

FINAL YEAR PROJECT REPORT

DESIGN AND IMPLEMENTATION OF PAKISTAN SIGN LANGUAGE TRANSLATOR MODEL FOR SPEECH IMPAIRED

In fulfillment of the requirement For degree of BS (COMPUTER SCIENCES)

By

ASMA UMER AFSAH AHMED MUSAB M. KHAN 57409 BSCS 57145 BSCS 57138 BSCS

SUPERVISED

BY

MISS AMNA IFTIKHAR

BAHRIA UNIVERSITY (KARACHI CAMPUS) SPRING-2022

DECLARATION

We hereby declare that this project report is based on our original work except for citations and quotations which have been duly acknowledged. We also declare that it has not been previously and concurrently submitted for any other degree or award at Bahria University or other institutions.

Name	:	ASMA UMER
Reg No.	:	57409
Signature	:	Obre
Name	:	AFSAH AHMED
Reg No.	:	57145
Signature	:	Alle
Name	:	MUSAB M. KHAN
Reg No.	:	57138
Signature	:	- Munap.

The copyright of this report belongs to Bahria University according to the Intellectual Property Policy of Bahria University BUORIC-P15 amended on April 2019. Due acknowledgement shall always be made of the use of any material contained in, or derived from, this report.

© 2019 Bahria University. All right reserved.

ACKNOWLEDGEMENTS

We would like to thank everyone who contributed to the successful completion of this project. We would like to express my gratitude to our research supervisor, Miss Amna Iftikhar for her invaluable advice, guidance, and her enormous patience throughout the development of the research.

In addition, we would also like to express our gratitude to our loving parents and friends who had helped and given us encouragement.

DESIGN AND IMPLEMENTATION OF PAKISTAN SIGN LANGUAGE TRANSLATOR MODEL FOR SPEECH IMPAIRED

ABSTRACT

One of the primary areas that the public ward on is social correspondence. Language is, without a doubt, the best means to communicate and connect with one another, both vocally and nonverbally. Because non-deaf persons have poorer comprehension of sign languages, there is a constant communication gap between the deaf and non-deaf hearing communities. As a result, numerous strategies have been used to address this problem, including turning sign language to text or audio and vice versa. In recent years, research into the use of computers, artificial intelligence, and machine learning to detect and translate sign language has evolved steadily. The suggested system is an interactive prototype that was created with the use of a Deep Learning model that was trained on a dataset of photos that included PSL signals. We used SSD MobileNet model to train our dataset and achieved an accuracy of 80% in detecting the gestures in real time.

TABLE OF CONTENTS

DECLARATION	ii
APPROVAL FOR SUBMISSION	iii
ACKNOWLEDGEMENTS	vi
ABSTRACT	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF SYMBOLS / ABBREVIATIONS	xii
LIST OF APPENDICES	liii

CHAPTER 1

1	INTE	INTRODUCTION				
	1.1	BACKGROUND	15			
	1.2	PROBLEM STATEMENTS	17			
	1.3	AIMS AND OBJECTIVES	17			
	1.4	SCOPE OF PROJECT	17			
2	LITE	CRATURE REVIEW	18			
	2.1	BACKGROUND	18			
	2.2	RELATED WORK	19			
	2.2.1	Deaf-Mute Communication Interpreter	19			
	2.2.2.	An Efficient Framework for Indian Sign Langu	age Recognition Using			
	Wave	elet Transform	20			
	2.2.3.	Hand Gesture Recognition Using PCA	20			
	2.2.4.	2.2.4. An Automated System for Indian Sign Language Recognition20				
	2.2.5	2.2.5 Real-Time Detection and Recognition of Indian and American Sign				
	Lang	uage Using Sift In	21			

2.2.6. A Revi	ew on Feature Extraction for Indian and A	American Sign			
Language in	21				
2.2.7. Sign Pro-an Application Suite for Deaf and Dumb 2					
2.2.8. Hand Ge	sture Recognition System for Dumb People	22			
2.2.9. Boltay H	ath System	22			
2.2.10. Reco	gnition of gestures in Pakistani sign languag	e using fuzzy			
classifier		22			
2.2.11. Sign L	anguage Translation in Urdu/Hindi Through M	icrosoft Kinect			
22					
2.2.12. Haar (Classifier	23			
2.2.13. Sign La 23	anguage Analysis and Recognition: A Preliminar	y Investigation			
2.2.14. Pose re	cognition using cross correlation for static image	es of Urdu sign			
language		23			
2.2.15. Other In	mplementations:	24			
2.2.15	.1 Sign Language to Text and Speech Translatio	n in Real Time			
Using	Convolutional Neural Network	24			
2.2.15	.2 A Glove to translate ASL into Text	25			
2.2.15.3 Design and Implementation of Sign Language Translator					
Using	Micro touch Sensor and Deep Learning	25			
2.2.15	.4. Time of flight camera	26			
DESIGN AND) METHODOLOGY	28			
3.1 PROP	OSED METHODOLOGY	28			
3.2 PROC	CESS MODEL	29			
3.2.1	Agile Methodology	29			
3.3 MOD	ULE DISCUSSION	30			
3.3.1	Python version 3.8.5	30			
3.3.2	IDE – Jupyter	31			
3.3.3	NumPy version 1.22.4	31			
3.3.4	Open CV version 4.6.0.66	31			
3.3.5	Keras version 2.9.0	31			
3.3.6	LabelImg	32			

	3.3.7	Architecture of the Model Used	32	
3.4	PROJEC	CT DIAGRAM	34	
	3.4.1	Use Cases	34	
IMPLN	AENTA]	TION	36	
4.1	MODU	LE DEVELOPMENT	36	
	4.1.1	Image Collection	36	
	4.1.2	Training and Testing	39	
4.2	RESUL	T AND DISCUSSION	41	
	4.2.1	Localization loss	41	
	4.2.2	Classification Loss	42	
	4.2.3	Regularization Loss	42	
	4.2.4	Learning Rate	42	
	4.2.5	Mean Average Precision	43	
	4.2.6	Mean Average Recall	43	
TESTING AND EVALUATION				
5.1	TEST F	PLAN	45	
	5.1.1	Testing	45	
	5.1.2	Unit Testing	45	
	5.1.3	Black box Testing	46	
	5.1.4	White Box Testing	46	
	5.1.5	System Testing	46	
	5.1.6	Acceptance Testing	47	
5.2	TESTING AND EVALUATION		48	
	5.2.1	Unit Testing	48	
	5.2.2	Black Box Testing	52	
CONCLUSION AND FUTURE WORK				
6 .1	CONC	LUSION	53	
6.2	FUTU	RE WORK	53	