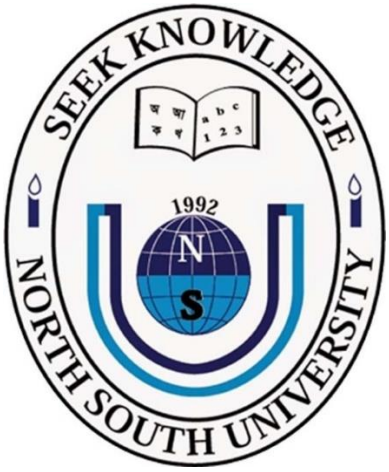
North South University

Department of Electrical and Computer Engineering



CSE499: Senior Project Design

Face Verification with Liveness detection using Deep Learning

Team Members

Name: Khaled Saifullah **ID: 1632664642**

Name: Pervej Ahamed Joy **ID: 171307642**

Name: Shahin Arman Apu **ID: 1711280642**

Faculty Advisor
Dr. Atiqur Rahman
Associate Professor
Department of Electrical and Computer Engineering
North South University

LETTER OF TRANSMITAL

February, 2022

To

Dr. Mohammad Rezaul Bari

Chairman,

Department of Electrical and Computer Engineering

North South University, Dhaka

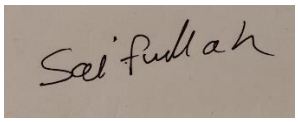
Subject: **Submission of Capstone Project Report on "Face Verification with Liveness detection using Deep Learning"**

Dear Sir,

With due respect, we would like to submit our **Senior Project Design** on **"Face Verification with Liveness detection using Deep Learning"** as a part of our BSc program. Our project's objective is to make a real time face verification system. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you kindly receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,



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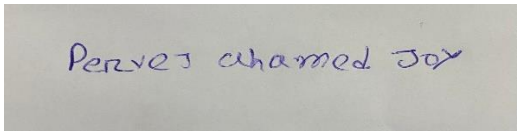

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Pervej Ahmed Joy
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North South University, Bangladesh

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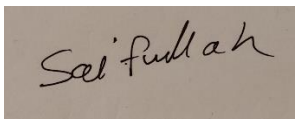
Declaration

This is to declare that no part of this report or the project has been previously submitted elsewhere for the fulfillment of any other degree or program. Proper acknowledgement has been provided for any material that has been taken from previously published sources in the reference section of this report.



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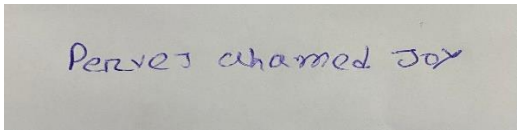

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North South University, Bangladesh

Approval

The Senior Design Project entitle "**Face Verification with Liveness detection using Deep Learning**" by Khaled Saifullah, Pervej Ahmed Joy and Shahin Arman Apu has been accepted as satisfactory and approved for partial fulfillment of the requirement of BS in CSE/EEE degree program.

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Supervisor's Signature

Dr. Atiqur Rahman

Associate Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

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Dr. Mohammad Rezaul Bari

Associate Professor & Chair

Department of Electrical and Computer Engineering

North South University.

Dhaka, Bangladesh.

Acknowledgement

First of all, we would like to express our profound gratitude to our honorable course instructor, Dr. Atiqur Rahman, for his constant and meticulous supervision, valuable suggestions, his patience and encouragement to complete this research.

We would like to thank everybody who supported us and provided with guidance for the completion of this research.

Abstract

Numerous advancements in the area of face detection and liveness analysis have been made to improve device security and attendance verification systems. Several methods use the 3D facial model to estimate the authenticity of the individual in front of it. Without using complex 3D imaging techniques or technology, our solution attempts to account for this difficulty. As a result, the system is indeed more cost-effective and convenient. It is divided into two sections, the first of which aids in face recognition and the second of which checks the liveness of the face. We employed a model based on Google's FaceNet Model in the first stage that trains a mapping from face images to compact Euclidean space distances, specifically relating to the similarity measure between the faces. Face Recognition may be simply accomplished using normal approaches using embeddings as feature vectors after the space has been created. We built a cascaded multi-task architecture for the second segment that separates specific elements from the face picture and then uses their relative displacements to verify for liveness. These separated characteristics were utilized to test the liveliness of a person's face by having them do a series of activities in a random order, such as body and facial twitches. The FaceNet based face detection model has an accuracy of 90%, and the facial features extraction model has 97% accuracy. After merging both models in real-time, we have an accuracy of 90%.