



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

**Senior Design Project**

**“Trapping An Atom and Assessing The Difference in  
Trapping Force Using Two Different Systems”**

**Taiful Islam                      ID: 1912105042**

**Arnab Roy Biswas              ID: 1921619043**

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**Faculty Advisor:**

**Dr. Mahdy Rahman Chowdhury**

**Associate Professor**

**ECE Department**

**Summer, 2023**

# LETTER OF TRANSMITTAL

December, 2023

To

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

**Subject: Submission of Capstone Project Report on “Trapping An Atom and Assessing The Difference in Trapping Force Using Two Different Systems”**

Dear Sir,

With due respect, we would like to submit our **Senior Project Report** on “Trapping An Atom and Assessing The Difference in Trapping Force Using Two Different Systems” as a part of our BSc program. The report deals with the analysis and assessment of Trapping Force in different systems. 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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Student Name1  
ECE Department  
North South University, Bangladesh

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Student Name2  
ECE Department  
North South University, Bangladesh

.....

Student Name3  
ECE Department  
North South University, Bangladesh

# APPROVAL

Arnab Roy Biswas (ID: 1921619043), Taiful Islam (ID: 1912105042), Zahin Ibne Amir (ID: 1822071043) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled “Trapping An Atom and Assessing The Difference in Trapping Force Using Two Different Systems” under the supervision of Dr. Mahdy Rahman 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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**Dr. Mahdy Rahman**

**Associate Professor**

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

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**1. Arnab Roy Biswas**

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**2. Taiful Islam**

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**3. Zahin Ibne Amir**

## ACKNOWLEDGEMENTS

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# ABSTRACT

## **Trapping An Atom and Assessing The Difference in Trapping Force Using Two Different Systems**

This report demonstrates the design and implementation of the theoretical phenomenon of Trapping Force in quantum field and also analyze the difference in trapping force when two different systems are involved. Our objective was to trap a particle and illustrate differences in trapping forces employing two different systems, specifically the crystalline structures of copper (Cu) and silicon (Si). Throughout the experimentation, we maintained a consistent adsorbate atom, helium (He). The primary aim was to validate the hypothesis that heavier atoms possess greater potential energy, resulting in enhanced trapping forces. This validation was pursued through numerous simulations over various softwares. The outcomes of this experiment unveil a spectrum of possibilities within the quantum field. Our future endeavors are centered on advancing the efficacy of trapping mechanisms, exploring ways to reinforce trapping capabilities further, and enhancing overall efficiency.