

Placeholder Sheet for Supplemental Content

Application Number: 18644959

Document Date: 04/24/2024

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Application Number: 18644959

Document Date: 04/24/2024

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Shawn		ZHANG		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Palo Alto	State/Province	CA	Country of Residence	US
Mailing Address of Inventor:					
Address 1		c/o Sanas.ai Inc.			
Address 2		437 Lytton Avenue, Suite 200			
City	Palo Alto	State/Province	CA		
Postal Code	94301	Country	US		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Lukas		PFEIFENBERGER		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
City	Salzburg	Country of Residence¹	AT		
Mailing Address of Inventor:					
Address 1		c/o Sanas.ai Inc.			
Address 2		437 Lytton Avenue, Suite 200			
City	Palo Alto	State/Province	CA		
Postal Code	94301	Country	US		
Inventor 3					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Jason		WU		

IPR2026-00273

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service			
City	Santa Clara	State/Province	CA
		Country of Residence	US

Mailing Address of Inventor:

Address 1	c/o Sanas.ai Inc.		
Address 2	437 Lytton Avenue, Suite 200		
City	Palo Alto	State/Province	CA
Postal Code	94301	Country ⁱ	US

Inventor 4 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Piotr		DURA	

Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service			
City	Warsaw	Country of Residence ⁱ	PL

Mailing Address of Inventor:

Address 1	c/o Sanas.ai Inc.		
Address 2	437 Lytton Avenue, Suite 200		
City	Palo Alto	State/Province	CA
Postal Code	94301	Country ⁱ	US

Inventor 5 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	David		BRAUDE	

Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service			
City	Edinburgh	Country of Residence ⁱ	GB

Mailing Address of Inventor:

Address 1	c/o Sanas.ai Inc.		
Address 2	437 Lytton Avenue, Suite 200		
City	Palo Alto	State/Province	CA
Postal Code	94301	Country ⁱ	US

Inventor 6 Remove				
Legal Name				

IPR2026-00273

Krisp Technologies EX1002 Page 4

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bajibabu		BOLLEPALLI	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Cottenham	Country of Residence ⁱ	GB	

Mailing Address of Inventor:

Address 1	c/o Sanas.ai Inc.			
Address 2	437 Lytton Avenue, Suite 200			
City	Palo Alto	State/Province	CA	
Postal Code	94301	Country ⁱ	US	
Inventor 7	Remove			

Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Alvaro		ESCUDERO	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	San Sebastian de los Reyes	Country of Residence ⁱ	ES	

Mailing Address of Inventor:

Address 1	c/o Sanas.ai Inc.			
Address 2	437 Lytton Avenue, Suite 200			
City	Palo Alto	State/Province	CA	
Postal Code	94301	Country ⁱ		
Inventor 8	Remove			

Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Gokce		KESKIN	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Mountain View	State/Province	CA	Country of Residence
		US		

Mailing Address of Inventor:

Address 1	c/o Sanas.ai Inc.			
Address 2	437 Lytton Avenue, Suite 200			
City	Palo Alto	State/Province	CA	
Postal Code	94301	Country ⁱ	US	

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Krisp Technologies EX1002 Page 5

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Inventor 9 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Ankita		JHA	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Bangalore	Country of Residence ¹	IN	
Mailing Address of Inventor:				
Address 1		c/o Sanas.ai Inc.		
Address 2		437 Lytton Avenue, Suite 200		
City	Palo Alto	State/Province	CA	
Postal Code	94301	Country ¹	US	
Inventor 10 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Maxim		SEREBRYAKOV	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Palo Alto	State/Province	CA	Country of Residence US
Mailing Address of Inventor:				
Address 1		c/o Sanas.ai Inc.		
Address 2		437 Lytton Avenue, Suite 200		
City	Palo Alto	State/Province	CA	
Postal Code	94301	Country ¹	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
☐ An Address is being provided for the correspondence Information of this application.	
Customer Number	11951
Email Address	Add Email Remove Email

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Application Information:

Title of the Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		
Attorney Docket Number	264248.000111	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	11951		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	63464432	2023-05-05
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Access Code ¹ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. ☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
--

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

[Clear](#)

☒ Assignee
 ☐ Legal Representative under 35 U.S.C. 117
 ☐ Joint Inventor

☐ Person to whom the inventor is obligated to assign.
 ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name

Mailing Address Information For Applicant:

Address 1	437 Lytton Avenue, Suite 200		
Address 2			
City	Palo Alto	State/Province	CA
Country	US	Postal Code	94301
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ¹		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Nicholas J. Gallo/		Date (YYYY-MM-DD)	2024-04-24	
First Name	Nicholas J.	Last Name	Gallo	Registration Number	60,758

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	264248.000111
		Application Number	
Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

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 the Freedom of Information Act requires disclosure of these records.
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 inspections 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.



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/644,959

RECEIPT DATE / TIME
04/24/2024 04:44:53 PM Z ET

ATTORNEY DOCKET #
264248.000111

Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 7475

FILED BY Nicholas Gallo

PATENT CENTER # 65231080

FILING DATE -

CUSTOMER # 11951

FIRST NAMED INVENTOR Shawn ZHANG

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Nicholas Gallo

Documents

TOTAL DOCUMENTS: 6

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
20240424__UTILITY__Applicati on__264248__000111- APP.TEXT.docx	23	Application body structured text document	44 KB
Warning: Bookmarks were found and have been removed.			
20240424__UTILITY__Applicati on__264248__000111.pdf	23	Auxiliary PDF of Application	177 KB
20240424__ADS__264248__000 111.pdf	11	Application Data Sheet	121 KB

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automatically loaded to other USPTO systems.

20240424_Certification_and_Request_Prioritized_Exam_264248_000111.pdf	2	Track One Request	166 KB
20240424_POA_264248_000111.pdf	2	Power of Attorney	282 KB
20240424_UTILITY_Drawings_264248_000111.pdf	8	Drawings-only black and white line drawings	397 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
20240424_UTILITY_Application_264248_000111-APP.TEXT.docx	25290E10BE398E86531AAABE028F0DF2137812B02C590C24B7234C037219D028F2FCD43AFCC3F4C1CC8656C61D58EC7B89F9056BD0CDC190A29929FB0D16D696
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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 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.

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APPLICATION #
18/644,959

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04/24/2024 04:44:53 PM Z ET

ATTORNEY DOCKET #
264248.000111

Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 7475

FILED BY Nicholas Gallo

PATENT CENTER # 65231080

AUTHORIZED BY Nicholas Gallo

CUSTOMER # 11951

FILING DATE -

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Shawn ZHANG

Payment Information

PAYMENT METHOD
DA / 500436

PAYMENT TRANSACTION ID
E20244NG46039478

PAYMENT AUTHORIZED BY
Nicholas Gallo

PRE-AUTHORIZED ACCOUNT
500436

PRE-AUTHORIZED CATEGORY

37 CFR 1.16 (National application filing, search, and examination fees); 37 CFR 1.17 (Patent application and reexamination processing fees); 37 CFR 1.19 (Document supply fees); 37 CFR 1.21 (Miscellaneous fees and charges)

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2817	REQUEST FOR PRIORITIZED EXAMINATION	1680.00	1	1680.00
2111	UTILITY PATENT APPL. SEARCH FEE	280.00	1	280.00
4011	BASIC FILING FEE- UTILITY	64.00	1	64.00
2051	SURCHARGE- LATE FILING FEE, SEARCH FEE, EXAMINATION FEE, INVENTOR'S OATH OR DECLARATION, OR APPLICATION	64.00	1	64.00

IPR2026-00273

Krisp Technologies EX1002 Page 17

FILED WITHOUT AT LEAST ONE
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2311	EXAMINATION OF ORIGINAL PATENT APPLICATION	320.00	1	320.00
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TOTAL AMOUNT:	\$2,408.00
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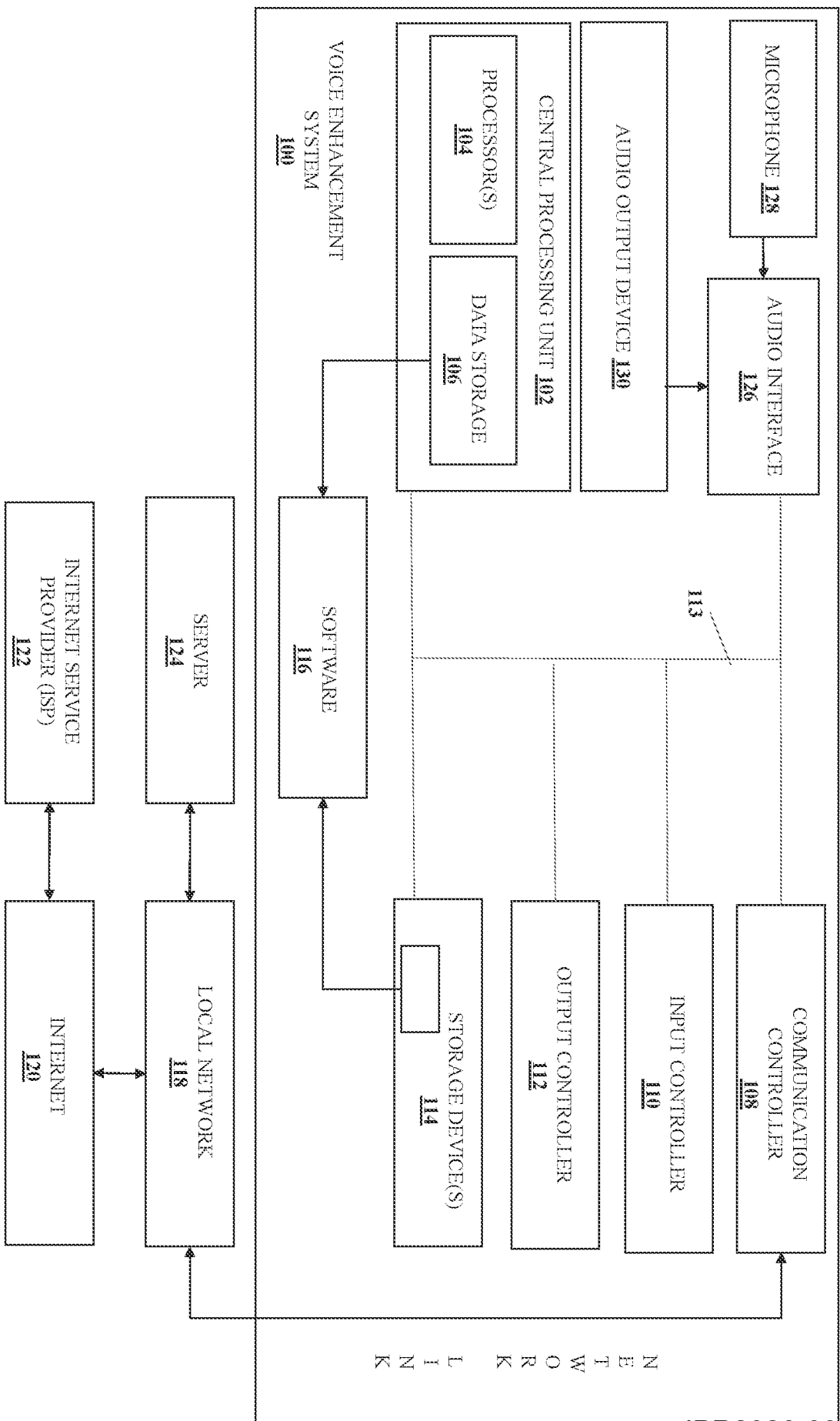


FIG. 1

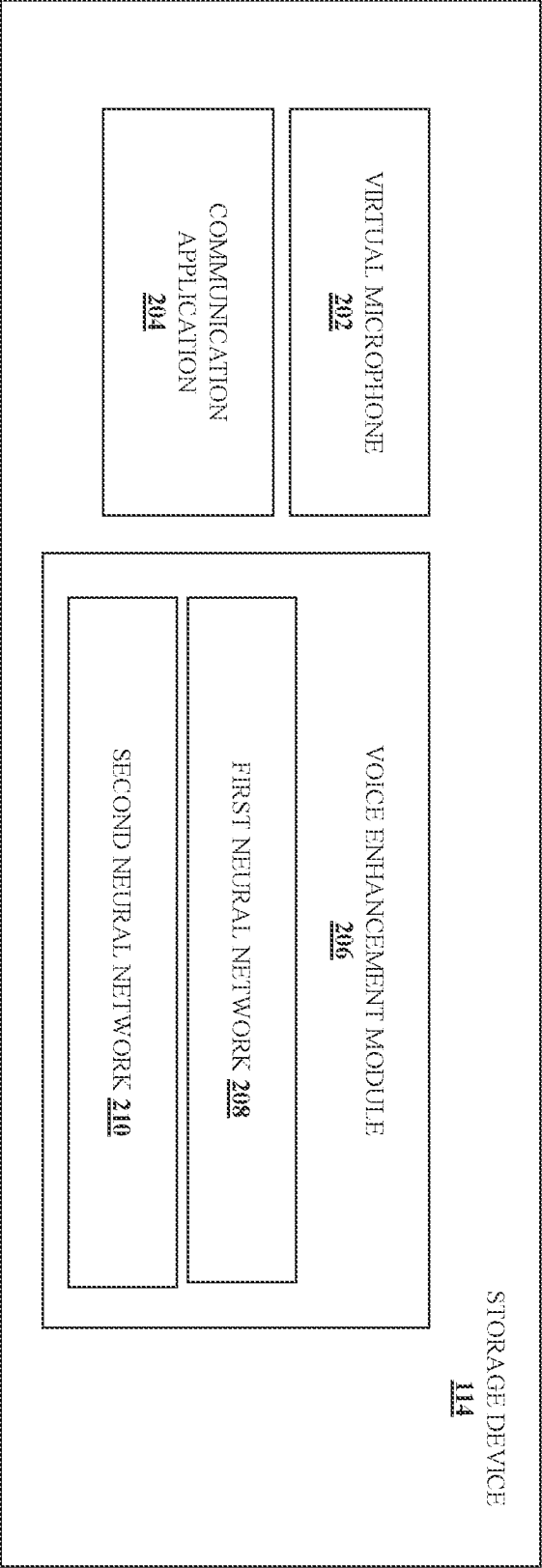


FIG. 2

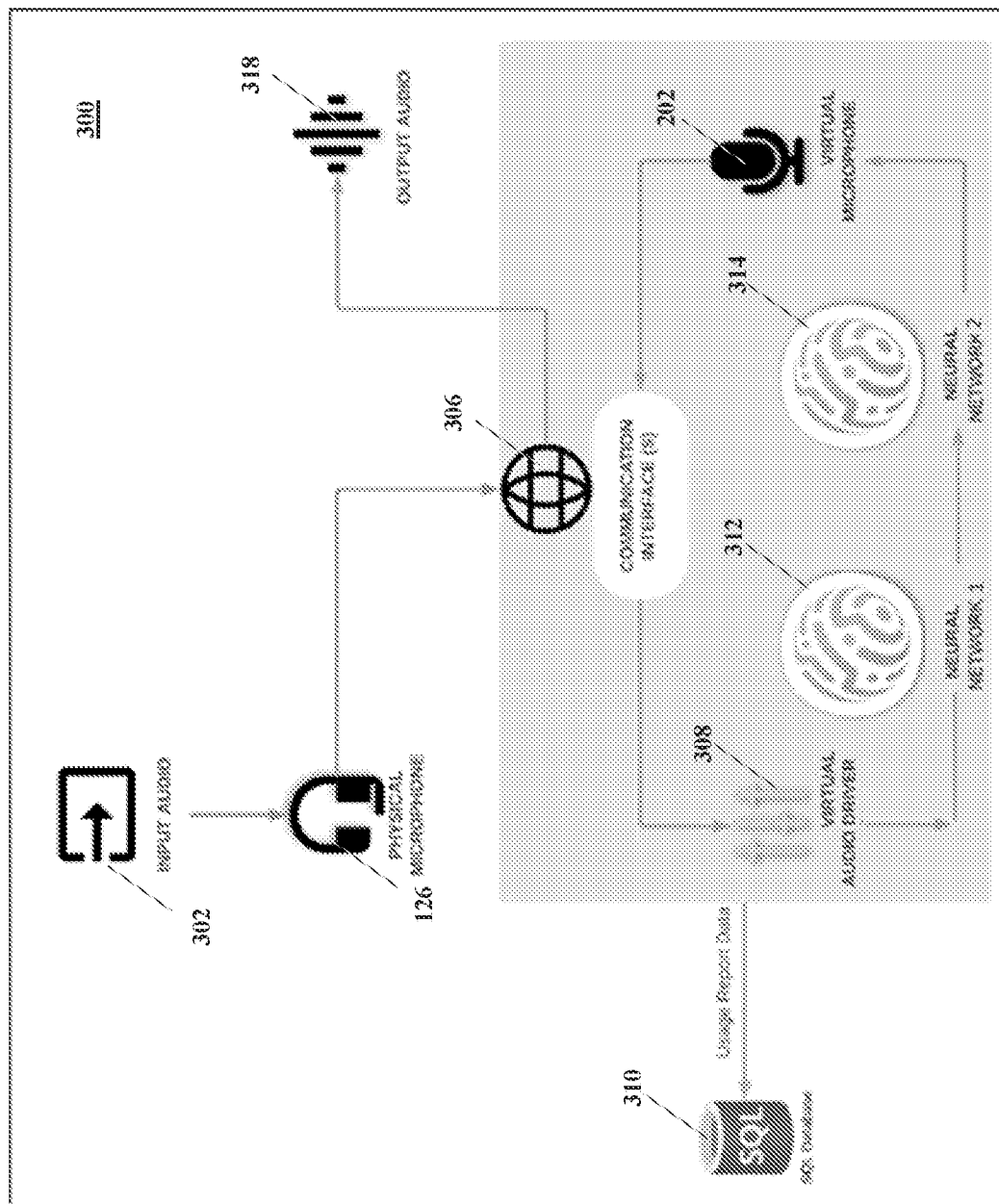


FIG. 3

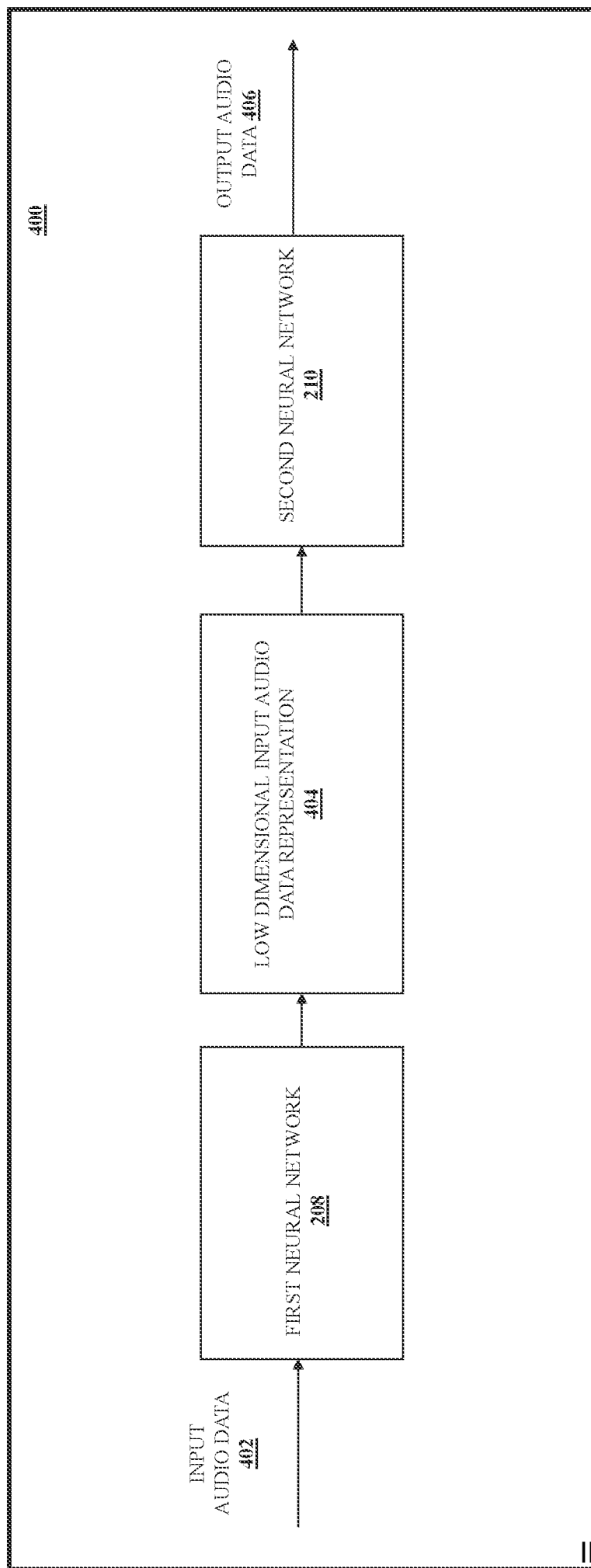


FIG. 4

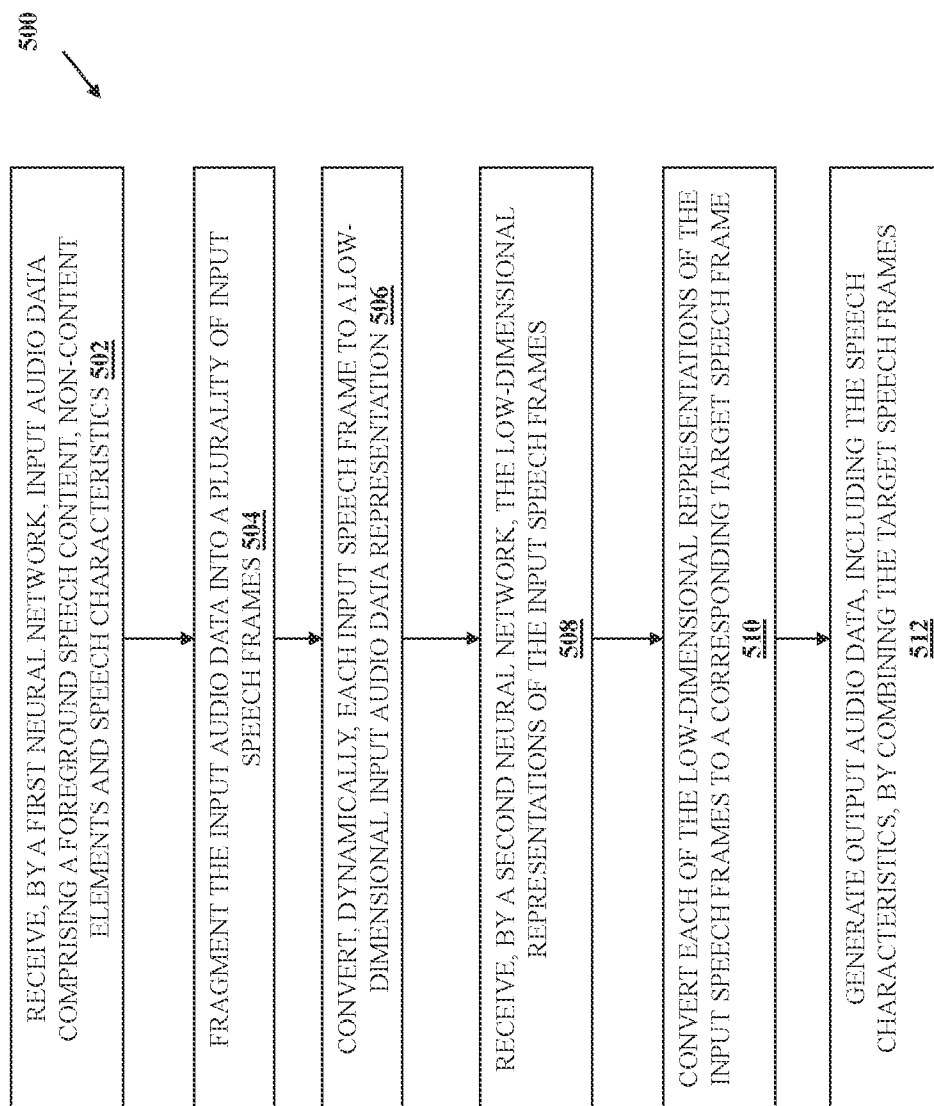


FIG. 5

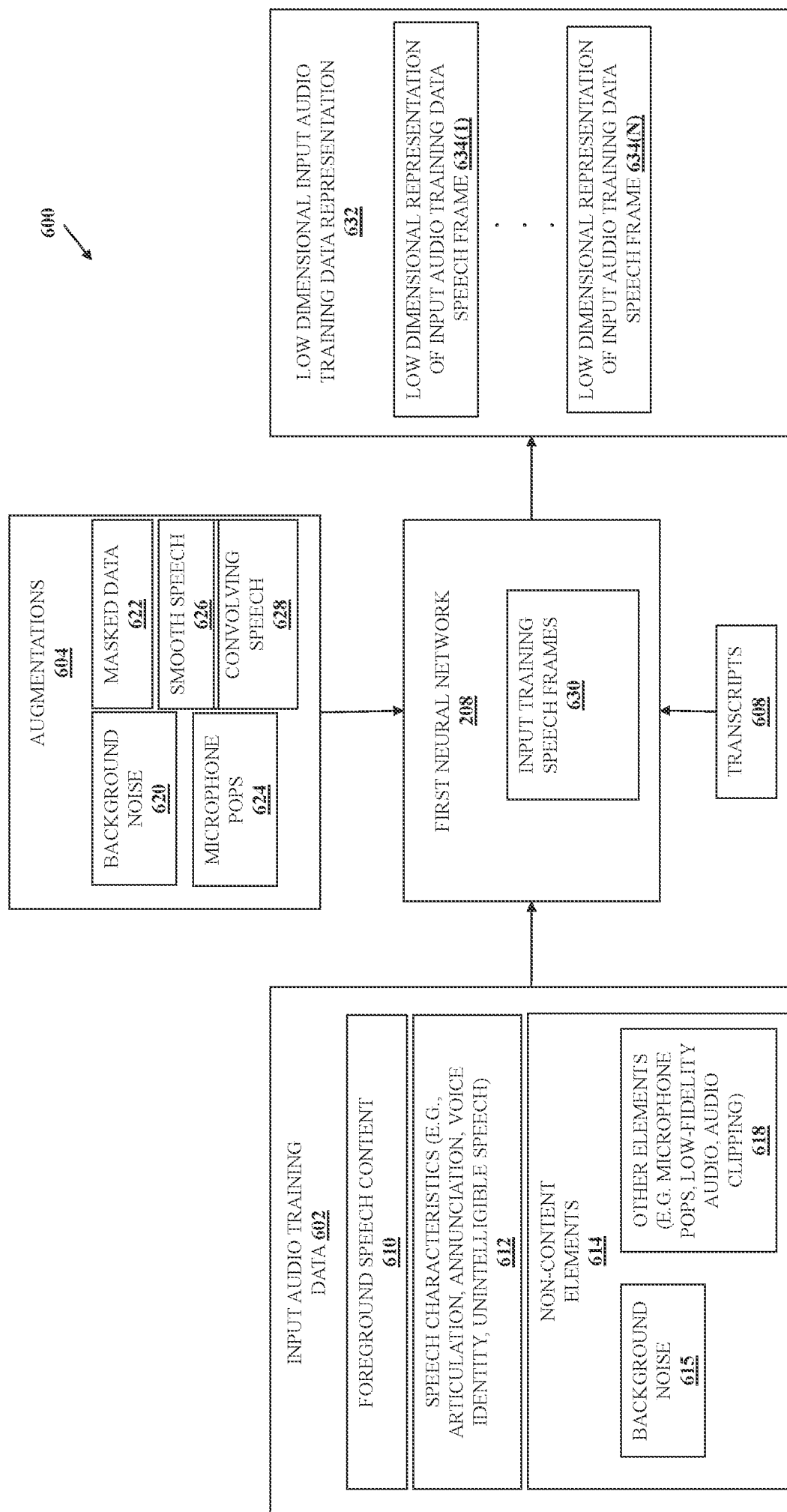


FIG. 6

700

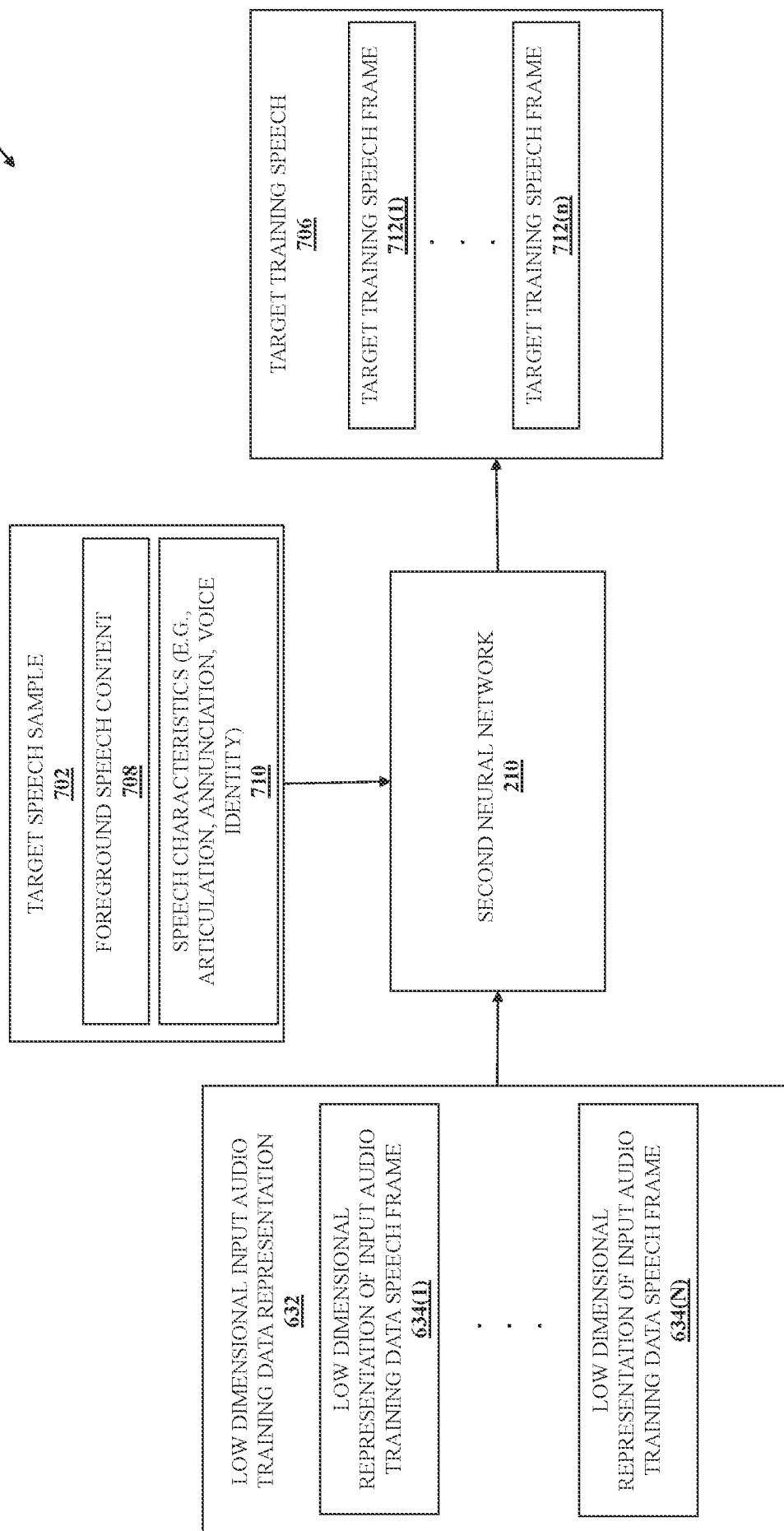


FIG. 7

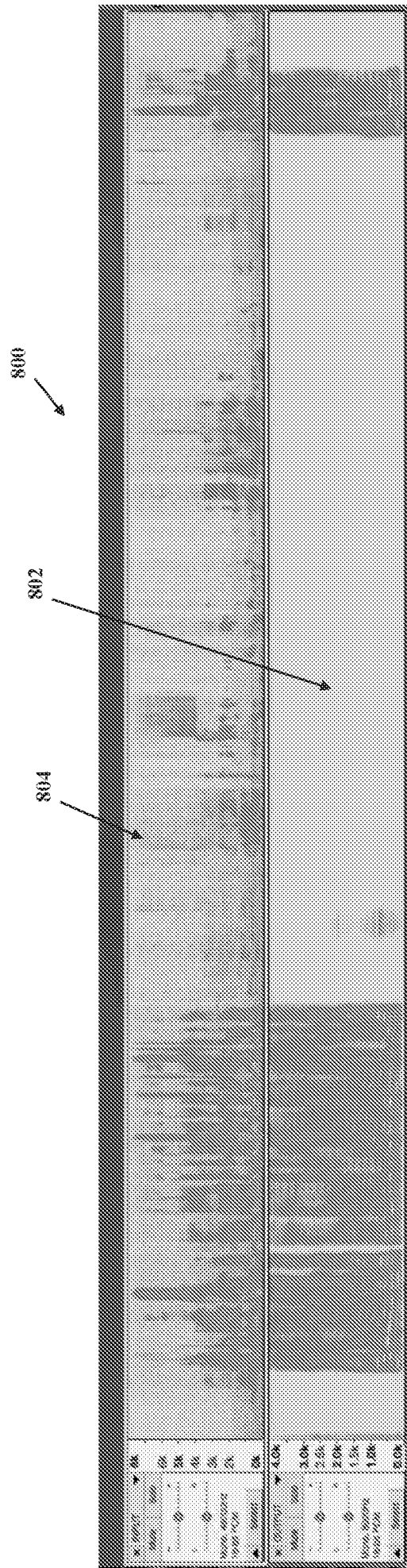


FIG. 8

**CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION
UNDER 37 CFR 1.102(e) (Page 1 of 1)**

First Named Inventor:	Shawn ZHANG	Nonprovisional Application Number (if known):	
Title of Invention:	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently \$0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.
2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.
3. The applicable box is checked below:

I. ☒ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via USPTO patent electronic filing system.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, or the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

- i. A request for continued examination has been filed with, or prior to, this form.
- ii. If the application is a utility application, this certification and request is being filed via USPTO patent electronic filing system.
- iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
- iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
- v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Nicholas J. Gallo/	Date 2024-04-24
Name (Print/Typed) Nicholas J. Gallo	Practitioner Registration Number 60758

Note: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.*

☒ *Total of 1 forms are submitted.

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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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). <https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf>

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- 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
- 8) 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));
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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	To be Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Shawn ZHANG
Title	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF
Art Unit	To be Assigned
Examiner Name	To be Assigned
Attorney Docket Number	264248.000111

SIGNATURE of Applicant or Patent Practitioner

Signature	/Nicholas J. Gallo/	Date (Optional)	2024-04-24
Name	Nicholas J. Gallo	Registration Number	60,758
Title (if Applicant is a juristic entity)	Attorney for Applicant		
Applicant Name (if Applicant is a juristic entity)	Sanas.ai Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.132, and 1.133. 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 1.11 and 1.14. This collection is estimated to take 3 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 Number	Filing Date

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11951

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Sanas.ai Inc.

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- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

Name

Maxim Serebryakov

Title

Chief Executive Officer

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

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

IPR2026-00273

TITLE: **METHODS FOR NEURAL NETWORK-BASED VOICE
ENHANCEMENT AND SYSTEMS THEREOF**

INVENTORS: **SHAWN ZHANG
LUKAS PFEIFENBERGER
JASON WU
PIOTR DURA
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ALVARO ESCUDERO
GOKCE KESKIN
ANKITA JHA
MAXIM SEREBRYAKOV**

DOCKET NO.: **264248.000111**

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 63/464,432, filed May 5, 2023, which is hereby incorporated herein by reference in its entirety.

FIELD

[0002] This technology generally relates to audio analysis and, more particularly, to methods and systems for voice enhancement using neural networks.

BACKGROUND

[0003] Many environments, such as inside of a vehicle, a bustling street, or a busy office, are susceptible to disruptive noise that can obstruct speech. The level of background noise can range from the quiet humming of a computer fan to the noisy chatter of a crowded café. This noise can not only directly hinder a listener's ability to understand speech but also lead to further unwanted distortions when the speech is processed. Voice enhancement techniques can be employed to enhance quality and clarity of speech, often with a focus on reducing noise.

[0004] In customer service roles, for example, where clear communication is essential for customer satisfaction, voice enhancement is used to improve the quality of calls and reduce misunderstandings. In the medical field, voice enhancement technology is used to enhance the quality of recordings of medical consultations, which can be useful for training and research purposes. In education, voice enhancement technology is used to help students with hearing impairments understand lectures and discussions more clearly, and there are many other use cases and applications of voice enhancement technology.

[0005] One approach for voice enhancement and noise suppression in speech signals is through speech separation, which considers all background sounds as noise.

Speech separation processing is often carried out in the short-time Fourier transform (STFT) domain. Ratio mask is another technique employed to distinguish speech signals from background noise, providing a means to diminish noise and enhance speech signals. Ratio mask leverages a representation of the signal-to-noise ratio (SNR) at each frequency band within an audio signal.

[0006] Another approach used in voice enhancement is equalization, which involves adjusting the frequency response of a speech signal to enhance its clarity and naturalness. The voice enhancement process involves regulating the level of various frequency components in the speech signal to improve the clarity of speech.

[0007] While current enhancement techniques can decrease noise and enhance the quality of the signal that is perceived, they can also distort the speech features that are necessary for speech recognition. This distortion caused by the suppression of noise can be more severe than the noise itself, which can result in inaccurate results when using automatic speech recognition (ASR) software. Additionally, current voice enhancement methods are only capable of attempting to preserve original speech audio, which can present a challenge when the original speech is unclear due to characteristics such as slurring, mumbling, or being too quiet.

[0008] For instance, a customer care representative may develop a sore throat and find it difficult to speak clearly on phone, while another representative may become fatigued and have trouble speaking clearly after extended periods of speaking on the phone. Moreover, people with speech patterns that are naturally unclear or indistinct, such as mumbling, creakiness, slurring, or quiet speech, may find that these characteristics hinder their ability to speak clearly and be easily understood. In another example, people with speech disorders, such as dysarthria or apraxia, can make it difficult for them to communicate effectively.

[0009] Since many current voice enhancement methods focus on noise removal, they have reduced effectiveness when the speech itself is not intelligible. Other current voice enhancement techniques fail to sufficiently enhance the quality, clarity, comprehensibility, and intelligibility of degraded speech signals.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The disclosed technology is illustrated by way of example and not limitation in the accompanying figures, in which like references indicate similar elements.

[0011] FIG. 1 is a block diagram of an exemplary network environment that includes a voice enhancement system.

[0012] FIG. 2 is a block diagram of an exemplary storage device of the voice enhancement system of FIG. 1.

[0013] FIG. 3 is a flow diagram of a method for real-time voice enhancement.

[0014] FIG. 4 is a flow diagram of another method for real-time voice enhancement.

[0015] FIG. 5 is a flowchart of an exemplary method for real-time voice enhancement.

[0016] FIG. 6 is a schematic diagram of an exemplary method for training a first neural network.

[0017] FIG. 7 is a schematic diagram of another exemplary method for training a second neural network.

[0018] FIG. 8 is an exemplary representation of converting a low-dimensional representation of input speech frames to target speech frames.

DETAILED DESCRIPTION

[0019] Examples described below may be used to provide methods, devices (e.g., a non-transitory computer readable medium), apparatuses, and/or systems for neural network-based voice enhancement and noise suppression. Although the technology has been described with reference to specific examples, various modifications may be made to these examples without departing from the broader spirit and scope of the various embodiments of the technology described and illustrated by

way of the examples herein. This technology advantageously improves speech clarity and intelligibility in various applications by utilizing noise suppression algorithms that more accurately estimate the background noise signal from a single microphone recording, thereby suppressing noise without distorting the target or output enhanced speech data.

[0020] Referring now to FIG. 1, a block diagram of an exemplary network environment that includes a voice enhancement system 100 is illustrated. The voice enhancement system 100 in this example includes processor(s) 104, which are designed to process instructions (e.g., computer readable instructions (i.e., code)) stored on the storage device(s) 114 (e.g., a non-transitory computer readable medium) of the voice enhancement system 100. By processing the stored instructions, the processor(s) 104 may perform the steps and functions disclosed herein, such as with reference to FIG. 5, for example.

[0021] The storage device(s) 114 may be optical storage device(s), magnetic storage device(s), solid-state storage device(s) (e.g., solid-state disks (SSDs)), non-transitory storage device(s), another type of memory, and/or a combination thereof, for example, although other types of storage device(s) can also be used. The storage device(s) 114 may contain software 116, which is a set of instructions (i.e., program code). Alternatively, instructions may be stored in one or more remote storage devices, for example storage devices (e.g., hosted by a server 124) accessed over a local network 118 or the Internet 120 via an Internet Service Provider (ISP) 122.

[0022] The voice enhancement system 100 also includes an operating system and microinstruction code in some examples, one or both of which can be hosted by the storage device(s) 114. The various processes and functions described herein may either be part of the microinstruction code and/or program code (or a combination thereof), which is executed via the operating system. The voice enhancement system 100 also may have data storage 106, which along with the processor(s) 104 form a central processing unit (CPU) 102, an input controller 110, an output controller 112, and/or a communication controller 108. A bus 113 may operatively couple components of the voice enhancement system 100, including processor(s) 104, data storage 106,

storage device(s) 114, input controller 110, output controller 112, and/or any other devices (e.g., a network controller or a sound controller).

[0023] The output controller 112 may be operatively coupled (e.g., via a wired or wireless connection) to a display device (e.g., a monitor, television, mobile device screen, touch-display, etc.) in such a fashion that output controller 112 can transform the display on the display device (e.g., in response to the execution of module(s)). Input controller 110 may be operatively coupled (e.g., via a wired or wireless connection) to an input device (e.g., mouse, keyboard, touchpad scroll-ball, touch-display, etc.) in such a fashion that input can be received from a user of the voice enhancement system 100.

[0024] The communication controller 108 is coupled to a bus 113 in some examples and provides a two-way coupling through a network link to the Internet 120 that is connected to a local network 118 and operated by an ISP 122, which provides data communication services to the Internet 120. The network link typically provides data communication through one or more networks to other data devices. For example, a network link may provide a connection through local network 118 to a host computer and/or to data equipment operated by the ISP 122. A server 124 may transmit requested code for an application through the Internet 120, ISP 122, local network 118, and/or communication controller 108.

[0025] The audio interface 126, also referred to as a sound card, includes sound processing hardware and/or software, including a digital-to-analog converter (DAC) and an analog-to-digital converter (ADC). The audio interface 126 is coupled to a physical microphone 128 and an audio output device 130 (e.g., headphones or speaker(s)) in this example, although the audio interface 126 can be coupled to other types of audio devices in other examples. Thus, the audio interface 126 uses the ADC to digitize input analog audio signals from a sound source (e.g., the microphone 128) so that the digitized signals can be processed by the voice enhancement system 100, such as according to the methods described and illustrated herein. The DAC of the audio interface 126 can convert generated digital audio data into an analog format for output via the audio output device 130.

[0026] The voice enhancement system 100 is illustrated in FIG. 1 with all components as separate devices for ease of identification only. One or more of the components of the voice enhancement system 100 in other examples may be separate devices (e.g., a personal computer connected by wires to a monitor and mouse), may be integrated in a single device (e.g., a mobile device with a touch-display, such as a smartphone or a tablet), or any combination of devices (e.g., a computing device operatively coupled to a touch-screen display device, a plurality of computing devices attached to a single display device and input device, etc.). The voice enhancement system 100 also may be one or more servers, for example a farm of networked or distributed servers, a clustered server environment, or a cloud network of computing devices. Other network topologies can also be used in other examples.

[0027] Referring now to FIG 2, a block diagram of an exemplary one of the storage device(s) 114 of the voice enhancement system 100 is illustrated. The storage device 114 may include a virtual microphone 202, a communication application 204, and a voice enhancement module 206 with a first neural network 208 and a second neural network 210, although other types and/or number of applications or modules can also be included in the storage device 114 in other examples. The virtual microphone 202 receives input audio data (e.g., digitized input audio signals) from the physical microphone 128, which is communicated to the voice enhancement module 206.

[0028] The virtual microphone 202 then receives the output of the second neural network 210 from the voice enhancement module 206, which represents output audio data including target speech that is an enhanced version of the input audio data and provides the output to the communication application 204. The communication application 204 can be audio or video conferencing or other software that provides an interface to a user of the voice enhancement system 100, for example.

[0029] Thus, the voice enhancement module 206 performs voice enhancement and/or noise suppression to convert the input audio data into the output audio data using the first and second neural networks 208 and 210, respectively. The first neural network 208 receives input audio data, fragments the input audio data into frames, and converts the frames to low-dimensional representations, also referred to as a reduced-

dimension representation, having lower dimensionality than that of the input audio data. The first neural network 208 can be trained as explained in more detail below with reference to FIG. 6.

[0030] The second neural network 210 receives the low-dimensional representations of the frames, converts the low-dimensional representations to corresponding target speech frames, and generates target speech frames, and combines the target speech frames to generate output audio data. The second neural network 210 can be trained as explained in more detail below with reference to FIG. 7. The operation of the voice enhancement module 206 is described in more detail below with reference to FIG. 5. In some examples, the virtual microphone 202 and the voice enhancement module 206 are combined within the same software application or other type of module.

[0031] Referring now to FIG. 3, a flow diagram of a method 300 for real-time voice enhancement is illustrated. In this example, a user of the voice enhancement system 100 may provide input audio 302 via analog audio signals received by a physical microphone 128 of the voice enhancement system 100 and subsequently digitized by the audio interface 126. The physical microphone 128 can be an integrated component of the voice enhancement system 100 (e.g., an onboard microphone of a laptop computer or smartphone). In other examples, the physical microphone 128 can be a wired or wireless peripheral device (e.g., a webcam or a dedicated hardware microphone) that is connected to an I/O interface of the voice enhancement system 100, and other exemplary physical microphones can also be used in yet other examples.

[0032] The digitized input audio 302 in this example is then routed from the physical microphone 128 over a communication interface 306 to a virtual audio driver 308. Advantageously, the voice enhancement may be accomplished locally on the voice enhancement system 100 in examples in which the communication interface 306 is the bus 113, which may minimize latency as compared to deployments that utilize cloud-based computing in which the communication interface 306 is the local network 118 and/or the Internet 120, for example. Optionally, usage report data can be generated and maintained in a local or remote database 310.

[0033] The digitized input audio 302 is then routed from the virtual audio driver 308 to a first neural network 208 and a second neural network 210 to enhance the voice and/or suppress the noise in the input audio 302, as described and illustrated in more detail below. The output of the second neural network 210 is a digital version of the input audio 302 converted according to the voice enhancement and/or noise suppression methods described and illustrated herein, which is provided to a virtual microphone 202 executed by the voice enhancement system 100. The virtual microphone 202 in this example uses the communication interface 306 to provide analog output audio 318 corresponding to the converted input audio 302.

[0034] Accordingly, in some examples, the software 116 that facilitates the voice enhancement and/or noise suppression may function as the virtual microphone 202 that receives the input audio 302 from the physical microphone 128 and performs voice enhancement and/or noise suppression to convert the input audio 302 into the output audio 318, as explained herein. The virtual microphone 202 then routes the converted output audio 318 via the communication interface 306 to the communication application 204 (e.g., Zoom™, Skype™, Viber™, Telegram™, etc.) executed by the voice enhancement system 100, which would otherwise receive the input audio 302 directly from the physical microphone 128 without the technology described and illustrated by way of the examples herein.

[0035] Referring now to FIG. 4, a flow diagram of another method 400 for real-time voice enhancement is illustrated. In this example, the voice enhancement system 100 applies the first neural network 208 to received input audio 302 that has been digitized to generated input audio data 402. The first neural network dynamically converts the input audio data 402 to a low-dimensional input audio data representation 404.

[0036] The voice enhancement system 100 then applies the second neural network 210 to the low-dimensional input audio data representation 404 to dynamically generate output audio data 406, which can be converted to analog signals before being output as output audio 318. The target speech of the output audio data 406 has enhanced voice and/or suppressed noise as compared to the input speech of the input

audio data 402 as a result of the application of the first and second neural networks 208 and 210, respectively. The output audio data 406 can then be output or provided, such as to the digital communication application 204, for example, as explained above.

[0037] Referring to FIG. 5, a flowchart of an exemplary method 500 for real-time voice enhancement is illustrated. In step 502 in this particular example, the voice enhancement system 100 provides to the first neural network 208 input audio data 402 including foreground speech content, one or more non-content elements, and a set of speech characteristics.

[0038] Referring to FIG. 6, a schematic diagram of an exemplary method 600 for training the first neural network 208 is illustrated. In this example, the first neural network 208 may be trained with input audio training data 602, one or more augmentations 604, and one or more transcripts 608, although additional training data can also be used in other examples. The input audio training data 602 in this example includes foreground speech content 610, a set of speech characteristics 612, and one or more non-content elements 614.

[0039] The speech characteristics 612 may include one or more of pitch, intonation, melody, stress, articulation, annunciation, voice identity, and/or unintelligible speech, for example. The unintelligible speech can be caused by one or more factors such as background noise, poor enunciation, heavy accents, language barriers and/or mumbled, creaky, slurred, and/or quiet speech, for example.

[0040] In some examples, the non-content elements 614 may include background noise 616 and other elements 618 such as microphone pops, low-fidelity audio, and/or audio clipping, although other types of background noise can also be used. The augmentations 604 may include background noise 620, masked data 622, microphone pops 624, smooth speech 626, and/or convolving speech 628, although other augmentations can also be used in other examples. The augmentations in this example are included to simulate degraded speech characteristics.

[0041] The input audio training data 602 in this example may be fragmented into a plurality of input training speech frames 630. Input training speech frames 630

may be converted dynamically to a low-dimensional input audio training data representation 632 by the first neural network 208. The low-dimensional input audio training data representation 632 may comprise multiple low-dimensional representations of input audio training data speech frames 634(1)-634(n). The low-dimensional input audio training data representation 632 may further include one or more portions of the foreground speech content 610 and/or the speech characteristics 612. Other methods for training the first neural network 208 can also be used in other examples.

[0042] Thus, the first neural network 208 may be optimized by the voice enhancement system 100 to learn a mapping between the input training speech frames and the low-dimensional input audio data training data representation 632, using techniques such as supervised learning or reinforcement learning, for example. The first neural network 208 also may be fine-tuned by the voice enhancement system 100 using additional data to improve the performance, and the hyperparameters of the first neural network 208 may be optimized to obtain improved results.

[0043] Referring back to FIG. 5, in step 504, the voice enhancement system 100 applying the first neural network 208 fragments the input audio data 402 received in step 502 into a plurality of input speech frames. In step 506, the voice enhancement system 100 applying the first neural network 208 dynamically converts each of the input speech frames fragmented in step 504 to a low-dimensional input audio data representation 404.

[0044] In some examples, the low-dimensional input audio data representation 404 comprises foreground speech content and at least one or more of the speech characteristics of the audio data received in step 502. The low-dimensional input audio data representation 404 may omit any number of the non-content elements of the audio data received in step 502 (e.g., background noise, and other elements such as microphone pops, low-fidelity audio, and audio clippings).

[0045] In other examples, the low-dimensional input audio data representation 404 generated by the first neural network 208 may be achieved by pre-processing the

input audio data 402 to remove noise and other distortions that may affect the quality of the speech signal. For example, a noise reduction algorithm may be applied to remove background noise, or a filtering technique may be used to remove high-frequency noise or pops.

[0046] Once the input audio data 402 is optionally pre-processed, features may be extracted by the voice enhancement system 100 such as by using Fourier Transform, Mel-Frequency Cepstral Coefficients (MFCC), or other techniques. These extracted features capture important characteristics of the resulting speech signal such as pitch, intonation, and formants, for example. The extracted features may be encoded by the voice enhancement system 100 into the low-dimensional input audio data representation 404 in step 506 using techniques such as Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), or other dimensionality reduction techniques, for example. The resulting low-dimensional input audio data representation 404 may capture the most important characteristics of the resulting speech signal while reducing the computational complexity of the first neural network 208.

[0047] In some examples, the low-dimensional input audio data representation 404 of the input speech may be achieved by using a hierarchical feature extraction network that extracts multiple levels of features from the input audio data 402. Each level of the network could be designed to capture different aspects of the input audio data 402, such as frequency content, temporal dynamics, and/or speech characteristics, for example. At each level of the hierarchical feature extraction network, the extracted features could be compressed into a low-dimensional input audio data representation 404 using a compression algorithm such as principal component analysis (PCA) or non-negative matrix factorization (NMF), for example.

[0048] The resulting compressed features may be passed to the next level of the hierarchical feature extraction network for further processing. This approach advantageously captures more detailed aspects of the input audio data 402 than traditional methods that rely on a single, fixed feature representation. The use of compression algorithms allows for efficient processing and storage of the feature representations, which may improve the accuracy and efficiency of real-time voice

enhancement by providing a more detailed and robust representation of the input audio data 402.

[0049] In step 508, the voice enhancement system 100 provides to the second neural network 210 the low-dimensional input audio data representation 404 generated in step 508. Referring now to FIG. 7, a schematic diagram of an exemplary method 700 for training the second neural network 210 is illustrated. The second neural network 210 may be trained using target speech sample 702 and low-dimensional representation of input training speech 704 to dynamically generate target training speech 706. The target speech sample 702 may include foreground speech content 708 and/or speech characteristics 710 (e.g., articulation, annunciation, voice identity, and/or unintelligible speech). The foreground speech content 708 and/or the speech characteristics 710 may be the same or different than the foreground speech content 610 and the speech characteristics 612, respectively.

[0050] The second neural network 210 may receive the low-dimensional input audio training data representation 632 and convert each of the low-dimensional representation of input audio training data speech frames 634(1)-634(n) to a respective corresponding one of the target training speech frames 712(1)-712(n). The target training speech 706 can include one or more of the speech characteristics 710 and can be generated dynamically by combining the target training speech frames 712(1)-712(n). Other methods for training the second neural network 210 can also be used in other examples.

[0051] In some examples, the second neural network 210 is trained to convert each of the low-dimensional representation of input audio training data speech frames 634(1)-634(n) with the respective corresponding one of the target training speech frames 712(1)-712(n) in real-time, which may be achieved using dynamic conversion. Dynamic conversion may allow for the efficient processing of the input audio data 402, ensure that the resulting target speech of the output audio data 406 may contain the desired speech characteristics, and enable real-time voice enhancement without the need for a separate conversion step.

[0052] Thus, the second neural network 210 may be initially trained using supervised learning to convert the low-dimensional representation of input audio training data speech frames 634(1)-634(n) in real-time. The second neural network 210 may be trained to learn the conversion between the low-dimensional representation of input audio training data speech frames 634(1)-634(n) and the target training speech frames 712(1)-712(n) using a loss function that minimizes the difference between the predicted and actual target speech frames, for example.

[0053] Once the second neural network 210 is trained using supervised learning, it may be further fine-tuned using an unsupervised learning approach. The second neural network 210 may be trained to learn the underlying structure of the low-dimensional representation of input audio training data speech frames 634(1)-634(n) without being provided with explicit target training speech frames, which may be achieved by training the second neural network 210 to predict future speech frames from past speech frames, without any knowledge of the target training speech frames. This training approach may help the second neural network 210 learn more robust and generalizable low-dimensional representation of input audio training data speech frames, which may be useful for converting input speech frames in real-time.

[0054] In yet other examples, diffusion probabilistic model(s), flow-based model(s), and/or generative adversarial network (GAN)-based model(s) can be used for the second neural network 210. Using diffusion probabilistic models, the second neural network 210 can be trained to iteratively refine relatively noisy input audio data 402 to generate relatively high-quality speech in the output audio data 406. Flow-based models are configured to learn transformations to map the distribution of relatively noisy input audio data 402 to relatively high-quality speech in the output audio data 406. Additionally, GAN-based models can be used to train a "discriminator" for the second neural network 210 to distinguish between relatively poor-quality speech in the input audio data 402 and relatively high-quality speech in the output audio data 406. Other types of models can also be used to train the second neural network 210 in other examples.

[0055] Referring back to FIG. 5, in step 510, the voice enhancement system 100 applying the second neural network 210 converts each frame of the low-dimensional input audio data representation 404 to a corresponding target speech frame (e.g., a frame of output audio data 406). In some examples, converting each frame of the low-dimensional input audio data representation 404 to a corresponding target speech frame may involve using unsupervised learning algorithms, such as clustering or dimensionality reduction techniques, to identify patterns and relationships within the frames of the low-dimensional input audio data representation 404 and target speech frames.

[0056] In other examples, converting each frame of the low-dimensional input audio data representation 404 to a corresponding target speech frame may involve using reinforcement learning algorithms to train the second neural network 210 to optimize the conversion process by adjusting a set of parameters in real-time based on feedback from the generated output audio data 406. This may allow the conversion process to adapt and improve over time based on the specific characteristics of the input speech and the desired speech characteristics.

[0057] In step 512, the voice enhancement system 100 applying the second neural network 210 combines the target speech frames to dynamically generate the output audio data 406 that includes the target speech and one or more of the speech characteristics received in step 502. The patterns learned in step 510 may be used in step 512 to generate the enhanced speech signal, which is also referred to herein as the output audio data 406.

[0058] Referring to FIG. 8, an exemplary representation 800 of converting a low-dimensional representation 404 of input speech frames to target speech frames is illustrated. The output or target speech 802 shown in the representation 800 and generated based on the technology described and illustrated herein, may advantageously preserve the speech characteristics and enhance the quality, clarity, comprehensibility, and/or intelligibility of degraded speech signals of the input speech 804.

[0059] Having thus described the basic concept of the invention, it will be rather apparent to those skilled in the art that the foregoing detailed disclosure is intended to be presented by way of example only and is not limiting. Various alterations, improvements, and modifications will occur and are intended for those skilled in the art, though not expressly stated herein. These alterations, improvements, and modifications are intended to be suggested hereby, and are within the spirit and scope of the invention. Additionally, the recited order of processing elements or sequences, or the use of numbers, letters, or other designations, therefore, is not intended to limit the claimed processes to any order except as may be specified in the claims. Accordingly, the invention is limited only by the following claims and equivalents thereto.

CLAIMS

What is claimed is:

1. A voice enhancement system, comprising memory having instructions stored thereon and one or more processors coupled to the memory and configured to execute the instructions to:

fragment input audio data into a plurality of input speech frames, wherein the input audio data comprises foreground speech content, one or more non-content elements, and one or more speech characteristics;

convert the input speech frames to low-dimensional representations of the input speech frames, wherein one or more of the fragmentation or the conversion is based on an application of a first neural network to the input audio data and the low-dimensional representations of the input speech frames omit one or more of the non-content elements;

apply a second neural network to the low-dimensional representations of the input speech frames to generate target speech frames; and

combine the target speech frames to generate output audio data, wherein the output audio data further comprises one or more portions of the foreground speech content and one or more of the speech characteristics.

2. The voice enhancement system of claim 1, further comprising a physical microphone and an audio output device, wherein the one or more processors are further configured to execute the instructions to:

digitize analog input audio signals obtained via the physical microphone to generate the input audio data;

convert the output audio data to analog audio output signals; and

provide the analog audio output signals to the audio output device via one or more of a virtual microphone or a communication application executed by the voice enhancement system.

3. The voice enhancement system of claim 1, wherein the non-content elements comprise one or more of background noise, microphone pops, low-fidelity audio, or audio clippings and the speech characteristics comprise one or more of pitch, intonation, melody, stress, articulation, annunciation, voice identity, or unintelligible speech.

4. The voice enhancement system of claim 1, wherein the one or more processors are further configured to execute the instructions to train the first neural network using input audio training data, one or more augmentations, and one or more transcripts, wherein the first neural network is trained to learn a mapping between input training speech frames fragmented from the input audio training data and low-dimensional representation of input audio training data speech frames.

5. The voice enhancement system of claim 4, wherein the augmentations simulate one or more degraded speech characteristics and comprise one or more of background noise, masked data, microphone pops, smooth speech, or convolving speech.

6. The voice enhancement system of claim 4, wherein the one or more processors are further configured to execute the instructions to train the second neural network using a target speech sample and the low-dimensional representation of input audio training data speech frames, wherein the second neural network is trained to use dynamic conversion to learn a mapping between each of the low-dimensional representation of input audio training data speech frames and a corresponding one of a plurality of target training speech frames.

7. The voice enhancement system of claim 1, wherein the second neural network comprises one or more of a diffusion probabilistic model, a flow-based model, or a generative adversarial network-based model.

8. The voice enhancement system of claim 1, wherein the one or more processors are further configured to execute the instructions to pre-process the input audio data by applying one or more of a noise reduction algorithm to remove

background noise from the input audio data or a filtering technique to remove high-frequency noise or pops from the input audio data.

9. The voice enhancement system of claim 1, wherein the one or more processors are further configured to execute the instructions to:

extract one or more features from the input audio data, wherein the features comprise one or more of pitch, intonation, or formants; and

encode the extracted features into one or more of the low-dimensional representations of the input speech frames using a dimensionality reduction technique.

10. The voice enhancement system of claim 9, wherein the one or more processors are further configured to execute the instructions to extract the features using a hierarchical feature extraction network comprises a plurality of levels, wherein each of the levels is configured to capture a different one or more of the features and the captured different one or more of the features are compressed at each of the levels.

11. A method for real-time voice enhancement, the method implemented by a voice enhancement system and comprising:

training a first neural network using input audio training data, one or more augmentations, and one or more transcripts and a second neural network using a target speech sample and a plurality of low-dimensional representation of input audio training data speech frames,

applying the trained first neural network to convert input speech frames fragmented from input audio data to low-dimensional representations of the input speech frames, wherein the low-dimensional representations of the input speech frames omit one or more non-content elements of the input audio data;

applying the trained second neural network to the low-dimensional representations of the input speech frames to generate target speech frames; and

combining the target speech frames to generate output audio data, wherein the output audio data further comprises one or more portions of foreground speech content of the input audio data and one or more speech characteristics of the input audio data.

12. The method of claim 11, wherein the trained first neural network is trained to learn a mapping between input training speech frames fragmented from the input audio training data and the low-dimensional representation of input audio training data speech frames.

13. The method of claim 11, wherein the augmentations simulate one or more degraded speech characteristics and comprise one or more of background noise, masked data, microphone pops, smooth speech, or convolving speech.

14. The method of claim 11, further comprising pre-processing the input audio data by applying one or more of a noise reduction algorithm to remove background noise from the input audio data or a filtering technique to remove high-frequency noise or pops from the input audio data.

15. The method of claim 11, further comprising:
extracting one or more features from the input audio data, wherein the features comprise one or more of pitch, intonation, or formants; and
encoding the extracted features into one or more of the low-dimensional representations of the input speech frames using a dimensionality reduction technique.

16. A non-transitory computer-readable medium comprising instructions that, when executed by at least one processor, cause the at least one processor to:
digitize analog input audio signals to generate input audio data;
fragment the input audio data into a plurality of input speech frames, wherein the input audio data comprises foreground speech content, one or more non-content elements, and one or more speech characteristics;

convert the input speech frames to low-dimensional representations of the input speech frames, wherein one or more of the fragmentation or the conversion is based on an application of a first neural network to the input audio data and the low-dimensional representations of the input speech frames omit one or more of the non-content elements;

apply a second neural network to the low-dimensional representations of the input speech frames to generate target speech frames;

combine the target speech frames to generate output audio data, wherein the output audio data further comprises one or more portions of the foreground speech content and one or more of the speech characteristics; and

convert the output audio data to analog audio output signals before providing the analog audio output signals to an audio output device.

17. The non-transitory computer-readable medium of claim 16, wherein the non-content elements comprise one or more of background noise, microphone pops, low-fidelity audio, or audio clippings and the speech characteristics comprise one or more of pitch, intonation, melody, stress, articulation, annunciation, voice identity, or unintelligible speech.

18. The non-transitory computer-readable medium of claim 16, wherein the instructions, when executed by the at least one processor further causes the at least one processor to train the first neural network using input audio training data, one or more augmentations, and one or more transcripts, wherein the first neural network is trained to learn a mapping between input training speech frames fragmented from the input audio training data and low-dimensional representation of input audio training data speech frames.

19. The non-transitory computer-readable medium of claim 18, wherein the instructions, when executed by the at least one processor further causes the at least one processor to train the second neural network using a target speech sample and the low-dimensional representation of input audio training data speech frames, wherein the second neural network is trained to use dynamic conversion to learn a

mapping between each of the low-dimensional representation of input audio training data speech frames and a corresponding one of a plurality of target training speech frames.

20. The non-transitory computer-readable medium of claim 16, wherein the second neural network comprises one or more of a diffusion probabilistic model, a flow-based model, or a generative adversarial network-based model.

ABSTRACT

The disclosed technology relates to methods, voice enhancement systems, and non-transitory computer readable media for real-time voice enhancement. In some examples, input audio data including foreground speech content, non-content elements, and speech characteristics is fragmented into input speech frames. The input speech frames are converted to low-dimensional representations of the input speech frames. One or more of the fragmentation or the conversion is based on an application of a first trained neural network to the input audio data. The low-dimensional representations of the input speech frames omit one or more of the non-content elements. A second trained neural network is applied to the low-dimensional representations of the input speech frames to generate target speech frames. The target speech frames are combined to generate output audio data. The output audio data further includes one or more portions of the foreground speech content and one or more of the speech characteristics.



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FILING RECEIPT



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Domestic Applications for which benefit is claimed - None.

A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/644,959**

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**** SMALL ENTITY ****

Title

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Preliminary Class

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

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Substitute for Form PTO-875

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APPLICATION AS FILED - PART I

(Column 1)		(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	64		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	280		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	320		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x	= 0	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x	= 0			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	664		TOTAL	

APPLICATION AS AMENDED - PART II

(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	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))						OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR		
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	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))						OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR		
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

IPR2026-00273



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/644,959	04/24/2024	Shawn ZHANG	264248.000111

CONFIRMATION NO. 7475

11951

Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Suite 210
Rochester, NY 14625

INFORMAL NOTICE



OC000000072333769

Date Mailed: 05/09/2024

INFORMATIONAL NOTICE TO APPLICANT

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

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

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

Shawn ZHANG
Lukas Pfeifenberger
Jason Wu
Piotr Dura
David Braude
Bajibabu Bollepalli
Alvaro Escudero
Gokoe Keskin
Ankita Jha
Maxim Serebryakov

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor must be submitted no later than the date on which the issue fee is paid in response to a notice requiring such fee. See 37 CFR 1.53(f).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/thberhe/



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Kathi Vidal

Under Secretary of Commerce for Intellectual Property and
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Derrick Brent

Deputy Under Secretary of Commerce for Intellectual Property and
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IPR2026-00273



United States Patent and Trademark Office

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Document Code:WFEE

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Sale Accounting Date:06/06/2024

Sale Item Reference Number

18644959

Effective Date

04/24/2024

Document Number

I202466028356004

Fee Code

2830

Fee Code Description

PROCESSING FEE, EXCEPT
PROV. APPLS.

Amount Paid

\$56.00

Payment Method

Deposit Account



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475
11951	7590	06/07/2024		
Troutman Pepper Hamilton Sanders LLP (Rochester)			EXAMINER	
70 Linden Oaks			CENTRAL, DOCKET	
Suite 210				
Rochester, NY 14625			ART UNIT	PAPER NUMBER
			OPAP	
			NOTIFICATION DATE	DELIVERY MODE
			06/07/2024	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@troutman.com

<i>Decision Granting Request for Prioritized Examination (Track I)</i>	Application No. 18/644,959	Applicant(s) ZHANG et al.	
	Examiner FIKIRTE A GEREMEW	Art Unit OMBL	AIA (FITF) Status Yes

1. THE REQUEST FILED 24 April 2024 IS **GRANTED** .

The above-identified application has met the requirements for prioritized examination

A. ☒ for an original nonprovisional application (Track I).

B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;

B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;

C. filing a **request for continued examination** ;

D. filing a notice of appeal;

E. filing a request for suspension of action;

F. mailing of a notice of allowance;

G. mailing of a final Office action;

H. completion of examination as defined in 37 CFR 41.102; or

I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT SPECIALIST, OMBL	
---	--

Notice of References Cited	Application/Control No. 18/644,959		Applicant(s)/Patent Under Reexamination ZHANG et al.	
	Examiner VU B HANG		Art Unit 2654	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-11868883-B1	2024-01-09	Commons; Michael Lamport	G06F40/30	1/1
*	B	US-11705147-B2	2023-07-18	Visser; Erik	G06N3/044	704/200
*	C	US-11482235-B2	2022-10-25	Hsiung; Wei Wei	G06N20/20	1/1
*	D	US-11410684-B1	2022-08-09	Klimkov; Viacheslav	G10L25/78	1/1
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
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	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 YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Issue Classification 	Application/Control No. 18/644,959	Applicant(s)/Patent Under Reexamination ZHANG et al.
	Examiner VU B HANG	Art Unit 2654

CPC						
Symbol					Type	Version
G10L	/	21	/	0232	F	2013-01-01
G10L	/	15	/	063	I	2013-01-01
G10L	/	15	/	02	I	2013-01-01
G10L	/	25	/	30	I	2013-01-01
G10L	/	15	/	22	A	2013-01-01
G10L	/	15	/	16	A	2013-01-01

CPC Combination Sets							
Symbol				Type	Set	Ranking	Version
	/		/				

NONE	Total Claims Allowed:		
(Assistant Examiner)	(Date)	20	
/VU B HANG/ Primary Examiner, Art Unit 2654	14 June 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification 	Application/Control No. 18/644,959	Applicant(s)/Patent Under Reexamination ZHANG et al.
	Examiner VU B HANG	Art Unit 2654

INTERNATIONAL CLASSIFICATION			
CLAIMED			
G10L	/	15	/ 00
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS
704	232

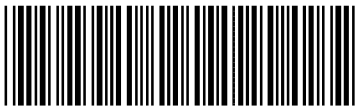
CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/VU B HANG/ Primary Examiner, Art Unit 2654 (Primary Examiner)	14 June 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification 	Application/Control No. 18/644,959	Applicant(s)/Patent Under Reexamination ZHANG et al.
	Examiner VU B HANG	Art Unit 2654

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10		19										
	2		11		20										
	3		12												
	4		13												
	5		14												
	6		15												
	7		16												
	8		17												
	9		18												

NONE	Total Claims Allowed:					
(Assistant Examiner)	(Date)	20				
/VU B HANG/ Primary Examiner, Art Unit 2654 (Primary Examiner)	14 June 2024 (Date)	<table><tr><td>O.G. Print Claim(s)</td><td>O.G. Print Figure</td></tr><tr><td>1</td><td>1</td></tr></table>	O.G. Print Claim(s)	O.G. Print Figure	1	1
O.G. Print Claim(s)	O.G. Print Figure					
1	1					

<i>Search Notes</i> 	Application/Control No. 18/644,959	Applicant(s)/Patent Under Reexamination ZHANG et al.
	Examiner VU B HANG	Art Unit 2654

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
G10L 15/16, 19/005, 19/00, 25/27, 25/30, 15/02, 15/063, 15/08, 15/07, 15/20, 15/22, 15/26, 15/30, 15/12, 21/0208, 25/78, 25/87	06/14/2024	VH

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
PE2E Search, Limited Text Search	06/14/2024	VH
NPL Search - Dialog	06/14/2024	VH
Inventor Search	06/14/2024	VH

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
G10L	15/16	06/14/2024	VH
G10L	25/30	06/14/2024	VH
G10L	15/02	06/14/2024	VH
G10L	15/22	06/14/2024	VH

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Search Notes 	Application/Control No. 18/644,959	Applicant(s)/Patent Under Reexamination ZHANG et al.
	Examiner VU B HANG	Art Unit 2654

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CONFIRMATION NO. 7475

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
18/644,959	04/24/2024	704	2654	264248.000111		
APPLICANTS Sanas.ai Inc., Palo Alto, CA;						
INVENTORS Shawn ZHANG, Palo Alto, CA; Lukas Pfeifenberger, Salzburg, AUSTRIA; Jason Wu, Santa Clara, CA; Piotr Dura, Warsaw, POLAND; David Braude, Edinburgh, UNITED KINGDOM; Bajibabu Bollepalli, Cottenham, UNITED KINGDOM; Alvaro Escudero, San Sebastian de los Reyes, SPAIN; Gokoe Keskin, Mountain View, CA; Ankita Jha, Bangalore, INDIA; Maxim Serebryakov, Palo Alto, CA;						
** CONTINUING DATA ***** ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 05/07/2024						
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and Acknowledged <u>/VU B HANG/</u> Examiner's Signature		☐ Met after Allowance VH Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 8	TOTAL CLAIMS 20	INDEPENDENT CLAIMS 3
ADDRESS Troutman Pepper Hamilton Sanders LLP (Rochester) 70 Linden Oaks Suite 210 Rochester, NY 14625 UNITED STATES						
TITLE METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF						
FILING FEE RECEIVED 0.00	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 Strategy from Dialog

June 14 2024 01:29

Search Strategy

Databases: Abstracts in New Technology & Engineering

Set#	Searched for	Results
S1	audio; first neural network; speech frame; low-dimensional representation; second neural network; speech enhancement; audio output	6°
S2	audio; first neural network; speech frame; reduced-dimensional representation; second neural network; speech enhancement; audio output	0°
S3	audio; first neural network; speech frame; filtered representation; second neural network; speech enhancement; audio output	9°
S4	audio; first neural network; speech frame; filtered; second neural network; speech enhancement; audio output	11°
S5	audio; first neural network; speech frame; noise; filtered; second neural network; speech enhancement; audio output	10°
S6	audio; first neural network; speech frame; background; filtered; second neural network; speech enhancement; audio output	7°
S7	audio; first neural network; speech frame; background; removed; second neural network; speech enhancement; audio output	12°
S8	audio; first neural network; speech frame; background; reduced; second neural network; speech enhancement; audio output	20°
S9	audio; first neural network; speech frame; background; suppressed; second neural network; speech enhancement; audio output	3°
S10	audio; first neural network; speech frame; noise; suppressed; second neural network; speech enhancement; audio output	5°
S11	audio; first neural network; speech frame; noise; reduced; second neural network; speech enhancement; audio output	30°
S12	audio; first neural network; speech frame; noise; filtered; second neural network; speech enhancement; audio output	10°
S13	audio; first neural network; speech frame; noise filtered; second neural network; speech enhancement; audio output	10°
S14	audio; first neural network; speech frame; noise removed; second neural network; speech enhancement; audio output	12°
S15	audio; first neural network; speech frame; noise suppressed; second neural network; speech enhancement; audio output	5°
S16	audio; speech frame; first neural network; low-dimension; second neural network; speech enhancement; audio output	1°

S17	audio; speech frame; first neural network; low-dimensional; second neural network; speech enhancement; audio output	7°
S18	audio; speech frame; first neural network; reduced; second neural network; speech enhancement; audio output	38°
S19	audio; speech frame; first neural network; representation; second neural network; speech enhancement; audio output	54°
S20	audio; speech frame; first neural network; second neural network; speech enhancement; audio output	68°
S21	audio; speech frame; first neural network; second neural network; audio enhancement; audio output	68°
S22	audio; speech frame; first neural network; second neural network; voice enhancement; audio output	28°
S23	audio; speech frame; first neural network; second neural network; voice enhancement; noise removed audio output	3°
S24	audio; speech frame; first neural network; second neural network; voice enhancement; noise removed; audio output	3°
S25	audio; speech frame; first neural network; second neural network; voice enhancement; noise filtered; audio output	2°
S26	audio; speech frame; first neural network; second neural network; voice enhancement; noise suppressed; audio output	1°
S27	audio; speech frame; first neural network; second neural network; voice enhancement; background suppressed; audio output	1°
S28	audio; speech frame; first neural network; second neural network; voice enhancement; background removed; audio output	3°
S29	audio; speech frame; first neural network; second neural network; voice enhancement; background filtered; audio output	2°
S30	audio; speech frame; first neural network; second neural network; speech enhancement; background filtered; audio output	7°
S31	audio; speech frame; first neural network; second neural network; speech enhancement; background reduced; audio output	20°
S32	audio; speech frame; first neural network; second neural network; speech enhancement; background removed; audio output	12°
S33	audio; speech frame; first neural network; second neural network; speech enhancement; noise removed; audio output	12°
S34	audio; speech frame; first neural network; second neural network; speech enhancement; noise reduced; audio output	30°
S35	audio; speech frame; first neural network; second neural network; speech enhancement; noise suppressed; audio	5°

	output	
S36	audio; speech frame; first neural network; second neural network; speech enhancement; noise filtered; audio output	10°
S37	audio; speech frame; first neural network; second neural network; voice enhancement; noise filtered; audio output	2°
S38	audio; speech frame; first neural network; second neural network; voice enhancement; noise reduced; audio output	15°
S39	audio; speech frame; first neural network; second neural network; voice enhancement; noise removed; audio output	3°
S40	audio; speech frame; first neural network; second neural network; voice enhancement; noise suppressed; audio output	1°
S41	audio; speech frame; first neural network; second neural network; voice enhancement; noise filtered; audio output	2°

° Duplicates are removed from the search and from the result count.

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	2420	(G10L ADJ 15/16)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 10:31 PM
L2	275	(G10L ADJ 25/27)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 10:31 PM
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L4	1094	(G10L ADJ 19/005)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY,	OR	ON	ON	2024/06/13 10:56 PM

L5	2176	(G10L ADJ 19/00)	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 10:56 PM
L6	1211	(G10L ADJ 15/07)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM
L7	2645	(G10L ADJ 15/20)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM

L8	12581	(G10L ADJ 15/22)	TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM
L9	7840	(G10L ADJ 15/26)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM
L10	4051	(G10L ADJ 15/30)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM
L11	2823	(G10L ADJ 15/02)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2024/06/13 11:02 PM

L12	3678	(G10L ADJ 15/063)	CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM
L13	3494	(G10L ADJ 15/08)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:02 PM
L14	202	(G10L ADJ 15/12)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:03 PM

L15	3656	(G10L ADJ 21/0208)	VN); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:03 PM
L16	2502	(G10L ADJ 25/78)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:03 PM
L17	560	(G10L ADJ 25/87)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:03 PM
L18	28083	(L1 OR L2 OR L3 OR L4 OR L5 OR L6 OR L7 OR L8 OR L9 OR L10 OR L11 OR L12 OR L13 OR L14 OR L15	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2024/06/13 11:04 PM

L19	20754951	OR L16 OR L17) zhang.in.	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:05 PM
L20	0	pfiefenberger.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:05 PM
L21	8451892	wu.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:06 PM

L22	722	dura.in.	JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:06 PM
L23	930	braude.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:06 PM
L24	206	bollepalli.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:06 PM
L25	3457	escudero.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2024/06/13 11:06 PM

L26	1441	keskin.in.	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:07 PM
L27	11676	jha.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:08 PM
L28	2153	serebryakov.in.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:08 PM

L29	27296165	(L19 OR L20 OR L21 OR L22 OR L23 OR L24 OR L25 OR L26 OR L27 OR L28)	IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:09 PM
L30	0	L18 AND ((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (speech ADJ frame\$1) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$3 OR remove\$3 OR eliminate\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (generate\$3 near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:22 PM

L31	0	((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data))) L18 AND ((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (speech ADJ frame\$1) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME generat\$3 SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:23 PM
L32	0	L18 AND ((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2024/06/13 11:23 PM

		(fragment\$3 OR segment\$3) SAME (speech ADJ frame\$1) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L33	0	L18 AND ((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:24 PM

		(microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))					
L34	0	L18 AND ((audio ADJ (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:24 PM

L35	0	merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data))) L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:24 PM
L36	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2024/06/13 11:25 PM

		pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME (output near3 (audio ADJ data)))	VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L37	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:25 PM

L38	0	SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME (output near3 audio)) L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME (output near3 audio))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:25 PM
L39	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO,	OR	ON	ON	2024/06/13 11:26 PM

		(((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L40	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME (transform\$3 OR convert\$3) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:26 PM

L41	0	OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1))) L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME (speech ADJ frame\$1) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:26 PM
L42	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2024/06/13 11:27 PM

		degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	IBM_TDB)				
L43	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:27 PM
L44	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2024/06/13 11:27 PM

		OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L45	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:28 PM
L46	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME ((low-dimensional OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO,	OR	ON	ON	2024/06/13 11:28 PM

		reduced-dimensional OR reduced) ADJ representation) SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L47	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ speech))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:29 PM
L48	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ speech))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:29 PM
L49	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2024/06/13 11:30 PM

		suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ speech))	HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L50	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME ((target OR enhanced) ADJ speech))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:30 PM
L51	4	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:32 PM
L52	1	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2024/06/13 11:32 PM

L53	0	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME ((target OR enhanced) ADJ speech) SAME ((filter\$3 OR omit\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)))	IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:43 PM
L54	0	((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (speech ADJ frame\$1) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (generat\$3 near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:43 PM

L55	0	((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data))) ((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (speech ADJ frame\$1) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME generat\$3 SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:43 PM
L56	0	((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2024/06/13 11:44 PM

		(fragment\$3 OR segment\$3) SAME (speech ADJ frame\$1) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L57	0	((audio near3 (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:44 PM

		(microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))					
L58	0	((audio ADJ (data OR input OR stream OR signal)) SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:44 PM

L59	0	merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data))) (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME ((combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1))) SAME (output near3 (audio ADJ data)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:44 PM
L60	0	(audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2024/06/13 11:44 PM

		degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME (output near3 (audio ADJ data)))	JPO; DERWENT; IBM_TDB)				
L61	0	(audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:45 PM

L62	0	merg\$3) near5 ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME (output near3 audio)) (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)) SAME (output near3 audio))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:45 PM
L63	0	(audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2024/06/13 11:45 PM

		degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((transform\$3 OR convert\$3) near5 (speech ADJ frame\$1)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	JPO; DERWENT; IBM_TDB)				
L64	0	(audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME (transform\$3 OR convert\$3) SAME (speech ADJ frame\$1) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:45 PM

L65	0	(speech ADJ frame\$1))) (audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:45 PM
L66	0	(audio SAME (first ADJ (neural ADJ network)) SAME (fragment\$3 OR segment\$3) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:45 PM

		representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))					
L67	0	(audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR (microphone ADJ pop)) SAME ((low- dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:46 PM
L68	0	(audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non- content ADJ element\$1) OR noise OR background) SAME (((speech OR voice) ADJ characteristic\$1) OR annunciation OR pitch OR intonation OR ((unintelligible OR degraded) ADJ speech) OR mumble OR accent OR melody OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2024/06/13 11:46 PM

		(microphone ADJ pop)) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	IBM_TDB)				
L69	0	(audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near4 (noise OR background)) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:46 PM
L70	0	(audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:46 PM

L71	0	(speech ADJ frame\$1)) (audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME ((non-content ADJ element\$1) OR noise OR background) SAME ((low-dimensional OR reduced-dimensional OR reduced) ADJ representation) SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ speech))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:46 PM
L72	0	(audio SAME (first ADJ (neural ADJ network)) SAME (foreground ADJ speech) SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ speech))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:46 PM
L73	0	(audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME (combin\$3 OR merg\$3) SAME ((target OR enhanced) ADJ speech))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:47 PM
L74	0	(audio SAME (first ADJ (neural ADJ network))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT,	OR	ON	ON	2024/06/13 11:47 PM

		SAME speech SAME (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) SAME (noise OR background) SAME (second ADJ (neural ADJ network)) SAME ((target OR enhanced) ADJ speech))	AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L75	19	(audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:47 PM
L76	2	(audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:47 PM
L77	0	(audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME ((target OR enhanced) ADJ speech) SAME ((filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2024/06/13 11:47 PM

L78	4	background))) L29 AND (L51 OR L52 OR L75 OR L76)	SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:50 PM
L79	0	L1 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/13 11:55 PM
L80	0	L18 AND (audio SAME (foreground ADJ speech) SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced OR fitered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:07 AM

L81	0	SAME ((combin\$3 OR merg\$3) near5 (speech OR frame\$1))) L18 AND (audio SAME (foreground ADJ speech) SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced OR fitered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:07 AM
L82	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced OR fitered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:07 AM
L83	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME ((low-dimensional OR reduced OR fitered) ADJ (representation OR format OR form)) SAME (second ADJ neural	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2024/06/14 01:08 AM

		ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L84	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced OR filtered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:09 AM
L85	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced OR filtered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:09 AM
L86	0	L1 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$4 OR remov\$3 OR eliminat\$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2024/06/14 01:09 AM

		OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1)	PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L87	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (speech ADJ frame\$1) SAME ((low-dimensional OR reduced OR filtered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:09 AM
L88	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME ((low-dimensional OR reduced OR filtered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:10 AM
L89	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2024/06/14 01:10 AM

		suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L90	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:10 AM
L91	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:11 AM
L92	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:11 AM
L93	0	(audio SAME (first ADJ	(US-PGPUB; USPAT;	OR	ON	ON	2024/06/14

		neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (speech ADJ frame\$1) SAME ((low- dimensional OR reduced OR filtered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				01:11 AM
L94	0	(audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME ((low-dimensional OR reduced OR filtered) ADJ (representation OR format OR form)) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:12 AM
L95	0	(audio SAME (first ADJ neural ADJ network) SAME (convert\$3 OR transform\$3) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise- suppressed OR noise- removed OR noise- reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:12 AM
L96	0	(audio SAME (first ADJ neural ADJ network) SAME (low-dimensional	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY,	OR	ON	ON	2024/06/14 01:12 AM

		OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3) SAME (speech OR frame\$1))	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L97	0	(audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)) SAME (combin\$3 OR merg\$3))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:12 AM
L98	0	(audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME ((target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) near3 (speech ADJ frame\$1)))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:12 AM
L99	0	(audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME (target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) SAME (speech ADJ frame\$1))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH,	OR	ON	ON	2024/06/14 01:13 AM

L100	14	(audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME (target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) SAME (speech OR audio OR voice))	TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB) (US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:13 AM
L101	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME (second ADJ neural ADJ network) SAME (target OR enhanced OR noise-suppressed OR noise-removed OR noise-reduced) SAME (speech OR audio OR voice))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:13 AM
L102	1	L29 AND L100	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:13 AM
L103	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2024/06/14 01:15 AM

		reduced OR filtered) SAME ((noise OR background) near4 (remov\$3 OR reduc\$3 OR filter\$3)) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L104	2	(audio SAME (first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME ((noise OR background) near4 (remov\$3 OR reduc\$3 OR filter\$3)) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:15 AM
L105	2	((first ADJ neural ADJ network) SAME (low- dimensional OR reduced OR filtered) SAME ((noise OR background) near4 (remov\$3 OR reduc\$3 OR filter\$3)) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:15 AM
L106	0	L18 AND ((first ADJ neural ADJ network) SAME (low-dimensional OR reduced OR filtered) SAME ((noise OR background) near4 (remov\$3 OR reduc\$3 OR filter\$3)) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN,	OR	ON	ON	2024/06/14 01:15 AM

		voice))	WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L107	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (transform\$3 OR convert\$3) SAME ((noise OR background) near4 (remov\$3 OR reduc\$3 OR filter\$3)) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:16 AM
L108	2	(audio SAME (first ADJ neural ADJ network) SAME (transform\$3 OR convert\$3) SAME ((noise OR background) near4 (remov\$3 OR reduc\$3 OR filter\$3)) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:16 AM
L109	4	(audio SAME (first ADJ neural ADJ network) SAME (transform\$3 OR convert\$3) SAME (noise OR background) SAME (remov\$3 OR reduc\$3 OR filter\$3) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2024/06/14 01:17 AM
L110	0	L18 AND (audio SAME (first ADJ neural ADJ network) SAME (transform\$3 OR convert\$3) SAME	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2024/06/14 01:17 AM

		(noise OR background) SAME (remov\$3 OR reduc\$3 OR filter\$3) SAME (second ADJ neural ADJ network) SAME (target OR enhanced) SAME frame SAME (speech OR audio OR voice))	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
--	--	---	--	--	--	--	--

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	4	L18 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:51 PM
N2	0	L1 AND ((udio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:52 PM
N3	0	L8 AND (((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:53 PM
N4	1	L1 AND (((audio SAME	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13

		(first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))					11:53 PM
N5	0	L11 AND (((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:54 PM
N6	2	L3 AND (((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:54 PM
N7	0	L1 AND (((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:55 PM
N8	0	L8 AND (((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))).clm.)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:55 PM

N9	0	network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background))))).clm.)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:56 PM
N10	0	L1 AND (audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:56 PM
N11	0	L11 AND ((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1))	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:57 PM
N12	0	L1 AND ((audio SAME (first ADJ (neural ADJ network)) SAME speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1).clm.)	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/13 11:57 PM

		speech SAME (second ADJ (neural ADJ network)) SAME (((target OR enhanced) ADJ speech) OR (filter\$3 OR omit\$\$ OR remov\$3 OR eliminat\$3 OR suppress\$3) near5 (noise OR background)) SAME (combin\$3 OR merg\$3) SAME frame\$1).clm.)					
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UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

11951 7590 07/05/2024
Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Suite 210
Rochester, NY 14625

EXAMINER

HANG, VU B

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 07/05/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475

TITLE OF INVENTION: METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	10/07/2024

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. 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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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

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 transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475

TITLE OF INVENTION: METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	10/07/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
HANG, VU B	2654	704-232000

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/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or 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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via the USPTO patent electronic filing system ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475
11951	7590	07/05/2024	EXAMINER	
Troutman Pepper Hamilton Sanders LLP (Rochester)			HANG, VU B	
70 Linden Oaks			ART UNIT	
Suite 210			PAPER NUMBER	
Rochester, NY 14625			2654	

DATE MAILED: 07/05/2024

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B 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 30 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.

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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).

<https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf>

Routine uses of the information in this record may include disclosure to:

- 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
- 2) a federal, state, local, or international agency, in response to its request;
- 3) a contractor of the USPTO having need for the information in order to perform a contract;
- 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
- 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
- 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
- 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
- 8) 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));
- 9) the Office of Personnel Management (OPM) for personnel research purposes; and
- 10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/644,959	Applicant(s) ZHANG et al.	
	Examiner VU B HANG	Art Unit 2654	AIA (FITF) Status Yes

-- 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 04/24/2024.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 1-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

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

Certified copies:

a) ☐ All b) ☐ Some* c) ☐ None of the:

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

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

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

* Certified copies not received: _____.

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

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

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

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

Attachment(s)

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

/VU B HANG/
Primary Examiner, Art Unit 2654

Notice of Pre-AIA or AIA Status

- The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.
- Claims 1-20 are allowed.

Allowable Subject Matter

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

The prior art of record fails to teach, disclose or suggest the claimed limitations of (in combination with all other limitations in the claim) "apply a second neural network to the low-dimensional representations of the input speech frames to generate target speech frames", as found in **Claim 1**. Similar features are claimed in **Claims 2-20**.

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 VU B HANG whose telephone number is (571)272-0582.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hai Phan, can be reached at (571)272-6338. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2654

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: <https://patentcenter.uspto.gov>. Visit <https://www.uspto.gov/patents/apply/patent-center> for more information about Patent Center and <https://www.uspto.gov/patents/docx> for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VU B HANG/

Primary Examiner, Art Unit 2654

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

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

As the below named inventor, I hereby declare that:

This declaration
is directed to:

☐

The attached application, or

☒

United States application or PCT international application number 18/644,959

filed on April 24, 2024

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

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

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

WARNING:

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LEGAL NAME OF INVENTOR

Inventor: Lukas PFEIFENBERGER

Date (Optional) : 5/9/2024

Signature: Lukas Pfeifenger

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Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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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	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF
--------------------	--

As the below named inventor, I hereby declare that:

This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number 18/644,959 filed on April 24, 2024.

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

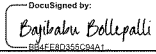
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LEGAL NAME OF INVENTOR

Inventor: Bajibabu BOLLEPALLI Date (Optional) : 5/1/2024

Signature: 

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Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

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LEGAL NAME OF INVENTOR

Inventor: David BRAUDE DocuSigned by: David Braude Date (Optional) : 5/2/2024
Signature: 786EFBD2744E417...

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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	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF
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LEGAL NAME OF INVENTOR

Inventor: Piotr DURA Date (Optional) : 5/6/2024

Signature: Piotr Dura

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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	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF
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LEGAL NAME OF INVENTOR

Inventor: Alvaro ESCUDERO DocuSigned by: Alvaro Escudero Date (Optional) : 4/30/2024

Signature: E8A6713B1725406...

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Title of
Invention

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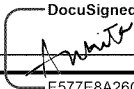
Inventor: Ankita JHA

4/30/2024

Date (Optional) :

Signature:

DocuSigned by:



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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	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF
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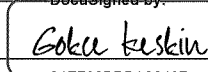
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LEGAL NAME OF INVENTOR

Inventor: Gokce KESKIN Date (Optional) : _____

Signature: 

24E702BDBA90407...

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LEGAL NAME OF INVENTOR

Inventor: Maxim SEREBRYAKOV DocuSigned by: Maxim Serbryakov Date (Optional): 5/7/2024
Signature: 24C0F320881343B...

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Title of Invention	METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF
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LEGAL NAME OF INVENTOR

Inventor: Jason WU Date (Optional) : 4/29/2024

Signature: Jason Wu

E415802B7D43451...

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LEGAL NAME OF INVENTOR

Inventor: Shawn ZHANG DocuSigned by: Shawn Zhang Date (Optional) : 4/29/2024

Signature: _____ EBF55735AED043F...

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0032. Public burden for this form is estimated to average 1 minute per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/644,959

RECEIPT DATE / TIME
07/09/2024 05:53:47 PM Z ET

ATTORNEY DOCKET #
264248.000111

Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 7475

FILED BY Mary Frances Heeks

PATENT CENTER # 66295608

FILING DATE 04/24/2024

CUSTOMER # 11951

FIRST NAMED INVENTOR Shawn ZHANG

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Nicholas Gallo

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Signed_Declarations_264248_000111.pdf	10	Oath or Declaration filed	851 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Signed_Declarations_264248_000111.pdf	D12206B348C5B552DDCA6442A833D3C7D30751F2CA4C56C1 C151495F1827A1A08AE3C05A93B3238AF731F5554674DAC79F ACC991340946605DE81C468AE9DE7C

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 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 NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
18/644,959	04/24/2024	2654	728	264248.000111	20	3

11951

Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Suite 210
Rochester, NY 14625

CONFIRMATION NO. 7475
REPLACEMENT FILING RECEIPT



0000000075280654

Date Mailed: 07/15/2024

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Shawn ZHANG, Palo Alto, CA;
Lukas Pfeifenberger, Salzburg, AUSTRIA;
Jason Wu, Santa Clara, CA;
Piotr Dura, Warsaw, POLAND;
David Braude, Edinburgh, UNITED KINGDOM;
Bajibabu Bollepalli, Cottenham, UNITED KINGDOM;
Alvaro Escudero, San Sebastian de los Reyes, SPAIN;
Gokoe Keskin, Mountain View, CA;
Ankita Jha, Bangalore, INDIA;
Maxim Serebryakov, Palo Alto, CA;

Applicant(s)

Sanas.ai Inc., Palo Alto, CA;

Power of Attorney: The patent practitioners associated with Customer Number 11951

Domestic Priority data as claimed by applicant

This appln claims benefit of 63/464,432 05/05/2023

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/07/2024

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/644,959**

Projected Publication Date: 10/30/2025

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Preliminary Class

704

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

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.

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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 (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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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 Assets Control, 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).

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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.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475
7590 07/18/2024 Troutman Pepper Hamilton Sanders LLP (Rochester) 70 Linden Oaks Suite 210 Rochester, NY 14625			EXAMINER HANG, VU B	
			ART UNIT	PAPER NUMBER
			2654	
			NOTIFICATION DATE	DELIVERY MODE
			07/18/2024	ELECTRONIC

NOTICE REQUIRING INVENTOR'S OATH OR DECLARATION

☐ An inventor's oath or declaration in compliance with 37 CFR 1.63 or substitute statement in compliance with 37 CFR 1.64 executed by or with respect to each inventor has not yet been submitted.

09 July 2024

The inventor's oath or declaration or substitute statement dated 09 July 2024 is defective. The inventor's oath or declaration does not comply with 37 CFR 1.63 or the substitute statement does not comply with 37 CFR 1.64 because it:

☐ does not include a statement that the person executing the oath or declaration or substitute statement believes the named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application for which the oath or declaration is being submitted.

☐ does not state that the application was made or was authorized to be made by the person executing the oath or declaration or substitute statement.

☐ does not acknowledge that any willful false statement made in such oath or declaration or substitute statement is punishable under section 1001 of title 18 by fine or imprisonment of not more than 5 years, or both.

☒ does not identify the person executing the oath or declaration or substitute statement by his or her legal name. Inventor 8 given name

☐ does not identify the application to which the oath or declaration or substitute statement is directed.

☒ Other: Inventor 10 docuSign obstructs printed name

The substitute statement dated _____ does not comply with 37 CFR 1.64 because it:

☐ does not identify the inventor with respect to whom the statement applies.

☐ does not identify the relationship to the non-signing inventor.

☐ does not identify the circumstances permitting execution of the statement.

☐ was signed by someone other than the applicant.

☐ Other: _____

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor **MUST** be filed **no later than the date on which the issue fee is paid**. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application. This period for reply is not extendable under 37 CFR 1.136(a).

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/644,959

RECEIPT DATE / TIME
07/18/2024 02:29:23 PM Z ET

ATTORNEY DOCKET #
264248.000111

Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 7475

FILED BY Mary Frances Heeks

PATENT CENTER # 66423435

FILING DATE 04/24/2024

CUSTOMER # 11951

FIRST NAMED
INVENTOR Shawn ZHANG

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Nicholas Gallo

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
20240718_312_Amendment_ Response_Notice_Requiring_ Inventor_Oath_264248_0001 11.pdf	1	Amendment after Notice of Allowance (Rule 312)	99 KB
Signed_SEREBRYAKOV_De c_264248_000111.pdf	1	Oath or Declaration filed	201 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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20240718_312_Amendment_Response_Notice_Requiring_Inventor_Oath_264248_000111.pdf	E2F7F81658936D891F0566AE00D8A8A7A9317DCC6AF19B20E04092066B3F69C461D91791EBA2A3018234CC9B808FBA21D227510B574A334CAD4CDE2488C2EE7E
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Signed_SEREBRYAKOV_Dec_264248_000111.pdf	094EA087E52A62ABF2A1F1C682FDCF435C613F9617033422DE4A39F5C52572ED4E7D9530B01CE3E62A06DE3341DC09561C2C8DB7B57E5DC34561C1377C9B5CDE
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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 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.

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****METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND
SYSTEMS THEREOF**

As the below named inventor, I hereby declare that:

This declaration
is directed to:☐

The attached application, or

☒United States application or PCT international application number 18/644,959filed on April 24, 2024

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

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

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

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTORInventor: **Maxim SEREBRYAKOV**

5/7/2024

Date (Optional):

Signature:

Maxim Serebryakov

24C0F320881343B...

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0032. Public burden for this form is estimated to average 1 minute per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Shawn ZHANG, et al.	)	
			)	
Applicant	:	Sanas.ai Inc.	)	Examiner:
			)	VU B HANG
Serial No.	:	18/644,959	)	
			)	
Cnfrm. No.	:	7475	)	Art Unit:
			)	2654
Filed	:	04/24/2024	)	
			)	
For	:	METHODS FOR NEURAL NETWORK-	)	
		BASED VOICE ENHANCEMENT AND	)	
		SYSTEMS THEREOF	)	

AMENDMENT AFTER ALLOWANCE UNDER 37 CFR 1.312

Mail Stop Issue Fee

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

Dear Commissioner:

In response to the Notice Requiring Inventor's Oath or Declaration dated July 18, 2024, ("Notice"), Applicant hereby submits a new Inventor Declaration for Inventor #10—**Maxim SEREBRYAKOV**—as his signature obstructed his written name on the previously-filed Inventor Declaration.

With regard to Inventor#8—**Gokce KESKIN**—the spelling of his last name is correct on the Application Data Sheet of record and on his Inventor Declaration. His name is misspelled on the U.S. Patent and Trademark Office website due to no fault of Applicant.

Therefore, Applicant respectfully requested that the Notice be rescinded and that the application remains in condition for allowance.

Respectfully submitted,

Date: July 18, 2024

/Nicholas J. Gallo/
Nicholas J. Gallo
Registration No. 60,758

Troutman Pepper Hamilton Sanders LLP
70 Linden Oaks, Suite 210
Rochester NY 14625
Telephone: 585-270-2133
Facsimile: 800-541-9525



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
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
18/644,959	04/24/2024	2654	728	264248.000111	20	3

11951

Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Suite 210
Rochester, NY 14625

CONFIRMATION NO. 7475
REPLACEMENT FILING RECEIPT



00000000/5548463

Date Mailed: 07/23/2024

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

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Inventor(s)

Shawn ZHANG, Palo Alto, CA;
Lukas Pfeifenberger, Salzburg, AUSTRIA;
Jason Wu, Santa Clara, CA;
Piotr Dura, Warsaw, POLAND;
David Braude, Edinburgh, UNITED KINGDOM;
Bajibabu Bollepalli, Cottenham, UNITED KINGDOM;
Alvaro Escudero, San Sebastian de los Reyes, SPAIN;
Gokce Keskin, Mountain View, CA;
Ankita Jha, Bangalore, INDIA;
Maxim Serebryakov, Palo Alto, CA;

Applicant(s)

Sanas.ai Inc., Palo Alto, CA;

Power of Attorney: The patent practitioners associated with Customer Number 11951

Domestic Priority data as claimed by applicant

This appln claims benefit of 63/464,432 05/05/2023

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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If Required, Foreign Filing License Granted: 05/07/2024

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/644,959**

Projected Publication Date: 10/30/2025

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Preliminary Class

704

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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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 Assets Control, 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).

SelectUSA

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 U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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 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. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

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

11951 7590 07/05/2024

Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Suite 210
Rochester, NY 14625

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 transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475

TITLE OF INVENTION: METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$480	\$0.00	\$0.00	\$480	10/07/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
HANG, VU B	2654	704-232000

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/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or 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.

Troutman Pepper Hamilton
Sanders LLP

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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

SANAS.AI INC.

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Palo Alto, CA

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

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via the USPTO patent electronic filing system ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. **500436**

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature **/Nicholas J. Gallo/**

Date **September 17, 2024**

Typed or printed name **Nicholas J. Gallo**

Registration No. **60,758**



UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/644,959

RECEIPT DATE / TIME
09/17/2024 09:35:30 AM Z ET

ATTORNEY DOCKET #
264248.000111

Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 7475

FILED BY Mary Frances Heeks

PATENT CENTER # 67200465

FILING DATE 04/24/2024

CUSTOMER # 11951

FIRST NAMED
INVENTOR Shawn ZHANG

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Nicholas Gallo

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
20240917_Issue_Fee_Transmit_2643248_000111.pdf	1	Issue Fee Payment (PTO-85B)	94 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
20240917_Issue_Fee_Transmit_2643248_000111.pdf	7968CBA65C600AC2443CB764A8114909D2DC95B7385196A0F49E264D368CA8736FEB2E285918A37FA3E228DCD7877FDC559A4F03BCC8B2C509BADBA21678DEE0

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.

IPR2026-00273

Krisp Technologies EX1002 Page 158

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for 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.



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Alexandria, VA 22313 - 1450
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #
18/644,959

RECEIPT DATE / TIME
09/17/2024 09:35:30 AM Z ET

ATTORNEY DOCKET #
264248.000111

Title of Invention

METHODS FOR NEURAL NETWORK-BASED VOICE ENHANCEMENT AND SYSTEMS THEREOF

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 7475

FILED BY Mary Frances Heeks

PATENT CENTER # 67200465

AUTHORIZED BY Nicholas Gallo

CUSTOMER # 11951

FILING DATE 04/24/2024

CORRESPONDENCE ADDRESS -

FIRST NAMED INVENTOR Shawn ZHANG

Payment Information

PAYMENT METHOD
DA / 500436

PAYMENT TRANSACTION ID
E20249G036136944

PAYMENT AUTHORIZED BY
Mary Frances Heeks

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2501	UTILITY ISSUE FEE	480.00	1	480.00
TOTAL AMOUNT:				\$480.00

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.

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IPR2026-00273

Krisp Technologies EX1002 Page 160

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.



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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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	10/22/2024	12125496	264248.000111	7475

11951 7590 10/02/2024
Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Suite 210
Rochester, NY 14625

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at <https://patentcenter.uspto.gov/>. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at <https://certifiedcopycenter.uspto.gov/index.html>. The Certified Copy Center may be reached at (800)972-6382.

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

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

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

Applicant will be able to obtain more detailed information by accessing the Patent Center (<https://patentcenter.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 Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional inventors):

Shawn ZHANG, Palo Alto, CA;
Lukas Pfeifenberger, Salzburg, AUSTRIA;
Jason Wu, Santa Clara, CA;
Piotr Dura, Warsaw, POLAND;
David Braude, Edinburgh, UNITED KINGDOM;

APPLICANT(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional applicants):

Sanas.ai Inc., Palo Alto, CA;

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](https://selectusa.gov).



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/644,959	04/24/2024	Shawn ZHANG	264248.000111	7475
11951	7590	10/22/2024		
Troutman Pepper Hamilton Sanders LLP (Rochester)			EXAMINER	
70 Linden Oaks			HANG, VU B	
Suite 210				
Rochester, NY 14625			ART UNIT	PAPER NUMBER
			2654	
			NOTIFICATION DATE	DELIVERY MODE
			10/22/2024	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@troutman.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
18/644,959	22-Oct-2024	12125496

Troutman Pepper Hamilton Sanders LLP (Rochester)
70 Linden Oaks
Rochester, NY 14625

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at <https://patentcenter.uspto.gov>

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit <https://www.uspto.gov/electronicgrants>