### SUMMER TRAINING REPORT

on

**“Predictive Model for SoC Estimation & Generator Runtime for Smart Hybrid System”**

****

### Project Report

UNDER THE GUIDANCE of

### SH. PIYUSH JOSHI, SCIENTIST ‘F’ DIBER(A Cell of DIPAS), DRDO

SUBMITTED BY

**AJAY RAWAT**

BACHELOR OF TECHNOLOGY, FINAL YEAR

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

GRAPHIC ERA HILL UNIVERSITY, BHIMTAL, (NAINITAL ), UTTARAKHAND

# ACKNOWLEDGEMENT

I express my heartfelt gratitude to **Sh. Devakanta Pahad Singh, Director, DIPAS**, for granting me the opportunity to work on this project at **DIBER(A Cell of DIPAS)** and for providing the necessary approval and facilities to carry out this work.

I would like to express my profound gratitude and indebtedness to my guide, **Sh. Piyush Joshi, Sc. ‘F’, DIBER(A Cell of DIPAS)** for having suggested the topic of my project and for his constant support and guidance, without which I would not have been able to attempt this project.

I thank him for being a constant help throughout the project and encouraging us with his words and whose regular useful advice, time, patience and understanding helped me a lot. His suggestions and instructions have served as the major contribution towards the completion of the project.

I would also like to thank **Mr. Dhirendra, SRF, DIBER** for also providing his invaluable guidance and technical assistance. His insightful feedback and encouragement were extremely helpful throughout my project.

**Ajay Rawat**

Bachelor of technology, Final Year

Dept. of Computer Science &Engineering Graphic Era Hill University, Bhimtal

result['Final Fuel (liters)']))

print("=" \* 100)

if len(all\_results) > 1:

avg\_results = {

'Time Until Solar (hours)': np.mean([r['Time Until Solar (hours)'] for r in all\_results]),

'Required SoC (%)': np.mean([r['Required SoC (%)'] for r in all\_results]),

'Generator Runtime (hours)': np.mean([r['Generator Runtime (hours)'] for r in all\_results]),

'Total Fuel Used (liters)': np.mean([r['Total Fuel Used (liters)'] for r in all\_results]),

'Final SoC (%)': np.mean([r['Final SoC (%)'] for r in all\_results]),

'Final Fuel (liters)': np.mean([r['Final Fuel (liters)'] for r in all\_results])

}

print("\nAverage Results Across All Iterations:")

print("-" \* 100)

print("{:<25} {:<15} {:<25} {:<20} {:<15} {:<15}".format(

"Time Until Solar (hours)", "Required SoC (%)", "Generator Runtime (hours)",

"Total Fuel Used (liters)", "Final SoC (%)", "Final Fuel (liters)"))

print("-" \* 100)

print("{:<25.2f} {:<15.2f} {:<25.2f} {:<20.2f} {:<15.2f} {:<15.2f}".format(

avg\_results['Time Until Solar (hours)'],

avg\_results['Required SoC (%)'],

avg\_results['Generator Runtime (hours)'],

avg\_results['Total Fuel Used (liters)'],

avg\_results['Final SoC (%)'],

avg\_results['Final Fuel (liters)']))

print("=" \* 100)

except Exception as e:

print(f"An error occurred in main: {e}")

if \_\_name\_\_ == "\_\_main\_\_":

main()

**CERTIFICATE**

This is to certify that **Ajay Rawat** , a student of **Graphic Era Hill University, Bhimtal** has successfully completed the project titled “**Predictive Model for SoC Estimation & Generator Runtime for Smart Hybird System**” as a part of the partial fullfillment of the requirements for the **Bachelor of Technology in Computer Science & Engineering.**

The project involves developing a python based model to optimize a hybrid energy system integrating solar power , battery storage and a diesel generator for remote areas. The model prioritizes solar energy , dynamically manages energy allocation using real-time solar and load data , and minimize fuel costs and emissions while ensuring reliable power delivery.

The work carried out in this project is completed under the guidance of **Sh. Piyush Joshi, Sc. ‘F’, DIBER(A Cell of DIPAS).**

(Sh. Piyush Joshi)

Scientist ‘F’

DIBER(A Cell of DIPAS)