

A

Project Report on

# **EFFICIENT GAIT RECOGNITION USING ONE SHOT LEARNING ALGORITHM**

**(PHASE – I)**

*Submitted for partial fulfilment of the requirements for the award of the degree of*

**BACHELOR OF TECHNOLOGY**

in

**COMPUTER SCIENCE AND ENGINEERING**

by

<b>B. PRATHYUSHA</b>	<b>18K81A0513</b>
<b>DURIKI ASHWITHA</b>	<b>18K81A0520</b>
<b>MARYJANE NAMYA</b>	<b>18K81A0538</b>
<b>SHUBHANKAR MAHAJAN</b>	<b>18K81A0554</b>

Under the Guidance of

**Dr. M. NARAYANAN**

**PROFESSOR & HEAD**



**DEPARTMENT OF COMPUTER SCIENCE AND  
ENGINEERING**

**St. MARTIN'S ENGINEERING COLLEGE**

**UGC Autonomous**

Affiliated to JNTUH, Approved by AICTE,  
Accredited by NBA & NAAC A+, ISO 9001:2008 Certified  
Dhulapally, Secunderabad - 500 100

**JANUARY - 2022**



## St. MARTIN'S ENGINEERING COLLEGE

An Autonomous Institute  
NBA & NAAC A+ Accredited  
Dhulapally, Secunderabad - 500 100  
[www.smec.ac.in](http://www.smec.ac.in)



### Certificate

This is to certify that the project entitled **“Efficient Gait Recognition Using One Shot Learning Algorithm”** is being submitted by **Ms. B. Prathyusha 18K81A0513**, in fulfilment of the requirement for the award of degree of **BACHELOR OF TECHNOLOGY in DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING** is recorded of bonafide work carried out by them. The result embodied in this report have been verified and found satisfactory.

**Guide**  
**Dr. M. NARAYANAN**  
**Professor & Head**  
**Department of CSE**

**Head of the Department**  
**Dr. M. NARAYANAN**  
**Professor & Head**  
**Department of CSE**

**Internal Examiner**

**External Examiner**

**Date:**

**Place:**



# St. MARTIN'S ENGINEERING COLLEGE

An Autonomous Institute  
NBA & NAAC A+ Accredited  
Dhulapally, Secunderabad - 500 100  
[www.smec.ac.in](http://www.smec.ac.in)



## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### DECLARATION

We, the students of ‘**Bachelor of Technology in Department of Computer Science and Engineering**’, session: 2018 - 2022, **St. Martin’s Engineering College, Dhulapally, Kompally, Secunderabad**, hereby declare that the work presented in this Project Work entitled “**Efficient Gait Recognition Using One Shot Learning Algorithm**” is the outcome of our own bonafide work and is correct to the best of our knowledge and this work has been undertaken, keeping in mind, the care of Engineering Ethics. This result embodied in this project report has not been submitted in any university for award of any degree.

<b>Ms. B. Prathyusha</b>	<b>18K81A0513</b>
<b>Ms. Duriki Ashwitha</b>	<b>18K81A0520</b>
<b>Ms. Maryjane Namya</b>	<b>18K81A0538</b>
<b>Mr. Shubhankar Mahajan</b>	<b>18K81A0554</b>

## ACKNOWLEDGEMENT

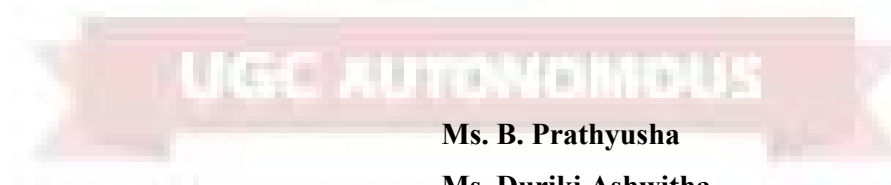
The satisfaction and euphoria that accompanies the successful completion of any task would be incomplete without the mention of the people who made it possible and whose encouragement and guidance have crowded our efforts with success.

We extend our deep sense of gratitude to Principal, **Dr. P. SANTOSH KUMAR PATRA**, St. Martin's Engineering College Dhulapally, for permitting us to undertake this project.

We are also thankful to **Dr. M. NARAYANAN**, Head of the Department, Department of Computer Science and Engineering, St. Martin's Engineering College, Dhulapally, Secunderabad. for his support and guidance throughout our project as well as our Project Coordinators **Dr. B. RAJALINGAM**, Associate Professor and **Dr. G. GOVINDARAJULU**, Associate Professor, Department of Computer Science and Engineering for their valuable support.

We would like to express our sincere gratitude and indebtedness to our project supervisor **Dr. M. NARAYANAN** Head of the Department, Department of Computer Science and Engineering, St. Martins Engineering College, Dhulapally, for his support and guidance throughout our project.

Finally, we express thanks to all those who have helped us successfully completing this project. Furthermore, we would like to thank our family and friends for their moral support and encouragement. We express thanks to all those who have helped us in successfully completing the project.



<b>Ms. B. Prathyusha</b>	<b>18K81A0513</b>
<b>Ms. Duriki Ashwitha</b>	<b>18K81A0520</b>
<b>Ms. Maryjane Namya</b>	<b>18K81A0538</b>
<b>Mr. Shubhankar Mahajan</b>	<b>18K81A0554</b>

# ABSTRACT

Gait recognition can analyse the shape of an individual's body and the unique way in which that body moves when walking or running, which can then be used to identify them. Gait Recognition works in a similar way to how the facial recognition technology works. This has been a topic of continued interest in the biometrics research community.

There have been considerable theories supporting that person's walking style is a unique behavioural characteristic, which can be used as a biometric. Differing from other biometric identification technologies such as face recognition, gait recognition is widely known as the most important non-contactable, non-invasive biometric identification technology, which is hard to imitate.

Hitherto, finding a person in a crowd from things like CCTV Footage was possible using methods like Face Recognition. But considering how the current situation is, it is safe to say that Face Recognition techniques are not of much use since having a mask on the person's face isn't ideal for the Face Recognition Algorithm.

At this point, we need an algorithm which would work irrespective of such external factors. Gait Recognition is such an algorithm which doesn't consider how a person looks/wear and doesn't require any external contact with the person. Our aim is to develop an Efficient Gait Recognition Algorithm using minimal prior training to the network. We plan on using Algorithms like One Shot Learning Algorithm which focuses on having only a single image, prior to recognition. We also planning on using algorithms such as Linear Binary Pattern (LBP), Histogram Oriented Gradients (HOG) and Haralick texture features for making the algorithm properly recognize a person irrespective to them carrying unknown covariates such as clothing and possessions of carrier bags. Furthermore, we utilize the Fisher Linear Discriminant Analysis for dimensionality reduction and selecting the most discriminant features. We evaluated our results using CASIA Gait Database A. The performance of the project needs to be performed.

# LIST OF FIGURES

Figure No.	Figure Title	Page No.
1.1	Processes in Gait Recognition System	05
3.1	Random Forest	09
3.2	Possible Hyperplanes for Support Vector Machine	11
3.3	Multi-Layer Perceptron	12
3.4	Generating a Feature Vector	13
4.1	Gait Images of a cycle	15
4.2	Gait energy image (GEI)	15



# LIST OF ACRONYMS AND DEFINITIONS

S.NO	ACRONYM	DEFINITION
01	LBP	Linear Binary Patterns
02	GEI	Gait Energy Image
03	HOG	Histogram Oriented Gradients
04	SVM	Support Vector Machine
05	ANN	Artificial Neural Network
06	CNN	Convolutional Neural Network
07	MLP	Multi-Layer Perceptron
08	SN	Siamese Network
09	FV	Feature Vector
10	CASIA	Center for Biometrics and Security Research

UGC AUTONOMOUS

# CONTENTS

<b>CERTIFICATE</b>	<b>ii</b>
<b>DECLARATION</b>	<b>iii</b>
<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
<b>ABSTRACT</b>	<b>v</b>
<b>LIST OF FIGURES</b>	<b>vi</b>
<b>LIST OF ACRONYMS AND DEFINITIONS</b>	<b>vii</b>
<b>CHAPTER 1: INTRODUCTION</b>	<b>01</b>
1.1 INTRODUCTION TO BIOMETRIC AUTHENTICATION	01
1.2 DOWNSIDES TO REGULAR BIOMETRIC AUTHENTICATION	02
1.3 INTRODUCTION TO GAIT RECOGNITION	02
1.4 SCOPE AND BENEFITS OF GAIT RECOGNITION	03
1.5 SCIENCE BEHIND GAIT RECOGNITION AND METHODS USED	04
<b>CHAPTER 2: LITERATURE SURVEY</b>	<b>06</b>
<b>CHAPTER 3: SYSTEM ANALYSIS AND DESIGN</b>	<b>08</b>
3.1 HARDWARE AND SOFTWARE REQUIREMENTS	08
3.1.1 Hardware Requirements	08
3.1.2 Software Requirements	08
3.2 SYSTEM DESIGN	09
3.2.1 Existing System	09
3.2.2 Proposed System	12
3.3 PROJECT PLANNING	14
<b>CHAPTER 4 MODULES</b>	<b>15</b>
4.1 GENERATE GEI	15
4.2 EXTRACTING HOG AND LBP FEATURES	16
4.2.1 Histogram Oriented Gradients (HOG)	16
4.2.2 Linear Binary Pattern (LBP)	16
4.3 ONE SHOT LEARNING	17
4.4 MULTI-LAYER PERCEPTRON	17
4.5 RANDOM FOREST	18
<b>CHAPTER 5 REFERENCES</b>	<b>19</b>