Acknowledgments

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Abstract

This Employee Management System is designed to simplify and improve management level of employees. It combines modern tools with AI for meeting the things which are needed in today's workplaces. The system makes it easier to handle tasks, interact with posts, and with documents using AI features.

Employees can use the system’s simple interface to update their work, monitor tasks, and collaborate with their team. This helps create a more productive and connected work environment. The EMS also includes tools that use AI to answer questions about documents or summarize information, which ultimately saves time and helps teams to make better decisions.

For improving teamwork the system offers real-time communication features which are also secure, with role-based access controls and strong data protection. For scalability, the system is hosted in the cloud using Kubernetes, making it reliable as the organization grows.

By using this AI powered system, companies can improve communication, and ensure the system adapts to future needs. It is a complete solution that combines ease of use with advanced technology to support modern employee management.

1. Introduction

The Ai based Employee Management System is the best tool for modern workplaces to optimize work processes and glean better productivity. It is applicable in different types of sectors to handle office work, communicate better, and structured document processing with Ai features. Teams using this system are able to stay organized, fulfill deadlines, and collaborate effectively in both small and large firms.

The system simplifies task management by allowing managers to assign and monitor tasks while enabling employees to update progress and submit completed work efficiently. It has features like handling documents and summarizing it in understandable form, also it allows you to query the documents using prompts. Also, It allows Real time communications, each employee and manager personalized dashboard and feedback sentiments analysis and announcement mechanisms which is helpful for engagement and alignment to teams. Also, this system will be designed with security and scalability features which in future will be adapting to future challenges with ease.

1.1 Problem Statement

Our Employee Management System overcomes traditional practices still common in Nepal, where managers assume employees work only for money. While some organizations are improving, many still lag behind. Regardless of some public and government organization, most of the private corporate houses started implementing good employee management practices in Nepal.(citation)

Our system focuses on modern, AI-driven tools to boost engagement, collaboration, and productivity, breaking away from outdated approaches.

- Ineffective Task Management: In Nepal and foreign countries, organizations often resort to manual assignment and tracking of tasks, which results in missed deadlines and overall low productivity.
- Lack of communication: For remote employees staying connected, getting timely updates and collaborating effectively often come out as major challenges in Nepal's rural areas, and globally in remote working setups.
- Time Consuming Document Handling: Querying from documents also summarizing large documents manually slows decision making and increases workload.
- Lack of Employee Engagement: There are very certain or limited tools in which employees can share their feedback and manager announce updates.
- Data Security Concerns: Today's world cyber threats are growing, many organizations are struggling to protect sensitive employee and operational data.

1.2 Project as a solution:

The above challenges can be solved by EMS, which has number of web-based and AI powered features regarding the above challenges, as listed below:

- **Employee Registration and Approval:** Employees first register using form and then managers review all new hires and he can approve or reject applicants, and assign approved employees to departments and their position.
- **OTP-Based Activation:** Once a manager assigns a department and position, an OTP is sent to the employee. The employee must enter OTP to activate their account and login into the system.
- **Task Automation:** Manager assigns tasks to employees and employees can see their own task in their dashboards.

- **Real-Time Communication:** It enables communication with team members in the system.
- **AI Document Tools:** It allows quickly querying and summarizing contents from documents.
- **Feedback and Engagement:** it collects employee feedback and shares updates to improve morale.
- **Secure Data Management:** Protects sensitive information with proper security and role-based access.

2. AIMS AND OBJECTIVES:

2.1 AIMS:

This system is designed to automate and improve employee management processes through AI powered tools. It essentially streamlines task assignment and post interaction, enhances communication, automates document handling, and increases employee engagement. Ensuring practicality, productivity, and smooth operations in contemporary workplaces, the system offers features such as registered verification, OTP-based activation, real-time collaboration, and smart document summarization.

2.2 OBJECTIVES:

1. Implement OTP registration features on which employees register with their details and after manager approval OTP code is sent to employee email for account activation and login.

2. Implement the feature for creating posts and allowing interactions in those posts such as likes and comments.

3. Develop a portal for creating , assigning the tasks to an employee and employee also can see all assigned tasks in his/her portal.

4. Develop a feature that allows employees to generate meeting slide presentations.

5. Integrate Real time messaging system for engaging and collaborating with each other within teams across departments.

6. Implement a chatbot to assist employees and managers with queries, and support related to tasks, policies, and other general information.

7. Implement the advanced Agentic RAG (Retrieval-Augmented Generation) system, which allows employees to query their documents.

8. Implement the LLM with llama Index and Langchain for generating the summary of the notebook uploaded by the employees.

9. Develop a system for employees to submit their feedback anonymously and managers to publish announcements.

3. Expected Outcomes and Deliverables

After completing this project the system delivers all innovative and unique features aimed at enhancing employee management systems. Below here is breakdown for outcomes and deleveries:

3.1 Expected Outcomes

Core Features:

- **Interactive Post System:** Employees can create posts which can be seen directly by managers as well as department people.

- **Efficient Task Management:** Manager can assign tasks to all employees and employees can directly see those tasks in his / her dashboard.

- **Automated Meeting slide Generation:** Tools for Employee to generate meeting slides through text content.

- **Document Querying and summarizing:** AI tools for querying, and summarizing documents.

Side Features:

- **Sentiment analysis of feedback:** Employee submits feedback which manager can read and also generate sentiments by all those feedbacks.

- **Automated attendance using facial recognition:** Employee attendance is carried out using facial recognition where employees need to show face for having attendence.

- **Chatbot Assistance:** An AI powered chatbot which assists both manager and employee with system related information.

- Added AI tools for content and plagiarism detection to ensure originality and quality in employee documents and reports.

3.2 Deliverables

1. Functional Prototype

   A fully functional EMS prototype which showcases core and side features:

   - Post Creation and Engagement
   - Submission and management of tasks.
   - Services for feedback and announcement
   - AI tools for creating slides.

2. User Guides

   Comprehensive user guides detailing:

   1. Setup, Configuration and Usage of Employee Management System
   2. Tutorials for employees and managers to effectively utilize its features for task management, collaboration, and productivity enhancement.

3. Technical Documentation

   A comprehensive technical specification that includes:

   1. System architecture and component description.
   2. Data models and flow diagrams.
   3. Deployment and maintenance guide.

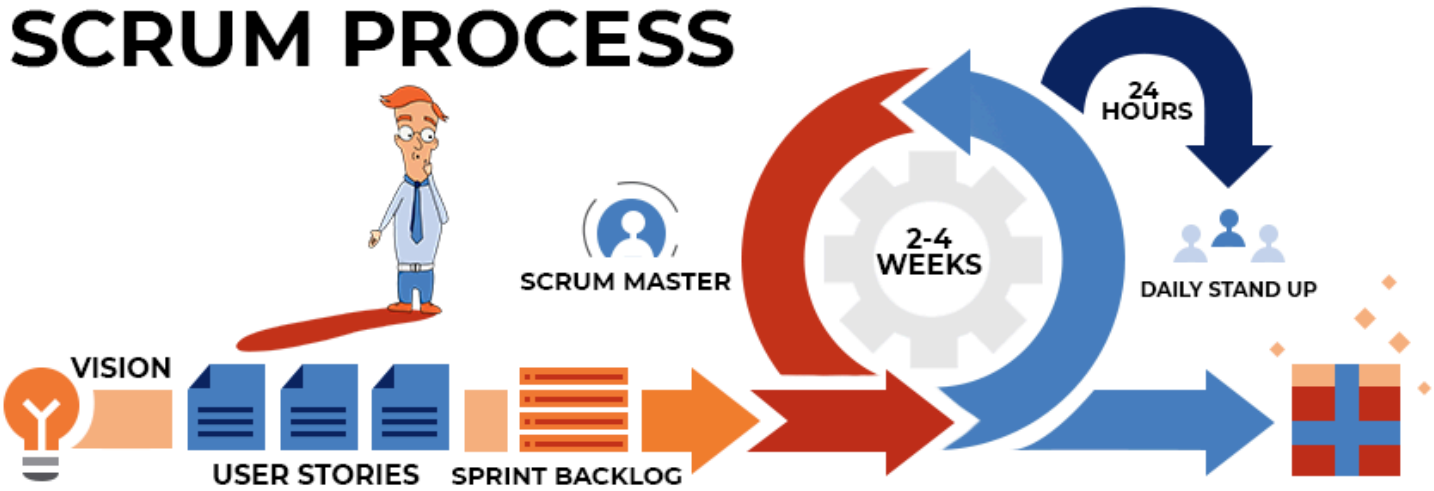
4. Risks, Threats, and Contingency Plans

Risk Area	Risks	Contingency Plans	Threats
System Downtime/Overload	Heavy resource consumption by AI tools (e.g., facial recognition, sentiment analysis) leading to system lag.	Use scalable cloud platforms (e.g., AWS, Azure). Apply model quantization (e.g., **INT8, FP16,GGUF**).	Frequent downtime disrupts employee workflows. Reduced confidence in system reliability.
AI Model Bias	Limited or skewed training data results in biased outputs for sentiment analysis or chatbot responses. Training a transformer model on **1 million rows** for **1000** epochs can take **24,000** hours and cost between **$12,624** and **$73,440.**	Train models on diverse datasets. Regularly update models and validate outputs with domain experts.	Employee mistrust in AI predictions. Compliance and ethical concerns.
Internet Stability	Cloud-dependent operations (e.g., model training, inference) interrupted by unstable connectivity.	Enable autosave checkpoints during operations. Configure failover mechanisms for critical workflows.	Delays in task assignment and processing. Potential data loss or incomplete records.
Integration	Lag between AI	Pre-test system	Reduced efficiency

Challenges	tools and real-time web components due to large model sizes or poor optimization.	performance. Use lightweight models. - Opt for asynchronous data processing.	in real-time task updates. User dissatisfaction with slow responses.
Attendance System Errors	Facial recognition inaccuracies lead to attendance disputes or missed logs.	Use robust, high-accuracy models. Allow manual overrides for unrecognized cases. Periodically test the system.	Disputed records leading to employee dissatisfaction. Reduced trust in the attendance system.
Sentiment Analysis Inaccuracy	Misinterpreted feedback sentiments result in flawed managerial decisions.	Validate results manually for critical feedback. Train models on domain-specific feedback datasets.	Damaged employee-manager relationships. Loss of credibility in the feedback system.
Chatbot Assistance Errors	Chatbot provides irrelevant or incorrect responses, affecting productivity.	Continuously update the chatbot knowledge base. Include an escalation option for human assistance.	Employee reliance on faulty responses. Reduced overall system efficiency.

5. Methodology

Agile Scrum is a flexible and collaborative approach to managing software development projects. It focuses on breaking down work into small, manageable chunks called sprints, which are typically 1 to 4 weeks long. During each sprint, a specific part of the project is completed, and the team can gather feedback from stakeholders to make improvements for the next sprint. This makes it easy to adjust the project as needs change, which is ideal for developing an employee management system where requirements might evolve over time.



- Sprint Planning

  In Sprint Planning, I set the tasks that need to be completed for the upcoming sprint. I break down larger features, such as task tracking, announcement, feedback service into smaller, manageable tasks. These could include designing the task management interface, implementing backend functionality, and integrating notifications. Each task is estimated in terms of time and effort, ensuring that I can deliver a realistic outcome by the end of the sprint. This planning phase ensures that I have clear goals and a roadmap for the sprint, allowing for focused and efficient work.

- Daily Standup (Daily Scrum)

  During the sprint, I conduct a daily check-in where I review my progress and adjust priorities and ensure that I remain aligned with the sprint goals, ensuring continuous progress.

- Sprint Execution

  In Sprint Execution, I focus on completing the tasks outlined in the Sprint Backlog. For example, if the task is to implement task tracking features, I would break it down into smaller actions like designing the task creation UI, setting up the database to store tasks, writing the logic to assign tasks, and testing the functionality. Each task is tracked as I move through the sprint, ensuring that progress is consistent and deadlines are met.

- Sprint Review

  At the end of each sprint, I review the work that has been completed. This involves testing the functionality of the new features, ensuring they work as expected, and validating that they meet the requirements set at the beginning of the sprint.

- Sprint Retrospective

  Following the Sprint Review, I conducted a retrospective to evaluate both the product and the features that I created. This phase allows me to refine my approach

and optimize the development process for future sprints, ensuring continued improvement and efficiency.

- Product Backlog
  The Product Backlog is a prioritized list of all features and tasks that need to be developed for the Employee Management System. It includes functionalities such as task tracking, employee registration, and document interactions, feedbacks . Tasks are continuously prioritized based on business needs and technical requirements, ensuring that I focus on delivering the most valuable features first.

- Sprint Backlog
  The Sprint Backlog is a subset of tasks chosen from the Product Backlog to be completed during the sprint. For each sprint, I select tasks that are critical to advancing the development of the system.

- Continuous Feedback & Improvement
  After each sprint, I consistently review the work completed, gather feedback, and make necessary adjustments. Whether the feedback comes from testing the system or evaluating the results personally, this iterative approach ensures continuous improvement. Regular feedback and reflection allow me to refine the features and ensure that the system evolves to meet the requirements effectively.

This methodology ensures that the development process is structured, efficient, and focused on delivering valuable features incrementally, while also allowing room for continuous improvement.

6. REQUIREMENTS:

6.1 HARDWARE REQUIREMENTS:

Component	Details
Development Machine	Model: Acer Predator Helios with RTX 4070 GPU Processor: Intel Core i7-14700HX, 13th Gen RAM: 16 GB Storage: 1 TB SSD
Additional Hardware	External SSDs for backups, storing datasets, and models

6.2 SOFTWARE REQUIREMENTS

Category	Details
Frontend Development	HTML, CSS, Bootstrap JavaScript: For adding interactivity and dynamic functionality to the frontend.
Backend and API Development	Python (Fast API): Used for developing RESTful APIs with high performance,

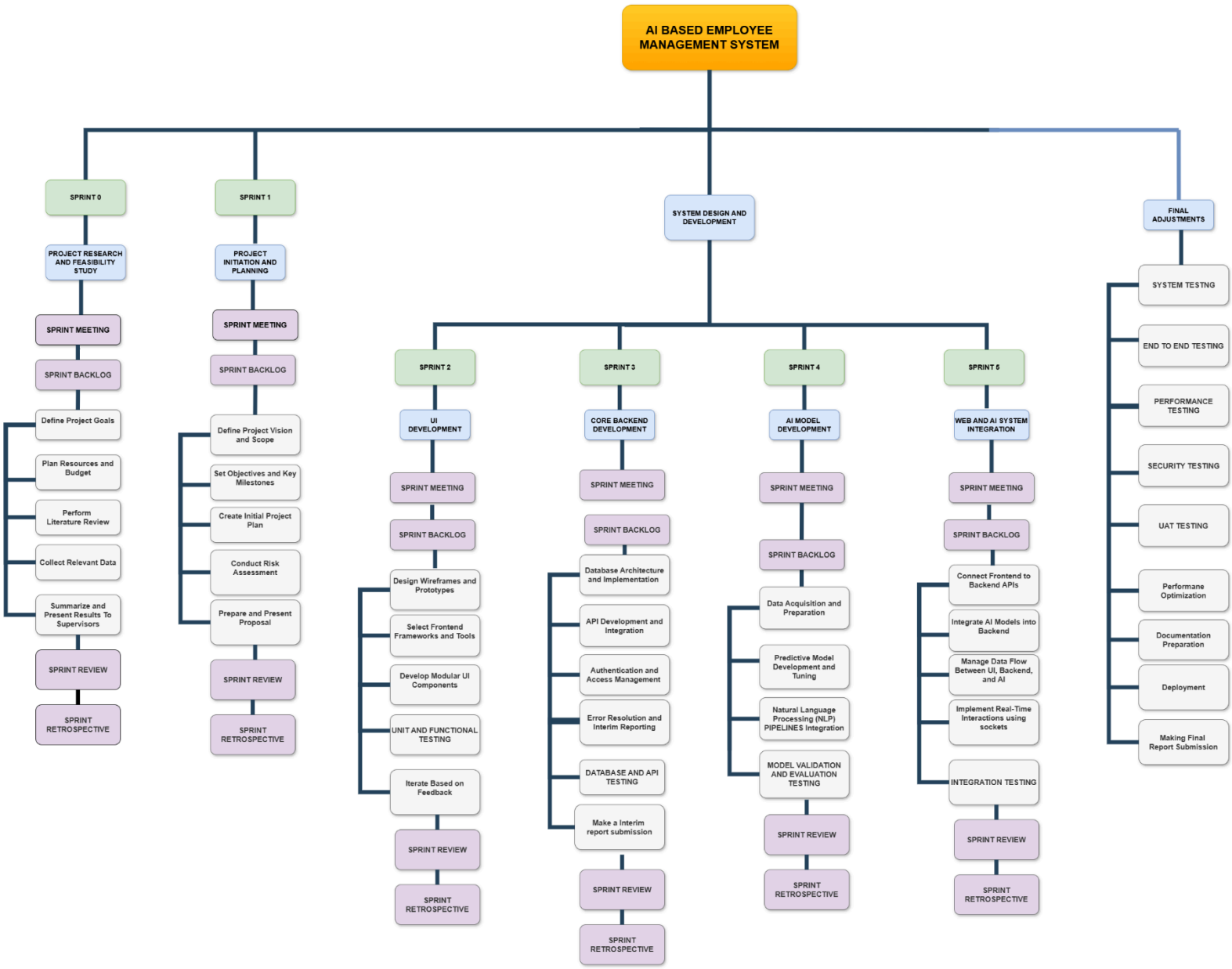
	scalability, and integration with AI/ML models and databases.
LLM Models & Frameworks	Pre-trained models (e.g., GPT, BERT) fine-tuned for tasks like document handling and chatbot interface. Hugging Face Transformers, PyTorch, TensorFlow.
Optional Models for NLP	BiLSTM + Attention: Suitable for sequence-to-sequence tasks, offering a robust understanding of sequential data. GRU + Attention: Efficient for time-series and NLP tasks, with lower computational overhead compared to LSTMs. BiGRU + Attention: Combines bidirectional GRUs with attention mechanisms for improved performance in complex NLP tasks.
Containerization	Docker: For containerizing APIs, models, and services. Kubernetes: For managing and scaling containerized applications.
Cloud Services (AWS)	EC2: For scalable compute resources. S3: For storing datasets, model checkpoints, logs, and backups. EKS: For deploying Kubernetes clusters. RDS: For managing relational databases (PostgreSQL/MySQL). Lambda Functions: For serverless backend task execution.

Data Science Libraries	Pandas, NumPy, Scikit-Learn: For data preprocessing and manipulation
Additional Tools	CI/CD: GitHub Actions or Jenkins for continuous integration and delivery. API Testing: Postman or curl for testing API endpoints.

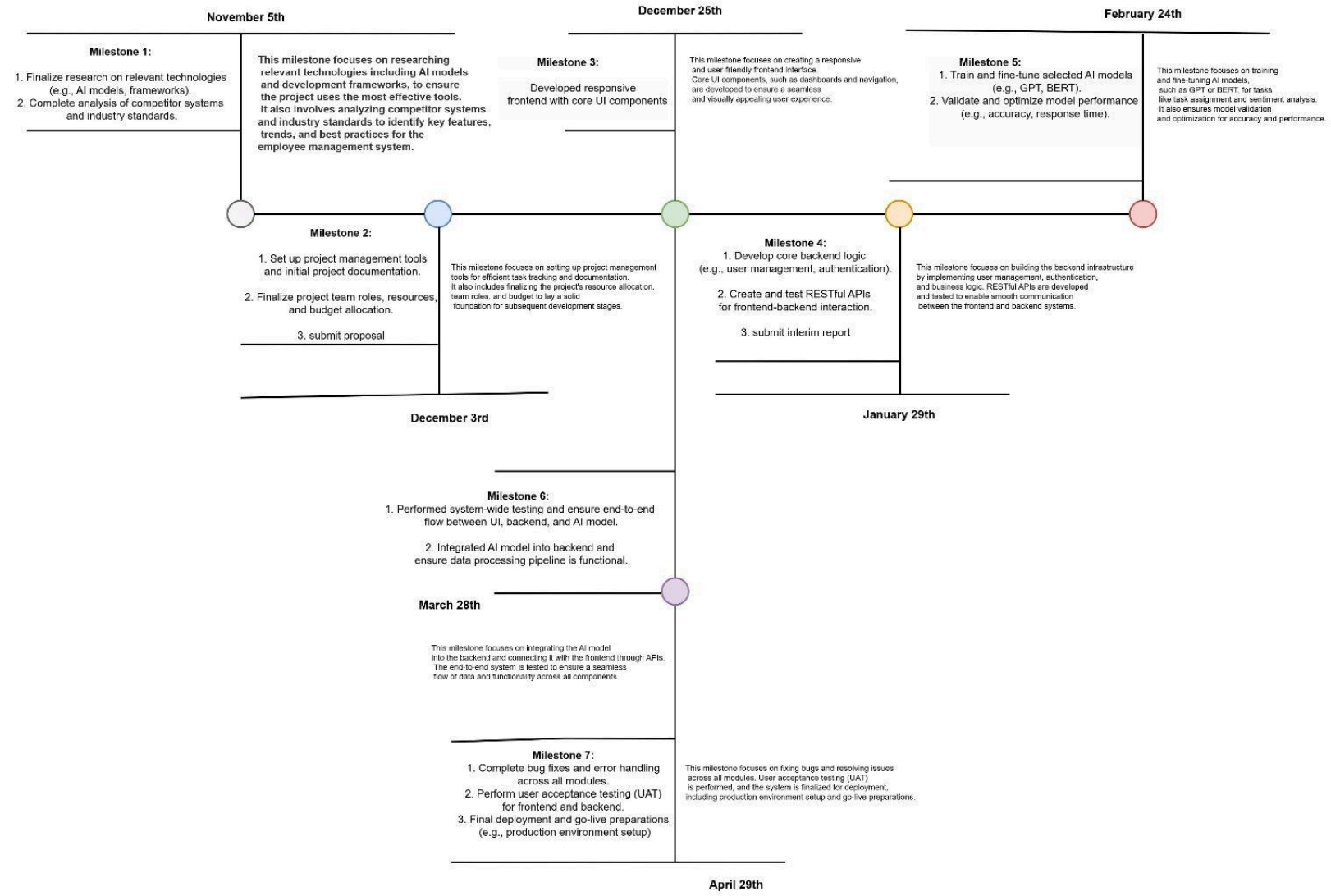
6.3 ACCESS TO RESOURCES:

RESOURCE	Details
Custom Datasets	Domain-specific datasets for LLM fine-tuning for plagirism detection and more.
Journals & Publications	Access to recent AI and ML research articles, papers for aligning with latest market trends.
IT & Cloud Infrastructure	AWS (or other cloud providers) for deployment, management, and system integration.
Additional Tools	Development aids such as CI/CD pipelines and API testing tools based on project needs.

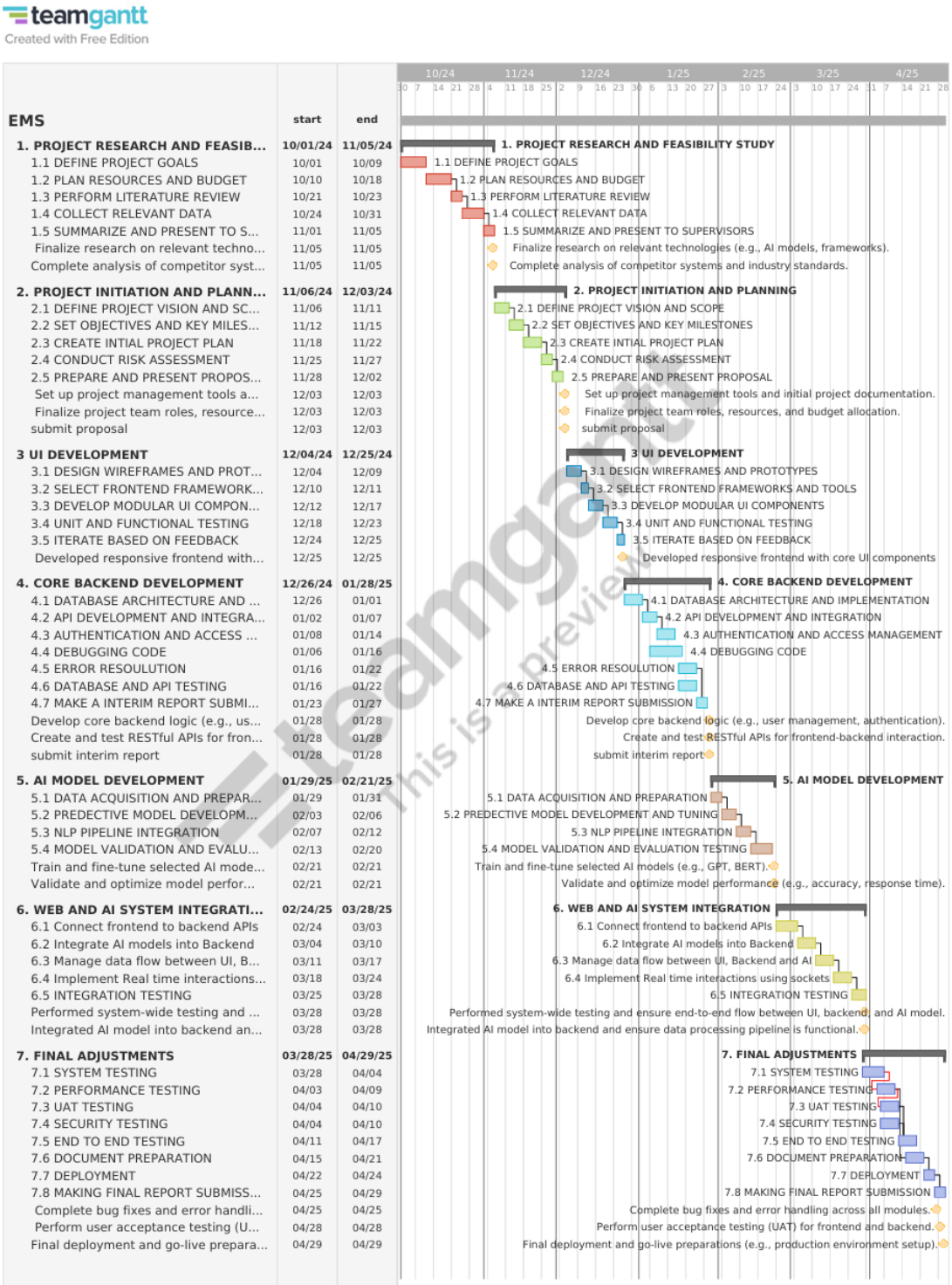
7. WBS


AI BASED EMPLOYEE MANAGEMENT SYSTEM
SPRINT 0
PROJECT RESEARCH AND FEASIBILITY STUDY
SPRINT MEETING
SPRINT BACKLOG
Define Project Goals
Plan Resources and Budget
Perform Literature Review
Collect Relevant Data
Summarize and Present Results To Supervisors
SPRINT REVIEW
SPRINT RETROSPECTIVE
SPRINT 1
PROJECT INITIATION AND PLANNING
SPRINT MEETING
SPRINT BACKLOG
Define Project Vision and Scope
Set Objectives and Key Milestones
Create Initial Project Plan
Conduct Risk Assessment
Prepare and Present Proposal
SPRINT REVIEW
SPRINT RETROSPECTIVE
SYSTEM DESIGN AND DEVELOPMENT
SPRINT 2
UI DEVELOPMENT
SPRINT MEETING
SPRINT BACKLOG
Design Wireframes and Prototypes
Select Frontend Frameworks and Tools
Develop Modular UI Components
UNIT AND FUNCTIONAL TESTING
Iterate Based on Feedback
SPRINT REVIEW
SPRINT RETROSPECTIVE
SPRINT 3
CORE BACKEND DEVELOPMENT
SPRINT MEETING
SPRINT BACKLOG
Database Architecture and Implementation
API Development and Integration
Authentication and Access Management
Error Resolution and Interim Reporting
DATABASE AND API TESTING
Make a Interim report submission
SPRINT REVIEW
SPRINT RETROSPECTIVE
SPRINT 4
AI MODEL DEVELOPMENT
SPRINT MEETING
SPRINT BACKLOG
Data Acquisition and Preparation
Predictive Model Development and Tuning
Natural Language Processing (NLP) PIPELINES Integration
MODEL VALIDATION AND EVALUATION TESTING
SPRINT REVIEW
SPRINT RETROSPECTIVE
SPRINT 5
WEB AND AI SYSTEM INTEGRATION
SPRINT MEETING
SPRINT BACKLOG
Connect Frontend to Backend APIs
Integrate AI Models into Backend
Manage Data Flow Between UI, Backend, and AI
Implement Real-Time Interactions using sockets
INTEGRATION TESTING
SPRINT REVIEW
SPRINT RETROSPECTIVE
FINAL ADJUSTMENTS
SYSTEM TESTNG
END TO END TESTING
PERFORMANCE TESTING
SECURITY TESTING
UAT TESTING
Performane Optimization
Documentation Preparation
Deployment
Making Final Report Submission

8. MILESTONES:



9. GANTT CHART:



10. CONCLUSION

This project aims to implement advanced AI-driven features while addressing potential risks and threats proactively. With robust contingency plans in place, such as thorough testing, employee training, data security measures, and continuous system updates, the project is well-positioned for success. By focusing on innovation, compliance, and user-friendly design, this initiative will enhance productivity and deliver a reliable, efficient employee management system.