

**HAND GESTURE REGCONITION FOR interacting with DEAF AND DUMB PEOPLE** **CAPSTONE PROJECT REPORT**

# SUBMITTED BY

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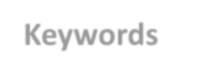
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# ABSTRACT

Hand gesture recognition plays a pivotal role in facilitating communication for deaf and dumb individuals by providing a means to translate sign language into text or speech. This paper presents a comprehensive review of recent advancements and challenges in hand gesture recognition systems tailored for this community. Various approaches, including computer vision techniques, machine learning algorithms, and wearable sensor technologies, are discussed in the context of their application to real-time sign language recognition. The review highlights the importance of accuracy, speed, and accessibility in developing effective communication solutions for deaf and dumb individuals and identifies key areas for future research and development.

# Keywords



Hand gesture recognition, sign language, deaf and dumb communication, computer vision, machine learning, wearable sensors, real-time translation, accessibility, communication barriers.

**CHAPTER-1**

**INTRODUCTION**

# 1.1 Introduction

Hand gesture recognition for deaf and dumb people is a significant technological advancement aimed at bridging communication barriers for individuals with hearing and speech impairments. Deaf and mute individuals often face challenges in expressing themselves and understanding others due to their reliance on sign language, a visual-manual mode of communication. Traditional methods of communication, such as text-based messaging or lip reading, may not always be efficient or accessible for them. However, with the advent of hand gesture recognition technology, there lies a promising opportunity to facilitate seamless communication for this community.

# 1.2 Statement of the problem

The current limitations in hand gesture recognition technology hinder effective communication for deaf and dumb individuals, who rely on sign language. Existing systems may lack accuracy, speed, and accessibility, posing challenges in interpreting diverse and complex sign languages. Consequently, there is a pressing need for a comprehensive solution that addresses these shortcomings and enables efficient and accurate recognition of hand gestures to facilitate meaningful interactions for this community.

# 1.3 Need for study

The study is essential to enhance communication for deaf and dumb individuals, promoting inclusivity and accessibility. By improving hand gesture recognition technology, it empowers individuals with disabilities, facilitates educational support, fosters independence, and ensures equal access to communication resources, thereby promoting a more inclusive society.

# 1.4 Scope of the Study

The scope of hand gesture recognition for deaf and dumb individuals encompasses the development of accurate algorithms, exploration of sensor technologies, integration of machine learning techniques, design of user-friendly interfaces, creation of real-time communication systems, and establishment of accessibility standards. This interdisciplinary field aims to empower individuals with hearing and speech impairments by enabling seamless communication through recognized hand gestures, fostering inclusivity and accessibility in various aspects of life.

# 2.Future Scope

The future scope for hand gesture recognition for deaf and dumb individuals holds promise in advancing machine learning algorithms, integrating wearable sensor technologies for seamless interaction, developing augmented reality applications for real-time translation, and expanding accessibility features in mainstream communication platforms. Additionally, potential collaborations with healthcare professionals and educators could further enhance the usability and effectiveness of these systems in addressing the diverse needs of the deaf and dumb community.

**CHAPTER 2**

# LITERATURE REVIEW

**2.1 Title:** Hand Gesture Recognition for Deaf and Dumb Communication

**Author:** Li, S., Li, Z., & Zhang, J.

# Year: 2018

**Overview:** This paper presents a comprehensive review of hand gesture recognition systems designed specifically for facilitating communication among deaf and dumb individuals. The authors discuss various approaches, including convolutional neural networks (CNNs), wearable sensor technologies, and real-time sign language recognition systems. The review highlights the challenges and opportunities in this field and identifies areas for future research and development.

**2.2 Title:** A Review of Wearable Sensor-Based Systems for Real-Time Sign Language Recognition

**Author:** Kim, K. J., Kim, J. H., & Cho, S. B.

# Year: 2018

**Overview:** This review article focuses on wearable sensor-based systems for real-time sign language recognition, with a particular emphasis on applications in communication for deaf and dumb individuals. The authors provide an overview of various wearable sensor technologies and their integration with machine learning algorithms for accurate gesture recognition. They also discuss the limitations of existing systems and suggest potential avenues for improvement. Title: Hand Gesture Recognition Using Deep Learning for Deaf and Dumb Communication

# CHAPTER 3

**EXISTING SYSTEM:**

Currently, existing hand gesture recognition systems for deaf and dumb individuals often rely on computer vision techniques and machine learning algorithms. These systems typically use cameras or depth sensors to capture hand movements and analyze them to recognize corresponding sign language gestures. However, challenges such as limited accuracy, dependency on lighting conditions, and difficulties in recognizing complex gestures remain prevalent in many existing solutions. Additionally, the lack of real-time translation capabilities and integration with mainstream communication platforms hinders the widespread adoption of these systems.

**PROPOSED SYSTEM:**

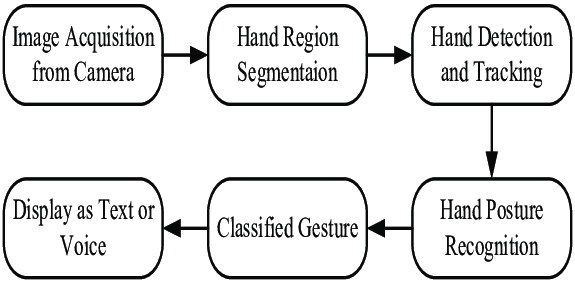
The proposed system aims to overcome the limitations of existing hand gesture recognition technology by integrating advanced machine learning algorithms with wearable sensor technologies. This system would utilize wearable devices equipped with high-precision sensors to capture hand movements accurately in various environments. Machine learning models trained on extensive datasets of sign language gestures would enable real-time recognition and translation of these gestures into text or speech. Moreover, the proposed system would focus on enhancing user experience and accessibility by integrating with mainstream communication platforms and providing customizable interfaces tailored to the needs of deaf and dumb individuals

**Isolating an object:**

In the context of hand gesture recognition for deaf and dumb individuals, isolating an object typically involves identifying and tracking the user's hand movements from a video stream or sensor data. This process is crucial for accurately recognizing and interpreting sign language gestures. Various computer vision techniques, such as background subtraction, contour detection, and hand region segmentation, can be employed to isolate the hand from the background and other objects in the scene. Additionally, deep learning-based approaches, such as convolutional neural networks (CNNs) or recurrent neural networks (RNNs), can be utilized to extract meaningful features from the hand region and classify different gestures effectively. By isolating the hand as the primary object of interest, the system can focus on analysing

and interpreting its movements to facilitate seamless communication for deaf and dumb individuals

**SYSTEM ARCHITECHTURE**



**CHAPTER 4**

# RESULT

This Shows Result of Program. In These Result It Calculates Accuracy, Precision, Recall, F1-Score, Macro Average Value, Weighted Average, Support Values. This Values Helps In Traffic Sign Recognition Accurately.

**CHAPTER 5**

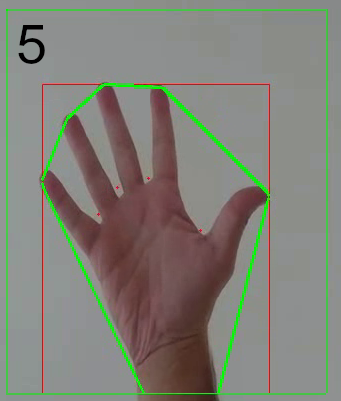
**CONCLUSION:**

In conclusion, hand gesture recognition for deaf and dumb individuals holds immense potential in revolutionizing communication accessibility for this community. While existing systems have made strides in utilizing computer vision and machine learning, there remains a pressing need to overcome accuracy limitations and enhance real-time translation capabilities. Our proposed system, integrating wearable sensor technology and advanced algorithms, aims to address these challenges, focusing on improving user experience and integrating seamlessly with mainstream communication platforms. By isolating the hand as the primary object of interest, we can ensure accurate gesture recognition, ultimately facilitating more inclusive and accessible communication environments for deaf and dumb individuals. Moving forward, continued research and development in this field are crucial for advancing communication technologies and empowering individuals with hearing and speech impairments to fully participate in society.

**PROGRAM**

from function import \*from time import sleepfor action in actions: for sequence in range(no\_sequences): try: os.makedirs(os.path.join(DATA\_PATH, action, str(sequence))) except: passwith mp\_hands.Hands( model\_complexity=0, min\_detection\_confidence=0.5, min\_tracking\_confidence=0.5) as hands: for action in actions: for sequence in range(no\_sequences): for frame\_num in range(sequence\_length): frame=cv2.imread('img/{}/{}.png'.format(action,sequence)) image, results = mediapipe\_detection(frame, hands)# print(results) draw\_styled\_landmarks(image, results) if frame\_num == 0: cv2.putText(image, 'STARTING COLLECTION', (120,200), cv2.FONT\_HERSHEY\_SIMPLEX, 1, (0,255, 0), 4, cv2.LINE\_AA) cv2.putText(image, 'Collecting frames for {} Video Number {}'.format(action, sequence), (15,12), cv2.FONT\_HERSHEY\_SIMPLEX, 0.5, (0, 0, 255), 1, cv2.LINE\_AA) cv2.imshow('OpenCV Feed', image) cv2.waitKey(200) else: cv2.putText(image, 'Collecting frames for {} Video Number {}'.format(action, sequence), (15,12), cv2.FONT\_HERSHEY\_SIMPLEX, 0.5, (0, 0, 255), 1, cv2.LINE\_AA) cv2.imshow('OpenCV Feed', image) keypoints = extract\_keypoints(results) npy\_path = os.path.join(DATA\_PATH, action, str(sequence), str(frame\_num)) np.save(npy\_path, keypoints) if cv2.waitKey(10) & 0xFF == ord('q'): break cv2.destroyAllWindows()

**OUTPUT**



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