SCET-MITWPU

Translator for specially abled people

AI/ML + Web Dev
In-House Project

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Under the guidance of
PROF. HIMANGI PANDE

Number of Time Students met the Project Guide : 5

CONTENT

INTRODUCTION

Developing a Cutting-Edge Translator Tool from English to Sign Language and braille . In this presentation, we will explore the challenges of communication faced by the deaf and blind community and how our innovative translator tool can bridge the gap. Our tool will deliver the features, benefits, and future prospects of this groundbreaking technology.

LITERATURE REVIEW

Sr No.	Publication Title with authors	Publication Year	Positive points of the publication	Gaps in publication work
1	REAL TIME SIGN LANGUAGE TRANSLATION SYSTEMS: A REVIEW STUDY By Maria Papatsimouli,Konstantinos Fillipos Kolias, Lazaros Lazirdis, George Maraslidis	June 2022	• Video interaction • Easy to understand graphics • Immersive Audio	• Limited representation of Sign Language • Adaption to individual user style Real time feedback and correction • Cross cultural consideration • Privacy and security concerns
2	SIGN LANGUAGE TRANSLATOR USING MACHINE LEARNING	January 2022	• Use of Fifth Dimension Technologies (5DT) gloves. • Gloves change hand signals into words • Different machine learning techniques like neural networks, decision tree classifier, and k-nearest neighbors have been used to classify the data into words.	• Decision Tree Classier performs poorly with multiple classes and small data . • Due to noise multiple inconsistencies are introduced into the branches resulting in overfitting.

3	ARTIFICIAL INTELLIGENCE FOR SIGN LANGUAGE TRANSLATION By Gero Strobel, Thorsten Schoorman, Leonardo Banh, Frederik Moller	April 2023	• Use of Artificial Intelligence fro sign language translation. • ML based sign language recognition and translation. • Real time detection.	• Data dependent. • Language changes, especially slangs, constant need to improve. • Surroundings and lighting conditions can lead to exclusion of critical information.
4	REAL-TIME SIGN LANGUAGE TO TEXT AND SPEECH TRANSLATION AND HAND GESTURE RECOGNITION USING THE LSTM MODEL By Pragati Goel, Vikas Goel, Ashutosh Sharma, Vikas Jain	12 Nov 2022	• Recording hand movements. • Merging the recorded data to form a sentence. • LSTM framework provides superior and more accurate results.	• Overly data dependent. • Takes time to process data. • Complex processing techniques.

| 5 | INDIAN SIGN LANGUAGE INTERPRETER FOR DEAF AND MUTE PEOPLE

By Aditi Chavan, Jayshree Ghorpade, Akriti Bhat, Aniket Raj, Shubham Mishra | 3 march 2021 | • Uses 3D CNN
• Live data input
• AI/ML techniques used
• Audio and Text output. | • Glove based sensors poses threats of hardware malfunction.
• Vision based system only limits the amount of data to be processed.
• Various methodologies could be used in better ways. |

Key Features of the Translator Tool

A Sign Language and Braille Translator Tool provides these vital benefits:

- ❑ **Accessibility**: It enables seamless interaction between individuals with sensory impairments and the broader community.
- ❑ **Inclusive Communication**: It fosters effective communication for people with sensory impairments, promoting participation in various settings.
- ❑ **Educational Support**: Facilitating academic material comprehension and independent learning for deaf and blind students.
- ❑ **Empowerment**: Enables self-reliance for individuals with sensory impairments, enhancing access to information and self-advocacy.
- ❑ **Cultural Expression**: Preserves and shares cultural languages and experiences within deaf and blind communities.
- ❑ **Career Opportunities**: Opens doors to careers like interpreters, educators, and transcribers, fostering vocational growth.

- ❑ **Efficiency**: Enhances real-time communication efficiency, reducing misunderstandings by translating spoken language to sign language or Braille.
- ❑ **Accessible Content**: Converts various written materials, including digital documents and PDFs, into Braille, increasing information accessibility for the visually impaired.
- ❑ **Independence**: Promotes independent communication and information access for the deaf and blind.
- ❑ **Awareness**: Raises awareness about sensory impairment needs and capabilities, fostering inclusivity.
- ❑ **User-Friendly Interface**: Ensures accessibility for users of varying technological abilities.
- ❑ **Continuous Learning**: Encourages ongoing adaptation and learning with an evolving vocabulary.

REQUIREMENT GATHERING

❑   Data Collection:

o   Develop a mapping database connecting characters, words, and phrases to their Braille equivalents.

❑   Language Understanding:

o   Employ machine translation algorithms to seamlessly convert the sign language into the intended target language.

❑   Tactile Representation for Braille:

o   Create a comprehensive mapping between each character and its corresponding Braille representation.

REQUIREMENT GATHERING

❑ PDF to Braille Conversion:

o   Extend the tool's functionality to encompass the ability to convert entire PDF documents from English or other languages to Braille.
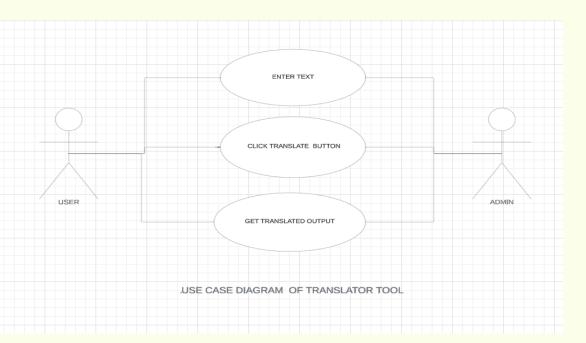
❑Accessibility and User Experience:

oCraft an intuitive user interface that enables users to input text, select target languages, and opt for sign language or Braille output catering to the needs of users with diverse abilities
oIntegrate customizable options such as font size adjustment for Braille.
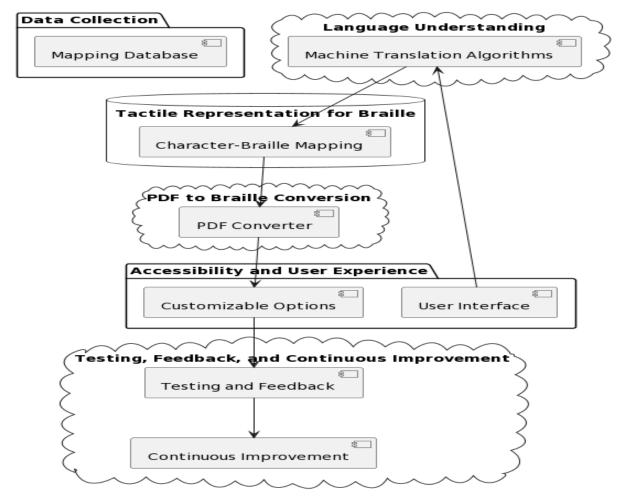
- ❑ Testing, Feedback, and Continuous Improvement:
- ○ Rigorously test the tool with members of the deaf and visually impaired communities to gather feedback and identify areas for improvement.
- ○ Iteratively refine the tool based on user input, expanding its vocabulary and enhancing translation accuracy.
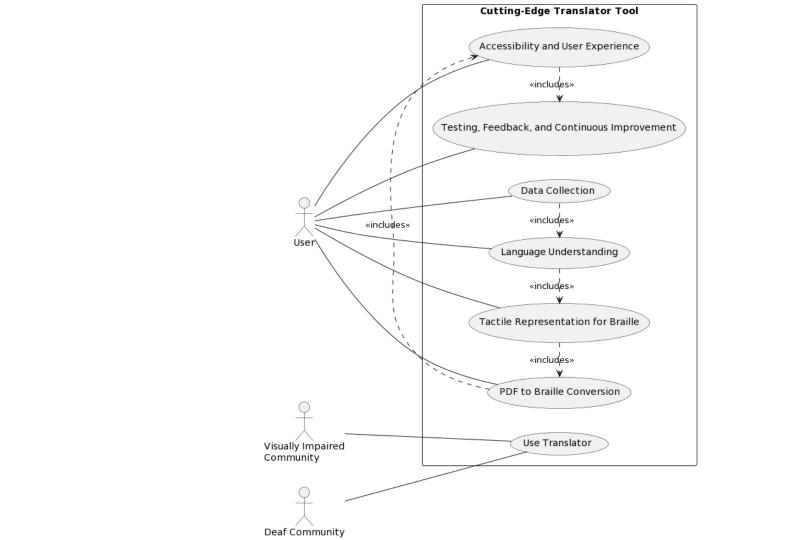
By incorporating the capability to convert entire PDF documents into Braille, the tool becomes a more comprehensive and inclusive resource, aiding both individuals with visual impairments and those seeking to access printed content in a tactile format.

SYSTEM DESIGN

ENTER TEXT

CLICK TRANSLATE BUTTON

GET TRANSLATED OUTPUT

USER

ADMIN

.USE CASE DIAGRAM OF TRANSLATOR TOOL
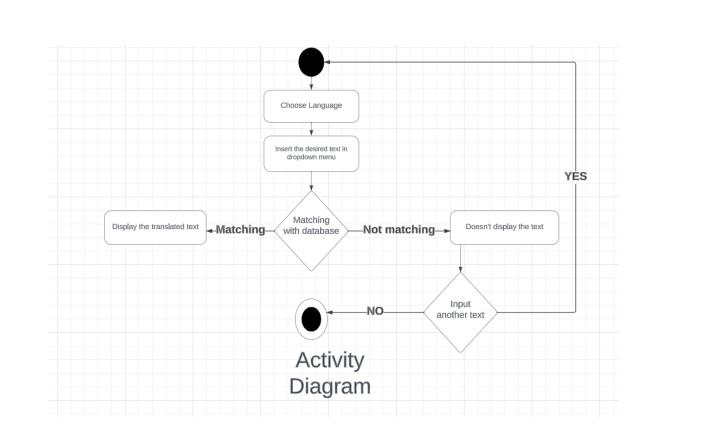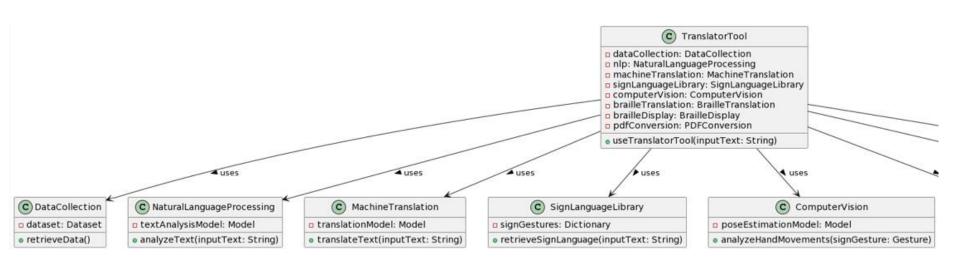
System Architecture for the Capstone Project

Data Collection
Mapping Database

Language Understanding
Machine Translation Algorithms

Tactile Representation for Braille
Character-Braille Mapping

PDF to Braille Conversion
PDF Converter

Accessibility and User Experience
Customizable Options

User Interface

Testing, Feedback, and Continuous Improvement
Testing and Feedback

Continuous Improvement

Choose Language

Insert the desired text in dropdown menu

Matching with database

Display the translated text ← **Matching**

Not matching → Doesn't display the text

Input another text

NO

YES

Activity Diagram

CLASS DIAGRAM

CLASS DIAGRAM

SEQUENCE DIAGRAM

User	Translator Tool	Data Collection	Natural Language Processing (NLP)	Machine Translation	Sign Language Library	Computer Vision	Braille Translation	Braille Display	PDF to Braille Conversion

Use Translator Tool

Retrieve Data

Data

Analyze Text

Analyzed Text

Translate Text

Translated Text

Retrieve Sign Language

Sign Language Gestures

Analyze Hand Movements

Replicated Movement

Translate Text to Braille

Braille Text

Display Braille

Displayed Braille Text

Convert PDF to Braille

Converted PDF Document to Braille

Translated Text + Sign Language + Braille

User	Translator Tool	Data Collection	Natural Language Processing (NLP)	Machine Translation	Sign Language Library	Computer Vision	Braille Translation	Braille Display	PDF to Braille Conversion

IMLEMENTATION

ENGLISH TO ISL

Hi Good Day!!

TRANSLATE

Choose File No file chosen

Convert file

ENGLISH TO BRAILLE

Hi Good Morning!!

⠓⠊⠀⠛⠕⠕⠙⠀⠍⠕⠗⠝⠊⠝⠛⠖⠖

TRANSLATE

Choose File | No file chosen
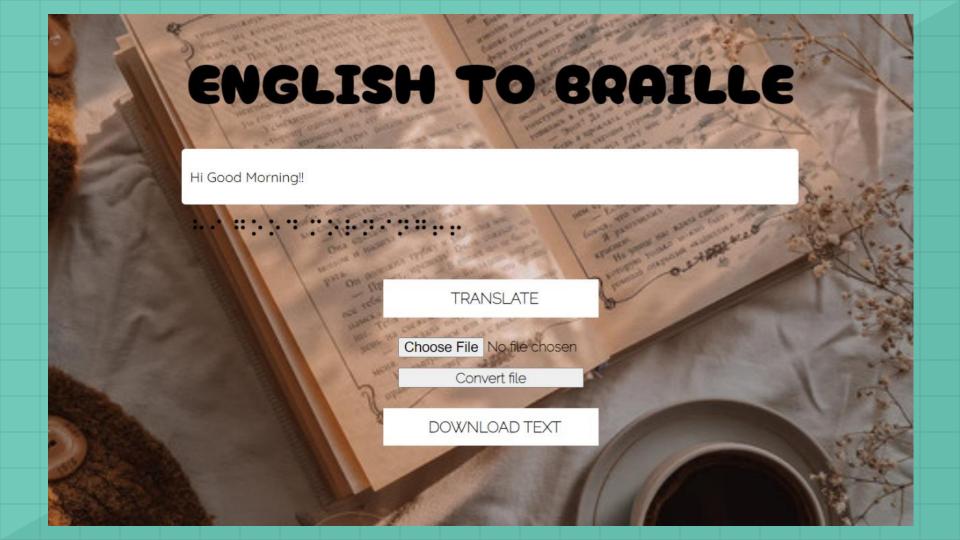
Convert file

DOWNLOAD TEXT

Future Prospects and Development

- ➢ ISL to English language translation using computer vision

- ➢ Sign language interpretation in not just English language but any Indian language

- ➢ Entire PDF conversion feature from English language to braille

S.No.	PRN	Name	Individual Objective	Learning outcome
1	1032200224	Anmol Prasad	Making backend apis for translation tool + Made integration of interface with apis and implemented the frontend	Learnt about ReactJS and NodeJS
2	1032200449	Kushagra Pokharna	Made frontend integration, + working on object detection project using tensorflow + uiux design of the webpage	Learning about Tensorflow and various python modules
3	1032200754	Shreyas Kawale	Designing and implementing the s/w for sign language detection	Learning about Tensorflow and various python modules
4	1032200559	Om Pawar	Gathered information and researched for the translation tool	Gained knowledge about various translation frameworks

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Thanks