



**Senior Design Project**

**Parkinson's disease onset detection Using  
Machine Learning.**

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**Faculty Advisor:**

**Md. Shahriar Hussain**

**Lecturer**

**ECE Department**

**Spring, 2022**

# LETTER OF TRANSMITTAL

May 2022

To  
Md. Shahriar Hussain

Lecturer,

Department of Electrical and Computer Engineering

North South University, Dhaka

Subject: **Submission of Project Report on “Parkinson’s disease onset detection Using Machine Learning.”**

Dear Sir,

With due respect, we would like to submit our **Project Report** on “**Parkinson’s disease onset detection Using Machine Learning**” as a part of our BSc program. This project was very much valuable to us as it helped us gain experience in the practical field and apply it in real life. 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

**Kazal Roy Sagar**

ECE Department

North South University, Bangladesh

**MD Samiul Hasan**

ECE Department

North South University, Bangladesh

**Anika Ferdousy**

ECE Department

North South University, Bangladesh

# APPROVAL

Kazal Roy Sagar ( **14307846432**), MD Samiul Hasan (**1512466042** ) and Anika Ferdousy ( **1512232042**) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled “ **Parkinson’s disease onset detection Using Machine Learning**” under the supervision of Md. Shahriar Hussain , partial fulfillment of the requirement for the degree of Bachelors of Science in Engineering and has been accepted as satisfactory.

**Supervisor’s Signature**

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**Md. Shahriar Hussain**

**Lecturer**

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

**Chairman’s Signature**

.....

**Dr. Mohammad Rezaul Bari**

**Associate Professor**

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

# DECLARATION

This is to certify that this project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

Students' names & Signatures

1. Kazal Roy Sagar

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2. MD Samiul Hasan

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3. Anika Ferdausy

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## **ACKNOWLEDGEMENTS**

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend our sincere thanks to all of them.

We are highly indebted to (North South University) for their guidance and constant supervision, as well as for providing necessary information regarding the project & also for their support in completing the project.

We would like to express our gratitude towards our parents & member of (NSU)for their kind co-operation and encouragement, which helped us in the completion of this project.

We would like to express our special gratitude and thanks to industry persons for giving us such attention and time.

Our thanks and appreciations also go to our classmates in developing the project and people who have willingly helped us out with their abilities.

# ABSTRACT

## **Parkinson's disease onset detection Using Machine Learning.**

Accurately identifying Parkinson's disease (PD) at an early stage is unquestionably critical for halting its progression and giving patients access to disease-modifying medication. To achieve that goal, the premotor stage of Parkinson's disease should be closely studied. Based on premotor traits, a unique deep-learning technique is introduced to determine if an individual has Parkinson's disease or not. In order to detect Parkinson's disease at an early stage, numerous indicators were used in this study, including Rapid Eye Movement and olfactory loss, cerebrospinal fluid data, and dopaminergic imaging markers. A comparison of the proposed deep learning model with twelve machine learning and ensemble learning methods based on relatively small data sets of 183 healthy individuals and 401 early Parkinson's disease patients reveals that the designed model achieves the highest accuracy, 96.45 percent on average. We present the feature importance of the PD detection procedure based on the Boosting approach in addition to identifying the PD. Traditional diagnostic procedures, on the other hand, may suffer from subjectivity because they rely on the interpretation of motions that are sometimes subtle to human sight and hence difficult to define, potentially leading to misdiagnosis. Meanwhile, early non-motor symptoms of Parkinson's disease may be moderate and caused by a variety of other illnesses. As a result, these symptoms are frequently missed, making early PD diagnosis difficult. To overcome these challenges and improve PD diagnosis and assessment procedures, machine learning algorithms for the

classification of PD and healthy controls or patients with similar clinical presentations have been used. A total of 209 papers were included, with pertinent material retrieved and provided in this review, with an examination of their aims, data sources, data kinds, machine learning methods, and associated outcomes. These results show that machine learning methodologies and novel biomarkers have a strong potential for adaption in clinical decision-making, leading to more systematic, informed PD diagnosis.