



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

**Senior Design Project
FIREFIGHTER ROBOT**

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**Faculty Advisor:
Dr. Shohana Rahman Deeba
Assistant Professor
ECE Department**

Spring, 2023

LETTER OF TRANSMITTAL

August 2023

To

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

Subject: Submission of Capstone Project Report on “Firefighter Robot”

Dear Sir,

With due respect, we would like to submit our **Capstone Project Report** on “**Firefighter Robot**” as a part of our BSc program. Our project focuses on designing and developing a robot to aid firefighters in hazardous situations. Through extensive research and implementation, we have successfully created a robot with advanced sensors and intelligent algorithms to detect and suppress fires, navigate complex environments, and assist in rescue operations. This project was very 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 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.

Sincerely Yours,

.....
Md. Momenul Hoque
ECE Department
North South University, Bangladesh

.....
Ashir Intishar Bin Mesbah
ECE Department
North South University, Bangladesh

.....
Shah Shadman Israk
ECE Department
North South University, Bangladesh

APPROVAL

Md. Momenul Hoque (1912321645), Ashir Intishar Bin Mesbah (1831511642), and Shah Shadman Israk (1813307643) from Electrical and Computer Engineering Department of North South University have worked on the Senior Design Project titled “Firefighter Robot ” under the supervision of Dr. Shohana Rahman Deeba 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. Shohana Rahman Deeba

Assistant Professor

Department of Electrical and Computer Engineering

North South University

Dhaka, Bangladesh.

Chairman’s Signature

.....

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. Md. Momenul Hoque

2. Ashir Intishar Bin Mesbah

3. Shah Shadman Israk

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. We would also like to thank my friends Ashir Intishar Bin Mesbah and Shah Shadman Israk for helping us in this project. The authors would also like to thank their loved ones for their countless sacrifices and continual support.

ABSTRACT

FIREFIGHTER ROBOT

Fire outbreaks pose significant risks to human lives and property, emphasizing the need for early detection and efficient extinguishing methods. In this project, we present the development of an autonomous fire-extinguishing robot that utilizes advanced technology to accurately detect fire locations and initiate the suppression process. The robot incorporates three high-precision flame sensors to enhance fire detection accuracy.

The proposed Arduino Fire Extinguishing Robot offers a solution to the limitations of current fire security measures, which often rely on human intervention and put individuals at risk. The robot minimizes the need for human presence in hazardous fire situations by automating the detection and extinguishing process. It utilizes sprinklers triggered by a water pump to extinguish fires effectively, reducing the potential for accidents and saving lives.

The robot's design includes robust gear motors and a motor driver system, ensuring precise control over its movement. This enables the robot to navigate efficiently toward the detected fire breakout location, enhancing its effectiveness in fire suppression. The integration of an Arduino UNO microcontroller serves as the central control unit, coordinating the various subsystems and ensuring seamless operation.

Through extensive testing and experimentation, the fire-extinguishing robot demonstrated exceptional performance in detecting fires and promptly initiating the extinguishing process. Integrating high-precision flame sensors, reliable gear motors, and a motor driver system ensured the robot's precise movement and effective response to fire incidents. The Arduino UNO microcontroller provided efficient control and coordination, improving the robot's overall performance and reliability.