AUTOMATED COMMUNICATION AND REMINDER SYSTEM

A project report submitted to ICT Academy of Kerala

in partial fulfillment of the requirements

for the certification of

CERTIFIED SPECIALIST

IN

DATA SCIENCE AND ANALYTICS

submitted by

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Dec 2025

List of Figures

List of Abbreviations

Abbreviation	Full Form\Description
n8n	Node-based Workflow Automation Tool
API	Application Programming Interface
UI	User Interface
CSV	Comma-Separated Values
UTC	Coordinated Universal Time
JSON	JavaScript Object Notation
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
LMS	Learning Management System
SMTP	Simple Mail Transfer Protocol

Table of Contents

Abstract

In modern educational environments, effective communication between institutions and students is critical for ensuring academic discipline, timely attendance, and on-time assignment submissions. However, many institutions still rely on manual methods such as phone calls, instant messages, or ad-hoc emails to notify students about upcoming classes and assignment deadlines. These methods are inefficient, prone to human error, and do not scale well with increasing numbers of students, courses, and sessions.

This project proposes and implements an Automated Class and Assignment Reminder System using n8n workflow automation. The system leverages Google Sheets as a centralized data repository for session schedules, assignment details, and student contact information. By applying time-based logic using JavaScript within n8n, the system continuously monitors session timings and assignment due dates based on Indian Standard Time (IST). When predefined conditions are met, automated notifications are sent to students via Email and Discord. The proposed solution eliminates manual intervention, improves communication reliability, and enhances student engagement through timely and consistent reminders.

1. Problem Definition

1.1 Overview

Educational institutions and training organizations face increasing difficulties in effectively managing and communicating academic schedules. Coordinators are often required to manually remind students about upcoming classes, sessions, and assignment deadlines. As the number of students, courses, batches, and academic activities grows, this manual process becomes complex, time-consuming, and inefficient. Additionally, the absence of a centralized system to integrate scheduling data with automated notifications leads to fragmented workflows and communication gaps.

1.2 Problem Statement

The existing manual and semi-automated reminder systems are prone to errors such as missed notifications, incorrect timings, and inconsistent communication. Many current solutions rely on multiple disconnected tools for data storage and message delivery, making the process unreliable and difficult to manage. Furthermore, inadequate handling of time-based conditions and time-zone differences often results in inaccurate reminder delivery. Therefore, there is a need for an automated, scalable, and reliable reminder system that can continuously monitor academic schedules, apply precise time-based conditions, and deliver notifications across multiple platforms while reducing dependency on manual coordination.

2. Introduction

Automation has emerged as a transformative approach in modern software systems, enabling organizations to streamline repetitive tasks and improve operational efficiency. In the education domain, automation can play a vital role in improving communication workflows and reducing administrative overhead.

This project introduces an automated reminder system developed using n8n, a low-code workflow automation platform that allows seamless integration between various services. Google Sheets is used as the primary data source due to its accessibility, collaborative features, and ease of maintenance. Email and Discord are chosen as notification channels to cater to both formal and instant communication needs.

By combining workflow automation with custom JavaScript logic, the system dynamically evaluates class schedules and assignment deadlines in real time. The system is designed to be flexible, allowing administrators to modify schedules or deadlines directly in the spreadsheet without altering the automation logic. This makes the solution highly adaptable and suitable for real-world academic environments.

3. Literature Survey

Several systems and research efforts have explored automated reminders and scheduling mechanisms in educational contexts. Learning Management Systems (LMS) such as Moodle, Blackboard, and Google Classroom provide built-in notification features. However, these systems often limit customization and require students to remain within the platform ecosystem.

Cron-based scheduling systems have also been used to automate email reminders. While effective, these systems require significant scripting expertise and are difficult to modify or extend. Moreover, cron jobs typically lack integration with real-time collaborative data sources like Google Sheets.

Chatbot-based reminder systems offer interactive communication but depend heavily on continuous user engagement and complex natural language processing techniques. These systems also introduce higher development and maintenance overhead.

Recent studies highlight the growing adoption of workflow automation platforms such as n8n, Zapier, and Make. These tools enable event-driven automation with minimal coding and support integration with multiple services. However, academic literature lacks detailed implementation-oriented studies demonstrating the practical use of workflow automation for educational reminders. This project bridges that gap by presenting a complete, real-world automation solution.

4. Methodology

The project follows a systematic development methodology to ensure reliability and scalability:

1. **Requirement Analysis**
   Identified key requirements such as automated session reminders, assignment deadline alerts, multi-channel notifications, and accurate time-zone handling.

2. **Data Modeling**
   Designed a master Google Sheet containing structured columns for student details, course information, session dates and times, assignment names, and due dates.

3. **Workflow Design in n8n**
   Configured n8n to fetch data from Google Sheets at regular intervals using scheduled triggers.

4. **Logic Implementation**
   Implemented JavaScript logic in n8n's Code node to:

   - Convert Excel date and time values into JavaScript Date objects

   - Normalize all comparisons using IST

   - Evaluate session start conditions and assignment due conditions

5. **Notification Integration**
   Integrated Email (SMTP) and Discord Webhooks to send formatted messages dynamically.

6. **Testing and Validation**
   Conducted multiple test scenarios to validate correctness, including session-only reminders, assignment-only reminders, and combined notifications.
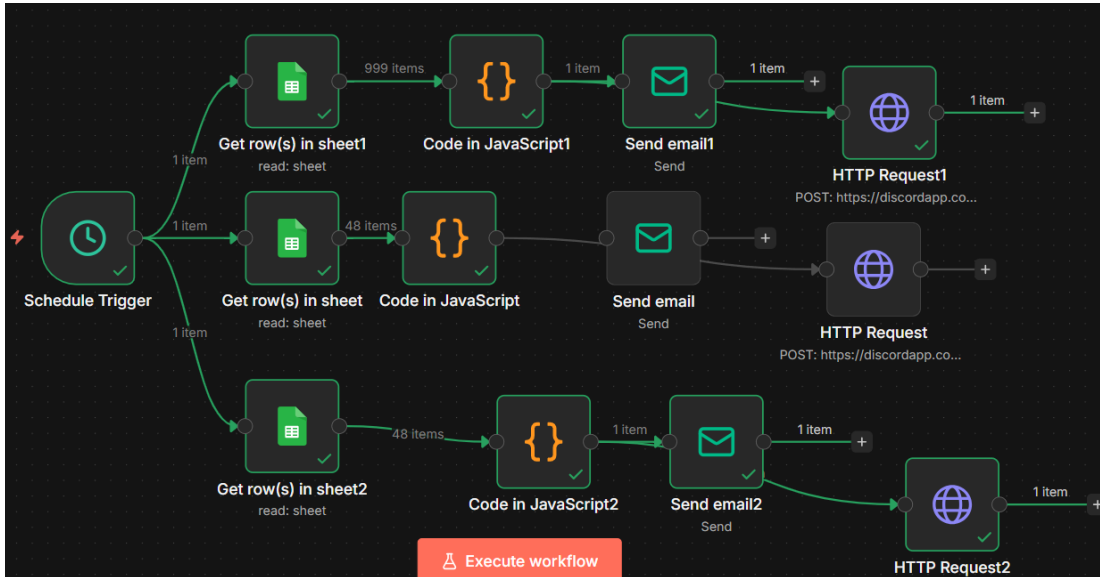
5. System Architecture

Figure 5.1: Work Flow

The system architecture of the Automated Class and Assignment Reminder System is designed using a modular, scalable, and event-driven approach. The architecture integrates cloud-based data storage, workflow automation, business logic processing, and multi-channel notification services to ensure reliable and timely communication with students.

- **Google Sheets**
  At the core of the architecture is Google Sheets, which acts as the centralized data repository. All academic information including student details, course names, batch identifiers, session schedules, assignment titles, due dates, and communication endpoints (email IDs and Discord channels) is stored in a structured tabular format. This design allows academic coordinators or administrators to update schedules and deadlines easily without modifying the underlying automation logic.

- **n8n Workflow Engine**
  The n8n Workflow Automation Engine serves as the central control unit of the system. It is configured with time-based triggers that execute at predefined intervals (for example, every 15 minutes or hourly). When triggered, n8n connects to Google Sheets through its built-in integration nodes and retrieves the latest data.

This ensures that any recent updates in schedules or assignments are immediately reflected in the system's behavior.

- **Code Node (JavaScript)**
  Once the data is retrieved, it is passed to the Code Node, where custom JavaScript logic is executed. This component is responsible for processing and validating the raw spreadsheet data. It converts date and time values into JavaScript Date objects, normalizes all timestamps to Indian Standard Time (IST), and applies conditional logic to determine whether a reminder should be triggered. The system checks multiple conditions, such as whether a class session is about to begin within a specified time window or whether an assignment deadline is approaching.

- **Notification Services**
  After evaluating the conditions, the system dynamically generates reminder messages using predefined templates. These messages are customized with relevant details such as student name, course title, session time, assignment name, and due date. The formatted messages are then routed to the appropriate notification channels.The Notification Layer consists of Email services (via SMTP or Email APIs) and Discord Webhooks. Email is used for formal and detailed communication, while Discord provides instant and real-time notifications suitable for student groups. n8n ensures reliable message delivery by handling authentication, message formatting, and error handling within the workflow.

Overall, this system architecture ensures loose coupling between components, high reliability, easy maintenance, and flexibility. By separating data storage, automation control, logic processing, and notification delivery, the system achieves efficient automation while remaining adaptable to future academic and technological requirements.

6. Result

The automated reminder system was successfully implemented and tested under various real-world scenarios. The system accurately identified academic sessions approaching their scheduled start times as well as assignments nearing their submission deadlines. Notifications were delivered reliably through both Email and Discord without requiring any manual intervention from coordinators.

The results demonstrated a significant improvement in the consistency and timeliness of communication between coordinators and students. Administrative workload was considerably reduced, allowing staff to focus on more critical academic responsibilities. The centralized workflow ensured that scheduling data and notification mechanisms remained synchronized, minimizing the chances of missed or incorrect alerts.

Furthermore, the system effectively handled multiple students, courses, batches, and assignments simultaneously, highlighting its scalability and robustness. Accurate time-based conditions ensured that reminders were sent at the correct intervals, even when managing complex schedules. Overall, the system proved to be efficient, reliable, and suitable for deployment in real-world educational and training environments.
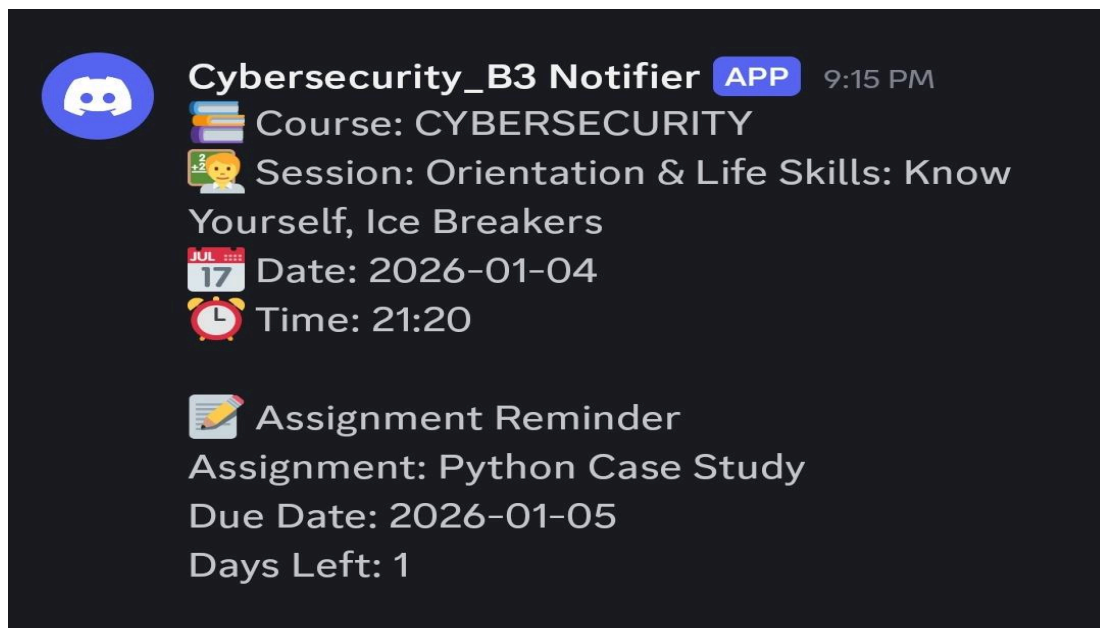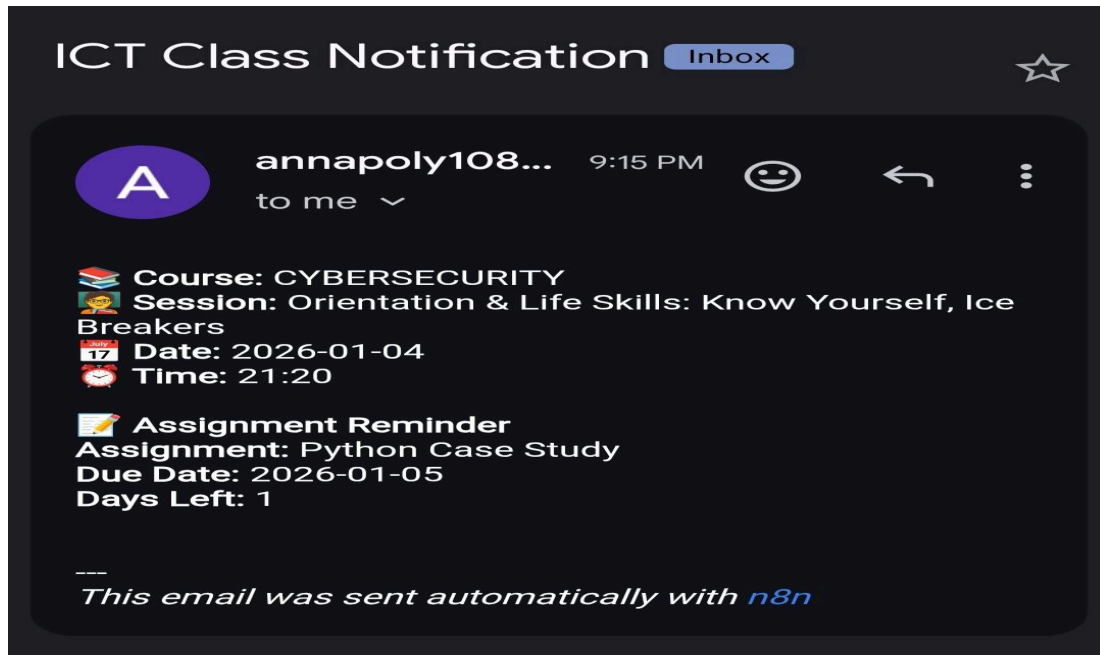

Figure 6.1: Discord Message

Figure 6.2: Email Message

The above figures 6.1 and 6.2 show the messages received by students through Discord and Email. The message content includes the daily session name, course, date, and time of the session. In addition, if any assignment submission deadline falls within three days (before or after the current date), a reminder notification is automatically sent to the students through both Email and Discord.

Currently, the system collects and processes details of students enrolled in the Cybersecurity, Full Stack Development, and Data Science and Analytics courses. Email and Discord notifications are successfully delivered to students across all three courses without any manual intervention. This demonstrates the system's ability to handle multiple courses simultaneously within a single automated workflow. The results confirm the reliability and scalability of the reminder system for managing diverse academic programs.

Video Link : 📷 ICT Internship-Project Video

7. Conclusion

This project successfully demonstrates the practical application of workflow automation in the education domain. By integrating n8n with Google Sheets, Email, and Discord, the system delivers a robust, scalable, and reliable reminder solution for managing academic schedules. The automation significantly reduces human error, improves operational efficiency, and ensures timely and consistent communication with students across multiple platforms.

The use of a centralized data source simplifies schedule management while enabling real-time monitoring of sessions and assignment deadlines. Automated time-based triggers eliminate the need for manual follow-ups, thereby reducing administrative workload and improving overall productivity. The system's ability to handle multiple students, courses, and batches highlights its effectiveness in complex academic environments.

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