FlexoPlate Manager
Optimizing Plate Usage through Similarity Detection

Group ID : R25 - 082

SLIIT
FACULTY OF COMPUTING

SUPERVISOR DETAILS

SUPERVISOR

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CO-SUPERVISOR

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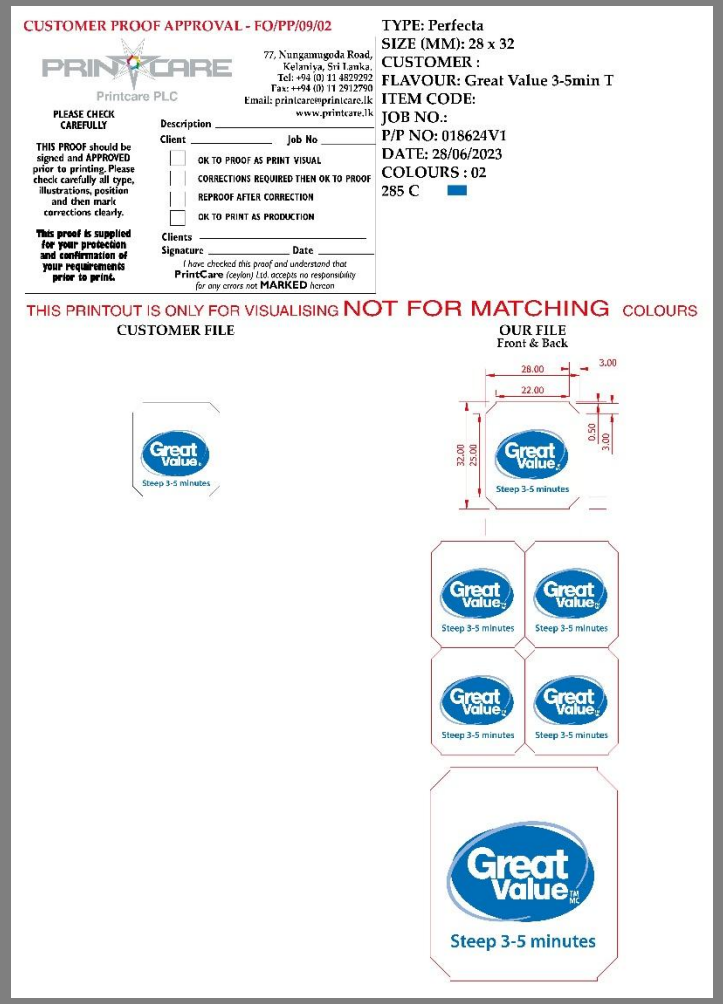
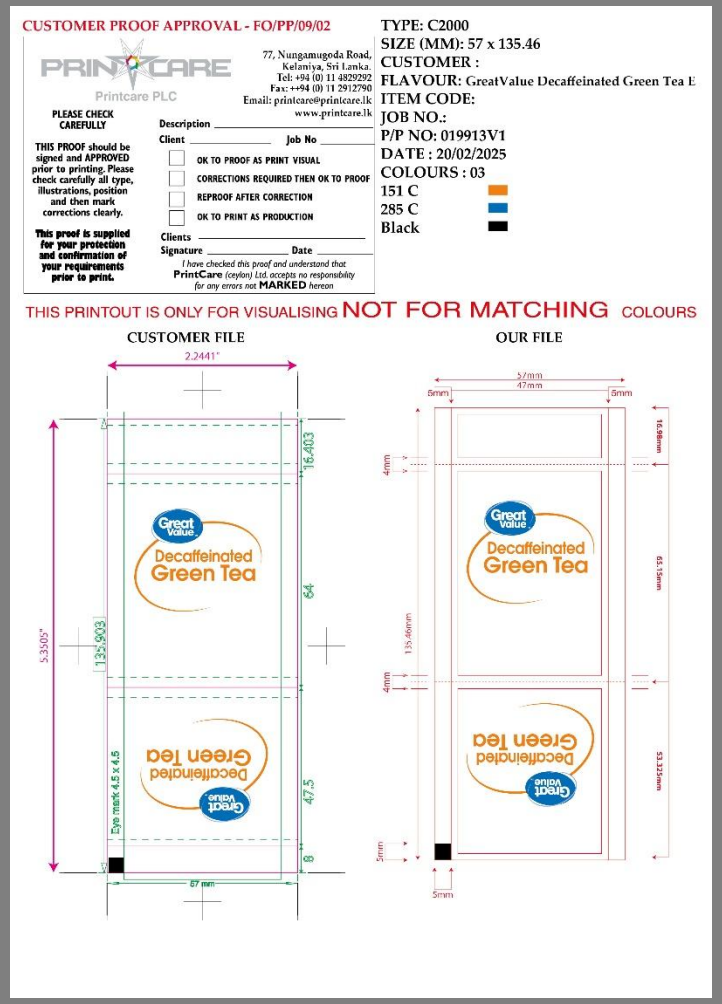
INTRODUCTION

Revolutionizing Flexo Printing: Harnessing AI to Reduce Waste, Cut Costs, and Optimize Plate Reuse.

Flexographic printing is essential in packaging, but manual plate reuse is inefficient and costly. This research leverages AI for artwork similarity detection and automated plate tracking to reduce waste, cut costs, and improve efficiency [1]

WHAT IS THE ARTWORK?





The number of polymer plates used for printing should be determined by the colors in the artwork.

OBJECTIVES

Harnessing AI to revolutionize flexo printing—minimizing waste, lowering costs, and enhancing efficiency.

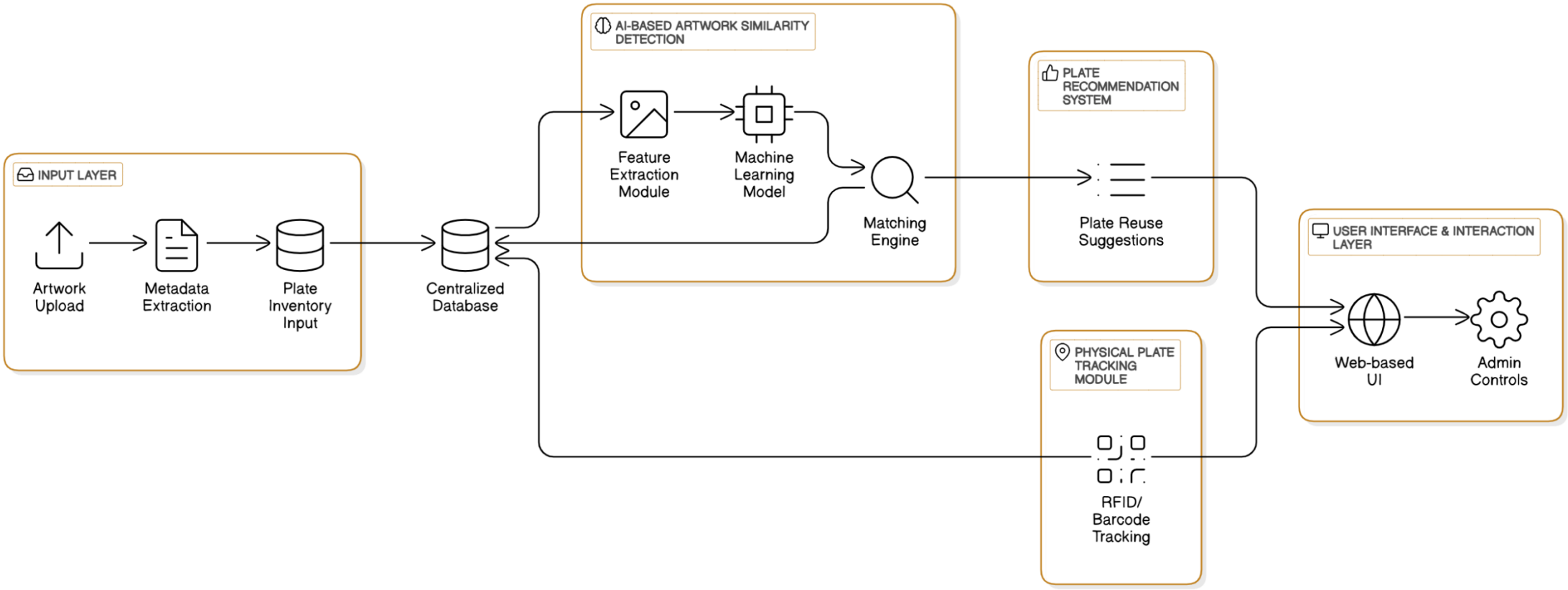
AI-Based Artwork Similarity Detection

Automated Plate Tracking

Cost & Waste Reduction

Operational Efficiency

OVERALL SYSTEM DIAGRAM



COMMERCIALIZATION PLAN

Basic Plan
Free

- ✓ Limited artwork similarity detection for up to 5 artwork uploads per month
- ✓ Basic plate tracking with manual entry
- ✓ View basic plate reuse suggestions without history tracking

Small businesses exploring AI for plate reuse.

Individual operators seeking basic tracking tools.

Premium Plan
($15/month)

- ✓ Unlimited artwork similarity detection using AI-powered analysis
- ✓ Automated plate tracking with barcode/RFID integration
- ✓ Advanced plate reuse recommendations with location and usage history
- ✓ AI-driven pattern recognition for better matching accuracy

Mid-sized businesses aiming for automated plate optimization.

Production managers needing detailed tracking and reports. Agency FB

Enterprise Plan
($150/month)

- ✓ All features from the Premium Plan
- ✓ Multi-user access for up to 20 users
- ✓ Centralized dashboard for managing multiple printing jobs and plate inventories
- ✓ Integration support for existing ERP or production systems
- ✓ Custom AI model training for industry-specific artwork styles

Large companies managing high-volume artwork and plates.

Corporations needing multi-user access and system integration.

IT21291500 | Premajayantha W.H.S.I.

Specialization: Information technology

INTRODUCTION

- Flexographic printing is essential in packaging, but manual plate reuse is ineffient and costly [2]
- Relies on operator experience, causing inconsistencies and unnecessary plate creation.
- Loss of knowledge when experienced operators leave or resign, creating a knowledge gap
- Time-consuming training for new operators, leading to further inefficiencies.
- High potential for mistakes, increasing material waste, production costs, and environmental impact.

CHALLENGES

- Polymer plates used in flexo printing are not environmentally friendly and contribute to waste
- Storage challenges—large amounts of plates require significant space to store properly.
- Tracking difficulty—managing and locating specific plates in a large inventory is time-consuming
- Job setup delays—finding the correct plates when loading a job into the machine can be complex.
- Duplicate plates issue—if multiple plates exist for the same design, identifying the correct one is difficult.

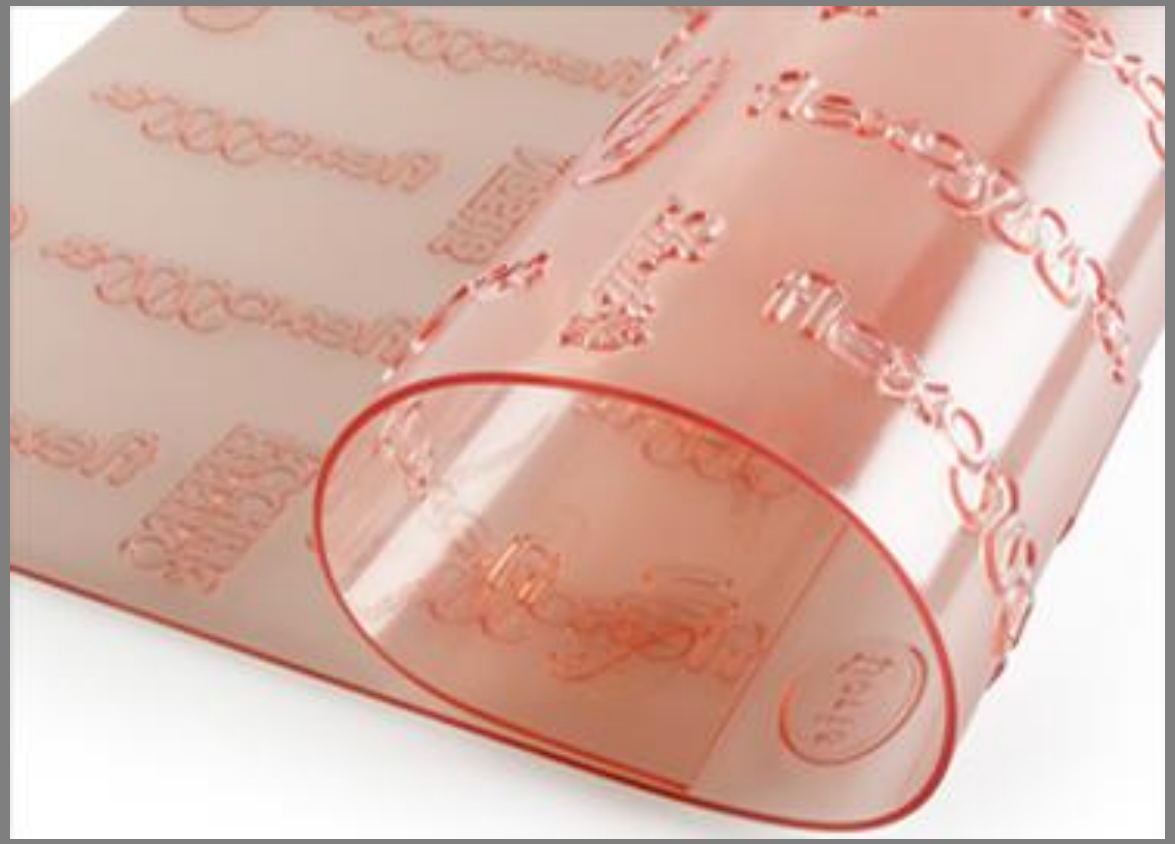
RESEARCH GAP

Component	[3]	[4]	[5]	[6]	Proposed System
AI-Based Artwork Similarity Detection	✗	✗	✓	✗	✓
Automated Plate Tracking (RFID/Barcode)	✗	✗	✗	✗	✓
Centralized Database for Plate Reuse	✗	✓	✗	✗	✓
Real-Time Plate Reuse Recommendation	✗	✗	✗	✗	✓
Knowledge Retention Without Operator Dependency	✗	✗	✗	✗	✓
Cost & Waste Reduction in Flexo Printing	✗	✗	✓	✗	✓

[3] **2022** - Study on AI applications in packaging industry automation.
[4] **2023** - Review of plate management challenges in flexographic printing.
[5] **2021** - Analysis of cost and material waste in flexo printing operations.
[6] **2024** - RFID and barcode tracking systems in industrial printing.

RESEARCH PROBLEM

How can we leverage AI-driven artwork similarity detection and automated plate tracking to optimize polymer plate reuse in flexographic printing, reducing material waste, production costs, and operational inefficiencies while improving sustainability?



OBJECTIVES

- **AI-Driven Artwork Similarity Detection**
  Automates plate reuse identification, reducing manual effort and costs.
- **Automated Knowledge Retention**
  Eliminates reliance on operator memory, ensuring consistent plate management even if experienced staff leave.
- **Efficient Plate Reuse & Waste Reduction**
  Identifies reusable plates to minimize material waste and unnecessary plate creation.

- **Real-Time Plate Tracking**
  Uses RFID/barcodes to track plate location and history, improving inventory management.
- **Faster Onboarding & Reduced Training Time**
  User-friendly system helps new operators adapt quickly, reducing disruptions.
- **Sustainability & Cost Savings**
  Optimizes resources, cutting costs while supporting eco-friendly practices in flexo printing.

TECHNOLOGIES

TensorFlow

React

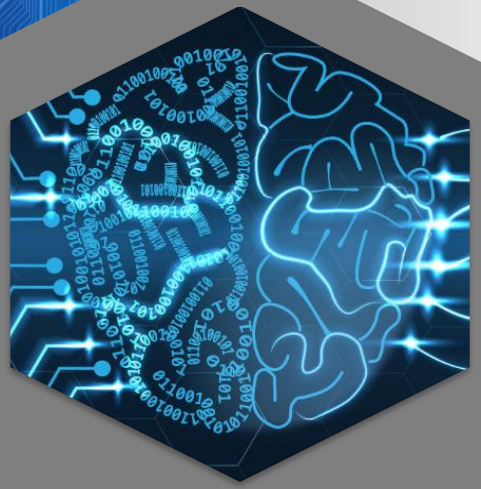
Python

Open CV

Machine Learning

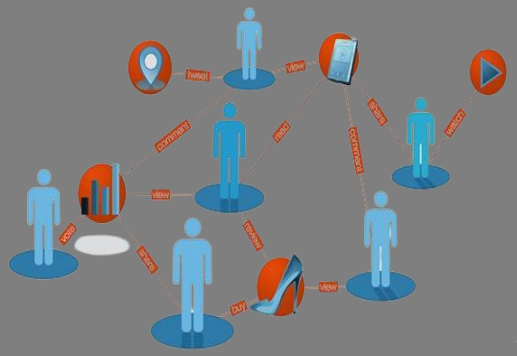
Automation & Tracking

Image Processing



KEY PILLARS

FUNCTIONAL REQUIREMENTS

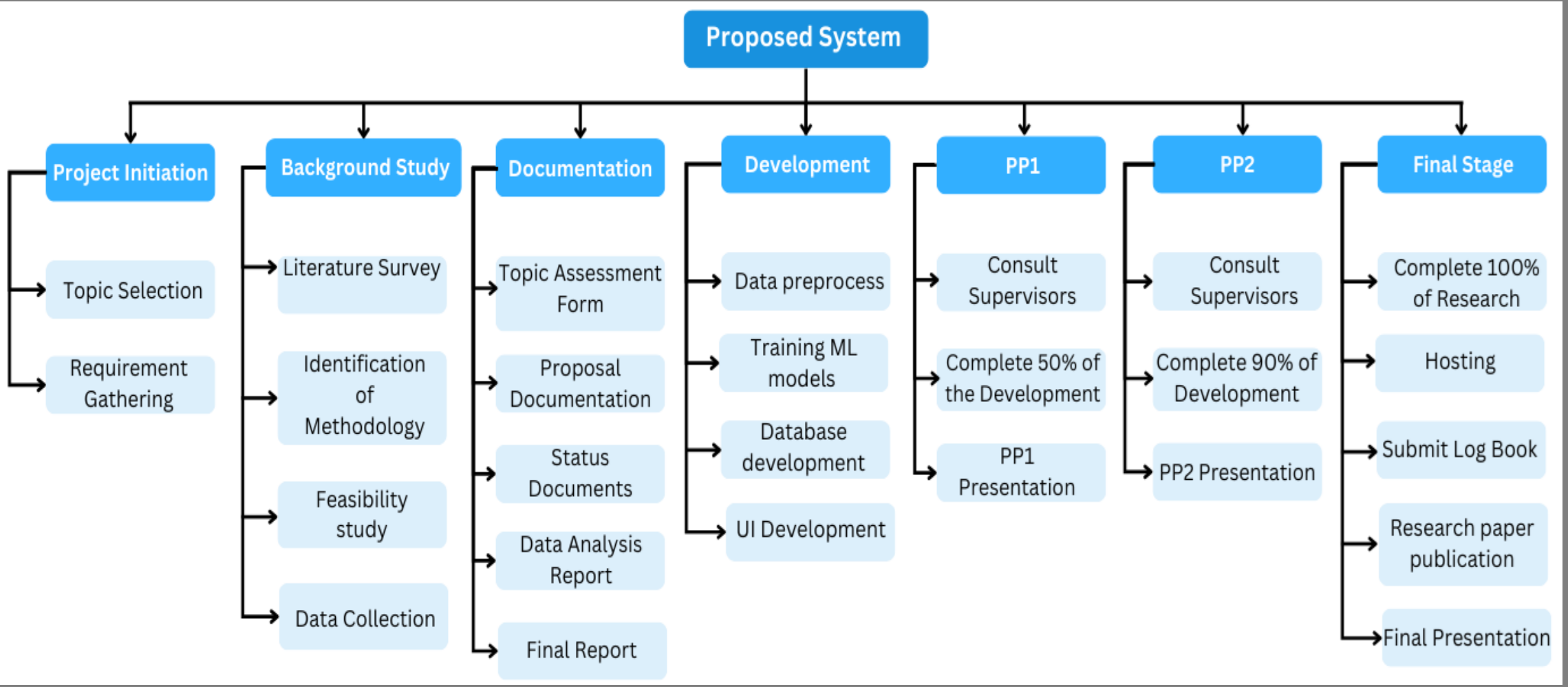


- Data Collection and Processing
- AI-Powered Artwork Similarity Detection
- Adaptive Plate Identification & Tracking
- Interactive Plate Selection & Recommendation System
- User Interface & Experience

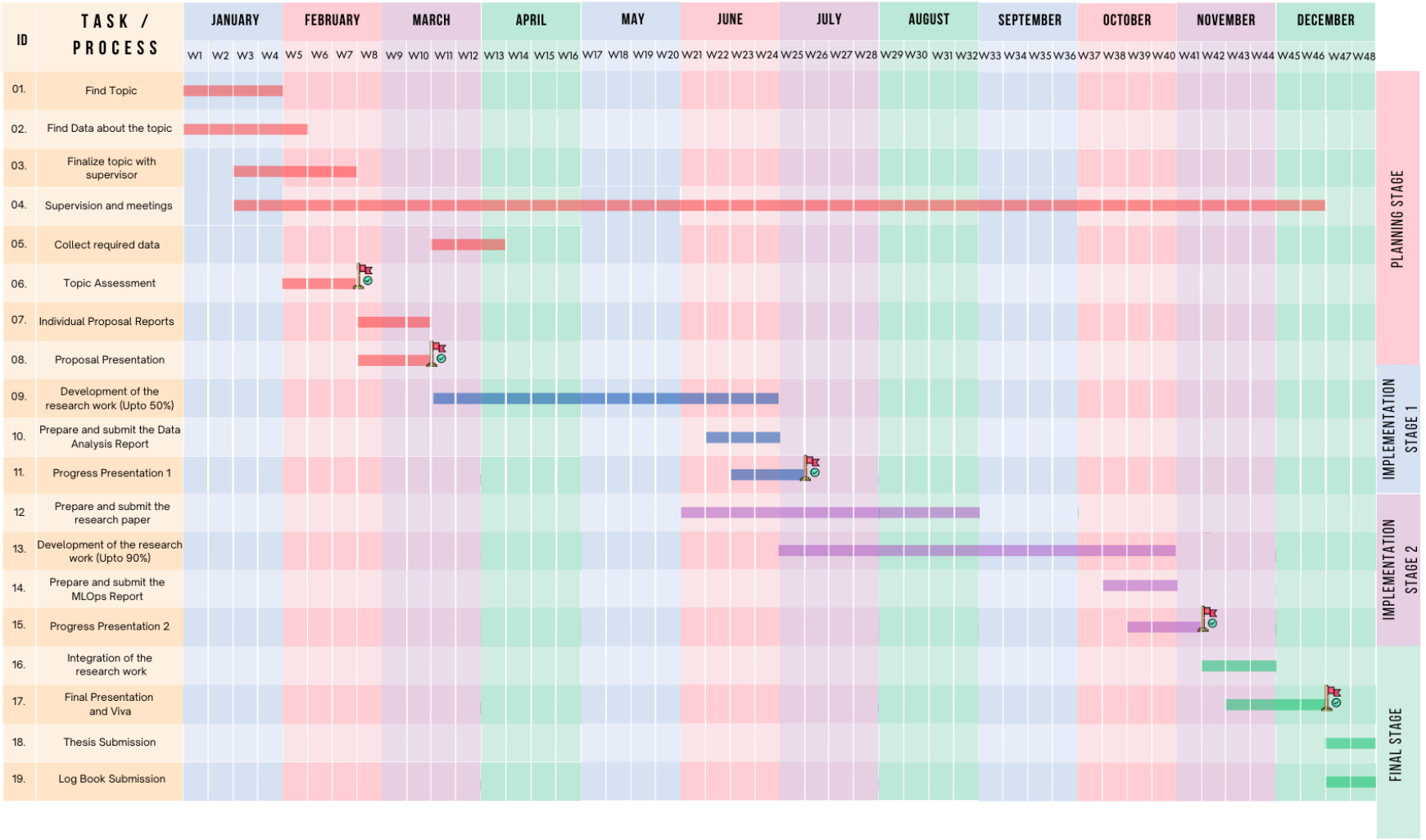
NON-FUNCTIONAL REQUIREMENTS

- Performance
- Reliability
- Usability
- Security

WORK BREAKDOWN CHART



GANTT CHART


ID
TASK / PROCESS
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13 W14 W15 W16 W17 W18 W19 W20 W21 W22 W23 W24 W25 W26 W27 W28 W29 W30 W31 W32 W33 W34 W35 W36 W37 W38 W39 W40 W41 W42 W43 W44 W45 W46 W47 W48
01. Find Topic
02. Find Data about the topic
03. Finalize topic with supervisor
04. Supervision and meetings
05. Collect required data
06. Topic Assessment
07. Individual Proposal Reports
08. Proposal Presentation
09. Development of the research work (Upto 50%)
10. Prepare and submit the Data Analysis Report
11. Progress Presentation 1
12 Prepare and submit the research paper
13. Development of the research work (Upto 90%)
14. Prepare and submit the MLOps Report
15. Progress Presentation 2
16. Integration of the research work
17. Final Presentation and Viva
18. Thesis Submission
19. Log Book Submission
PLANNING STAGE
IMPLEMENTATION STAGE 1
IMPLEMENTATION STAGE 2
FINAL STAGE

REFERENCES

[1] J. Smith and R. Kumar, "AI applications in packaging industry automation: A comprehensive study," *IEEE Transactions on Industrial Informatics*, vol. 18, no. 7, pp. 4561–4573, Jul. 2022.

[2] A. Johnson and M. Lee, "Review of plate management challenges in flexographic printing," *Journal of Printing Science and Technology*, vol. 35, no. 4, pp. 215–227, 2023.

[3] J. Smith and R. Kumar, "AI applications in packaging industry automation: A comprehensive study," *IEEE Transactions on Industrial Informatics*, vol. 18, no. 7, pp. 4561–4573, Jul. 2022.

[4] A. Lee and M. Fernandez, "Challenges in plate management for flexographic printing: A systematic review," *Journal of Packaging Science and Technology*, vol. 12, no. 3, pp. 112–125, Mar. 2023.

[5] K. Johnson and P. Wang, "Cost analysis and material waste reduction in flexo printing operations," *International Journal of Printing Technology*, vol. 29, no. 5, pp. 325–338, Oct. 2021.

[6] D. Brown and L. Carter, "RFID and barcode-based tracking systems in industrial printing," *IEEE Transactions on Automation Science and Engineering*, vol. 21, no. 1, pp. 134–145, Jan. 2024.