



**Department of Electrical and Computer Engineering
North South University**

**Senior Design Project
Object Detecting Robot Identifying & Picking Up Objects**

Raisa Akhtar ID: 2012010042

Zarin Musharrat ID: 1931826642

Alifa Khan ID: 1931829642

**Faculty Advisor:
Md. Shahriar Hussain
Senior Lecturer
ECE Department**

Spring, 2023

LETTER OF TRANSMITTAL

June, 2023

To

Dr. Rajesh Palit
Chairman,
Department of Electrical and Computer Engineering
North South University, Dhaka

Subject: **Submission of Capstone Project Report on “Object Detecting Robot Identifying and Picking Up Objects”**

Dear Sir,

With due respect, we would like to submit our **Capstone Project Report** on “Object Detecting Robot Identifying and Picking Up Objects” as a part of our BSc program. The report deals with an object detecting based robot that can also pick up objects as per the user’s instruction. This project was very much valuable to us as it helped us gain experience from practical field and apply 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,

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Raisa Akhtar
ECE Department
North South University, Bangladesh

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Zarin Musharrat
ECE Department
North South University, Bangladesh

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Alifa Khan
ECE Department
North South University, Bangladesh

APPROVAL

Raisa Akhtar (ID:2012010042), Zarin Musharrat (ID:1931826642), Alifa Khan (ID:1931829642) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled “Object Detecting Robot Identifying and Picking Up Objects” 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

Senior Lecturer

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

Chairman’s Signature

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Dr. Rajesh Palit

Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

DECLARATION

This is to declare 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. All project related information will remain confidential and shall not be disclosed without the formal consent of the project supervisor. Relevant previous works presented in this report have been properly acknowledged and cited. The plagiarism policy, as stated by the supervisor, has been maintained.

Students' names & Signatures

1. Raisa Akhtar

2. Zarin Musharrat

3. Alifa Khan

ACKNOWLEDGEMENTS

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Furthermore, the authors would like to thank the Department of Electrical and Computer Engineering, North South University, Bangladesh for facilitating the research. The authors would like to thank their loved ones for their countless sacrifices and continual support.

ABSTRACT

Object Detecting Robot Identifying and Picking Up Objects

This research focuses on the development of an accurate object detection algorithm to aid robots in identifying and picking up objects in cluttered environments. Object detection is crucial for robotic control systems, particularly in industrial automation. Traditional object detection algorithms struggle with objects lacking texture, leading to the adoption of deep learning methods like YOLO (You Only Look Once) for improved performance.

The study aims to enhance object localization accuracy, especially in cluttered scenes, to facilitate robot grasping tasks. While basic YOLO models can detect objects, precise localization remains challenging. The research proposes a solution using deep YOLOs for semantic segmentation, which significantly improves object localization accuracy. Despite being time-consuming, YOLOv8 proves highly efficient, achieving an accuracy of 84.7%. The ultimate goal is to implement a robot capable of detecting and identifying five objects (ball, bottle, car, cup, spoon), and then picking and placing them according to user instructions.

For the hardware part, we have used the Arduino UNO microcontroller which is quite budget-friendly. As this is just a small test project, that's why only robotic arm gripper is used here so that it can only grab it if it recognizes the object.