

INDIAN SIGN LANGUAGE TO TEXT/SPEECH TRANSLATION

A PROJECT REPORT

Submitted by,

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Under the guidance of,

Mr. E. Sakthivel

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

**IN
COMPUTER SCIENCE AND ENGINEERING (INTERNET OF
THINGS)**

At



PRESIDENCY UNIVERSITY

BENGALURU

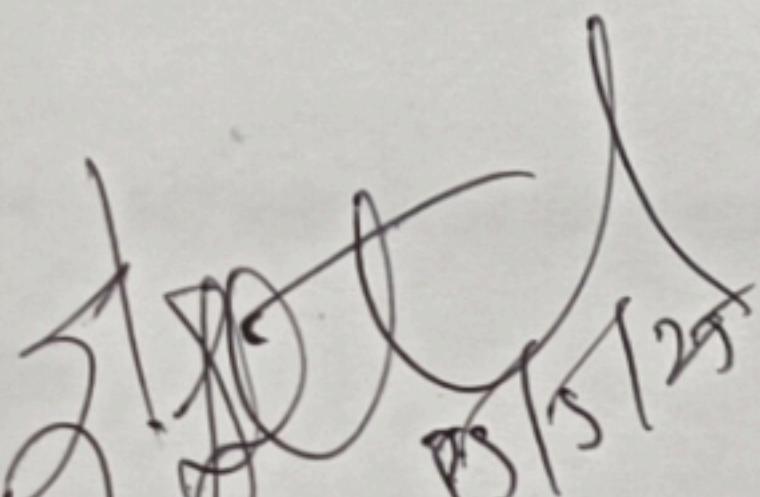
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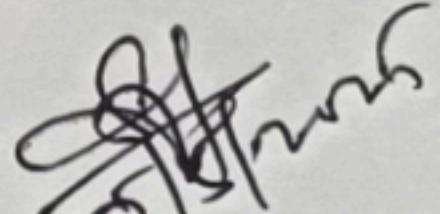
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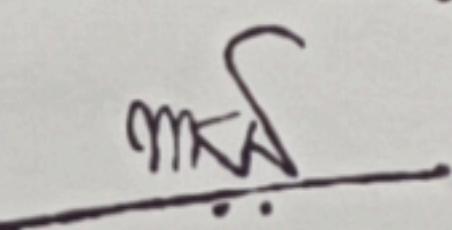
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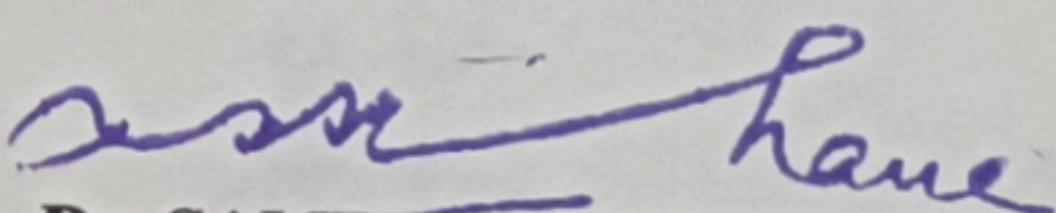
CERTIFICATE

This is to certify that the Project report "**INDIAN SIGN LANGUAGE TO TEXT/SPEECH TRANSLATION**" being submitted by Venkat Navya S, R Manisha, Challa Shalini, P Durga Prasheena, Chavva Rajeswari bearing roll number(s) 20211CIT0042, 20211CIT0104, 20211CIT0164, 20211CIT0166, 20211CIT0170 in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering (Internet of Things) is a bonafide work carried out under my supervision.


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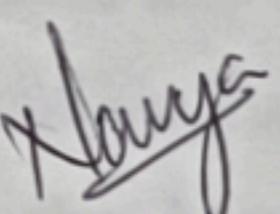
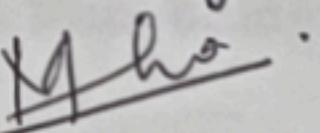
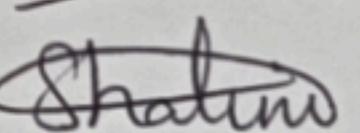
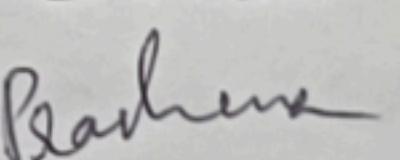
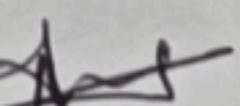

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DECLARATION

We hereby declare that the work, which is being presented in the project report entitled **INDIAN SIGN LANGUAGE TO TEXT/SPEECH TRANSLATION** in partial fulfillment for the award of Degree of **Bachelor of Technology in Computer Science and Engineering (Internet of Things)**, is a record of our own investigations carried under the guidance of **Mr. E. Sakthivel, Assistant Professor, Presidency School of Computer Science Engineering, Presidency University, Bengaluru.**

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

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ABSTRACT

Sign language is an important and special means of communication among deaf or speech-disadvantaged individuals, through which they are able to exchange ideas, emotions, and thoughts in the form of visual hand movements and signs. Though important, pervasive lack of knowledge regarding sign language among members of society is a serious barrier to access to communication that will result in social and working-world exclusion of users of sign language. This lack of communication highlights the imperative need for technology that can serve as real-time interpreters bridging the signers and non-signers' gap and providing an inclusive environment.

The aim of this project is to turn around this deficiency by developing a system that provides instant ISL gestures in textual and verbal forms. The major and first emphasis of the system is the detection and interpretation of gestures that represent the English alphabet (A-Z). The system employs a deep learning model, YOLOv8, for gesture classification, which is trained on a clean, static hand gesture image dataset to effectively identify the gestures. Given the need for deployment on computationally less-capable mobile devices, the pre-trained model, initially created with PyTorch, is exported to TensorFlow Lite (TFLite) for streamlined offline inference on Android devices in order to make the system internet-independent.

For the backend system, a server based on Flask is utilized for server-side inference, offering scalable processing for computationally more-intensive or resource-consumptive tasks. To run without exposing local ports, the Flask server is exposed using Cloudflare Tunnel, providing a secure and stable connection to the system. Additionally, the system also has on-device prediction capability through the TFLite model, allowing it to continue running well in environments where there is either no or poor internet connectivity, thus being flexible and providing seamless service.

After the hand sign has been detected and interpreted, the corresponding alphabet letter is transformed into speech using the Sarvam API, a robust text-to-speech capability that is capable of generating speech in various Indian as well as foreign languages. The capability not only enhances the inclusiveness of the system but also sensitizes the system culturally and linguistically to the various needs of people from around the globe.

The proposed system is an integrated, scalable, and comprehensive one that bridges the communication gap between the deaf community and hearing society. Based on integration of deep learning frameworks, mobile computing capabilities, and natural language processing features, the system provides real-time support for interaction and enables social integration in a vision of developing a welcoming environment of inclusive society to those reliant on sign language for effective communication.

ACKNOWLEDGEMENT

First of all, we are indebted to the **GOD ALMIGHTY** for giving me an opportunity to excel in our efforts to complete this project on time.

We express our sincere thanks to our respected dean **Dr. Md. Sameeruddin Khan**, Pro-VC, School of Engineering and Dean, School of Computer Science Engineering & Information Science, Presidency University for getting us permission to undergo the project.

We express our heartfelt gratitude to our beloved Associate Dean **Dr. Mydhili Nair**, School of Computer Science Engineering & Information Science, Presidency University, and **Dr. Anandaraj S P**, Head of the Department, School of Computer Science Engineering & Information Science, Presidency University, for rendering timely help in completing this project successfully.

We are greatly indebted to our guide **Mr. E. Sakthivel**, Assistant Professor and Reviewer **Dr. Sharmasth vali Y**, Associate Professor, School of Computer Science Engineering & Information Science, Presidency University for his inspirational guidance, and valuable suggestions and for providing us a chance to express our technical capabilities in every respect for the completion of the project work.

We would like to convey our gratitude and heartfelt thanks to the CSE7301 University/internship Project Coordinators **Dr. Sampath A K**, and **Mr. Md Zia Ur Rahman**, department Project Coordinators **Dr. Sharmasth Vali Y** and Git hub coordinator **Mr. Muthuraj**.

We thank our family and friends for the strong support and inspiration they have provided us in bringing out this project.

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