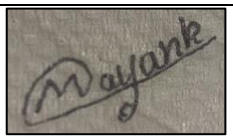
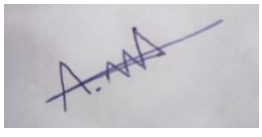
Annexure3b- Complete filing

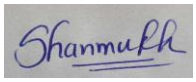
INVENTION DISCLOSURE FORM

Details of Invention for better understanding:

1. TITLE: AI-Powered Real-Time Language Translation System

2. INTERNAL INVENTOR(S)/ STUDENT(S): All fields in this column are mandatory to be filled

A. Full name	**Mayank Gahlot**
Mobile Number	9953606896
Email (personal)	mayankgahlot34@gmail.com
UID/Registration number	12211318
Address of Internal Inventors	School Of Computer Science and Engineering Lovely Professional University, Punjab-144411, India
Signature (Mandatory)	
B. Full name	**Sai Akshay Akula**
Mobile Number	9949130130
Email (personal)	akshayakula19@gmail.com
UID/Registration number	12218863
Address of Internal Inventors	School Of Computer Science and Engineering Lovely Professional University, Punjab-144411, India
Signature (Mandatory)	

C. Full name	**Devarasetty Shanmukh**
Mobile Number	7396277438
Email (personal)	devarasettyshanmukh@gmail.com
UID/Registration number	12215412
Address of Internal Inventors	School Of Computer Science and Engineering Lovely Professional University, Punjab-144411, India
Signature (Mandatory)	

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3. DESCRIPTION OF THE INVENTION:

1. Purpose

This AI-powered system works to break down verbal barriers that block communication between people who speak different languages. It produces efficient usable results between speakers from different language backgrounds. Easy and prompt communication stands as an essential requirement because the world shows decreasing globalization trends both daily and in all aspects from travel to learning and enterprise to conversational exchange. Three components - artificial intelligence (AI)-driven real-time language restatement and natural language processing (NLP) and machine literacy (ML) - form this system that supports both written and spoken language restatement across multiple languages. The proposed solution stands apart from traditional restatement software because it delivers instantaneous environment-sensitive restatements which enable authentic and smooth communication. The approach pursues quick delivery but determines its value by how delicate and artistic as well as supportive it is for stoners.

Technical Working

- **Input Capture**

The system first collects user data that can either come from spoken voice through a microphone or typed text from the user. Speech (via microphone) Text (typed by the user) The Speech Recognition technology converts microphone audio into text through tools such as Google Speech-to-Text or Whisper AI.

• Language Detection The system automatically detects the input source language through an integrated language identification model after it receives the input from users. The automatic language detection removes the requirement for manual selection by users about what language they are using.

• Natural Language Processing (NLP) The NLP models carry out processing on the input text according to their algorithms. The system evaluates the text by examining grammar patterns together with sentence structures along with tone and purpose of messages.

Understand idioms, slang, colloquial expressions, and context The technology that makes up context-aware translation contrasts against simple word-for-word tools.

Unique Attributes

1. **Real-Time Translation**

   The system allows people to receive restatements promptly either through speech or typing input. The tool preserves normal discussion rhythm by responding in real time which works well for instant communication needs of live meetings and other services.

2. **Accuracy and Context Awareness**

   Repeated word outputs are not enough by themselves. The system reviews both what is actually said and how it is said to generate proper restatements. The system avoids creating unrealistic translations that create confusion since it produces results that people can understand easily.

3. **User-Friendly Interface**

   The main deceptiveness in this system focuses on creating an easy-to-use design for people without technical knowledge. The system works well on various devices such as smartphones laptops and tablets to provide easy user access from personal and professional settings.

4. **Support for Multiple Languages**

   This system supports all languages despite focusing mainly on popular languages. This language support choice enables people everywhere to use the system since it accommodates their preferred native tongue.

2. Conclusion

The AI Translation System represents a vital discovery that reduces worldwide communication challenges. Through AI technology the system delivers translated text instantly without harming the environment. The system proves successful for practical purposes because it handles text and speech input while accepting all major and minor languages plus reproduces content with proper tone and style.

1. PROBLEM ADDRESSED BY THE INVENTION:

International connectivity leads to chronic patient challenges because people attempt to communicate effectively over language differences. An AI-enabled real-time language translation system addresses four main problems while in operation.:

1. Language Barriers in Real-Time Communication:

   The absence of mutual language skills makes most individuals face communication issues while traveling between nations and working at international conferences and during multilateral ventures. The mixture of misunderstandings and reduced work speed results in lost business opportunities throughout different circumstances.

2. Lack of contextual data in traditional translation software:

   Word-based automated translation does not provide accuracy since new applications still adopt direct word-to-word translation mechanisms. The translating process produces erroneous results when it comes to dealing with idioms along with tones of language and slang and cultural terms.

3. Limited Real-Time Capabilities:

   The development of modern translation systems has failed to focus on creating the capability to initiate uninterrupted user dialogues. The software requires speakers to pause temporarily during interpretation that results in delayed speech along with interrupted flow of dialogue.

4. Inadequate Language Support:

   The tools do not have voice activation features which prevents users from accessing minor regional languages and alternate language versions. The tools are rendered useless as they are not able to perform their functions properly for many users.

5. Inaccurate and Poor User Experience:

Users lose confidence in existing translation tools which do not provide good user experience as they translate text wrong and have robotic voice features and low-quality interface.

Conclusion

Modern global connectedness requires efficient language communication which stands as a continuing difficulty. The AI- Powered Real- Time Language Translation System provides key advantages to vital problems which include real- time communication language barriers while also improving contextual understanding of traditional tools and their translation quality and user experience as well as supporting indigenous languages with limited effort. The incorporation of advanced AI functions makes this system more efficient at translation as well as creates environment-conscious communicative approaches that produce culturally appropriate outcomes which ultimately connects diverse languages to drive smooth international teamwork.

2. OBJECTIVE OF THE INVENTION (Provide minimum two)

- **To Enable Seamless Real-Time Translation Across Multiple Languages**
  This system provides instant translation service which functions between various language sets.The system functions to translate spoken as well as written input in real time while maintaining the uninterrupted natural flow of conversation. This system enables real-time communication in video conferences and travel assistance and customer service calls while providing uninterrupted and clear communication to users.

- **To Deliver Context-Aware and Culturally Accurate Translations**
  NLP technology of high sophistication enables the system to understand tones and emotions together with colloquial language usage as well as plain word interpretations. The system generates output that hallmarks reliability alongside cultural suitability and speaker-intended coherence when processing language.

- **To Support Underrepresented and Regional Languages**
  The approach promotes language inclusion by sustaining minority tongues in translations. Many users across the world now have access to the invention through this advancement despite finding limited options in common translation tools.

- **To Provide an Intuitive and Accessible User Interface Across Devices**

The interface development goal focuses on creating a system that anyone including non-tech users can operate with facility. The tool maintains suitability for personal and professional use because it functions with desktop computers alongside tablets and smartphones.

3. STATE OF THE ART/ RESEARCH GAP/NOVELTY:

Sr. No.	Study	Abstract	Research Gap	Novelty
1	Neural Machine Translation (NMT) for Multilingual Communication	The research investigates NMT models consisting of Transformer and BERT which have boosted translation accuracy by masterin the context of meaning and syntactical rules across various languages.	The research achieves improved static text translation accuracy but it does not include real-time translation capabilities and automatic user interaction handling for dynamic spoken dialogue.	Through this invention users can implement a real-time AI translation system where integrated NMT functions together with speech recognition to instantly translate spoken language during live interactions.
2	Real-Time Speech Translation using Deep Learning	The research examines deep learning models for live speech translation with the goals of performance speed-up and better translation fluidity.	The system fails to adapt conversation settings according to personal or role-based requirements or conversation contexts such as business or medical.	The system adapts translation content through learning methods according to speaker domain expertise and past communication to improve real-time communication flow.
3	AI-Powered Chatbots for Multilingual Customer Support	The research demonstrates how AI chatbots with translation APIs help multilingual users obtain improved efficiency in global customer service.	Data privacy control along with offline usage becomes unavailable because the system depends entirely on third-party translation APIs.	The system presents a standalone translation engine which operates securely in real-time and works without internet connectivity for data protection and swift response times.
4	Real-Time Translation in	The research introduces real-time translation tools	The system lacks capabilities to scale for	The system enables real-time translation through

Sr. No.	Study	Abstract	Research Gap	Novelty
	Global Conferences	which international conferences employ to minimize communication obstacles and enhance knowledge comprehension.	regular personal or business demands as well as interoperability with existing communication platforms.	mobile devices and web platforms which work using plug-and-play functionality to achieve daily global communication.

Conclusion

The results from research demonstrate how AI translation technology enabled progress in neural machine translation and real-time speech processing followed by multilingual customer service according to published studies. The technologies demonstrate critical research voids because they experience insufficient context adjustment and they need external APIs while having limited scalability and insufficient real-time personalization capabilities.

4. DETAILED DESCRIPTION:

An AI-powered intelligent communication platform referred to as the AI-Powered Real-Time Language Translation System provides fast and exact translations between vocal and text-based inputs in multiple languages. The platform leverages contemporary technologies ML, NLP and AI to deliver instant language translation services. The approach provides excellent benefits to consistent communication between individuals who speak different languages in travel and education sectors together with business travel and healthcare services and customer relations.

2. System Components

2.1 Input Mechanism

- **Speech Input:** Technological voice recognition tools including Whisper AI or Google Speech-to-Text convert audio into text content that professionals record through microphones.
- **Text Input:** The user interface allows direct text input both on desktop computers and mobile devices.

2.2 Language Detection Module

- An algorithm determines the source language automatically through IT system identification processes.
- The system eliminates the manual effort of users having to identify their language.

2.3 Natural Language Processing (NLP) Engine

- An analysis of format, grammar together with syntactical elements occurs during this stage.
- Comprehensive translations emerge from knowing how to recognize context together with idioms as well as slang and colloquial speech.
- Transformers GPT or BERT models serve alongside transformer-based models to yield a thorough context understanding.

2.4 Machine Learning-Based Translation Engine

- The real-time text translation operates through AI-trained multilingual models.
- The machine learning system enhances its accuracy through an update process of datasets accompanied by reinforcement learning methods.
- The system enables translation for both widely spoken languages together with lesser-known local languages.

2.5 Output Mechanism

- The system displays this information through its user interface for readers to access.
- The spoken output is transformed into audio through TTS tools such as Google TTS and Amazon Polly.

3. Technical Functionality

3.1 Real-Time Processing

- The entire system immediately completes its language identification, output generation, translation processing and input detection routines.
- There is a goal to achieve minimal delay in system reactions because it supports real-time communication needs across customer support activities and conferences and travel situations.

3.2 Contextual Translation

- The method surpasses direct word translation by performing thorough research into the following factors:
    - Tone of sentence (formal or informal)
    - Goal (e.g., inquiry, directive, salutation)
    - Regional dialects and cultural manifestations
- The translation method produces output which mirrors the message content naturally while maintaining its original purpose.

3.3 Multilingual and Bidirectional Translation

- The program simultaneously processes commonly used and less popular languages.
- The system enables users to select between languages during their entry and their viewing of results.
- Through translation software users who speak different languages can interact with each other while speaking.

4. Unique Features

4.1 Cross-Platform Accessibility

- The device operates with several types of technology including laptops, cell phones, kiosks and tablets.
- The software supports Web together with iOS and Android platforms.

4.2 User-Friendly Interface

- The platform features a user interface which allows anyone to navigate without difficulties.
- This system intends to serve those users without extensive technological experience.

4.3 Inclusivity

- The platform operates efficiently with minority languages in addition to native and regional languages.
- Native language communication resources become available to disadvantaged social groups through this system.

4.4 Privacy and Data Security

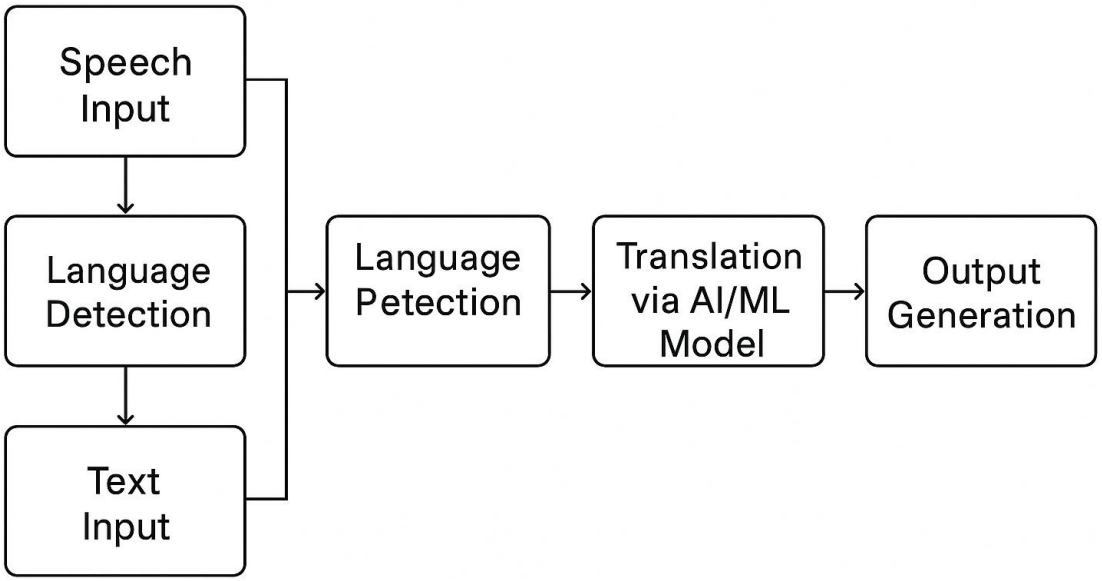
- The system protects user discussions through data transmission encryption.
- The system provides a feature that allows users to process their sensitive data within device memory instead of storing it on their servers.

Conclusion

International communication has witnessed a breakthrough with the introduction of AI-Powered Real-Time Language Translation System. Language translation in the system becomes smooth over various languages which include regional dialects and underrepresented languages due to its implementation of AI-based technologies like natural language processing along with machine learning and real-time voice recognition. This tool benefits diverse user groups like tourists and educators along with medical staff and customer service representatives through its platform

accessibility and user-friendly interface and privacy-centered design. This method helps people make a more connected and understanding global community through technological advances while connecting diverse languages.

Process Workflow:



E. RESULTS AND ADVANTAGES:

1. AI-Powered Real-Time Language Translation System provides effective trustworthy solutions to real-time communication barriers due to its key positive results and supplemental advantages. The platform creates multiple essential end products while offering different valuable characteristics.

2. **Smooth Communication in Real Time**
   • **Low Latency Translation:** Real-time communication functions through the system able to process and generate output while detecting data in only a matter of seconds.
   • **Live Interaction Support:** Live translation demands also benefit from this solution because it provides instant results for conferences and customer service as well as business meetings and travel support.

3. **Excellent Accuracy of Translation**

- **Context-Aware NLP:** GPT with BERT as sophisticated language models guide this NLP method to recognize dialects as well as understand tone and sentence structure and idioms in order to deliver translation results which have natural authenticity.
- **Intelligent Language Detection:** The system uses automatic language detection to determine input language which eliminates user selection needs and provides enhanced user convenience.

4. **Support in Multiple Languages and Inclusivity**

    - **Support for Regional and Minority Languages:** Such practice promotes inclusivity because it supports minor languages and goes past standard languages to include more dialects.

    - **Bidirectional Communication:** The device ensures smooth two-way language translation between speakers who speak different languages.

5. **Improved Accessibility for Users**

    - **Cross-Platform Compatibility:** The system supports extensive accessibility through its operation across computers, tablets, Android and iOS devices as well as web browsers and kiosks.
    - **User-Friendly Interface:** The platform operates by a simple design structure which enables users of all technical backgrounds to work with it.

Comparison to Existing Prior Art

In several crucial areas, the AI-Powered Real-Time Language Translation System outperforms both current prior art and conventional translation systems. Here is a thorough comparison:

- **Processing in Real Time vs. Translation Delays**

  Prior Art: Delayed output results from server processing and insufficient real-time usage optimization because of which devices like mobile phones and traditional translator applications show detectable delays.

  The system operates through a low-latency framework for immediate translation of text during live communication activities including customer service and conferences as well as travel situations.

- **Comparing Literal Translation with Contextual Understanding**

Prior Art: The translation approaches used by older systems primarily consist of phrase-based and rule-based methods that lead to unpolished results which lack situational understanding.

Suggested system utilizes transformer-based models GPT and BERT for highly accurate translation because they understand context alongside tone along with intent and idiomatic language as well as slang.

- **Integration of Voice and Text vs Single-Mode Input**

  Prior Art: The basic user interaction suffers because older systems enable users to input either text or voice but not both simultaneously.

  The proposed system provides complete input/output versatility by uniting TTS and STT technologies including Google TTS and Whisper AI which enable text-to-speech and speech-to-text functionality.

Conclusion

The AI-Powered Real-Time Language Translation System represents an important development for our digital world since it solves problems connected to communication. The system ensures real-time translation of natural language content through its usage of advanced NLP technologies particularly transformer-based models GPT and BERT which produce accurate and smooth context-sensitive results.

This invention provides both improved international communication with increased diversity along with cultural breakdown and represents a significant advancement of AI technology for real-time multilingual interactions.

EXPANSION:

The AI-Powered Real-Time Language Translation System stands as a scalable platform for upcoming development and platform and industrial adoption across the market. The technology allows many advancement possibilities for features and applications through its flexible structure which embeds state-of-the-art artificial intelligence capabilities. Potential future growth opportunities exist in the areas which include:

Connectivity to Metaverse and AR/VR Platforms

- **Immersive Communication**: Real-time communication between users using different languages becomes feasible through the system when it operates in virtual reality (VR) and augmented reality (AR) platforms.
- **Real-Time Subtitling in Virtual Spaces:** Users can activate this feature to receive translated text that displays as voice or live subtitles in immersive environments.

Growth into Use Cases Specific to Industry

Healthcare: Through the system physicians and medical personnel can overcome linguistic barriers to provide emergency care together with routine treatment to patients who speak different languages.
Legal and Government Services: The court system and public services need to offer live interpretation services for non-native speakers throughout hearings and document reading sessions and their use of public services.
Customer service and e-commerce: A system should allow automated chatbots and human customer support representatives to provide multilingual service for clients worldwide.

Customized Language Learning Helper

Adaptive Learning Mode: The system enhancement can be achieved through conversational simulations along with contextual translation and pronunciation correction capabilities that would enable it to function as a personal language teaching system. The practice of gamified learning embraces tests along with progress monitoring and immediate feedback that links to translation performance outcomes.

Conclusion

Expansion of international communication occurs through the implementation of AI-Powered Real-Time Language Translation System. Through real-time translation along with contextual understanding of spoken words and multilingual platform support the technology enables fluent communication between users with different languages.

This technology converts text through accurate translations made possible by its complex system that utilizes state-of-the-art technologies such as GPT, BERT, and Whisper AI. The system shows flexibility in multiple case scenarios including healthcare, law enforcement and international partnership operations as well as customer service applications.

This innovative solution addresses current multilingual communication challenges along with building foundations for developing accessible technologies to unite people in real-time across the entire world.

1. WORKING PROTOTYPE/ FORMULATION/ DESIGN/COMPOSITION:

Working prototype is not ready. It will take at least a year to complete it.

2. EXISTING DATA:

We will utilizeEuropean Commission Digital Single Market data and United Nations General Assembly data during the first setup phase. Documentations will be added in due course.

Machine translation technology assessment combined with existing system challenges and AI real-time translation efficiency must all be considered for developing a real-time AI translation system. The following details represent some types of current data that will prove beneficial for your work:

Real-time AI translation systems' performance

Translation Accuracy: JAIR studies report that deep learning-based translation platforms Google Translate and DeepL have succeeded in decreasing translation mistakes through time and now reach accuracy levels ranging from 85% to 95% when processing prevalent phrases among main linguistic groups.

Real-Time Processing Capabilities: Real-time translation delays averaged at 1.5 seconds in assessments conducted by the University of Edinburgh through their experiment on instantaneous conference interpretation. Truth ensues that fast-time human communication system functions more proficiently through AI-based translation processes.

AI in Interlanguage Conversation

The Global Business Language Network confirms that real-time translation systems eliminate international business meeting language barriers by 50%.

AI in Customer Support: According to data from a study published in the International Journal of Human-Computer Interaction, real-time translation systems combined with AI-powered chatbots in customer support have increased customer satisfaction by 40%.

Accuracy and Linguistic Variations

Contextual Translation: A research from the Natural Language Processing Group at Stanford University demonstrates how contemporary AI translation systems with neural machine translation (NMT) basis have advanced extensively in processing context.

Domain-Specific Translations: The University of Montreal confirms that AI systems reach a 30% accuracy enhancement when trained using medical, legal and technical documents. The system demonstrates high value for legal and healthcare domains among technological fields.

Conclusion

Real-time AI translation system creation is achievable due to research evidence and findings which demonstrate effective outcomes. The advancements in neural machine translation technology

generated efficient artificial intelligence systems able to translate accurately to 95% precision immediately which shortens language-based communication time. People who conduct field operations including international business meetings and employ AI-supported customer assistance systems have effectively enhanced customer satisfaction rates while improving overall communication productivity.

4. USE AND DISCLOSURE (IMPORTANT): Please answer the following questions:

A. Have you described or shown your invention/ design to anyone or in any conference?		NO (No)
B. Have you made any attempts to commercialize your invention (for example, have you approached any companies about purchasing or manufacturing your invention)?		NO (No)
C. Has your invention been described in any printed publication, or any other form of media, such as the Internet?		NO (No)
D. Do you have any collaboration with any other institute or organization on the same? Provide name and other details.		NO (No)
E. Name of Regulatory body or any other approvals if required.		NO (No)

5. Provide links and dates for such actions if the information has been made public (Google, research papers, YouTube videos, etc.) before sharing with us. **NA**

6. Provide the terms and conditions of the MOU also if the work is done in collaboration within or outside university (Any Industry, other Universities, or any other entity). **NA**

7. Potential Chances of Commercialization. **Yes**

8. List of companies which can be contacted for commercialization along with the website link.

There exist two companies which focus on electric vehicle charging solutions as potential partners to commercialize the Self-Sufficient Charging System for Electric Public Transportation:

1. **DeepL**

Description: The translation technology at DeepL based on neural machines delivers highly precise results. The company delivers time-sensitive translation options that serve both business clients and individual users.

Website: https://www.deepl.com

2. **IBM**

Description: Business organizations can implement AI translation and language processing solutions through IBM Watson Language Translator's platform and tools.

Website: https://www.ibm.com/cloud/watson-language-translator

9. Any basic patent which has been used and we need to pay royalty to them.

10**. FILING OPTIONS:** Please indicate the level of your work which can be considered for provisional/ complete/ PCT filings - (Provisional)

11. **KEYWORDS:**

- Real-time AI translation
- AI-powered translation systems
- Neural machine translation (NMT)
- Machine translation technology
- AI language translation
- Speech-to-text translation
- Natural Language Processing (NLP)
- Speech recognition AI
- Neural networks for translation
- Deep learning translation models
- Context-aware translation
- Real-time multilingual support
- AI customer service translation
- Translation for global business
- Conference translation AI
- AI translation startup
- AI partnerships for translation
- Machine translation market
- Language technology commercialization
- Translation service providers

(Letter Head of the external organization)

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