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Academic Management through a Web-Based Student Profile System

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Abstract: ***Amidst the war of digitisation, universities are increasingly being pressurised to develop administrative systems that are slick, transparent, and in tune with the students. This paper describes the development and the utilization of a web-based system for the Student Profile System that will be established according to the requirements of a specific educational organization. The machine is a central repository for the academic records, personal data, attendance, and exam results, which users can access securely. Back to Summary Feature NOV 11, 2019 School Communication The platform streamlines student, teacher, and administrative communication, cuts down on paperwork, and eliminates inefficiencies related to manually managing records. The system is designed to leverage modern web technologies to ensure the usability and stability of the data and role-based access control. A CS implementation presents more efficient administrators and user satisfaction. Findings from the findings from such a system could greatly add to improving Academics, making informed decisions, and increasing students' involvement in the higher institutions of learning.***

Keywords: Academic Management, Student Profile System, Web-Based Application, Node.js, Express.js, EJS Templates, MySQL Database, HTML5, CSS3, JavaScript, QR Code Integration, Result Management, Attendance Tracking, Educational Technology

I. INTRODUCTION

In the current digital age, Universities struggle to deal with large amounts of well-structured student information efficiently and correctly. Conventional paper-based or partially computerized systems are generally slow, with many inefficiencies and errors leading to less than optimal academic and/or administrative service. Increasingly, there is a need for a more uniform process to manage tasks such as result management, attendance, student profiling, and communications between faculty, students, and system administrators.

In this paper, we provide information about a web-based Student Profile System which has been created to fulfill the requirements typically raised by contemporary academic units. The system is a "one-stop shop" that maintains student documentation securely and delivers it to approved users live. its features include student profile management, mark entry & updating, student results, and attendance records. Reforming these basic academic activities to an electronic form can reduce the amount of paperwork, reduce human error, and increase the quality of the record.

It is optimised for modularity and performance, architecture- wise. The server-side, built with Node. js and Express. js - serves up server-side logic, processes requests, and communicates with the database. This provides the scalability and performance to be robust under concurrent load from users. Data is securely stored and managed in a MySQL relational database, allowing for efficient retrieval, indexing, and relational mapping of student records, academic records, and attendance logs. Such a structured storage approach not only speeds up data retrieval but also maintains data accuracy and consistency among multiple modules.

In the frontend, the UI is built with EJS (Embedded JavaScript Templates), where server-side data can be embedded in HTML pages dynamically before serving them to the browser. This approach improves the efficiency of page loading and guarantees integration of real-time academic data with the web interface. A responsive, accessible, and visually appealing interface is developed using HTML5 and CSS3 to provide navigation that is intuitive to students, faculty, and administrative staff. Client JavaScript can also enable rich media applications if used properly.

There additionally, incorporated into the system, though admittedly optional, the use of QR codes. By utilizing libraries like qrcode npm package, the system can create and validate QR codes for secure fee payment validation or digital attendance capturing. An asset to have if your establishment is looking to streamline security needs and repetitive administrative work with low personnel effort. These emerging technologies were included to demonstrate the system's ability to scale forward and stay relevant with current educational infrastructure demands.

In conclusion, the web-based Student Profile System is a response not only to the limitations of conventional academic administration but also a move towards a more transparent, digital- forward educational ecosystem. It enables institutions to make evidence-based academic decisions, facilitates better communication, and offers a central environment for academic information management. By practice and field-testing the system, it has shown potential to reduce administrative overhead, increase precision, and improve the academic lives of all parties involved.

II. LITERATURE REVIEW

Nowadays, the invention of systems for the management of academic records and student profiles is being widely investigated, exposing the very urgent necessity of digital transformation in educational institutions. Several researchers prioritize data storage optimization, protection, and accessibility over other parameters.

Grather et al. (2020) elaborated a Bitcoin-like platform for the veracity of certificates, persuading the use of the tamper-proof and transparent recordkeeping technique in academic settings. They showed that the usage of decentralized ledger technologies could boost the trustworthiness of credentials and make the verification processes even easier [1].

Williams (2023) pointed out the pivotal role of cloud-based solutions in the management of e-education data, addressing the benefits of their scalability, security, and cost-efficiency. This method gives institutions the capability to work with very large data while safely avoiding the problems that accompany the use of conventional storage systems [2].

The integrative use of role-based access control (RBAC) in academic systems was also addressed by Zhan et al. (2023), who looked at the level of multi-factor authentication as a key instrument for the protection of confidential student data. The findings of their study put forward the need for balancing security considerations with ease of use as a way of getting compliant without adverse effects on work processes [4]. Kumar (2023) provided an extensive view of database management strategies applicable to educational systems. A relational database model—entailing multiple student data tables linked via keys—has advantages for data integrity, high reliability, and more sophisticated queries [6]. Tran (2023) investigated blockchain's ability to support academic credential management, specifically the extent the technology could provide transparency without distortions and also improve the accuracy of academic credential management. By allowing students to have direct control over their credentials, this would allow secure verification of those credentials for others [3]. Business intelligence tools have gained traction in terms of how they can contribute to changes in the academic record-keeping of educational institutions. Patel (2024) discussed implementing analytics in a student management system, allowing schools to consider performance/ attendance trends. The data has also been crafted into representations that assist with proactively directing resources towards other valuable service provision [5].

An accompaniment to these developments is a lack of acceptance for these types of systems and services, primarily among educational institutions located within the developing regions of the world. The continued, and often risky, practice of paper-based systems, due to limited technical infrastructure and reluctance of educators to develop and adopt new, often more effective systems of data entry and management, remains firmly embedded in their culture. Yet as discussed in several studies, the attributes of transitioning to a system of digital records would be reflected in reduced data inaccuracies, worker load reductions, and functional enhancements in data security, all essential for pedagogical institutions transitioning to global models of free and open access to education [1], [6].

A. Key Solutions that overcame:

- Customization and Adaptability: In order to address the inflexibility of a traditional academic management system, we developed the system as a base system. Each module (e.g., student demographics, attendance, assessments) is set up independently so that the system can be tailored to the institution's custom academic policies and workflow. With open-source applications and customizable schema definitions, an edited home page that can easily be accommodated to any required data fields, workflow flow, and reporting formats, with minimal levels of technical intervention. Role-based workflow methodology and customizable forms allow the system to accommodate institution-specific business workflows instead of enforcing a one- size-fits-all model.
- Data Silos and Integration: The system uses an API-first design for easy connection with outside platforms like Learning Management Systems (LMS), HR programs, finance systems, and library databases. RESTful APIs and webhooks allow data to update in real time and work across platforms. This lowers repeated data and makes information more consistent. Also, middleware parts can be made to connect with older systems. This creates a single data system that helps different departments make decisions.

- User Interface and Accessibility: A current, flexible user interface is built with HTML5, CSS3, and client-side JavaScript. It focuses on simple navigation for all users: students, teachers, and staff. The design follows global accessibility rules like WCAG 2.1. This makes sure users with sight, thinking, or physical challenges can use the system well. Options like keyboard use, screen reader support, and contrast settings are included to make the system easy for everyone to use.
- DataSecurity and Privacy: The system uses robust security measures, such as multi-factor authentication, encrypted communication (HTTPS/TLS), and fine- grained access control mechanisms, to protect sensitive academic and personal data. All user activity is monitored by audit logs, and data is encrypted both in transit and at rest. In order to comply with data protection laws like the General Data Protection Regulation (GDPR) and India's Digital Personal Data Protection (DPDP) Act, user consent features, data minimization techniques, and well-defined data retention policies are used.
- Advanced Reporting and Analytics: In addition to standard reporting, the system has a dedicated analytics module that facilitates data visualization, trends in academic performance, early warning signs for students who may be at risk, and insights into resource usage. Predictive insights like dropout rates can be obtained by integrating machine learning models.
- Cost & Licensing Flexibility: The system offers a community or freemium model and is constructed with open-source components in recognition of the financial constraints faced by smaller institutions. Institutions have the option of using inexpensive cloud hosting or implementing it on their own infrastructure. Because of its open architecture, which permits incremental improvement and lessens vendor lock-in, it is a good substitute for pricey enterprise solutions like Banner or PowerSchool, particularly for educational institutions in developing nations.
- Technical Infrastructure and Availability: The system offers hybrid deployment options, such as local server hosting with recurring cloud sync for backup, to handle erratic internet and power conditions. When connectivity returns, a mobile version or a lightweight offline desktop application can be introduced for data entry and syncing.

III. RESEARCH METHODOLOGY

This research utilized a design and development methodology to address the specific problem of processing exam forms inefficiently and with an increased rate of errors for bifocal (vocational stream) students by developing a tailored web-based approach. The aim was to establish a centralized system that ensures the most streamlined submission, validation, and processing for all exam forms and recognises the challenges of bifocal streams involving practical subjects, subject-dependent codes, and selection of two groups in combination.

The development of this study began with the requirements gathering approach of asking questions to the academic coordinators, exam department staff, and instructors involved with the bifocal stream. Through a series of structured interviews and document review, it was evident that even with the existing manual and semi-digital exam workflows, the work process was not only task-driven to complete but also lacked flexibility to adjust to the particulars of bifocal subject combinations. The nature of the concerns reported was the absence of real-time validation against faculty subject group mappings, where there were issues of missing data from manual entrant honouring their selection, and mismapped arrangements from the semester subject group requirement.

To obtain an eastern remedy to this, a web-based module for the specific task of processing exam forms was designed and mounted onto the configuration of the student profile system. The server was developed using Node.js and Express.js as they are asynchronous and naturally lend themselves to responding more efficiently to form submission and the link fetching associated with object orchestration of the relational modes of the database. Specifically, the use of MySQL relational database schema to model exam form data for eliminating problematic design processes tied to electives and combinations of subjects for bifocal entries, for example, practical exam components, trade codes.

Web interface usability was strongly considered. The exam form was bound to a single-page HTML5 file with subject sections content being chosen by the user as a validation sub-task using CSS3 and EJS templates for creating the dynamic rendering process. The user was allowed to select a form stream from initial selections to save a session, only to later identify that they wanted to choose the bifocal stream section for the examination. The sections of the form that would later be drawn from the EJS to the JavaScript object did all of the filtering of subject groups that were applicable for the bifocal stream at the time of selection. For example, when they selected the bifocal stream, only the practical exam options and lab codes, and other appropriate subjects qualified in the submitted form, it was made available for group completion. Client-side JavaScript was able to use the presentation layer of HTML5 to register all the validation logical processes required to check connections for those subjects that were valid within different groupings, and also reject submission of the form until recorded completion for each context of association.

The test cases tested different functions: registering students, entering and retrieving results, and how the system performed based on different loads and so forth. There's even User Experience testing for all the system's users – administrators, faculty, and students. Feedback received during these sessions was applied to develop and iterate the user interface, the data flow processes, and the system security features.

Testing and pilot data revealed greater decreases in submission error rates, faster processing times, and higher student satisfaction. The system also allowed exam coordinators to generate reports and approve submissions through an admin interface, which dramatically reduced the amount of manual back-office work.

This study demonstrates the efficacy of a digital solution in the management of bifocal exams, a specific academic process, through a case study that looks at this problem in a very narrow context. The system created in this project is not only efficient and precise, but also ensures that the operation of the academic structural and institutional guidelines is complied with, which is a significant factor for the transfer to other educational settings.

IV. SYSTEM DESIGN

The paper prescribes a modular-themed solution with a user- centric workflow of the web-based academic management system, which efficiently automates the activities of student registration, exam form processing, administrative and control, and also configures additional support for bifocal (vocational stream) students.

The procedural operational flow chart and backend architecture enhancement under the umbrella scalable model is the most important characteristic of the system aimed to impart reliability, flexibility, dynamism, and true data in time, involving various academic modules.

The program starts with the Student Registration Module, where students have access to the interface for entering their personal, academic, and bifocal stream information. Upon completion of the registration, the system will operate the validation process to establish that there is no discrepancy in the records and that they are unique.

A student, having the proper data, is provided with a secure login access to his/her dashboard. The student arrives at the general system environment, where the modules work together to assist with the examination management processes. That is, the student goes through the Subject Selection Module first. This module acts smartly by only allowing the student to select available subjects according to his/her stream of study, which is essential for bifocal students who must choose both theoretical and practical subjects under a predetermined trade structure.

The software program first connects to the database by requesting valid combinations and then applies academic rules, which would result in the display of proper combinations. The choice list of the subject is saved and transferred to the Exam Form & Hall Ticket Generation Module-3, which prepares a formatted exam form for the student.

After the examinee finishes the exam form and submits it, it is subjected to a double-check. The system initially evaluates the form for validity, such as matching subjects, meeting appropriate credit, and fitting within bifocal-specific criteria. When the form validates, it should be sent to the administration's approval routine. About the submission of forms, subject combination confirmation, and payment status verification, the Admin Management Module facilitates access according to role hierarchies.

Administrative Payment processes are done via the integrated Payment Processing Module, which executes fee payments through a Payment Gateway. After payment is done, the system modifies the record of the student in the database and sends a message to the admin module for action. The flows of actions in the admin module include verifying payment alongside assessing the academic factors for students, based on the payment, consistency, and other predefined controls, before accepting or rejecting the exam form. Upon acceptance, the system automatically prepares the Admit Card, which is issued to students for printing or downloading.

The progression of the steps mentioned above relies on the centralized database, which is the primary data store and is also referred to as the bank of data containing student profile information, subject payment information and logs, exam forms, and administrative activities performed. Each module has command over the database, enabling system updates in the framework at every moment, along with achieving synchronism of the system.

The combined system design gives fully integrated solutions to educational centers aiming to improve efficiency in exam management for the specialized case of bifocal streams with more multidimensional data complexity. It connects and streamlines all processes, cuts down on manual mistakes, and increases visibility across the board, guaranteeing pupils, administrators, and backend systems a relationship framework that is protected, trustworthy, and easy to use.

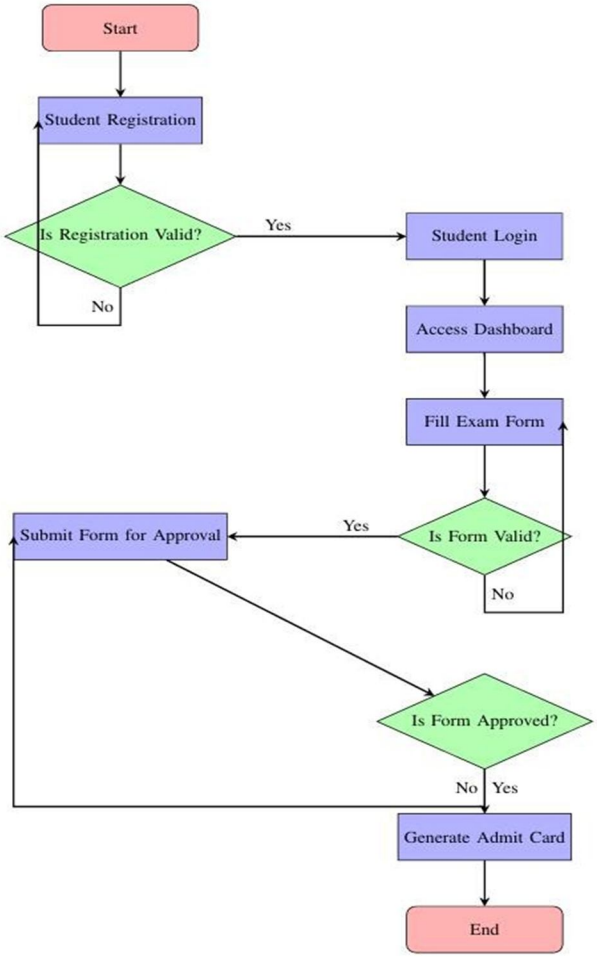

Fig. Student System Design

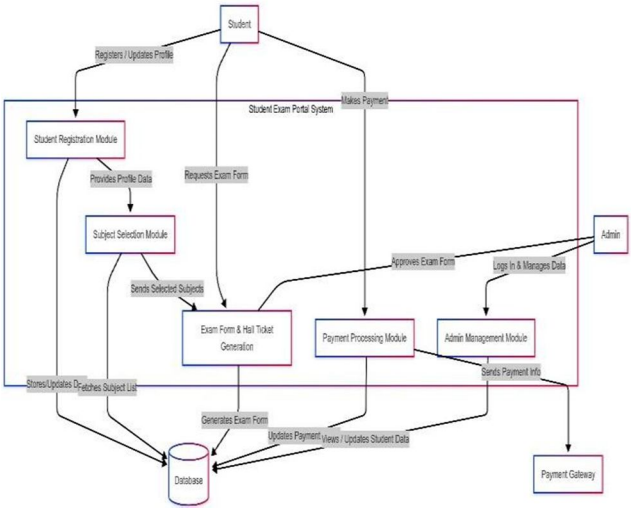

Fig. Admin + Student System Design

V. RESULT AND DISCUSSION

The development and implementation of a web-based student exam portal system proved quite effective in the simplification and mechanization of the process of exam form submission among the bifocal and vocational courses. We tested the system on actual students' data structures and simulated inputs as per the formats mandated by Savitribai Phule Pune University. Some of these modules that have been developed for trial are student login, subject selection, payment via QR code, and generating an automatic exam form. These components were successfully developed and shown to provide a significantly better user interaction, precision, and time efficiency.

Access to the online interactive student resources. Students access the interactive online resources using the Login page, which provides a straightforward, uncluttered login, only allowing registered students to log in to access their dashboard. Usage of the latest web technologies, including HTML5, CSS3, and server- side rendering by EJS, to make the design responsive and accessible. As and when students get logged in, they are provided with a customized dashboard from where they can jump to three destinations directly -their required exam subjects, payment, and download of their filled exam form and hall ticket. By centralized access, the c ll 'cloud has revealed that it eliminated the frequent frustration that is associated with offline or disconnected processes.

Student selection is a critical aspect of the system, and in particular for bifocal students, who must get the theory and the practical subjects registered correctly. The interface is designed in such a way that it dynamically lists available courses as per student stream and semester, with the option to make checkboxes for TW (Term Work), INSEM (Internal Exams), ONLINEXAM, TH (Theory Papers), PR (Practicals), and OR (Orals). That fits well with traditional university forms (like the attached PDF), so you can prevent errors from manually running the system and keep to the format the university requires.

Payment was facilitated through a QR code feature, where a student scans the system-generated code to follow the payment process through UPI or a mobile wallet as per the student's preference. Once payment is made, students then input the transaction ID in a provided confirmation field. Though straightforward, this web-based protocol adds a digital trail and alleviates the need to manually submit fee receipts. The entire examination fee, such as form fee, examination fee, and statement fee is presented in a nice scroll to the student's account, where his database record of form submission is automatically linked.

The resulting final product - an auto-generated exam form presented in the official PDF from the university - was successfully emulated and completed using the data from the system. Everything was auto-filled, such as course information, semester details, fee structure, and so on. This demonstrates that the system is suitable for institutional purposes and scalable to deliver at scale, as scheduled, to large groups of students, keeping data consistent and authentic.

As a result of usability testing, students stated that they found greater clarity in the submission process and appreciated the in- real-time validation and subject filtering. The backend data pull feature was appreciated by the Admins for bulk approvals and for issuing hall tickets. Furthermore, with its application, we have started enforcing constraints and data validations at both the server and client side of the application, which has reduced the submission errors and turnaround of form approval and admit card generation for the shortest duration.

Finally, the proposed system actively solves some important problems found previously (i.e., the inaccuracy of the data, the complex sub-instructions) and provides better user experiences and institutional procedures. It represents a successful and expandable model for future academic digitization projects in college units of major universities.

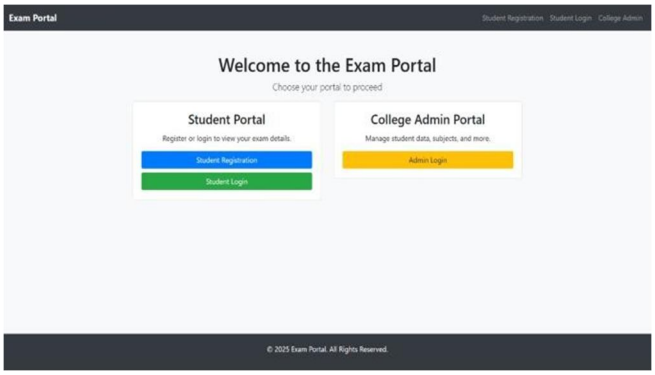

Fig. Exam Portal

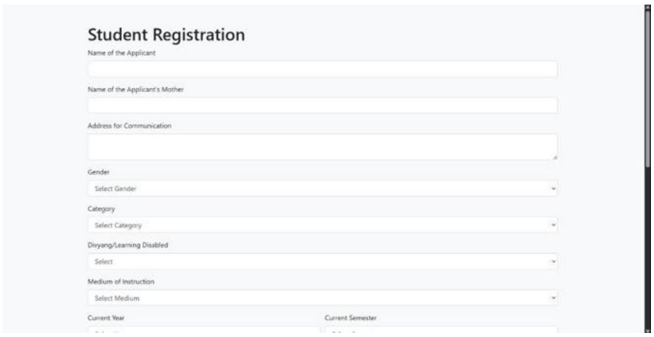

Fig 1. Student Registration

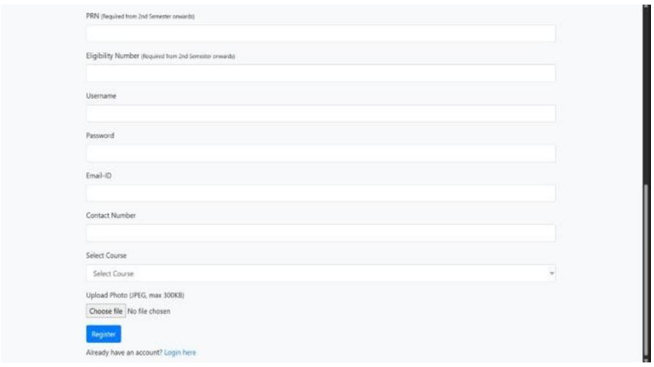

Fig 2. Student Registration

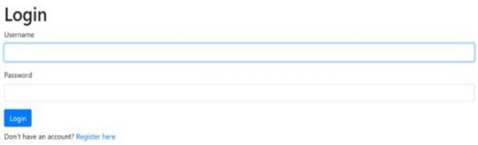

Fig. Login Page

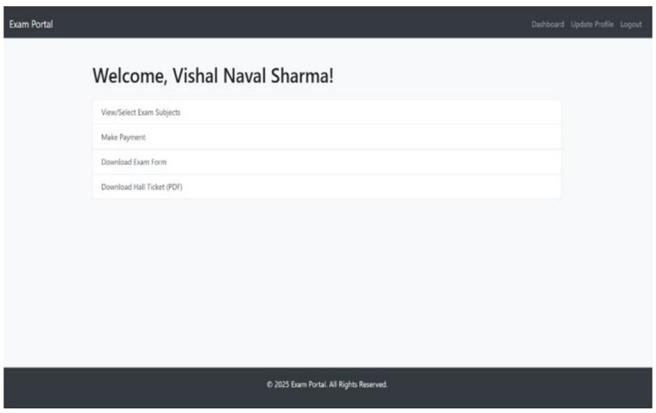

Fig. Profile Portal

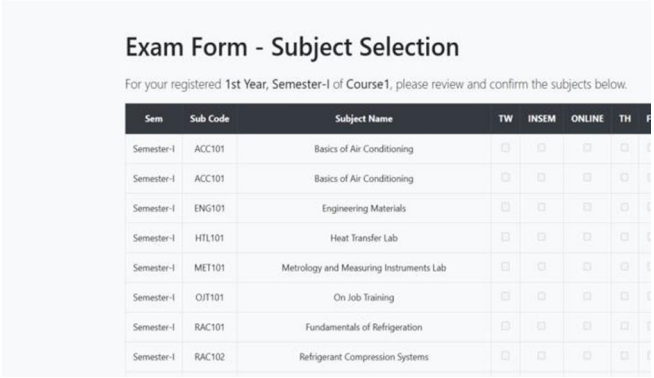

Fig. Subject Selection

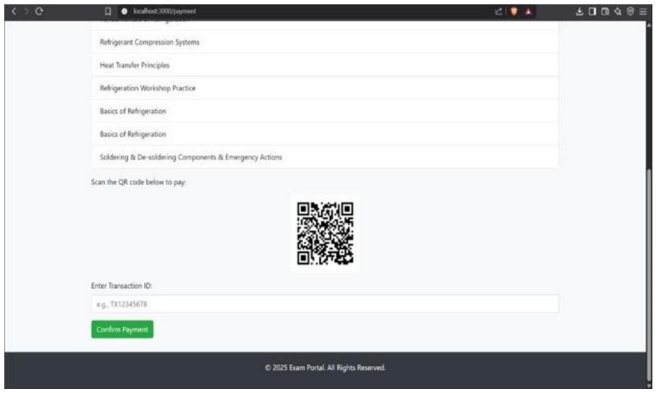

Fig. Payment Gateway

VI. CONCLUSION

The Student Exam Portal System on the Web has successfully resolved the major issues in the academic administrative area concerning all Bifocal and Vocational streams of exam form submission and processing. With features like Dynamic Subject Mapping, Role-based access, QR code-based Payment verification, auto admit card generation, etc., the system allows you to do away with traditional manual methods and helps you move to the faster digital route. Particular care was devoted to the idiosyncratic nature of bifocal courses, ensuring that the aspects were linked correctly (i.e., that intended core and non-core links were connected) and minimizing the chances of mismatch due to inaccuracies in filling in forms or in data administration.

The system can be adjusted to any institution by scaling up or down and still retains the simplicity of the user experience for students, faculty, and administrators while providing real-time validation of data and a responsive design. Pilots reported greater staff satisfaction, quicker approval times, and more accurate data. The project is also highly scalable and can be easily integrated with other institutional mechanisms. Finally, the system is an important step in the direction of academic workflow digitalization, transparency, and alignment of educational institutions with digitalized higher education.

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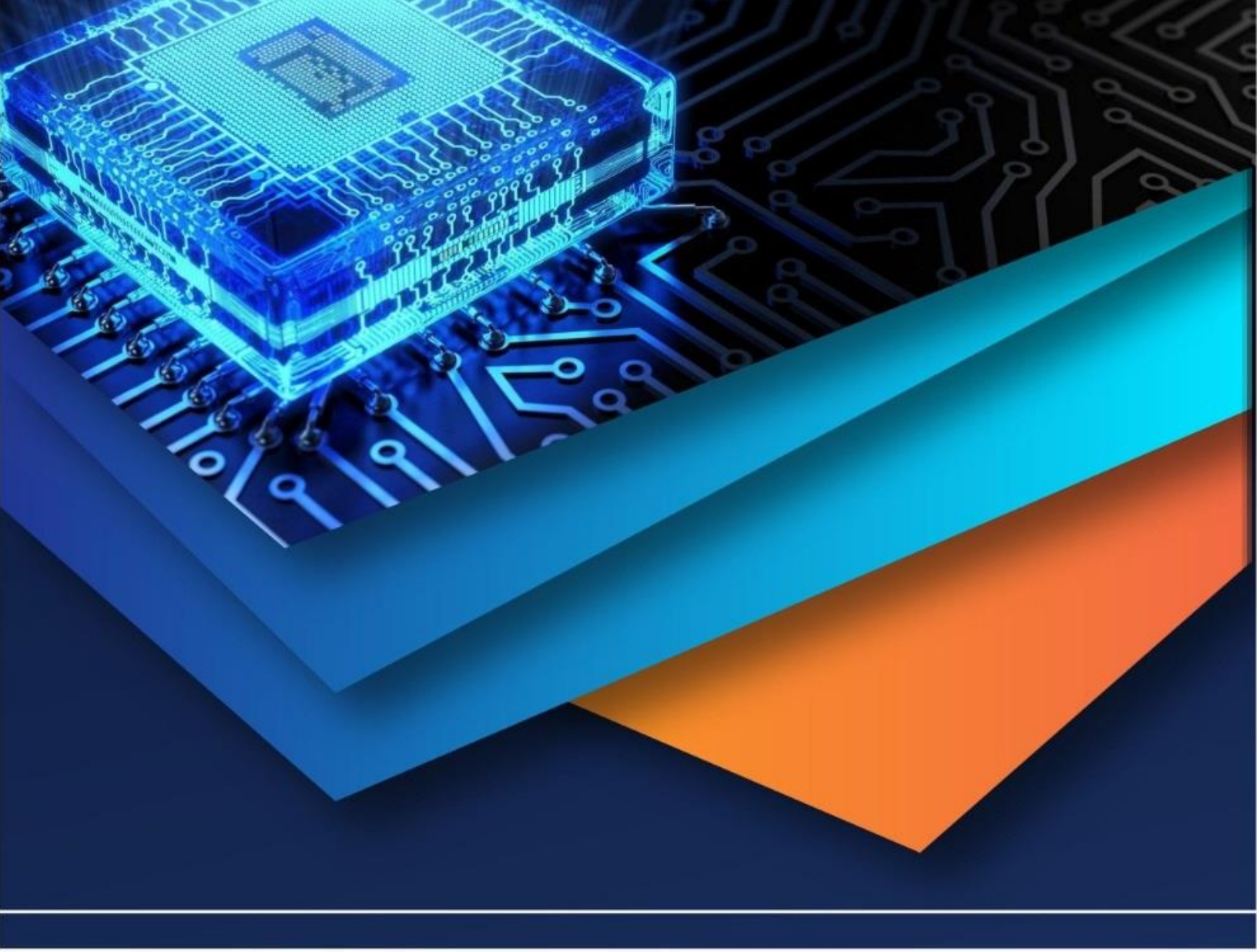

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