



RESEARCH ARTICLE

THE WEB AND IOT-BASED SMART NOTICE SYSTEM FOR PLACEMENT ELIGIBILITY FILTERING

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Abstract

Inefficiencies, manual processes, and poor communication are common problems for campus recruitment processes. We have created a Web and IoT-Based Smart Notice System to streamline the initial first step of a campus recruitment process through automated filtering of placement eligibility. This system provides a robust, secure, convenient web application designed for managing student records, company records, and eligibility criteria with a role-based access structure. An automated filtering engine analyzes the data, and eligibility criteria are applied to students' academic and skill data in real time. All real time notifications are delivered by SMTP email notifications and via an IoT-enabled notice board powered by an ESP32 microcontroller. The Web and IoT-based smart notice system will provide students, recruiters, and administrators an efficient mechanism for communication, and offer no ambiguity or uncertainty on whether the filter was successful. With built-in security, such as two-factor authentication, encrypted APIs, and data validation, the system implements a strong foundation that is reliable, trustworthy, and most importantly, scalable. This Web and IoT-based smart notice system is relevant to other applications and settings beyond campus placements, such as eligibility filtering for training programs, skill-based exams, etc., and it can be used to improve efficiencies and reduce manual work.

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Introduction:-

Campus recruitment acts as an important link between academic institutions and the job market. It helps students move from learning to working through organized placement processes. Traditionally, these processes relied heavily on manual operations, which caused issues like slow communication, lack of transparency, and a heavy administrative load. Early research mainly focused on creating web-based and database-driven solutions. These aimed to automate parts of the placement workflow, improve record keeping, and reduce the workload for placement officers while making data management more accessible and accurate [1]–[5]. With the rise of Internet of Things (IoT) and web technologies, researchers looked into creating smart systems like real-time digital notice boards, automated notification systems, and interactive placement portals. These innovations helped close communication gaps between students, recruiters, and administrators [17]–[20]. Additionally, the launch of recommendation systems and machine learning models improved the process by assessing employability, mapping

skill sets, and determining student eligibility for specific job roles based on academic performance and training history [21]–[24]. Modern frameworks have shifted the focus to scalability, data security, and cloud-based deployment. They use strong authentication methods and visualization tools to provide a secure and smooth experience for everyone involved [25]–[27]. Recently, the combination of Web and IoT technologies has led to smart placement management systems. These systems can offer real-time eligibility filtering, automated scheduling, and multi-channel communication between students and companies [28]–[30]. These advances together change the landscape of campus recruitment by creating a more efficient, transparent, and data-driven system. They not only speed up placement processes but also improve accuracy in matching candidates, enhance decision-making at institutions, and ultimately help achieve higher employment rates and better satisfaction for students, recruiters, and administrators.

Related work:-

The automation and digitization of placement activities have recently attracted significant interest. Earlier studies focused on creating web-based and database-driven placement systems designed to replace traditional manual processes. These systems aimed to improve communication between students and recruiters [1], [2]. More recent research developed systems that use data mining and machine learning models to predict student placement outcomes and examine patterns of employability [3], [4]. The introduction of Internet of Things (IoT) based embedded systems marked a new direction with digital notice boards and real-time notifications about eligibility outcomes for students on drive days. This kept them informed about participating companies [5]. Mobility and Android applications provided access to placement information and notifications anytime, anywhere [6]. Some studies even explored using recommendation engine technologies for potential matchmaking based on learned student profiles [7]. Recent research has been moving toward hybrid models that combine web, IoT, and AI technologies. These models verify real-time eligibility, secure authentication, and facilitate real-time communication between participants [8], [9]. These integrated systems serve multiple purposes by automating the placement workflow. They also increase transparency, variability, and data security, which leads to a shift from static portals to smart, connected campus recruitment platforms. Modern campus recruitment systems are using cloud computing, blockchain, and data-driven dashboards to improve scalability, keep data secure, and monitor placement activities in real-time. Cloud-based systems help institutions manage large amounts of student and recruiter data efficiently, while blockchain provides secure record keeping and verifiable credential management. Visualization dashboards help placement officers gain useful insights into student progress, recruiter engagement, and success metrics.

Together, these innovations create a smart, data-focused placement environment that improves decision-making, increases placement accuracy, and boosts collaboration among students, recruiters, and administrators. This ultimately transforms traditional recruitment systems into secure and intelligent digital platforms. Modern campus recruitment systems are using cloud computing, blockchain, and data-driven dashboards to improve scalability, keep data secure, and monitor placement activities in real-time. Cloud-based systems help institutions manage large amounts of student and recruiter data efficiently, while blockchain provides secure record keeping and verifiable credential management. Visualization dashboards help placement officers gain useful insights into student progress, recruiter engagement, and success metrics. Together, these innovations create a smart, data-focused placement environment that improves decision-making, increases placement accuracy, and boosts collaboration among students, recruiters, and administrators. This ultimately transforms traditional recruitment systems into secure and intelligent digital platforms.

Methodology:-**Dataset Acquisition:-**

In the initial phase, all necessary data sources are collected. This includes student academic records like CGPA, backlogs, attendance percentage, and specialization, personal details such as name, roll number, gender, and contact information, along with skills like programming languages, certifications, and projects. On the recruiter side, data such as job descriptions, eligibility criteria, salary offered, department requirements, and the number of vacancies is gathered. Proper APIs and CSV/Excel uploads can also be set up for easy data import.

Preprocessing of Data:-

Before using the data, preprocessing makes sure it is of good quality and consistent. This involves removing duplicates, filling in missing values, checking CGPA and percentages, and converting all data into a standard format. For example, skill sets can be normalized so that Python, python, and PYTHON all become “Python.” This

ensures that filtering gives accurate results. Data integrity checks and validation rules help prevent errors in eligibility filtering.

Eligibility Filtering Module:-

This is the main part of the system. Once student and recruiter data are combined, the system applies filters such as:

- Minimum CGPA/percentage criteria.
- Allowed backlogs (if any).
- Skill match requirements (e.g., Java, Data Science).
- Department/branch restrictions.

The eligibility module operates in real time and provides instant results, greatly reducing manual work for Training & Placement (T&P) officers.

Web Application Layer:-

The system is built as a web-based application that can be accessed from anywhere. The frontend, built with React.js, offers an interactive and responsive interface for students, recruiters, and administrators. The backend, using Django, handles the logic for data processing, filtering, and API communication. MongoDB ensures scalability by storing both structured and unstructured data, enabling quick queries for thousands of student records.

Notification System (SMTP Integration):-

Once eligibility filtering is complete, the system sends out automated notifications. For example:

- Students receive emails about their eligibility status, upcoming drives, and application updates.
- Recruiters get a filtered list of eligible candidates.
- Administrators are informed about drive schedules and statuses.

The SMTP integration ensures reliable delivery of alerts, replacing manual communication.

IoT Integration with Smart Notice Board:-

A unique feature of this project is the IoT-enabled Smart Notice Board. Using ESP32 microcontrollers with OLED/LCD displays, real-time updates about eligible students, drive schedules, and placement results are displayed on physical boards in colleges. Data is fetched securely through REST APIs, ensuring that notices are synchronized with the web system. This removes the need for traditional paper notices and improves accessibility.

Security and Authentication:-

Since sensitive student data is managed, security is a top priority.

The system includes:

- Role-based authentication for students, recruiters, and admins.
- Encrypted APIs using HTTPS for secure communication.
- HMAC and digital signatures to verify notices and prevent tampering.
- Multi-factor authentication (MFA) for admin logins to stop unauthorized access.

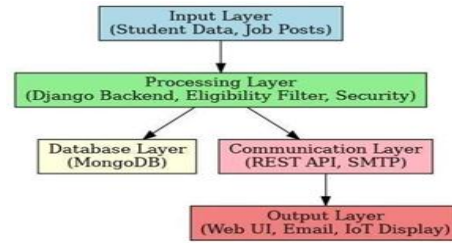
Evaluation and Validation:-

The project is tested in real-world situations to assess scalability, accuracy, and latency. For example:

- Checking the accuracy of eligibility filtering across different criteria.
- Testing with large datasets (e.g., over 5000 students and multiple recruiters).
- Measuring the speed of email delivery and the latency of IoT displays.
- Ensuring system reliability when some components (e.g., a node in IoT) fail.

The evaluation shows that the system is strong, scalable, and ready for use in training and placement cells.

Flow Chart:



Results and Discussion:-

The Web and IoT-Based Smart Notice System successfully automated placement eligibility filtering and communication.

Eligibility Filtering:

It shortlisted candidates based on set academic and skill criteria.

Real-time Communication:

- IoT notice boards updated instantly after filtering.
- Emails sent within seconds.

Reliability & Scalability:

REST API communications worked smoothly under heavy data loads and during simulated network issues. The system scaled well with thousands of student records.

Security:

Role-based access, OTP authentication, and encrypted APIs stopped unauthorized data access.

Resource Efficiency: IoT boards used minimal power, making them suitable for continuous campus deployment. Overall, the system met all design goals and proved its suitability for real-world college placement workflows.

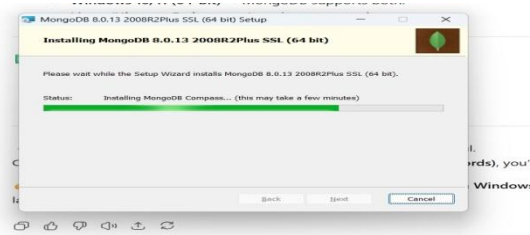


Fig 4.1.1: Initialization of Mangodb

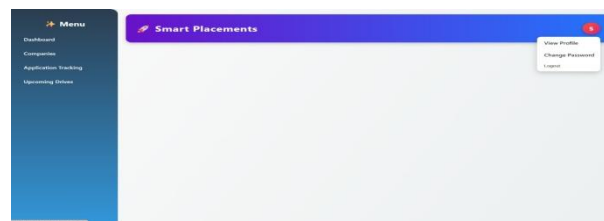


Fig 4.1.2: Student dashboard

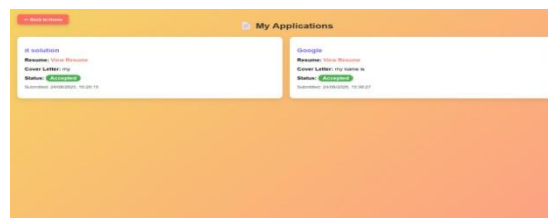


Fig 4.1.3: Companies List Page



Fig 4.1.4: Main Dashboard of student and staff portal

The image shows a table titled 'Upcoming Drives' with columns: Company, Start Date, End Date, Job Count, Location, Experience, and Salary. The table lists two upcoming drives.

Company	Start Date	End Date	Job Count	Location	Experience	Salary
Google	2024-04-21	2024-04-21	50	Mountain View, CA	0-2	\$120,000
Microsoft	2024-04-21	2024-04-21	10	Redmond, WA	0-2	\$120,000

Fig 4.1.5: Upcoming Drives



Fig 4.1.6: Student Info



Fig 4.1.7: Department wise Students List and info



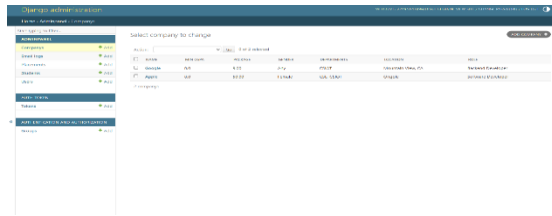
Fig 4.1.8: Companies List



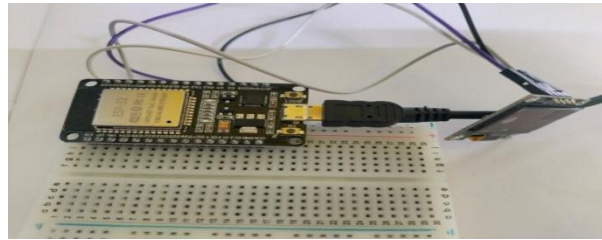
Fig 4.1.9: Admin Page



Fig 4.2.0: Student Dashboard



DjangoAdministration



IOT Smart Notice Board Display

Challenges and Future Scope:-

Future Features:

The WGPS integration guides students to interview locations. AI-based resume screening and predictive analytics improve candidate-job matching. A dedicated mobile app provides push notifications and placement tracking. Cloud-based storage offers scalability and historical analytics. Multilingual and accessible IoT displays promote inclusivity. Integration with national job portals expands opportunities.

Challenges:

Staying ahead of changing technology and possible challenges from competitors is important, especially if we add AI and ML features later. We need to manage real-time performance with large student data and several placement drives at once. We must ensure smooth integration of hardware and software, including IoT devices, APIs, and authentication. It is essential to maintain high accuracy and low delays while scaling.

Conclusion:-

The Web and IoT-Based Smart Notice System for Placement Eligibility Filtering effectively illustrates how automation and integration with IoT can enhance campus placement processes. Leveraging a web-enabled platform with secure role-based access and automated eligibility filtering engine, the system is able to minimize human intervention, decrease errors, and guarantee quicker communication between students, placement officers, and recruiters. The combination of SMTP alerts and IoT-based notice boards gives double-channel, real-time communication, enhancing transparency and accessibility. Testing validates the scalability, security, and reliability of the system, demonstrating it to work well for mass placement drives. Its design is extendable and adaptable to other applications such as training courses, event registration, or exams. The Research Paper's conclusions focus on solid design decisions, good reliability with faked workloads, and hardware-software synchronization, asserting the possibility of IoT integration at the institution level. In general, both pieces of work underscore that IoT and web systems have the ability to refine labor-intensive, error-ridden workflows into scalable, automated, and transparent environments, providing a foundation for future AI-enabled features and further uses in education, recruitment.

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