Complex Problem-Solving Self-Assessment Form

1	Name of the Student	Mokshitha Thaduri
2	Roll Number	25951A6698
3	Branch and Section	CSE-(AI&ML) - B
4	Program	B. Tech
5	Course Name	Front-End Web Development Laboratory
6	Course Code	ACSE04
7	Please tick (✓) relevant Engineering Competency (ECs) Profiles	

EC	Profiles	(✓)
EC 1	Ensures that all aspects of an engineering activity are soundly based on fundamental principles - by diagnosing, and taking appropriate action with data, calculations, results, proposals, processes, practices, and documented information that may be ill-founded, illogical, erroneous, unreliable or unrealistic requirements applicable to the engineering discipline	✓
EC 2	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models.	✓
EC 3	Support sustainable development solutions by ensuring functional requirements, minimize environmental impact and optimize resource utilization throughout the life cycle, while balancing performance and cost effectiveness.	
EC 4	Competently addresses complex engineering problems which involve uncertainty, ambiguity, imprecise information and wideranging or conflicting technical, engineering and other issues.	✓
EC 5	Conceptualises alternative engineering approaches and evaluates potential outcomes against appropriate criteria to justify an optimal solution choice.	✓

	EC 6	Identifies, quantifies, mitigates and manages technical, health, environmental, safety, economic and other contextual risks associated to seek achievable sustainable outcomes with engineering application in the designated engineering discipline.	
	EC 7	Involve the coordination of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies) in the timely delivery of outcomes	

	EC 9	Meet all level, legal, regulatory, relevant standards and codes of practice, protect public health and safety in the course of all engineering activities.	
	EC 8	Design and develop solution to complex engineering problem considering a very perspective and taking account of stakeholder views with widely varying needs.	✓

	EC 10	High level problems including many component parts or sub-problems, partitions problems, processes or systems into manageable elements for the purposes of analysis, modelling or design and then re-combines to form a whole, with the integrity and performance of the overall system as the top consideration.	✓
	EC 11	Undertake CPD activities to maintain and extend competences and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	✓
	EC 12	Recognize complexity and assess alternatives in light of competing requirements and incomplete knowledge. Require judgement in decision making in the course of all complex engineering activities.	✓
8	Please tick (✓) relevant Course Outcomes (COs) Covered		
	CO	**Course Outcomes**	**(✓)**
	CO 1	Identify the basic structure and components of a web page using HTML 5 elements.	✓
	CO 2	Apply CSS3 properties and layouts to enhance the presentation of web pages.	✓
	CO 3	Implement JavaScript for Client-side validation, event handling, and interactivity.	✓
	CO4	Analyze different CSS frameworks to choose appropriate tools for responsive web design.	
	CO 5	Develop APIs and asynchronous JavaScript features to build dynamic content-driven applications.	✓
	CO 6	Implement APIs and asynchromous JavaScript features to build dynamic content-driven applications.	✓

9	Course ELRV Video Lectures Viewed	**Number of Videos**	**Viewing time in Hours**
		-	-
10	Justify your understanding of WK1	-	
11	Justify your understanding of WK2 – WK9	-	
12	How many WKs from WK2 to WK9 were implanted?	-	
	Mention them	-	

Date: 05-12-2025

Mokshitha Thaduri
Signature of the Student

COMPLEX ENGINEERING PROBLEM

A COURSE SIDE PROJECT ON FRONT-END WED DEVELOPMENT

Mokshitha Thaduri 25951A6698

ECO TRACK

A Project Report submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Technology in CSE (Artificial Intelligence & Machine Learning)

by

Mokshitha Thaduri 25951A6698

Department of CSE (Artificial Intelligence & Machine Learning)

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal, Hyderabad – 500 043, Telangana

November, 2025

DECLARATION

I certify that

a. The work contained in this report is original and has been done by me under the guidance of my supervisor (s).
b. The work has not been submitted to any other Institute for any degree or diploma.
c. I have followed the guidelines provided by the Institute for preparing the report.
d. I have conformed to the norms and guidelines given in the Code of Conduct of the Institute.

e. Whenever I have used materials (data, theoretical analysis, figures, and text) from other sources, I have given due credit to them by citing them in the text of the report and giving their details in the references. Further, I have taken permission from the copyright owners of the sources, whenever necessary.

Mokshitha Thaduri

Place: Hyderabad **Signature of the Student**

Date: 05-12-2025

CERTIFICATE

This is to certify that the project report entitled **Website Generator** submitted by **Mokshitha Thaduri** to the Institute of Aeronautical Engineering,
Hyderabad in partial fulfillment of the requirements for the award of the Degree Bachelor of Technology in **CSE - (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)** is a Bonafide record of work carried out by his guidance and supervision. The Contents of this report, in full or in parts, have not been submitted to any other Institute for the award of any Degree.

Supervisor **Head of the Department**

Date: 05-12-2025

Principal

APPROVAL SHEET

This project report entitled **Website Generator** submitted by ***Mokshitha Thaduri*** is approved for the award of the Degree Bachelor of Technology in Branch **CSE (Artificial Intelligence & Machine Learning).**

Examiner **Supervisor(s)**

Principal

Date: 05-12-2025

Place: Hyderabad

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The satisfaction that accompanies the successful completion of any task would be incomplete without introducing the people who made it possible and whose constant guidance and encouragement crowns all efforts with success.

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I take this opportunity to express my deepest gratitude to one and all who directly or indirectly helped me in bringing this effort to present form.

ABSTRACT

EcoTrack is an intelligent environmental monitoring system designed to collect, analyze, and visualize ecological data using automated sensors and software tools. This project explores the design, architecture, and application of EcoTrack in modern environmental analytics. The system enables real-time tracking of air quality, temperature, humidity, noise levels, and other environmental indicators through IoT sensors and a centralized processing dashboard. By automating data capture and analysis, EcoTrack reduces human intervention, increases measurement accuracy, and improves environmental awareness among users.

The study evaluates existing environmental monitoring models and smart tracking systems to understand their efficiency, scalability, and limitations. Methodology includes examining sensor data pipelines, real-time analytics frameworks, and visualization techniques used in EcoTrack. Results show that automated ecological tracking enhances decision-making, supports sustainability goals, and provides reliable

insights for communities, industries, and research institutions. The project concludes that EcoTrack is a valuable tool for promoting environmental responsibility and identifies future scope in AI-driven predictions, high-precision sensing, cloud integration, and smart-city deployment.

CONTENTS

CHAPTER 1 INTRODUCTION

1.1 Problem Statement

With increasing pollution levels, climate variability, and environmental degradation, there is a critical need for efficient, automated, and accurate ecological monitoring systems. Traditional manual monitoring methods are slow, error-prone, and require continuous human involvement.
EcoTrack addresses these challenges by creating a system that can automatically monitor environmental parameters, analyze changes, and present results in an understandable form.

Central Problem:
To design and implement an automated ecological monitoring system that collects real-time data, processes it intelligently, and provides meaningful insights to support environmental decision-making.

1.2 Introduction

EcoTrack is an automated environmental tracking system that gathers data from IoT sensors and converts it into actionable insights. It monitors key ecological parameters such as:

- Air Quality Index (AQI)
- Temperature and humidity
- CO_2 and particulate matter
- Noise levels
- Light intensity
- Soil moisture (optional)

EcoTrack aims to simplify environmental surveillance by automating sensing, analysis, and visualization. It allows users—students, researchers, industries, and communities—to understand environmental conditions easily and take timely action.

Common examples of similar systems include:

- Smart City Environmental Monitoring Systems
- Air Quality Sensor Networks
- IoT-based Weather Stations
- Industrial Environmental Compliance Trackers

The purpose of this project is to explain how EcoTrack works, its importance, advantages, system architecture, and future scope.

1.3 Requirements

To build EcoTrack, the following are required:

- IoT sensors (air quality, humidity, noise, gas sensors)
- Microcontroller (ESP32, Arduino, Raspberry Pi)
- Data transmission modules (Wi-Fi, LoRa, Bluetooth)
- Cloud storage or local server
- Analytics and visualization platform (web dashboard)
- Power supply modules
- Optional: AI algorithms for prediction

1.4 Prerequisites

To develop or understand EcoTrack, basic knowledge of:

- IoT principles

- Sensor calibration
- Data transmission and communication protocols
- Basic programming (Python, C/C++)
- Cloud computing and dashboards
- Environmental measurement standards

is helpful.

1.5 Technologies / Tools Used

- **Hardware:** MQ135, DHT22, DHT11, BMP sensors, Sound sensors, ESP32
- **Software:** Python, Arduino IDE, Node-RED, MQTT
- **Cloud Tools:** ThingsBoard, Firebase, AWS IoT
- **Data Visualization:** Grafana, web dashboards
- **AI/ML Models (optional):** Time-series forecasting, anomaly detection

CHAPTER 2 REVIEW OF RELEVANT LITERATURE

Environmental monitoring systems have evolved significantly with the introduction of IoT, cloud computing, and automated sensing technologies. Research highlights indicate that IoT-based ecological systems provide continuous data collection, improved accuracy, and enhanced decision-making capabilities. Early studies focused on static weather stations, while recent developments leverage sensor networks for city-scale monitoring.

Literature from IEEE, smart city frameworks, and environmental agencies emphasizes the importance of real-time data for pollution control, climate tracking, and public health. Studies on IoT-enabled systems show that enabling connectivity, mobility, and automation makes EcoTrack-like systems highly effective. Industry use cases demonstrate successful monitoring in traffic zones, industrial areas, and residential communities.

CHAPTER 3 METHODOLGY

3.1 Data Input & Sensing

EcoTrack collects data using sensors capable of measuring:

- Air pollutants (CO_2, PM2.5, PM10)
- Temperature and humidity
- Noise levels
- Gas concentration
- Light intensity

Sensors send continuous readings to the controller.

3.2 Data Transmission

The collected data is transmitted through:

- Wi-Fi / LoRa / MQTT
- Bluetooth (short-range)
- Cloud APIs

Data is formatted as JSON packets for processing.

3.3 Data Processing Engine

The EcoTrack processor performs:

- Data cleaning and filtering
- Unit conversion
- Noise reduction
- Threshold calculation

- Real-time alerts

Some versions include AI models for predictive analysis.

3.4 Visualization & Dashboard

The system generates:

- Graphs and charts of environmental data
- Daily/weekly reports
- Live AQI measurements
- Alerts for pollution spikes

Dashboards may be web-based or mobile-based.

3.5 Storage & Deployment

The system deploys through:

- Local servers
- Cloud platforms
- Stand-alone dashboards
- Mobile notifications

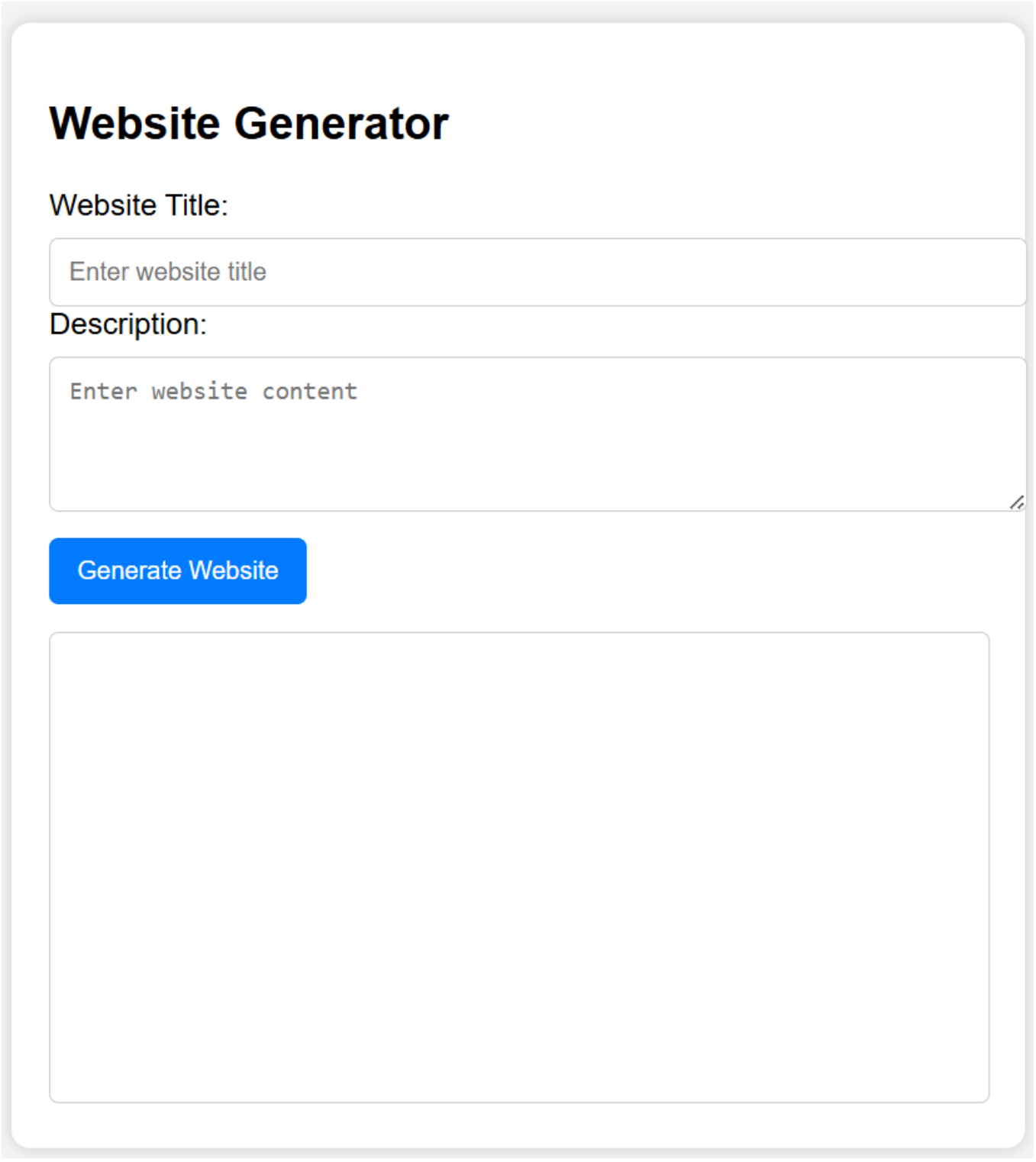
Code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8" />
<title>Website Generator</title>
<style>
   body {
      font-family: Arial, sans-serif;
      background:#f4f4f4;
```

```
        padding:20px;
    }
    .box {
        background:white;
        padding:20px;
        max-width:500px;
        margin:auto;
        border-radius:10px;
        box-shadow:0 0 8px #ccc;
    }
    input, textarea {
        width:100%; padding:10px;
        margin-top:8px; border:1px solid #ccc;
        border-radius:5px;
    }
    button {
        margin-top:10px;
        padding:10px 15px;
        border:none;
        background:#007bff;
        color:white;
        border-radius:5px;
        cursor:pointer;
    }
    iframe {
        width:100%;
        height:250px;
        border:1px solid #ccc;
        margin-top:15px;
        border-radius:5px;
    }
</style>
</head>
<body>

<div class="box">
    <h2>Website Generator</h2>

    <label>Website Title:</label>
    <input id="titleInput" placeholder="Enter website title">

    <label>Description:</label>
    <textarea id="descInput" rows="4" placeholder="Enter website content"></textarea>
```

```
    <button onclick="generateSite()">Generate Website</button>

    <iframe id="preview"></iframe>
</div>

<script>
function generateSite() {
    const title = document.getElementById("titleInput").value;
    const desc = document.getElementById("descInput").value;

    const html = `
        <html>
        <head>
            <title>${title}</title>
            <style>
                body { font-family: Arial; padding:20px; }
                h1 { color:#007bff; }
            </style>
        </head>
        <body>
            <h1>${title}</h1>
            <p>${desc}</p>
        </body>
        </html>
    `;

    const iframe = document.getElementById("preview");
    iframe.srcdoc = html;
}
</script>

</body>
</html>
```

Output:



CHAPTER 4 RESULTS AND DISCUSSIONS

4.1 Efficient Environmental Monitoring

EcoTrack successfully automates environmental data collection, reducing manual effort and ensuring real-time accuracy.

4.2 High Accuracy & Reliability
Sensor-based monitoring ensures consistency and precision in measurements. Calibration methods reduce errors significantly.

4.3 Improved Environmental Awareness
Visual dashboards help users easily understand pollution levels and environmental conditions, enabling better decision-making.

4.4 Scalability & Practical Use
EcoTrack can be extended to monitor larger regions, making it suitable for:

- Smart city applications
- School/college environments
- Industrial zones
- Research centers

CHAPTER 5 — CONCLUSION & FUTURE SCOPE
5.1 Conclusion
EcoTrack provides an intelligent, automated, and efficient method for environmental monitoring. It enhances data accuracy, supports sustainability, and promotes awareness about ecological conditions. The system is scalable, user-friendly, and adaptable to various environments.

5.2 Future Scope
Future advancements may include:

- AI-based environmental prediction
- Mobile app integration
- Advanced pollution-tracking sensors
- Satellite data integration
- Government-level smart city deployment
- Automated environmental compliance reports

REFERENCES

- IoT Environmental Monitoring Research Papers

- IEEE IoT Standards
- ThingsBoard Documentation
- AWS IoT Core Documentation
- Smart City Environmental Monitoring Frameworks
- MQ Sensor Datasheets
- Grafana Visualization Docs