

# Unified Roster and Machine Allocation System

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## Abstract:

This paper presents a Unified Roster Management and Machine Allocation System (URMMAS), a software-driven solution designed to optimize industrial operations by streamlining resource management and enhancing efficiency. Leveraging advanced computational techniques, real-time data handling, and intuitive interfaces, URMMAS dynamically allocates personnel and machines based on predefined parameters, utilizing automated scheduling algorithms to prevent shift overlaps, balance workloads, and adapt to changing demands. Manual override options provide managerial flexibility, while real-time notifications, alerts, and comprehensive data analysis tools enable informed decision-making by offering insights into machine usage, employee performance, and operational trends. Additional features, including leave management, role-specific dashboards, and cross-platform accessibility, ensure adaptability and user-friendliness. By integrating advanced algorithms and leveraging existing digital infrastructure, URMMAS delivers a scalable, efficient, and sustainable solution for industrial operations.

**Keywords —Shift Overview, Machine Assignment, Notifications, Leave Status, Task Management.**

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## I. INTRODUCTION

This paper presents the plan and execution of an Unified Roster Management and Machine Allocation System manage employees, machines, and production schedules across various departments.

The framework coordinates a login page and after entering the login credentials by users it verifies whether the credentials is correct or not then it verifies that the user is employee or admin then according to that it re-direct them to there dashboards.

It includes leave Management that helps for managing leaves ([1], [2]), and real time updates from the admin or from the head of the department to employees in industries .([3],[4]).

The framework likewise incorporates an independent dashboards for employee to maintain personal details and records. ([8]).

Security is improved through providing different employee id and password for every employee in industries, incorrect password or id may not let them to login. ([7], [9]). This adaptable, roster management and machine allocation system

consolidates for maintaining and managing work loads in industries, allocating employee for their shifts and managing leaves and delivering real-time updates to employees. ([6], [11]).

## II. METHODOLOGY

### A. System Design

The Software Requirements Specification (SRS) for the Unified Roster Management and Machine Allocation System (URMMAS) provides a detailed outline of the system's functional and non-functional requirements. It clearly defines what the system is designed to accomplish and serves as a foundation for validation throughout the development process. Created through close collaboration between stakeholders and the development team, the SRS ensures a shared understanding of the system's goals. It includes specific use cases and design constraints, helping to gather all necessary requirements and setting the stage for the successful creation of a reliable and efficient solution.

### B. Key Modules

1) **Employee Dashboard** :It serves as the central hub for all employee-related information and activities. It provides an interface for employees to view their schedules, machine assignment, and leave status ([1], [5]).

2) **Machine Management** :It is a critical component of the system, designed to efficiently track, manage, and allocate machines across different departments ([3]).

3) **Employee Management** :It encompasses the system's ability to manage employee records roles, shift assignments, and performance ([2], [9]).

4) **Automatic and Manual Booking System** :The Booking System plays a crucial role in assigning machines to employees. It includes both automatic and manual booking functionalities ([7], [9]).

5) **Leave Application and Approval** :The feature enables employees to apply for leave and for managers to handle these requests in an organized manner ([6], [11]).

6) **Notification System** :It is an essential feature that keeps both employees and managers informed in real-time about various system updates. It ensures transparency and improve communication ([4], [8]).

### C. Development Workflow

1) **Requirement Gathering and Analysis** :Collaborated with stakeholders to understand key system requirements, including machine allocation, employee management, shift scheduling, and notification needs. Documented functional and non-functional requirements, ensuring clarity in the scope of work. ([3], [8]).

2) **System Design** : Created high-level system diagrams and detailed architecture diagrams to map out the components and their interactions. Defined database schemas for employees, machines, bookings, shifts, and notifications.

3) **Frontend Development** : Developed a responsive user interface using REACT.js and BOOTSTRAP. Integrated dynamic schemas for employees, machines, bookings, shifts and notifications. ([4]).

4) **Backend Development** : Built RESTful APIs using Django Rest Framework (DRF) to handle requests for employee management, machine allocation, and bookings. Integrated PostgreSQL for secure and efficient data storage. ([10]).

5) **Testing** :Conducted unit testing for individual modules to ensure functionality. Performed integration and system testing to validate workflows across different modules. Tested edge cases for shift overlaps, manual overrides, and concurrent data access. ([2]).

6) **Collaboration and Version Control** :Used Git for version control to manage code changes and ensure collaboration among team members. Followed a branching strategy to streamline development and integration. ([11]).

7) **Continuous Integration and Deployment** :Integrated CI/CD pipeline using Jenkins or GitHub Actions to automate testing, building, and deployment. ([7]).

## III. RESULTS

The implementation of the Unified Roster Management and Machine Allocation System has yielded a range of impactful results, showcasing its effectiveness :

### A. Performance Evaluation

1) **Employee Dashboard** : It functions as the main platform managing performance-related data, offering tools for managers to assess employee productivity, track task completion, and evaluate overall performance efficiently.([1], [2]).

2) **MACHINE MANAGEMENT** : It's an important part of the system that helps keep track of how well machines are working and makes it easier to check and evaluate their performance in different departments. ([3]).

3) **EMPLOYEE MANAGEMENT** : It's about how the system helps keep track of employees' performance, checking their progress, recognizing their achievements, and giving helpful feedback. ([9]).

4) **Automatic and Manual Booking System** : THE BOOKING SYSTEM IS ESSENTIAL FOR ASSIGNING MACHINES TO

EMPLOYEES. IT OFFERS OPTIONS FOR BOTH AUTOMATIC AND MANUAL BOOKINGS, MAKING THE PROCESS FLEXIBLE AND EASY TO MANAGE. ([7], [9]).

5) **Leave Application and Approval** : This feature enables managers to evaluate employee performance, monitor progress, provide feedback, and efficiently handle leave requests, including accepting or rejecting them.

6) **Notification System** : This feature helps keep employees and managers updated in real time about performance reviews, making the process clear and improving communication.

2) **Feature Demonstrations**

1) **Login Page** :By entering the username and password it takes to the dashboard.

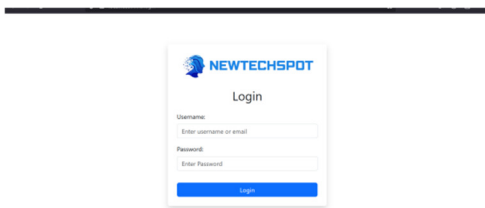


Fig.1 Login Page

2) **Employee List** :It shows the details of employees and in which department there are working in it.

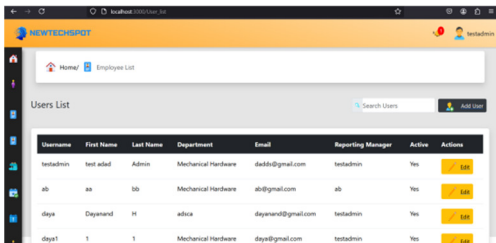


Fig. 2 Employee List

3) **Machine List** :It shows how many machines are present in industries and the details of machines.

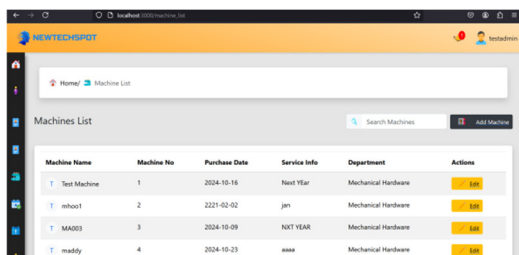


Fig. 3 Machine List

4) **Department List** :It shows the different departments present in industries.

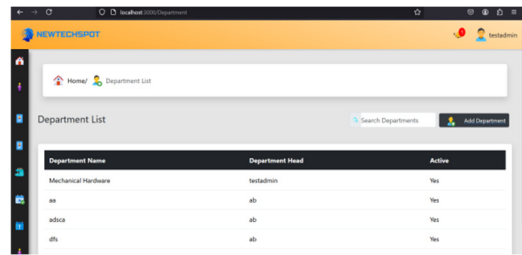


Fig. 4 Department list

5) **Bookings** :The bookings can be done automatically or manually.

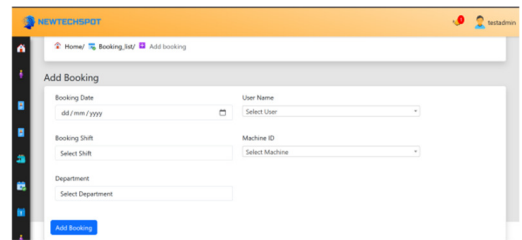


Fig. 5 Bookings

6) **Leave Request Management** :The admin can accept or reject the leave request.

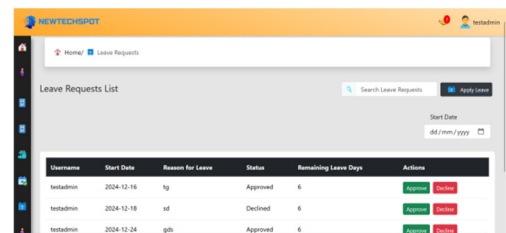


Fig. 6 Leave Request Management

IV. CONCLUSION

The Unified Roster Management and Machine Allocation System is an invaluable solution for streamlining factory operations, combining automated machine and shift allocations, leave management, and real-time notifications to address everyday challenges.

By reducing downtime and ensuring consistent production, the system optimizes resource utilization, while its shift and leave management features help create a better work-life balance for employees and give managers clear oversight of

employee availability. Real-time notifications and automatic task allocation improve communication and minimize disruptions, ensuring smooth operations. Additionally, the system offers a balance of automated and manual modes, promoting flexibility, transparency, and compliance with policies. Altogether, it enhances productivity, efficiency, and resource management, enabling factories to achieve their goals while fostering employee satisfaction.

## **FUTURE SCOPE**

URMMAS has a great potential for further development, especially with the adoption of efficient and intelligent systems highlights the growing need for optimized resource management in industrial environments. Future developments for the URMMAS could include the integration of advanced technologies such as artificial intelligence, machine learning, and cloud-based solutions to enhance performance and scalability.

Future iterations can incorporate predictive analytics for better resource allocation, automated maintenance scheduling to minimize downtime, and enhanced decision-making capabilities. Additionally, integration with workforce analytics tools and cloud platforms can further improve flexibility, efficiency, and adaptability, ensuring the system evolves to meet the demands of modern industrial operations.

### **A. Predictive Maintenance for Machines**

Integrate machine learning models to predict maintenance needs and minimize downtime.

### **B. Shift Swap functionality**

Allow employees to request and approve shift swaps through the system.

### **C. Advanced Analytics Dashboard**

Provide insights into machine utilization, employee productivity, and shift performance. Include export options for reports in formats like PDF and Excel.

### **D. Mobile Application**

Develop a mobile-friendly app for employees and managers to access the system on the go.

### **E. Integration with IoT Devices**

Connect machines with IoT sensors to monitor their real-time status and operational metrics.

### **F. Customizable Notification Settings**

Allow users to customize notification preferences(eg., email, SMS, or in-app alerts).

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