SZABIST
UNIVERSITY
Islamabad Campus

Final Year Project Long Proposal

TimeCraft SZABIST: A Faculty Scheduler Automation System

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Spring 2024

Revision History

Compiled By	Checked By	Date	Description	Version
Aiman Aman Ullah	Mr. Faisal Hayat	26 Feb 2024	Section 1	1.0
Malik Subhan Awan	Mr. Faisal Hayat	26 Feb 2024	Section 2	1.1
Muttaher Ali Zia	Mr. Faisal Hayat	26 Feb 2024	Section 3	1.2
Aiman Aman Ullah	Mr. Faisal Hayat	27 Feb 2024	Section 4	1.3
Malik Subhan Awan	Mr. Faisal Hayat	27 Feb 2024	Section 5	1.4
Muttaher Ali Zia	Mr. Faisal Hayat	27 Feb 2024	Section 6	1.5
Aiman Aman Ullah	Mr. Faisal Hayat	28 Feb 2024	Section 7	1.6
Malik Subhan Awan	Mr. Faisal Hayat	28 Feb 2024	Section 8	1.7
Muttaher Ali Zia	Mr. Faisal Hayat	28 Feb 2024	Section 9	1.8
Aiman Aman Ullah	Mr. Faisal Hayat	29 Feb 2024	Section 10, 11	1.9
Malik Subhan Awan	Mr. Faisal Hayat	29 Feb 2024	Section 12, 13	2.0

1. Project Description

The proposed system will optimize for educational institutes. Divided into Program Manager, Faculty, and Students sections, it will facilitate seamless communication and task delegation. Program Manager will be able to prioritize faculty selection based on qualifications, ensuring efficient scheduling. Faculty will be able to request class cancellations, subject to Program Manager's approval. The system will resolve scheduling conflicts and ensure non-overlapping class times. With user authentication and personalized dashboards, it will streamline operations. Enhancements may include advanced reporting and integration with academic systems. Aims will include enhancing productivity and organization within educational institutes.

The system aims to streamline faculty scheduling processes, optimize class timetables, facilitate efficient communication among faculty members, and enhance productivity. It currently automates class scheduling, prioritizes faculty selection based on qualifications, and provide platform for requesting and approving class cancellations. Additionally, it ensures equitable distribution of teaching assignments and minimize scheduling conflicts. Through these objectives, it improve efficiency and effectiveness of academic operations within the institution, fostering a cohesive and dynamic learning environment.

The proposed system will integrate essential features of streamline scheduling processes effortlessly. Users, divided into Program Manager, Faculty, and Students, will access personalized dashboards. Program Manager can prioritize faculty selection, manage timetables, and approve class cancellations request. Faculty can request class cancellations, subject to Program Manager approval. The system will insure no class overlap and optimally schedule classes across different departments within institute timings. Additionally, it will manage faculty qualifications and departmental constraints, and works for efficient scheduling.

2. Real World Problem

The proposed automation system addresses the challenge of manual timetable creation in educational institutions. It streamline processes to boost efficiency and accuracy in scheduling classes, rooms, and faculty assignments. The solution optimize resource allocation and mitigates conflicts, ensuring an organized and productive learning environment. User-friendly interfaces tailored for program managers, faculty, and students promote collaboration and transparency in managing academic schedules. Intelligent algorithms and intuitive functionalities anticipate and resolve scheduling complexities, enhancing efficiency.

The system will resolve the identified problem of inefficiently managing schedules and class timetables in educational institutions will adversely effect stakeholders and

the industry. Faculty members will experience increased stress due to erratic schedules, potentially leading to burnout. Students may face disruptions to their learning, impacting academic performance and satisfaction. Moreover, administrators will grapple with decreased efficiency and productivity, hindering the institutional effectiveness. Additionally, the reputation of the institution may suffer, affecting enrollment and funding opportunities. Addressing these issues through automation will be crucial for maintaining stakeholder satisfaction and sustaining competitiveness in the industry.

The system will align with solving the identified problem by introducing an automated system for managing schedules and class timetables in educational institutions. By streamlining timetable creation, optimizing faculty allocation, and minimizing class conflicts, the system will enhance efficiency and effectiveness. Faculty members will experience reduce workload and stress, while students will benefit from smoother learning experiences. Administrators will witness increased productivity and improved institutional reputation. The implementation of the system will mitigate the challenges associated with manual scheduling processes, ensuring a more streamlined and satisfactory educational environment for all stakeholders.

3. Project Stream

☑ Web-Based FYP ☐ Desktop Application

☐ Mobile App ☐ Game

☐ Hardware-Based

4. Modules

Table 1 provides a breakdown of project modules and assigned students based on deadlines, showcasing their roles and responsibilities.

Table 1: Module Breakdown and Assignment

Deadline	**Modules**	**Student**
P1 Mid	User Registration and Authentication	Aiman Aman Ullah (2012346)
	Navigation View	Malik Subhan Awan (2012367)
	Faculty Profile Management	Muttaher Ali Zia (2012379)
P1 Final	Course Allocation	Aiman Aman Ullah (2012346)
	Faculty Prioritization	Malik Subhan Awan (2012367)

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Table 1 – *Continued from previous page*

Deadline	**Modules**	**Student**
	Schedule Automation	Muttaher Ali Zia (2012379)
P2 Mid	Schedule Generation	Aiman Aman Ullah (2012346)
	Mobile Accessibility	Malik Subhan Awan (2012367)
	Class Rescheduling and Make-up Requests	Muttaher Ali Zia (2012379)
P2 Final	Notification Module	Aiman Aman Ullah (2012346)
	Interactive Schedule Display	Malik Subhan Awan (2012367)
	Performance Evaluation	Muttaher Ali Zia (2012379)

5. Names of existing similar FYPs (if repeated)

N/A

6. New Functionalities (main) to be added Features

None.

7. Development Environment

Tools:	HTML/CSS/JavaScript/Bootstrap/Python/Flask
DBMS:	Any SQL based DB(MySQL)
Platform:	VSCode, PyCharm, AWS/GCP

8. Introduction

The proposed system offers an innovative automation solution tailored for educational institutions, addressing scheduling challenges and optimizing faculty timetables for seamless coordination. Advanced algorithms like Genetic Algorithm, Tabu Search, CSP, and ILP are integrated, profoundly influencing system efficiency. Genetic Algorithm refines solutions iteratively, aligning class and resource allocation with institutional objectives. Tabu Search enhances exploration of the solution space while avoiding revisits. CSP ensures systematic satisfaction of scheduling constraints, managing room availability and faculty preferences. ILP provides a rigorous framework for optimizing resource allocation. Together, these algorithms optimize faculty schedules, maximizing resource utilization and fostering a conducive learning environment.

The forthcoming initiative highlights the core objectives of the system: to streamline faculty scheduling, optimize resource allocation, and enhance academic productivity. By automating timetable management, it addresses the identified problem of manual inefficiencies and scheduling conflicts. The initiative aims to foster a cohesive academic environment by facilitating seamless coordinating among faculty members and departments.

Through the utilization of advanced algorithms and user-friendly interface, stakeholders are empowered to efficiently manage timetables, ensuring a balanced distribution of teaching responsibilities and maximizing institutional resources for academic excellence.

9. Application Review

The application review introduces an evaluation of advanced software, analyzing its features and functionality to enhance academic scheduling efficiency. It analyzes the features and functionality of the tool, assessing its potential to make faculty timetables more efficient and optimize resource allocation. The review aims to offer valuable insights for stakeholders seeking to enhance academic productivity and create a cohesive educational environment. Through an objective assessment, the review highlights the benefits and drawbacks of the application.

MyStudyLife [1] is a comprehensive online platform designed to help students effectively manage their academic schedules and tasks. It offers a user-friendly interface that allows students to easily input their class schedules, assignments, exams, and other important dates. With MyStudyLife, students can organize their timetables by day, week, or month, ensuring they stay on top of their academic responsibilities. The platform also provides handy reminders and notifications to help students stay informed about future deadlines and events. Moreover, MyStudyLife offers cross-platform synchronization, allowing students to access their timetables and tasks from any device, whether it's a computer, tablet, or smartphone. The system ensures that students can stay organized and productive no matter where they are. Additionally, the platform allows users to collaborate with classmates and share schedules and assignments, fostering a sense of community and teamwork among students. MyStudyLife is a valuable tool for students looking to streamline their academic workflows and stay on track with their studies.

MyStudyLife is an invaluable tool for students seeking to manage their academic schedules effectively. Its user-friendly interface and customizable features make it easy to input and organize class schedules, assignments, and exams. The integration with other calendar platforms ensures seamless accessibility across devices, allowing users to stay on top of their academic commitments wherever they are. The reminder and notification features serve as helpful prompts to keep users informed of future tasks and deadlines, helping them stay organized and on track with their studies. MyStudyLife is tailored specifically for individual students rather than faculty members. While both systems focus on scheduling and organization, the proposed system is designed to manage the schedules and assignments of faculty members within an academic institution. It includes features such as faculty workload management, course scheduling, and resource allocation, which are not present in MyStudyLife. Additionally, the target users and scope of these systems differ, with MyStudyLife catering to individual student needs while the proposed

ystem serves the administrative requirements of academic institutions. Despite these differences, both systems aim to enhance efficiency and organization within the academic aspect, despite from different perspectives and for different user groups.

- **Cross-Platform Synchronization:** MyStudyLife seamlessly synchronizes data across multiple devices, and it also ensure users have access to their schedules and tasks wherever they go.
- **Reminder Notifications:** The app provides timely reminders and notifications for upcoming tasks and deadlines, helping users stay organized and on track with their studies.
- **Task Management:** For task management, users efficiently categorize tasks by priority, due date, and subject, aiding in better time and schedule organization for their scheduling activities.
- **Customizable Booking Pages:** Users can customize booking pages to match their branding and preferences. Furthermore, it offers the flexibility to add custom fields and branding elements.
- **Offline Access:** The system MyStudyLife offers offline access to timetables and tasks, allowing users to access and update their schedules even without an internet connection.

The limitations of the application are listed below.

- **Limited Automation:** MyStudyLife lacks advanced automation features, such as automated task creation or integration with external calendars, which may require manual input of information.
- **No Collaborative Features:** The app does not offer collaborative features, making it less suitable for group projects or shared timetables among students and faculty members.
- **Interface Complexity:** Regarding interface complexity, some users perceive the MyStudyLife interface as overwhelming or challenging to navigate, particularly when customizing timetables or managing tasks within the scheduling system.
- **Dependency on Internet:** While offline access is available, certain features, such as synchronization across devices, require an internet connection, limiting usability in offline scenarios.
- **Platform Restrictions:** MyStudyLife may not be available on all platforms or devices, restricting access for users who prefer or require alternative and operating systems of their choice.

TimeTable Maker [**2**] is a comprehensive web application designed to simplify the process of creating and managing timetables for various purposes, such as academic

courses, work schedules, or personal routines. With its user-friendly interface, users can effortlessly input their schedule details, including course names, timings, locations, and any additional notes. The intuitive drag-and-drop functionality allows for easy rearrangement of schedule components to accommodate changes or preferences. Timetable Maker offers flexibility in customization, allowing users to choose different layouts, colors, and styles to suit their preferences and enhance readability. Moreover, Timetable Maker provides collaborative features, enabling multiple users to work on the same timetable simultaneously. The system facilitates coordination among team members, classmates, or colleagues, ensuring everyone stays updated with the latest schedule changes. Additionally, the application offers the ability to export timetables in various formats, such as PDF or image files, making it convenient to share or print schedules as needed. With its robust features and user-friendly interface, Timetable Maker serves as an indispensable tool for efficiently organizing and managing schedules in various settings.

Timetable Maker is a comprehensive tool for organizing schedules efficiently. Its user-friendly interface allows users to create customized timetables effortlessly. With features like drag-and-drop functionality and customizable templates, users can easily design timetables tailored to their needs. Timetable Maker streamlines the process of scheduling by providing intuitive tools for adding, editing, and managing events. Additionally, the application offers flexibility in terms of viewing options, allowing users to switch between daily, weekly, or monthly views to better visualize their schedules. What sets Timetable Maker apart is its simplicity and effectiveness in managing timetables without overwhelming users with unnecessary features. In comparison, Faculty Scheduler Automation System offers similar functionalities geared towards academic institutions. Both systems facilitate timetable creation and management but differ in their target audience and scope of features. While Timetable Maker caters to a broader user base, Faculty Scheduler Automation System is specifically tailored for educational institutions, offering specialized tools for faculty scheduling and academic planning. Despite their differences, both applications share the common goal of simplifying schedule management, making them valuable tools for organizing tasks and events efficiently.

- **Customization of System:** Timetable Maker offers extensive customization options, allowing users to input their class schedules, events, and tasks according to their preferences and needs.
- **Flexibility:** Users are able to effortlessly change their timetable whenever necessary, allowing them to adapt to new scheduling needs or unforeseen obligations without difficulty.
- **Accessibility:** The web-based platform ensures that users can access their timetables from any device with an internet connection, facilitating convenient usage on the go.

- **Integration of the System:** Timetable Maker seamlessly integrates with other calendar applications, enabling users to synchronize their timetables across multiple platforms and various devices.
- **Collaboration:** The platform supports collaboration features, that is enabling users to share their timetables with classmates or colleagues for group projects or study sessions.

The limitations of the application are listed below.

- **Limited Automation:** Timetable Maker lacks automated features such as task prioritization or schedule optimization, requiring users to manually manage their timetables, and scheduling processes.
- **No Reminders:** The absence of reminder functionalities means that users must rely on external tools or their own memory to stay informed of upcoming events or deadlines.
- **Basic Interface:** When using the system, the interface of Timetable Maker is often viewed as simplistic and shallow in comparison to more visually appealing or feature-rich alternatives.
- **Dependency on Internet:** Since Timetable Maker is a web-based application, users require an internet connection to access and modify their timetables, limiting usability in offline environments.
- **Lack of Advanced Features:** Advanced features commonly found in premium timetable management tools, such as analytics or data insights, are not available in Timetable Maker.

UniTime [3] is a robust web application designed to facilitate the management of classes within academic institutions. It offers a comprehensive platform where users can access and organize class schedules for specific terms, such as the Fall 2010 semester. Through UniTime, users can efficiently navigate through various class schedules, accessing essential details such as course names, timings, and locations without hassle. The platform equips users with advanced search and filtering functionalities, enabling them to quickly locate specific classes using keywords or predefined criteria. Moreover, UniTime empowers both students and academic administrators to handle class enrollment seamlessly. Students can utilize the system to register for courses, while administrators can monitor class capacities and manage enrollments effectively. With its user-friendly interface and intuitive design, UniTime serves as a valuable tool for optimizing the organization and management of class schedules within academic institutions.

UniTime is a robust web application that offers extensive features for managing class schedules and academic resources. Users praise its intuitive interface and comprehen-

sive functionality, allowing for efficient organization of classes, enrollment, and resource allocation. Many users appreciate its ability to streamline the scheduling process and enhance communication between students and academic staff. In comparing UniTime to Faculty Scheduler Automation System, similarities lie in their core functionalities of scheduling classes, managing resources, and facilitating communication within academic institutions. Both systems aim to optimize the scheduling process and improve complete efficiency within educational settings. UniTime, like Faculty Scheduler Automation System, prioritizes user-friendly interfaces and customizable features to meet the diverse needs of academic institutions. Users note that UniTime's versatility and scalability make it suitable for various educational contexts, from small colleges to large universities. Its adaptability and robust feature set make it comparable to Faculty Scheduler Automation System in terms of meeting the scheduling needs of academic institutions effectively. UniTime garners positive reviews for its comprehensive approach to class scheduling and resource management, echoing the benefits observed in Faculty Scheduler Automation System.

- **Advanced Search Functionality:** The platform offers robust search features, allowing users to quickly find specific classes using keywords or predefined criteria and filter options.
- **Class Enrollment Management:** UniTime enables efficient management of class enrollments, allowing for easy registration and monitoring of class capacities, ensuring efficient allocation of resources, facilitating seamless registration for students and monitoring capacities for administrators.
- **Customizable Scheduling Options:** Users customize settings and preferences according to their needs, adapting UniTime to fit the unique requirements of their academic institution, enhancing flexibility and personalization.
- **Real-time Updates:** UniTime provides real-time updates on class schedules and enrollment statuses, ensuring users have access to the latest information and changes to scheduling information.
- **Reporting and Analytics:** UniTime offers comprehensive reporting and analytics features, allowing users to generate insights and track key metrics related to class scheduling and enrollment, supporting informed decision-making.

The limitations of the application are listed below.

- **Learning Curve:** Users face a learning curve when initially navigating UniTime's features and functionalities, requiring time and resources for training and adaptation to the system.

- **Technical Issues:** UniTime encounters technical glitches or downtime, potentially disrupting class scheduling and enrollment processes, necessitating prompt resolution to maintain smooth operations and user satisfaction.
- **Dependency on Internet Connectivity:** It requires internet connectivity to access scheduling data and perform essential functions. This reliance on internet access may pose challenges for faculty members, especially in areas with unreliable internet connection, hindering their ability to access schedules or make changes offline.
- **Scalability Challenges:** UniTime's performance and scalability are challenged when handling large volumes of class schedules and enrollment data, potentially leading to slower response times or system instability.
- **Maintenance Requirements:** UniTime requires regular maintenance and updates to ensure optimal performance and address security vulnerabilities, imposing additional overhead on academic institutions for upkeep and support.

Table 2 presents a comparative analysis of key features among various applications. The comparison includes functionalities crucial for effective management. The comparison aims to highlight the unique offerings of each application and underscore the comprehensive capabilities of the Proposed System.

Table 2: Applications Comparison

Features	**Applications**			
	MyStudyLife [1]	TimeTable Maker [2]	UniTime [3]	Proposed System
Class Cancellation Request Workflow	✗	✗	✗	✓
Automated Reminders	✓	✗	✗	✓
Schedule Conflict Resolution	✗	✗	✗	✓
Department-Specific Constraints	✗	✗	✗	✓
Timetable Automation	✗	✗	✗	✓
Mobile Accessibility	✓	✓	✓	✓
User Roles and Permissions	✓	✓	✓	✓
Qualification-Based Prioritization	✗	✗	✗	✓
Reporting	✗	✗	✓	✓

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Table 2 – *Continued from previous page*

Features	Applications			
	MyStudyLife [1]	TimeTable Maker [2]	UniTime [3]	Proposed System
Make-up Class Requests	✗	✗	✗	✓

10. Problem Statement

The identified problem revolves around manual scheduling working of timetables withing educational institutions leading to inefficiencies and operational challenges. The issue is arises by the complexity of coordinating schedules for various classes, faculty members, and departments. Without the proposed system in place, Program Manager, Faculty, Students face difficulties in accessing timely and accurate timetable information, resulting in confusion and disruptions to the learning process. The problem extends across all levels of the institution, affecting daily operations and academic performance.

The objective alignment of the initiative centers on addressing the prevalent issue of manual timetable management within educational institutions. By developing an automated system, the proposed system aims to streamline the scheduling process and enhance operational efficiency. Through features such as user authentication, personalized dashboards, and timetable automation modules, the system caters to the specific needs of Program Manager, Faculty, and Students. The system acknowledges certain limitations such as the need for comprehensive faculty and class information input, and potential challenges in resolving scheduling conflicts.

11. Scope

The scope of the initiative within the educational institute encompasses streamlining faculty scheduling processes. Features include in the system user authentication for different stakeholders, personalized dashboards, and comprehensive timetable management. Limitations may arise concerning system scalability and adaptability to diverse institutional structures. Integration with existing system and ensuring data security are also pivotal considerations. Despite these challenges, the system holds promise in enhancing operational efficiency and facilitating better resource utilization with educational settings.

Module: User Registration and Authentication

- Sign-Up or Sign-In

- Access control for all Users
- Sign-In using Social Media
- Password Recovery

Module: Navigation View

- Overview of the System
- Displaying Relevant Information
- Navigation Options
- Overview for each User Type

Module: Faculty Profile Management

- Comprehensive Profile Creation
- Document Repository
- Availability and Preferences
- Professional Development

Module: Course Allocation

- Faculty Profile Management
- Course Assignment
- Communication Tools
- Course Catalog Management

Module: Faculty Prioritization

- Skill Matching
- Domain Expertise
- Define User Roles
- Allows Managing Departments and their respective classes

Module: Schedule Automation

- Automated Schedule Generation
- Faculty Availability Tracking
- Conflict Resolution
- Ensure no overlaps between classes

Module: Schedule Generation

- Room Allocation Optimization
- Schedule Optimization Algorithms
- Customization Options
- Conflict Resolution

Module: Mobile Accessibility

- Responsive Design
- Mobile-Optimized Layout
- Gestures and Swipes
- Push-to-Call or Email

Module: Class Rescheduling and Make-up Requests

- Class Request Submission
- Class Rescheduling
- Approval Workflow
- Notification System

Module: Notification Module

- Schedule Alerts
- Customizable Reminders
- Notification Templates
- Push Notification

Module: Interactive Schedule Display

- Customizable Views
- Filter Options (Daily, Weekly and Monthly)
- Interactive Interface
- Schedule Sharing

Module: Performance Evaluation

- Faculty Performance Reviews
- Research Productivity Tracking
- Performance Dashboards
- Performance Analytics

12. Significance

The significance of the proposed system will lie in its ability to streamline academic operations. By automating timetable management, it will optimize resource allocation and enhances efficiency. Stakeholders will benefit from improved organization, reduced scheduling conflicts, and increased faculty satisfaction. Students will gain access to accurate timetable, enhancing their learning experience. Faculty will enjoy simplified class cancellation requests and efficient communication channels. Ultimately, the system will foster a conducive learning environment, supporting the academic community's growth and productivity. The anticipated outcome of the initiative will be to streamline the timetabling process for educational institute, fostering efficiency and organization within academic scheduling. The system will provide a user-friendly interface for faculty members, administrators, and students, facilitating seamless communication and coordination. By automating timetable generation and incorporating features such as request management and priority assignment, the proposed system will aim to optimize resource utilization and minimize scheduling conflicts. The positive impact will be expected to manifest in improved productivity, reduced administrative. burden, and enhanced satisfaction among stakeholders, contributing to a more conducive learning environment.

13. Tools and Techniques

The proposed system will utilize HTML, CSS, and JavaScript for front-end development, ensuring a responsive and visually appealing user interface. Bootstrap framework will aid in achieving in achieving consistency and responsiveness across different devices. Python, with Flask framework, will power the back-end, enabling rapid development and easy integration with front-end components. MySQL will serve as the relational database management system, storing and managing data efficiently. Integrated development environments like VSCode or PyCharm will facilitate code writing and debugging. With these tools offer robust capabilities, careful consideration of their respective limitations will be crucial for effective implementation and performance optimization.

- Front-End: The system will utilizes HTML, CSS, JavaScript, and Bootstrap for creating a user-friendly and visually appealing interface. These technologies will ensure responsiveness and compatibility across various devices and browsers.
- Back-End: Python and Flask framework will power the back-end, facilitating rapid development and seamless integration with the front-end. The combination will offer scalability, flexibility, and robustness in handling data logic efficiently.
- Database: The proposed system will utilize MySQL, an SQL-Based RDBMS. MySQL will offer features like scalability and strong data integrity. It will support complex queries, joins, and transactions, ensuring efficient storage and retrieval of data.

- Tools: For development, tools like VSCode and PyCharm will be used. VSCode will offer extensibility, debugging support, and Git integration. PyCharm will provide advanced Python support, code and analysis, and system management.

References

[1] "My Study Life- Online Student Planner," MyStudyLife, Mar. 27, 2021. https://mystudylife.com/ (Accessed Feb. 26, 2024).

[2] "Timetable Maker, the best free online schedule builder," timetablemaker.com. https://timetablemaker.com/ (Accessed Feb. 26, 2024).

[3] "UniTime — University Timetabling," www.unitime.org. https://www.unitime.org/ (Accessed Feb. 26, 2024).