SMART INDIA HACKATHON 2025

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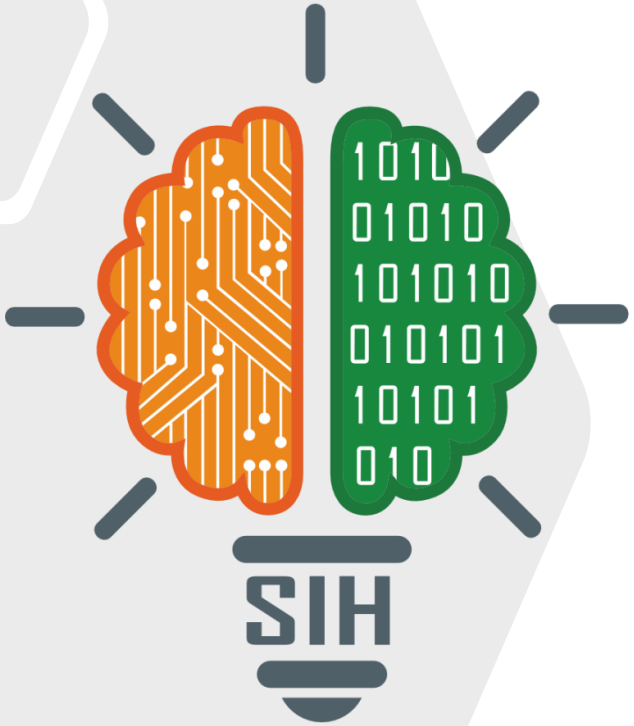

- **Problem Statement ID – SIH25028**
- **Problem Statement Title- Smart Classroom &**
- **Timetable Scheduler**

Theme- Smart Education

- **PS Category- Software**
- **Team ID-77306**
- **Team Name (Registered on portal):The Code OF Duty**

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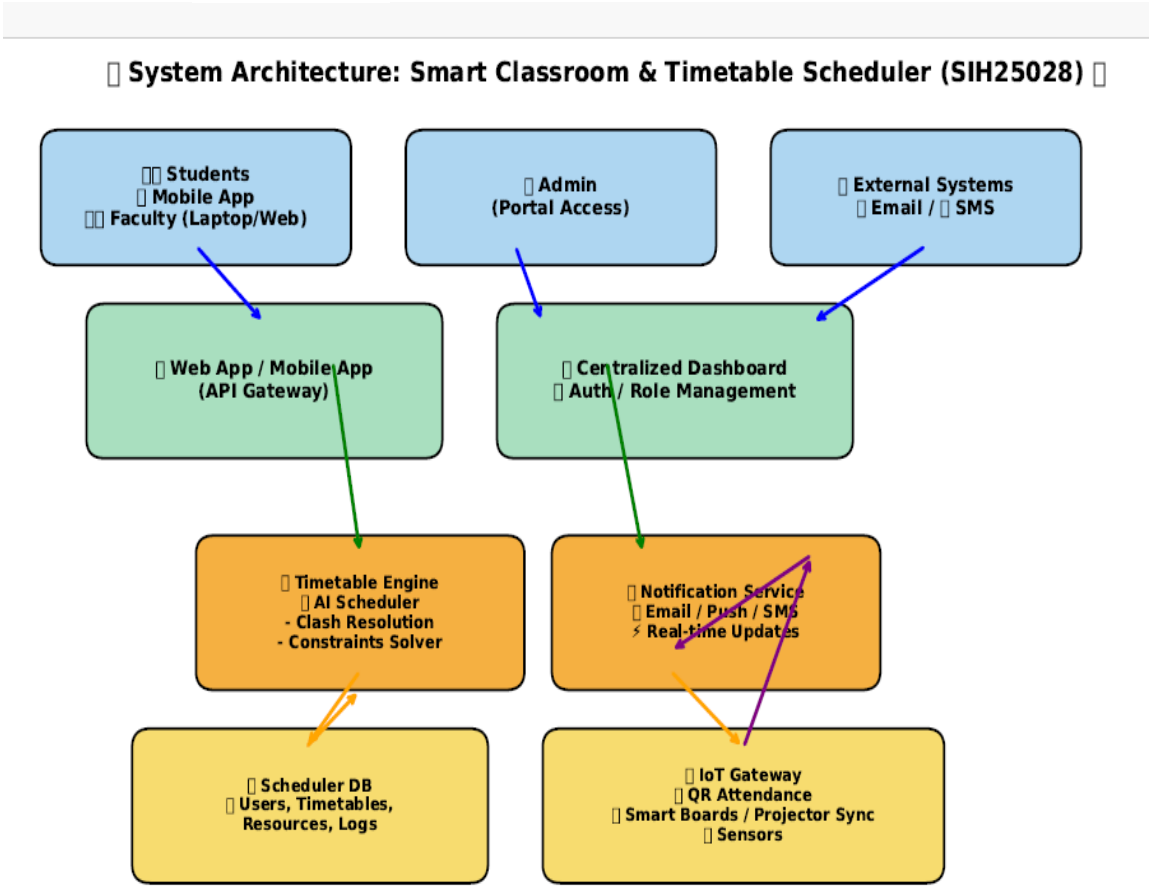
❖Proposed Solution

- **1. Automated Timetable Generator:**
- Generates clash-free schedules using AI/algorithms.
- Considers teacher, subject, and classroom availability.
- **2. Smart Classroom Allocation:**
- Automatically assigns classrooms based on batch size and subject type (Lab/Lecture).
- Ensures proper use of resources like projector, smart board, and lab equipment.
- **3. Centralized Dashboard :**
- One platform for students and faculty to view timetables, classes, and updates.
- Accessible through both Web App and Mobile App.
- **4. Real-time Updates & Notifications:**
- Instant alerts for class cancellations, rescheduling, or changes.
- Students and faculty stay updated in real time.
- **5. Integration with Smart Devices:**
- QR code/IoT sensor-based attendance system.
- Automatic sync with projector and digital board for class sessions.
- **6. Resource Utilization Reports:**
- Tracks usage of classrooms, labs, and faculty hours.
- Generates reports for better planning and decision-making.



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TECHNICAL APPROACH

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1. Technologies to be Used:

- **Programming Languages –**
- Python / Java (backend), JavaScript (frontend)
- **Frameworks –** Django / Spring Boot (backend), React / Angular (frontend)
- **Database –** MySQL / MongoDB
- **AI/ML Tools –** For conflict-free scheduling and optimization
- **Hardware (if required)** – Smart classroom displays, projectors, tablets, servers

2. Methodology and Process for Implementation:

Step 1: Requirement Analysis – Understand needs of institution (classrooms, subjects, teachers, slots).

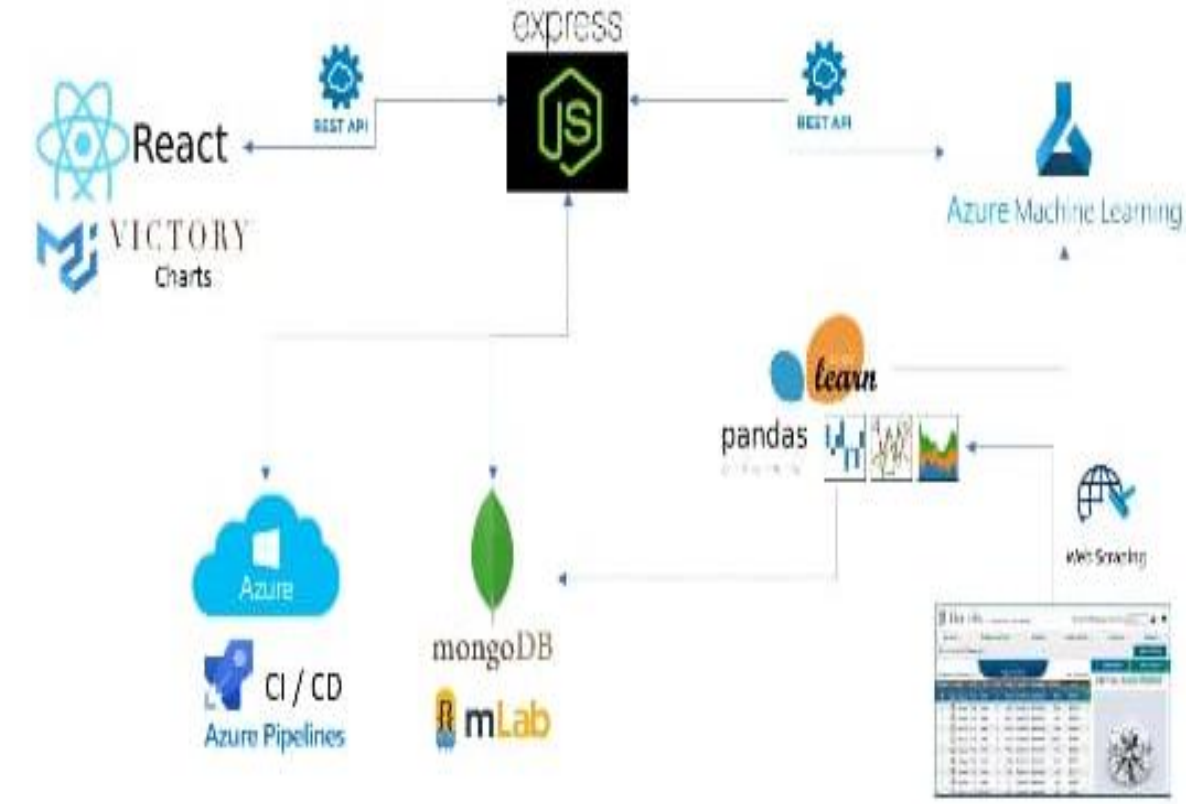
Step 2: System Design – Create database schema, architecture, and user interface designs.

Step3: Development – Implement backend (Python/Java) + frontend (React/Angular).

Step 4: Integration of AI/ML – Add scheduling algorithms for automatic timetable generation.Step

5: Testing & Deployment – Check for errors, timetable clashes, and user acceptance.Step

6: Maintenance & Updates – Regular improvements and scalability



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FEASIBILITY AND VIABILITY

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Idea

- An AI-based system to **automatically schedule classes, allocate**
- **classrooms, and manage timetables.**
- Provides **real-time updates** for teachers, students, and admins

Feasibility

- **Technical –** Can be built using Python/Java (backend),
- JavaScript (frontend), MySQL/MongoDB (database).

- **Economic –** Cost-effective by using open-source tools.
- Operational – User-friendly web/mobile app for easy adoption.
- **Legal –** Data privacy and compliance ensured.

Viability

- Saves time, cost, and effort in timetable creation.

- Scalable for schools, colleges, and universities.

- Provides long-term benefits by reducing errors and manual work.

Potential

- Can be extended to smart attendance tracking.
- Integration with learning management systems (LMS).
- Used across multiple institutions with cloud support.

Challenges

- Complex scheduling for large institutions.
- Integration with existing ERP/college systems.
- Resistance from staff used to manual methods.

Use Cases

- **School/College Timetable** – Automatic allocation of classrooms and teachers.
- **Smart Classrooms –** Allocates based on projector, lab, or special equipment availability.
- **Event Scheduling –** Manages seminars, workshops, and guest lectures without clashe.

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IMPACT AND BENEFITS

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- Potential impact on the target audience:

•**For Students**: Ensures reduced clashes in classes, better learning engagement, and access to a more organized academic schedule. Students experience less stress due to mismanagement of timetables and gain more productive learning hours.
•**For Teachers**: Provides balanced workload distribution, minimizes scheduling conflicts, and allows more time for effective teaching and research.

- Benefits of the solution :

1. Social Benefits
Promotes **fair access** to classrooms and resources for all students.
Enhances **teacher-student interaction** by ensuring smoother schedules and reducing fatigue caused by mismanagement.
Supports inclusivity by accommodating **special requirements** (e.g., labs, equipment, or accessibility needs).
2. Economic Benefits
Reduces administrative costs by minimizing manual scheduling efforts.
Saves time for both students and staff, which can be redirected toward productive learning or research.
Optimizes resource allocation (classrooms, labs, staff hours), leading to **cost-effective utilization** of institutional infrastructure.

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RESEARCH AND REFERENCES

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1. Smart Classroom Concept

- **Article:** Smart Classroom: An Innovative Teaching and Learning Tool
  https://a1ca2a1c94394ea28583a167e7008525-main.projects.builder.my/
- **IEEE Paper:** Smart Classroom – Future of Education with IoT and Cloud

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2. Timetable Scheduling & Automation

- **Survey:** A Comparative Study on Timetable Scheduling Algorithms
- **Optimization Paper:** Automatic Timetable Generation using Genetic Algorithm.

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3. Environmental & Social Benefits

- **Journal:** Paperless Education and its Environmental Impact