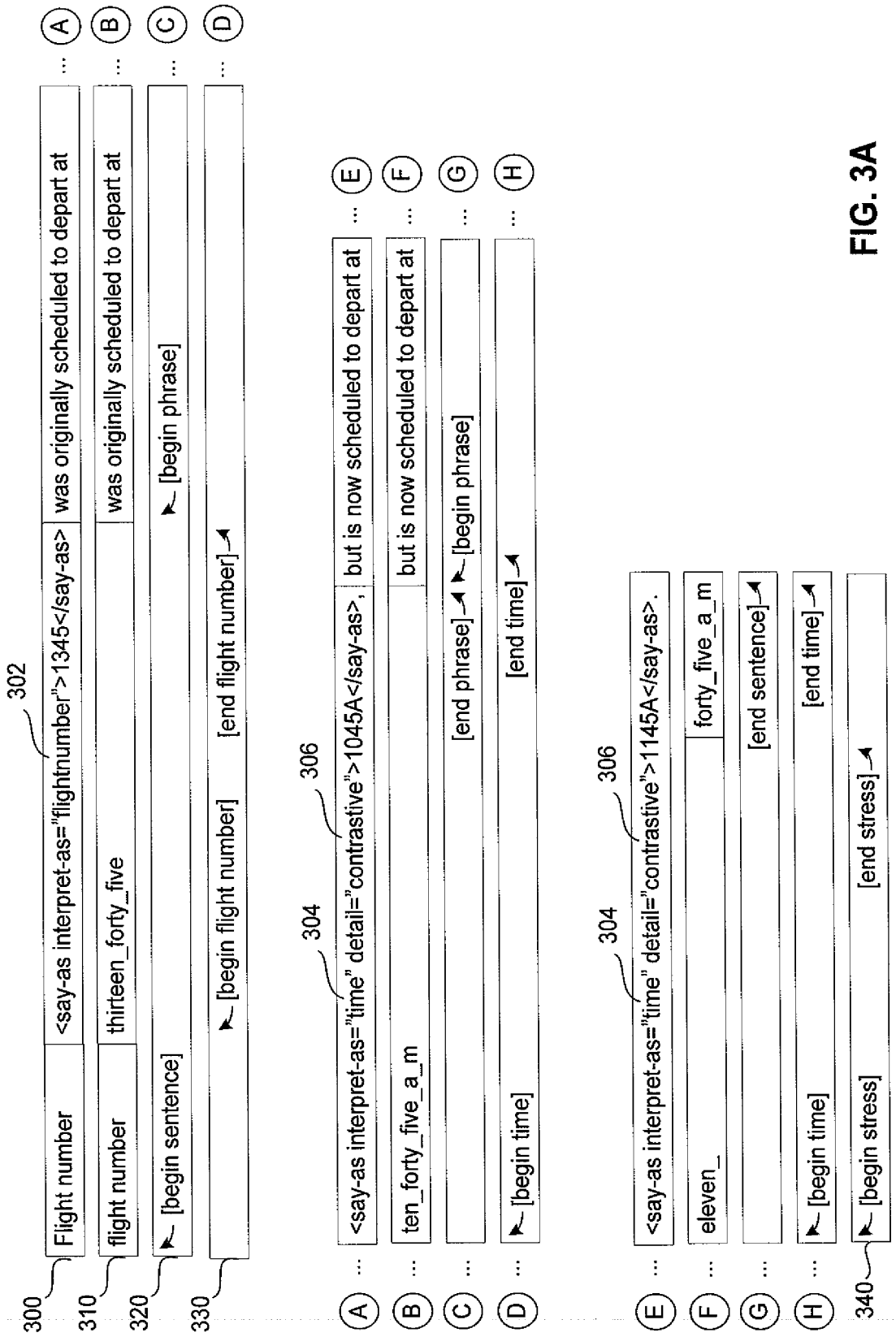
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FIG. 3A

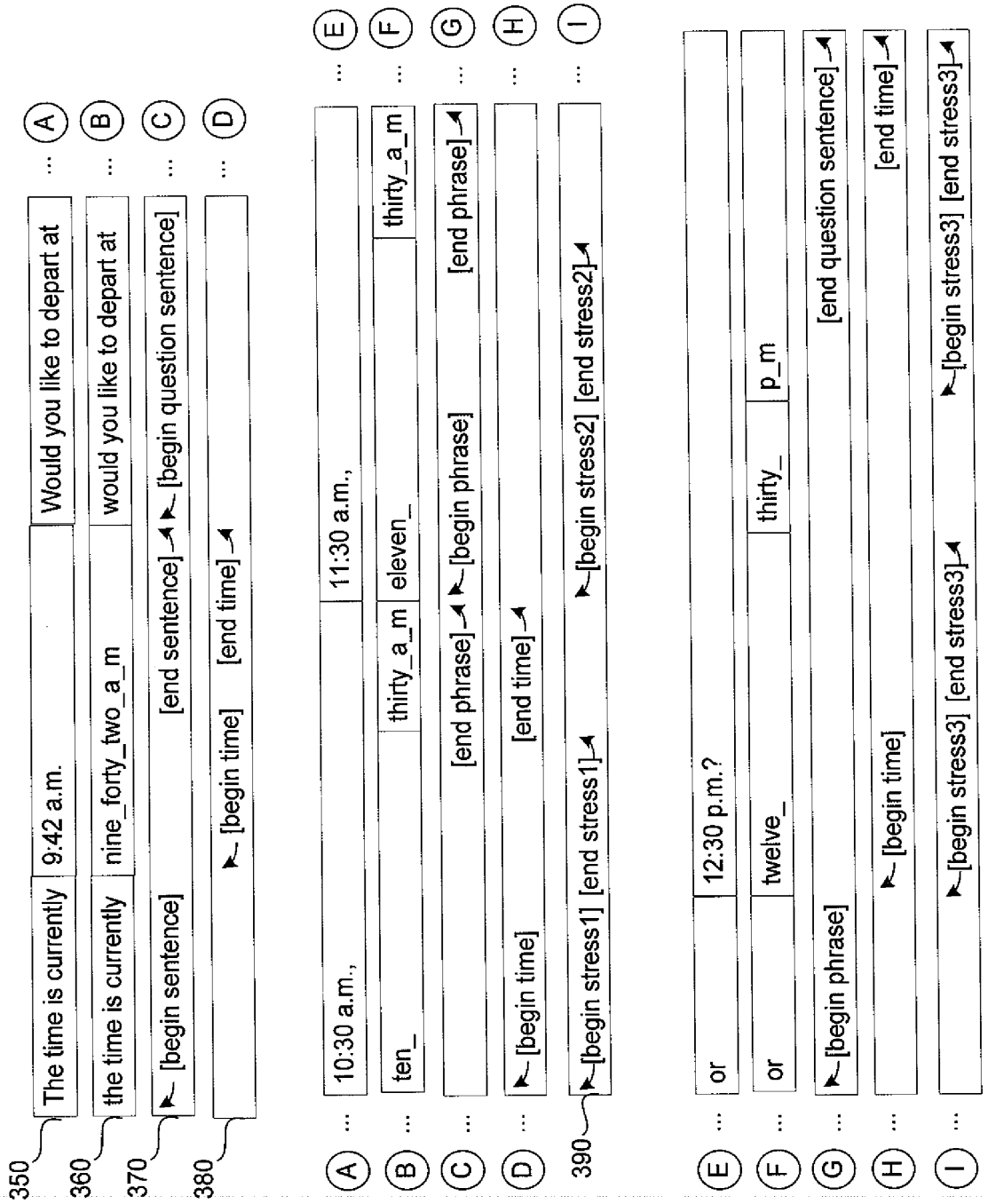
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FIG. 3B

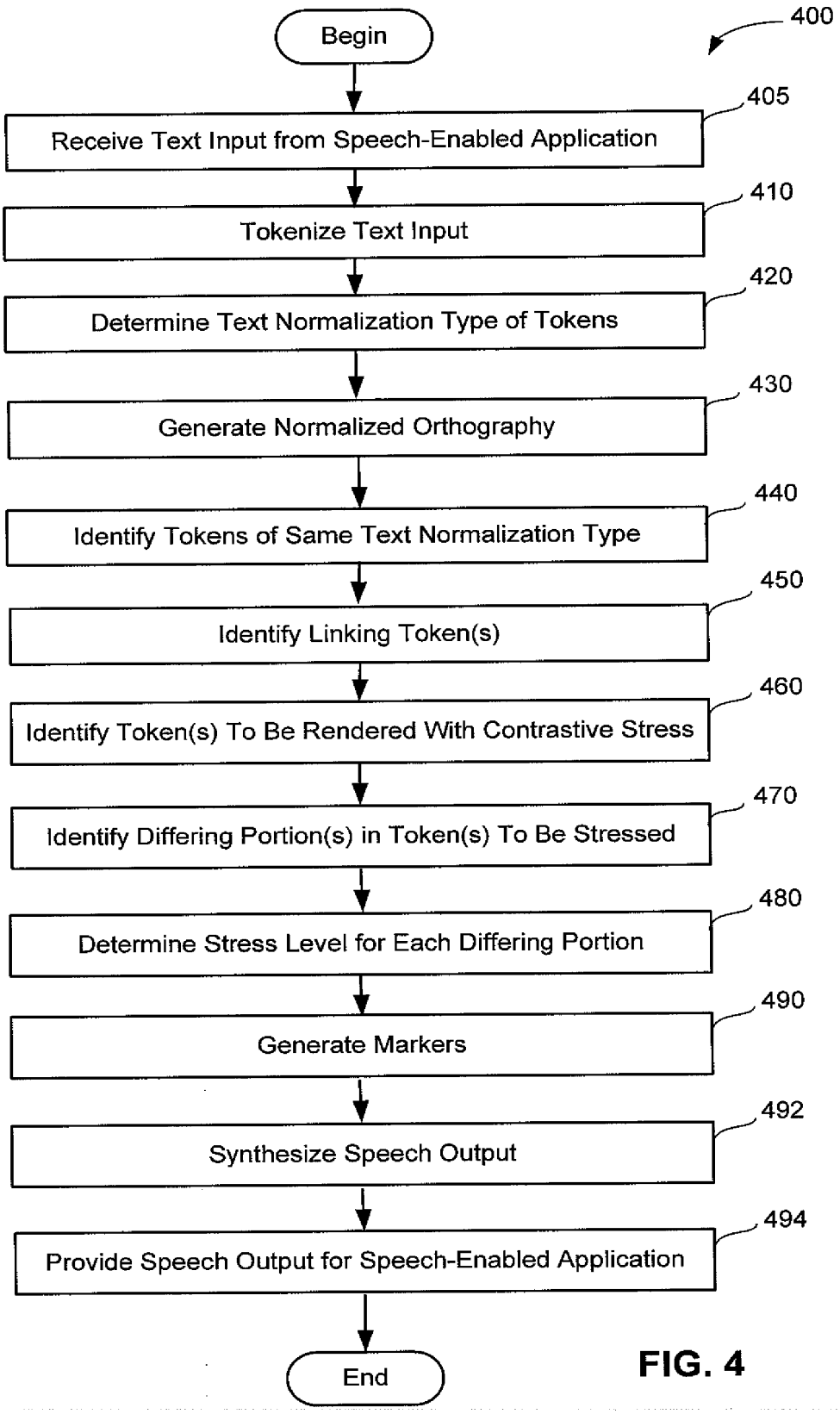
400
Begin
405
Receive Text Input from Speech-Enabled Application
410
Tokenize Text Input
420
Determine Text Normalization Type of Tokens
430
Generate Normalized Orthography
440
Identify Tokens of Same Text Normalization Type
450
Identify Linking Token(s)
460
Identify Token(s) To Be Rendered With Contrastive 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

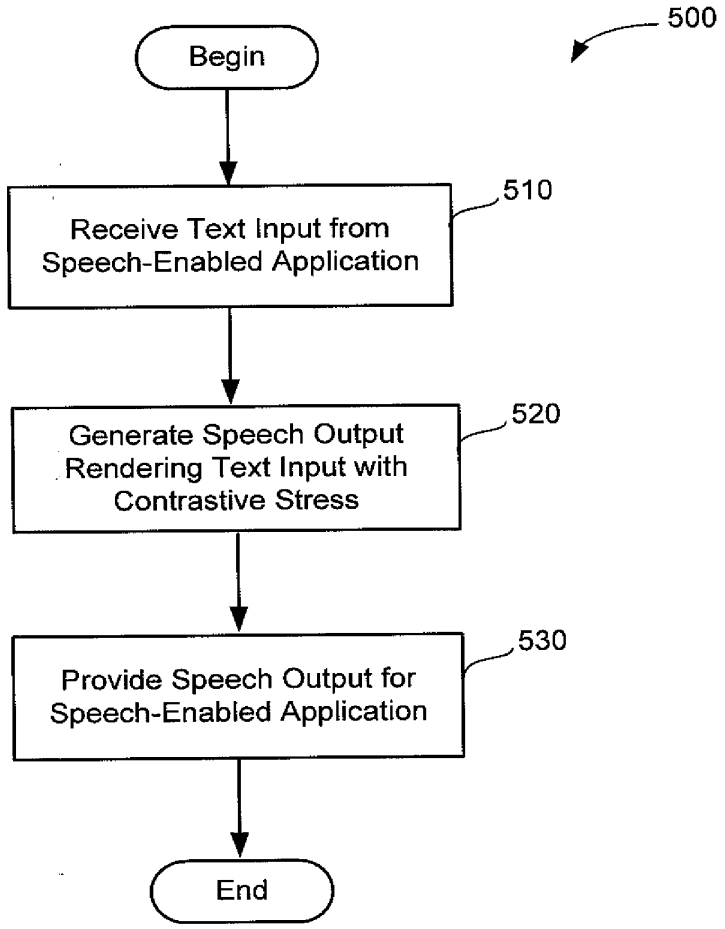
500
Begin
Receive Text Input from Speech-Enabled Application
510
Generate Speech Output Rendering Text Input with Contrastive Stress
520
Provide Speech Output for Speech-Enabled Application
530
End

FIG. 5

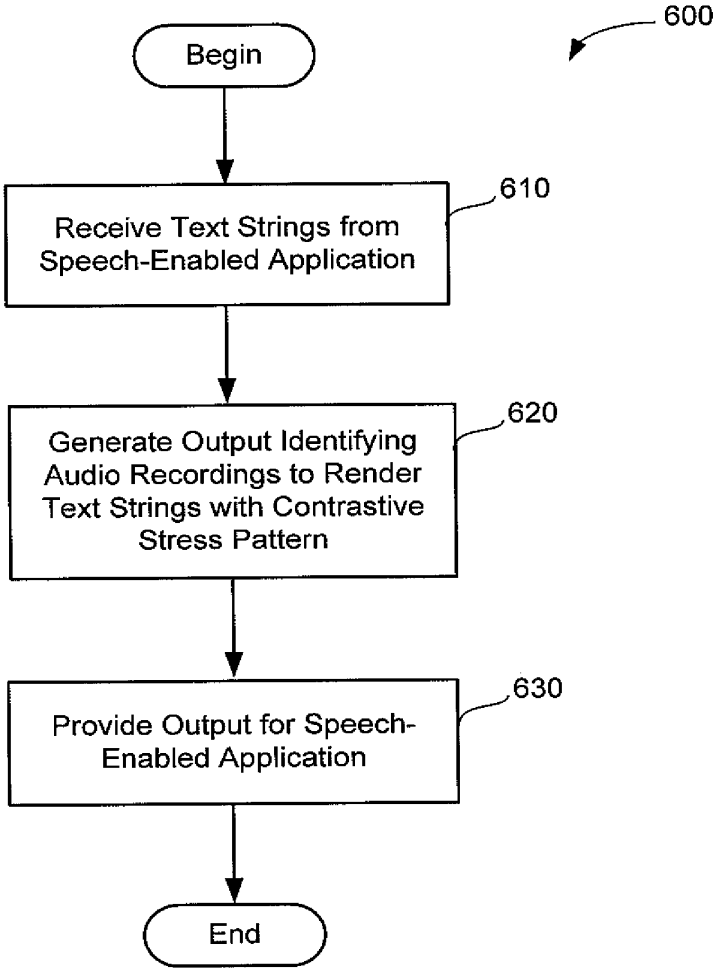
600
Begin
610
Receive Text Strings from Speech-Enabled Application
620
Generate Output Identifying Audio Recordings to Render Text Strings with Contrastive Stress Pattern
630
Provide Output for Speech-Enabled Application
End

FIG. 6

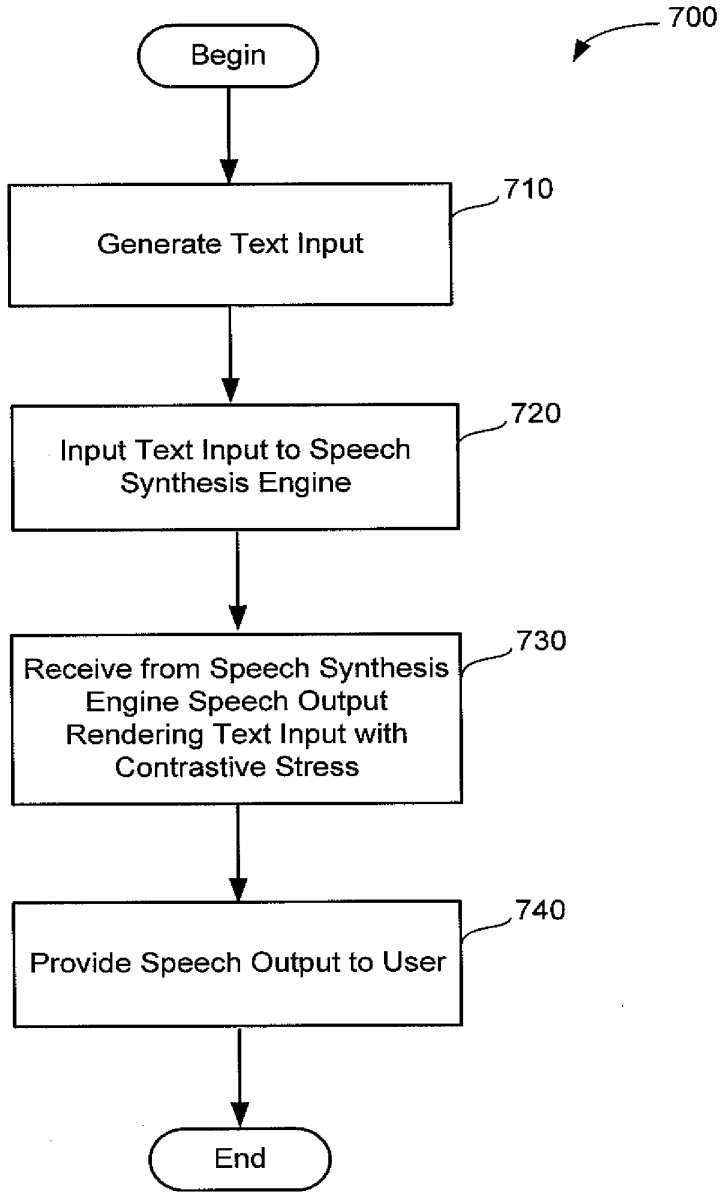
700
Begin
710
Generate Text Input
720
Input Text Input to Speech Synthesis Engine
730
Receive from Speech Synthesis Engine Speech Output Rendering Text Input with Contrastive Stress
740
Provide Speech Output to User
End

FIG. 7

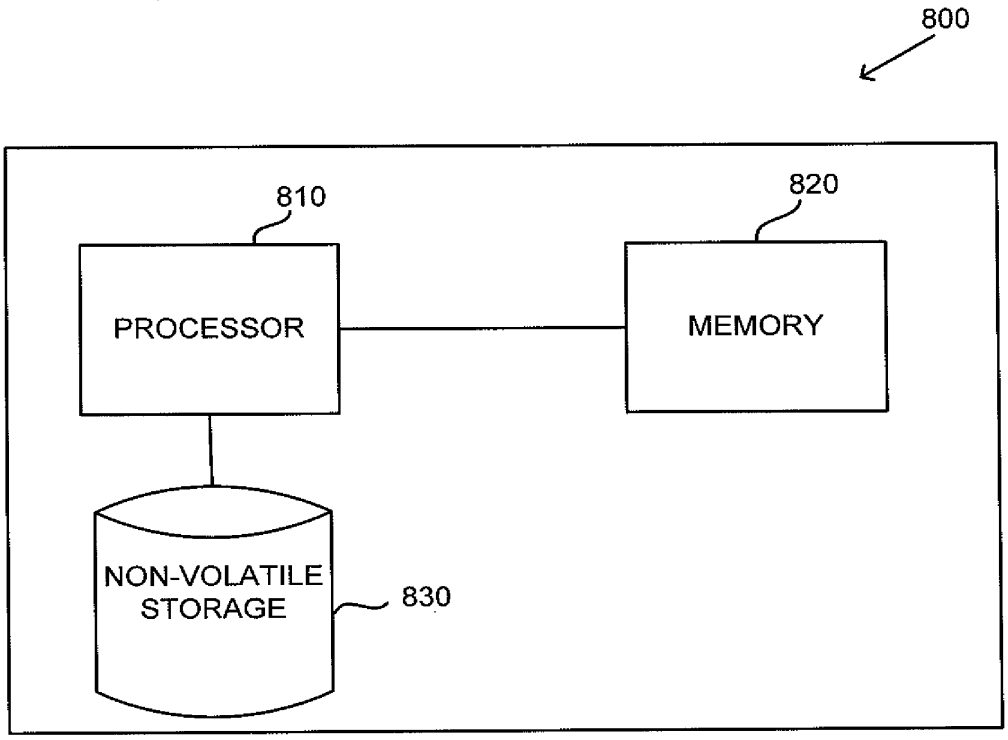

FIG. 8

PTO/SB/01A (01-09)
Approved for use through 06/30/2010. 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.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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

As the below named inventor(s), I/we declare that:

This declaration is directed to:

[x] The attached application, or

[ ] Application No. _____ filed on _____

[ ] As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

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

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

WARNING:

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All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Darren C. Meyer Date: 7/27/10

Signature: _____ Citizen of: US

Inventor two: Stephen R. Springer Date: _____

Signature: _____ Citizen of: US

[ ] Additional inventors or a legal representative are being named on _____ additional form(s) attached hereto.

2030789.1

PTO/SB/01A (01-09)
Approved for use through 06/30/2010. OMB 0651-0032
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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

As the below named inventor(s), I/we declare that:

This declaration is directed to:

[x] The attached application, or

[ ] Application No. _____ filed on _____

[ ] As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

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

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

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All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: Darren C. Meyer Date: _____

Signature: _____ Citizen of: US

Inventor two: Stephen R. Springer Date: 8/4/2010

Signature: Stephen Springer Citizen of: US

[ ] Additional inventors or a legal representative are being named on _____ additional form(s) attached hereto.

2030799.1

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:	Richard F. Giunta/Eileen MacKenzie
Attorney Docket Number:	N0484.70944US00

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	330	330
Utility Search Fee	1111	1	540	540
Utility Examination Fee	1311	1	220	220
Pages:				
Claims:				
Independent claims in excess of 3	1201	3	220	660
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1750**

Electronic Acknowledgement Receipt	
EFS ID:	8182428
Application Number:	12853026
International Application Number:	
Confirmation Number:	5017
Title of Invention:	METHOD AND APPARATUS FOR GENERATING SYNTHETIC SPEECH WITH CONTRASTIVE STRESS
First Named Inventor/Applicant Name:	Darren C. Meyer
Customer Number:	23628
Filer:	Richard F. Giunta/Eileen MacKenzie
Filer Authorized By:	Richard F. Giunta
Attorney Docket Number:	N0484.70944US00
Receipt Date:	09-AUG-2010
Filing Date:	
Time Stamp:	17:17:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1750
RAM confirmation Number	3661
Deposit Account	232825
Authorized User	GIUNTA,RICHARD F.
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	N048470944US00-TRN-RFG.PDF	42957 1177863f2a0174856d9d02af3af109c5c6b378ba	no	1
Warnings:					
Information:					
2	Fee Worksheet (PTO-875)	N048470944US00-FEETRN-RFG.PDF	40885 068b426480ef872a9140f8c281d552b33dff6eb4	no	1
Warnings:					
Information:					
3	Application Data Sheet	N048470944US00-ADS-RFG.pdf	16914 a0145d6a67eaca963f9140c726e0a4bb5030c26a	no	2
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4		N048470944US00-UTLAPL-RFG.pdf	288848 48e7a513f6d8e04967fab031d5bda18f56f7efe5	yes	63

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	59
Claims	60	62
Abstract	63	63

Warnings:					
Information:					
5	Drawings-only black and white line drawings	N048470944US00-DRW-RFG.PDF	146145 99471297414f14c51d30cc912c4b3de6f8a994e1	no	9
Warnings:					
Information:					
6	Oath or Declaration filed	N048470944US00-DEC-RFG.PDF	160917 47fc04ab8fc416b9f63f198cab26f26be6906562	no	2
Warnings:					
Information:					

7	Fee Worksheet (PTO-875)	fee-info.pdf	36772 1e0abdea82b47b0c4084cb90f99a33c3abe8034c	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	733438	

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/06 (12-04)

Date: **08/09/10**

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 12/853,026

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	330
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	540
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	220
TOTAL CLAIMS (37 CFR 1.16(i))	6 minus 20 =		x$26		OR	x$52	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	6 minus 3 =	* 3	x$110			x$220	660
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $270 ($135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
			TOTAL			TOTAL	1750

* If the difference in column 1 is less than zero, enter "0" in column 2.

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 ($)	SMALL ENTITY ADDI-TIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDI-TIONAL FEE ($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDI-TIONAL FEE ($)	OR	RATE ($)	ADDI-TIONAL FEE ($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T 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.

This collection of information is required by 37 CFR 1.16. 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. Paten and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.