Rajalakshmi Engineering College

(An Autonomous Institution)

Rajalakshmi Nagar,

Thandalam- 602105

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

MACHINE LEARNING INTERNSHIP

CS23421 – INTERNSHIP

Internship Report submitted by

REGISTRATION NUMBER	**:**	**231501008**
STUDENT NAME	**:**	**AFRAH M**
YEAR	**:**	**2023-2027**
INTERNSHIP COMPANY	**:**	**Approtech R&D Solutions Pvt Ltd**
TRAINER NAME	**:**	**Miss Petsi**
INTERNSHIP PERIOD	**:**	**FROM: 27.12.2024 TO: 10.01.2025**
INTERNSHIP DURATION	**:**	**15 DAYS**

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(Approved/ Not Approved)	(Approved/ Not Approved)	(Approved/ Not Approved)	(Approved/ Not Approved)
Examiner 1	Examiner 2	HOD(AIML)	Deputy HOD

WORK CARRIED IN INDUSTRY

TECHONOLOGIES AND TOOLS USED:

Career-Craft is an AI-powered web application that recommends personalized career paths for students based on their individual skills, personality traits, and salary expectations. During the internship, I worked on building this system end-to-end, using modern machine learning and web technologies.

1. Frontend:

The frontend of **Career-Craft** was designed to provide a seamless, responsive, and intuitive user experience. It was developed using:

- **HTML5**: Structured the layout of the web pages, including forms, headings, input elements, and sections. HTML5 ensured semantic clarity and accessibility.
- **CSS3**: Styled the elements with colors, typography, spacing, and layouts. Media queries were used to make the design responsive across different screen sizes.
- **JavaScript**: Enabled interactivity on the web pages such as form validation, dynamic displays, and real-time feedback for user inputs.
- **Bootstrap**: Provided a responsive grid system and pre-designed UI components like cards, buttons, modals, and navigation bars, which helped accelerate frontend development.
- **Jinja2 Templating**: Used within the Flask framework to dynamically render HTML pages based on backend data. This allowed for real-time display of predictions, recommended careers, tutorials, and confidence scores.

2. Backend:

The backend was responsible for handling user inputs, managing business logic, performing data processing, and integrating with the machine learning model.

- **Python 3.10**: The core programming language used for logic development, data manipulation, and integration with machine learning components.
- **Flask Microframework**: Served as the primary backend framework due to its simplicity and flexibility. Flask managed routing, template rendering, and form handling.

- **RESTful Routing**: Structured the web application routes in a clean, logical, and maintainable way (e.g., /predict, /result, /home). This improved both code readability and user navigation.
- **MVC Pattern (Model-View-Controller)**: Ensured separation of concerns in the application:
    - *Model*: Encapsulated the machine learning logic.
    - *View*: Managed by Jinja2 templates for user interface rendering.
    - *Controller*: Flask routes that handled logic and coordinated between frontend and backend.

3. Machine Learning:

At the core of the system lies a robust ML pipeline designed to analyze user inputs and recommend career paths.

- **XGBoost Classifier**: A highly efficient and accurate gradient boosting algorithm used to perform multiclass classification. It was selected for its speed, interpretability, and superior accuracy in handling structured data.
- **scikit-learn**: Provided tools for splitting data, encoding features, generating evaluation metrics (e.g., accuracy, F1-score), and integrating with the XGBoost model.
- **pandas & NumPy**: Used for data manipulation, feature extraction, and preprocessing tasks like one-hot encoding and salary normalization.
- **joblib**: Employed for model serialization. The trained model was saved as a .pkl file, allowing it to be loaded efficiently into the Flask backend for real-time prediction without needing to retrain each time.

4. Database (Optional):

While a traditional database was not used in this prototype, static data management was handled effectively using structured CSV files.

- **CSV Files**: Maintained datasets for:
    - Skill-to-career mappings (to perform skill gap analysis).
    - Recommended YouTube tutorials (for missing skill resolution).
    - Companies hiring for various career roles.
- This approach provided simplicity and fast access for prototyping, and it also allowed easy scalability toward using relational or NoSQL databases in future releases.

PROJECT OVERVIEW

Objective:

The goal of the Career-Craft project is to develop an **interactive, AI-driven career recommendation platform** tailored for students and young professionals. The system takes into account the individual's current **technical and soft skills**, their **MBTI personality traits**, and their **expected salary** to generate **personalized career path suggestions**. The core idea is to use **machine learning** not just to make predictions, but to offer **meaningful, actionable guidance** that can help users better align their personal attributes with real-world job roles. The platform aims to reduce the uncertainty and confusion many students face while choosing a career by providing:

- **Top 2 most suitable career paths** with associated **confidence scores** to help users understand how strongly their profile matches each recommendation.
- A clear **identification of missing skills** required for those careers.
- **Curated YouTube tutorials** to help users build the required competencies.
- A list of **top companies** currently hiring for those roles, giving users a sense of direction and industry relevance.

Key Features:

1. **User Input Form**
    - An intuitive and responsive form that allows users to select up to **10 skills** from a predefined list, choose **3 personality types**, and enter their **salary expectations**.
    - Designed for simplicity and clarity to make it accessible for all students, regardless of technical background.
2. **Machine Learning Prediction**
    - The collected data is pre-processed using one-hot encoding and passed to a trained **XGBoost classifier**, which predicts the most suitable careers.
    - The system returns the **top 2 career options** along with **probability-based confidence scores**.
3. **Confidence Ranking**
    - Each career recommendation includes a percentage score representing the model’s confidence, helping users make informed comparisons between their options.

4. **Skill Gap Analysis**
    - The system compares the user's selected skills against a predefined set of skills required for each recommended career.
    - **Missing skills** are identified and highlighted for each option.
5. **Tutorial and Company Recommendations**
    - Based on the missing skills, the system provides links to **high-quality YouTube tutorials**.
    - It also displays a curated list of **top companies** hiring for those roles, bridging the gap between guidance and real-world opportunities.

My Contributions:

1. **UI/UX Design**
    - Designed and implemented the complete user interface using HTML, CSS, JavaScript, and Bootstrap for responsiveness.
    - Ensured the web interface is visually appealing, intuitive, and accessible across devices.
2. **Machine Learning Model**
    - Trained and evaluated the **XGBoost classifier** using a custom-built dataset.
    - Achieved a **prediction accuracy of 97.1%**, ensuring high reliability in the results.
3. **Backend Development**
    - Built backend logic using Flask, including routing, form handling, and integration with the ML model.
    - Handled all data preprocessing tasks, including feature encoding and normalization.
4. **Skill Gap & Tutorial Recommendation Logic**
    - Developed a skill-to-career mapping system to identify missing skills.
    - Mapped those missing skills to curated YouTube tutorials, making the results actionable for learners.
5. **Performance Tuning & Optimization**
    - Used techniques like hyperparameter tuning, class balancing, and caching to optimize model accuracy and system responsiveness.
    - Ensured that the platform operates smoothly in real-time conditions.

Soft Skills Development

In addition to technical work on the Career-Craft project, I also focused on developing essential soft skills that contribute to professional growth and workplace readiness.

Communication & Presentation:

- Improved verbal and written communication through documentation and project discussions.
- Practiced presenting ideas clearly while explaining system features and outputs.

Team Collaboration:

- Worked with peers and mentors, shared feedback, and coordinated project modules.
- Learned how to adapt in group settings and manage tasks collectively.

Problem Solving & Critical Thinking:

- Tackled real-time challenges in model tuning, UI responsiveness, and backend integration.
- Applied logical thinking and research to debug and optimize solutions.

Time Management & Organization:

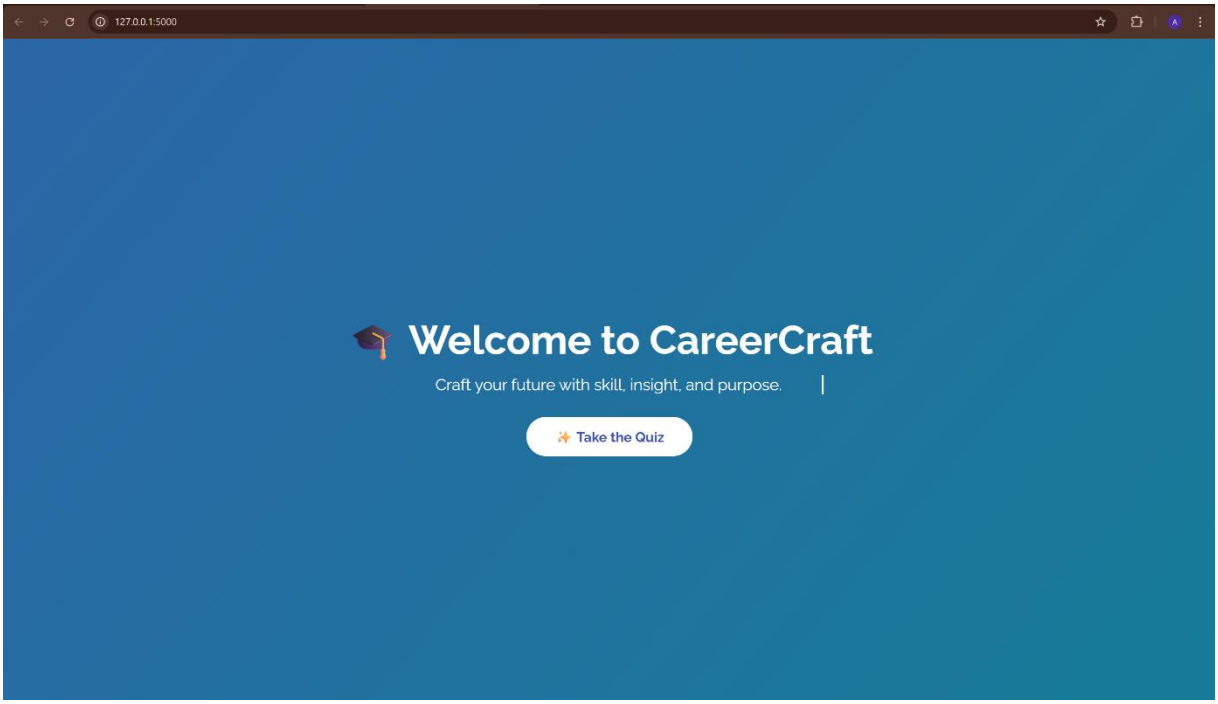
- Managed project milestones within a short internship period.
- Prioritized tasks effectively to meet deadlines for UI, backend, and ML integration.

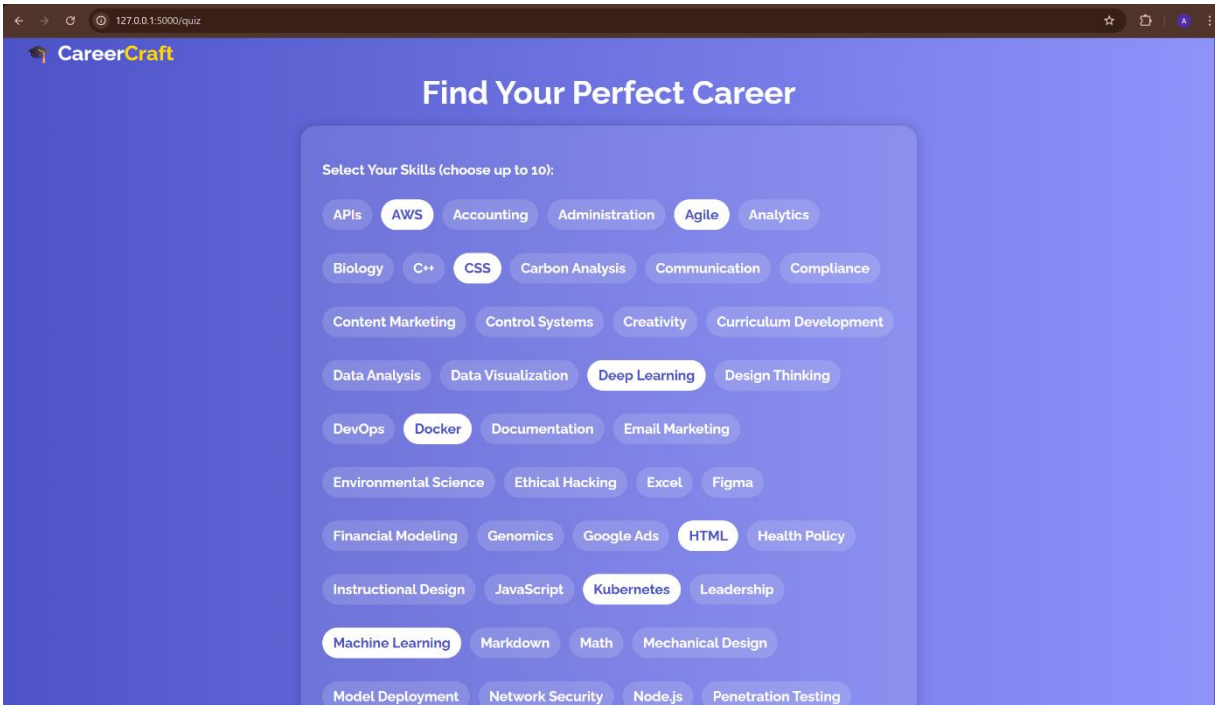
Professional Etiquette:

- Gained insights into professional communication and project presentation.
- Understood the importance of attention to detail, clarity, and user-focused design.

This soft skills development experience helped me become more confident, adaptable, and prepared for future professional roles and team environments.

DEMO OUTPUT:


127.0.0.1:5000
Welcome to CareerCraft
Craft your future with skill, insight, and purpose.
Take the Quiz


127.0.0.1:5000/quiz
CareerCraft
Find Your Perfect Career
Select Your Skills (choose up to 10):
APIs
AWS
Accounting
Administration
Agile
Analytics
Biology
C++
CSS
Carbon Analysis
Communication
Compliance
Content Marketing
Control Systems
Creativity
Curriculum Development
Data Analysis
Data Visualization
Deep Learning
Design Thinking
DevOps
Docker
Documentation
Email Marketing
Environmental Science
Ethical Hacking
Excel
Figma
Financial Modeling
Genomics
Google Ads
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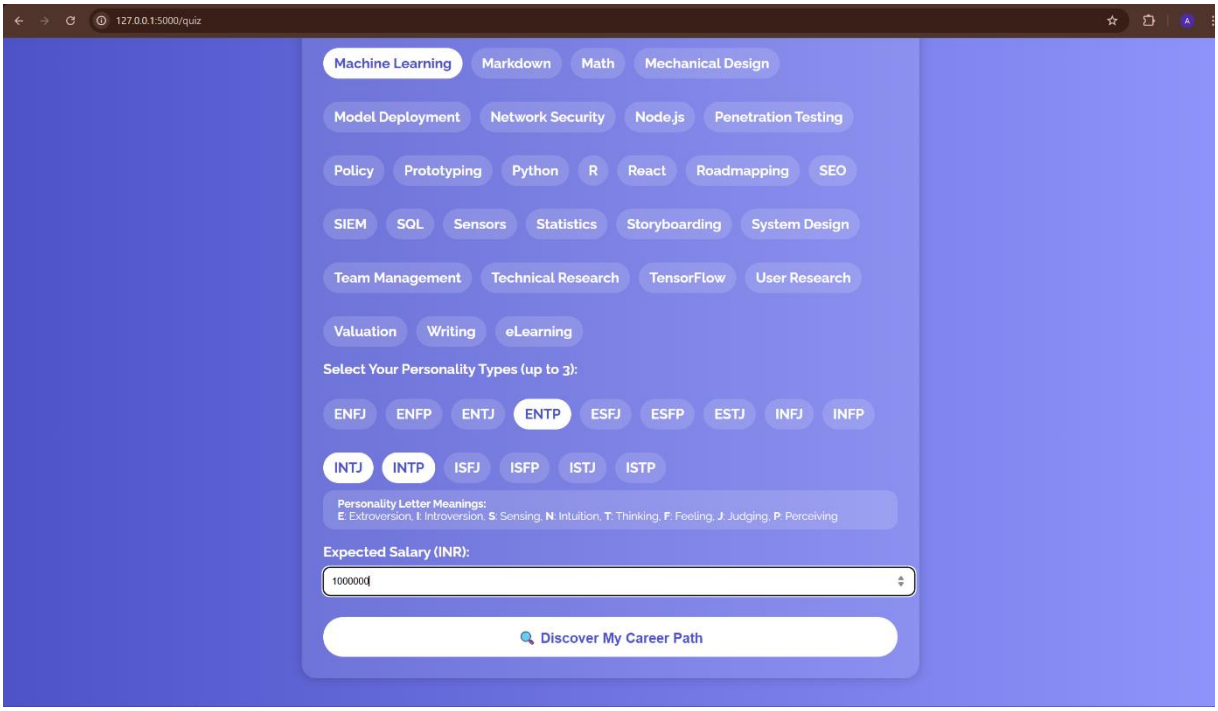
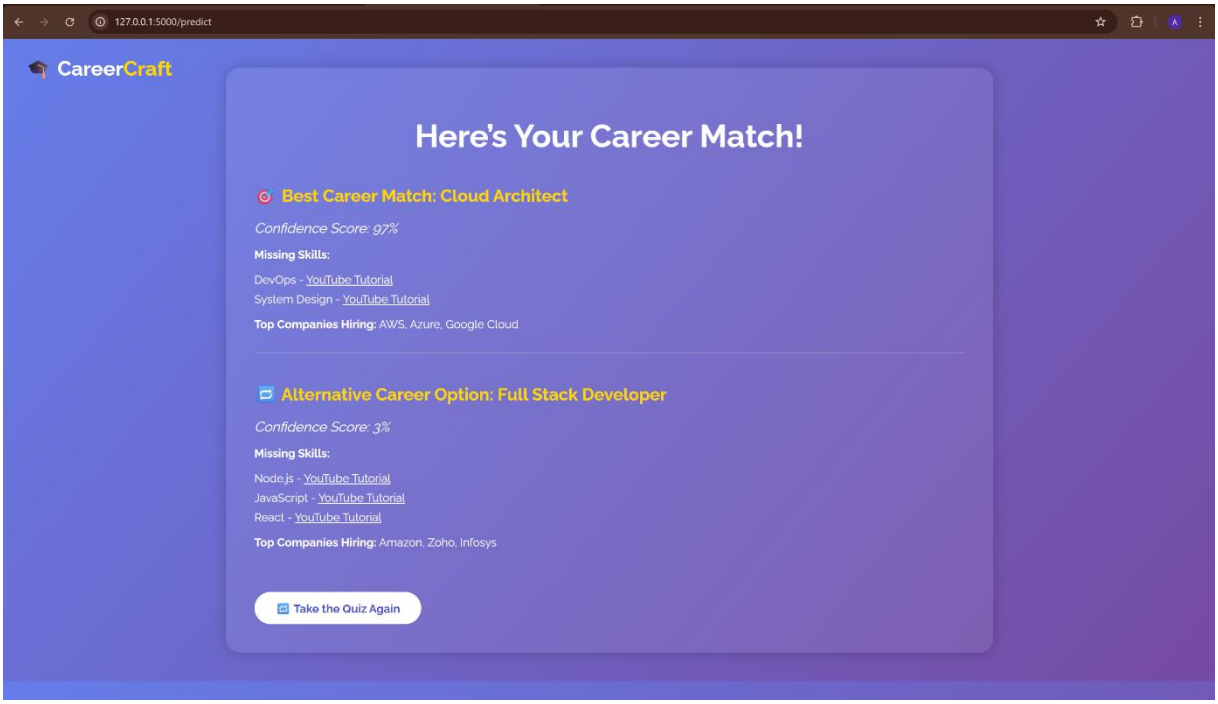
Machine Learning
Markdown
Math
Mechanical Design
Model Deployment
Network Security
Node.js
Penetration Testing


127.0.0.1:5000/quiz
Machine Learning
Markdown
Math
Mechanical Design
Model Deployment
Network Security
Node.js
Penetration Testing
Policy
Prototyping
Python
R
React
Roadmapping
SEO
SIEM
SQL
Sensors
Statistics
Storyboarding
System Design
Team Management
Technical Research
TensorFlow
User Research
Valuation
Writing
eLearning
Select Your Personality Types (up to 3):
ENFJ
ENFP
ENTJ
ENTP
ESFJ
ESFP
ESTJ
INFJ
INFP
INTJ
INTP
ISFJ
ISFP
ISTJ
ISTP
Personality Letter Meanings:
E: Extroversion, I: Introversion, S: Sensing, N: Intuition, T: Thinking, F: Feeling, J: Judging, P: Perceiving
Expected Salary (INR):
1000000
Discover My Career Path


127.0.0.1:5000/predict
CareerCraft
Here's Your Career Match!
Best Career Match: Cloud Architect
Confidence Score: 97%
Missing Skills:
DevOps - YouTube Tutorial
System Design - YouTube Tutorial
Top Companies Hiring: AWS, Azure, Google Cloud
Alternative Career Option: Full Stack Developer
Confidence Score: 3%
Missing Skills:
Node.js - YouTube Tutorial
JavaScript - YouTube Tutorial
React - YouTube Tutorial
Top Companies Hiring: Amazon, Zoho, Infosys
Take the Quiz Again

Conclusion and Reflection

The internship experience while developing the **Career-Craft – AI-Based Career Recommendation System** was both enriching and transformative. It not only enhanced my technical knowledge but also strengthened my professional and problem-solving abilities.

Key Learnings:

• Built a complete career recommendation web platform using **HTML, CSS, JS, Python (Flask)**, and **XG-Boost**.

• Learned the full development cycle — from **frontend design** and **backend logic** to **machine learning model integration**.

• Understood how to **preprocess data**, encode inputs, and evaluate models using classification metrics.

• Applied **RESTful routing**, implemented **MVC architecture**, and practiced clean code organization.

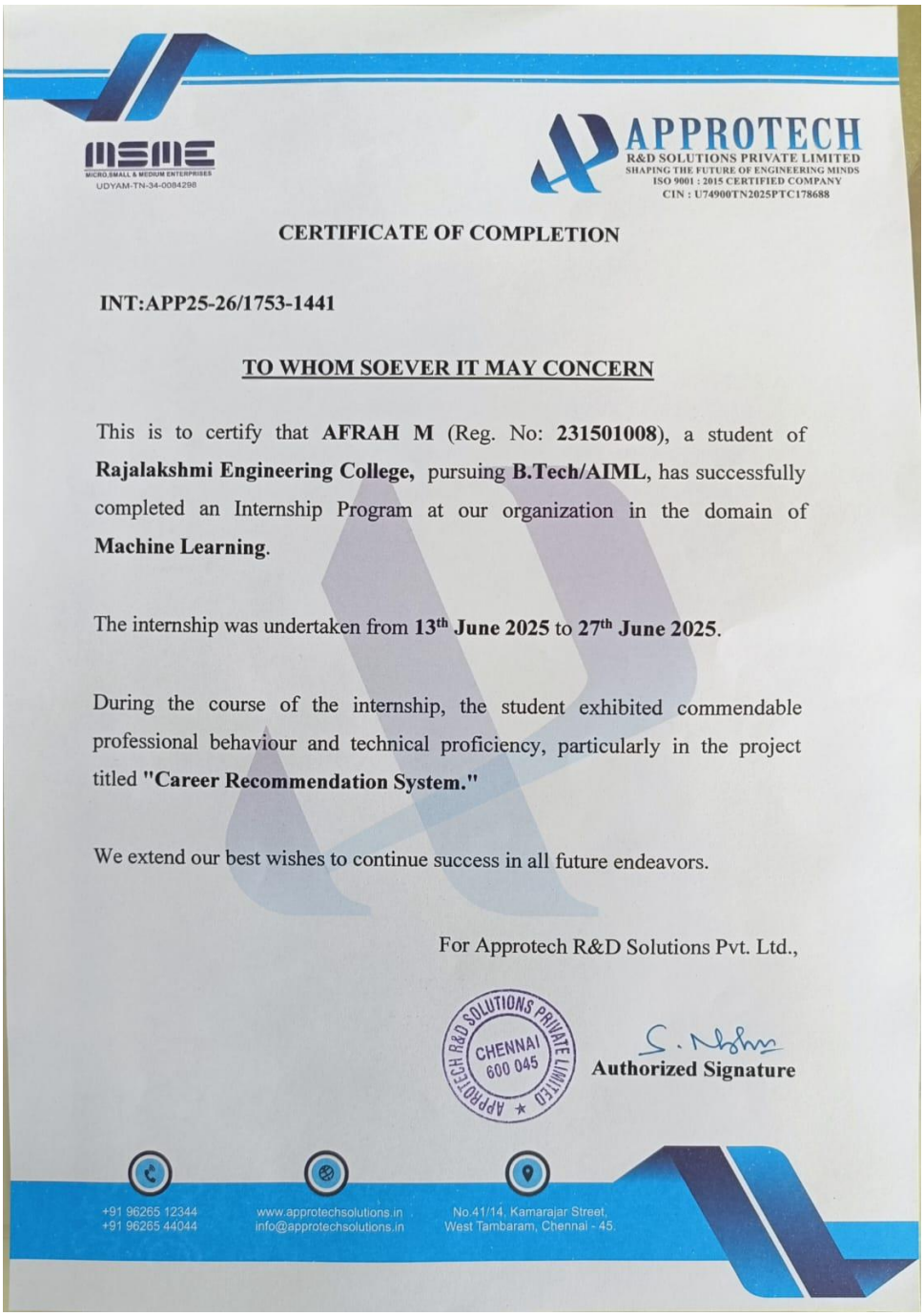
• Gained practical exposure to **AI in education and HRTech**, along with hands-on deployment practices.

• Improved skills in **project documentation**, collaboration, and UI/UX optimization.

Final Thoughts:

I am truly grateful to my mentor **Miss Pitsi** and the entire guidance team for their support, feedback, and encouragement throughout this internship. This project laid a strong foundation for my interest in **machine learning**, **full-stack development**, and **real-world AI applications**. It has also inspired me to continue learning advanced concepts in AI and contribute to building impactful, user-focused digital solutions in the future.

INTERNSHIP COMPLETION CERTIFICATE



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SHAPING THE FUTURE OF ENGINEERING MINDS
ISO 9001 : 2015 CERTIFIED COMPANY
CIN : U74900TN2025PTC178688

CERTIFICATE OF COMPLETION

INT:APP25-26/1753-1441

TO WHOM SOEVER IT MAY CONCERN

This is to certify that **AFRAH M** (Reg. No: **231501008**), a student of **Rajalakshmi Engineering College,** pursuing **B.Tech/AIML**, has successfully completed an Internship Program at our organization in the domain of **Machine Learning**.

The internship was undertaken from **13th June 2025** to **27th June 2025**.

During the course of the internship, the student exhibited commendable professional behaviour and technical proficiency, particularly in the project titled **"Career Recommendation System."**

We extend our best wishes to continue success in all future endeavors.

For Approtech R&D Solutions Pvt. Ltd.,

APPROTECH R&D SOLUTIONS PRIVATE LIMITED CHENNAI 600 045

Authorized Signature

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