



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Conversational Digital Platform For Handling Academic Inquiries Related To Financial Obligations And Admission Processes

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ABSTRACT:

Because higher education institutions are changing so quickly to digital, students and university administration need to be able to talk to each other quickly and easily. Students often want to know about things like how to sign up for classes, how to pay for them, deadlines, academic rules, and other administrative tasks. But traditional manual systems often slow things down, make things less consistent, and give administrative staff more work to do.

This project suggests using a chatbot to help students with questions about paying for and enrolling in college (CSM). The chatbot uses Machine Learning (ML) and Natural Language Processing (NLP) to understand and answer student questions quickly and accurately. The system offers automated help around the clock, making sure that students always get accurate, timely answers without having to rely on administrative staff.

There are many parts to the chatbot, such as user interaction, natural language processing, machine learning adaptation, database management, response generation, and analytics tracking. These modules work together to understand what users are asking, get the right information from institutional databases, and give answers that are relevant to the situation.

To check how well the system worked, we looked at usability metrics like response time, task completion time, and user satisfaction levels. Students said they had good experiences with the chatbot because it was easy to use, fast, clear, and they felt confident using it again. The solution cuts down on repetitive work for staff by a lot, and it also makes it easier for students to access and enjoy their work. The proposed chatbot system makes administration more efficient, makes sure that information is consistent, and makes the student experience better through smart automation.

Keywords— Chatbot System, Higher Education, Natural Language Processing (NLP), Machine Learning (ML),

1. INTRODUCTION

The energy industry has changed a lot since traditional electrical power systems became smart grids. A smart grid uses advanced communication technologies, automation systems, sensors, and smart data analytics to make power generation, transmission, and distribution more efficient, reliable, and long-lasting. Smart grids are different from regular grids because they let utilities and customers talk to each other in both directions. This lets utilities monitor, manage demand, and find faults in real time. But this change to digital also brings with it big problems for cybersecurity. Because smart grids depend on connected networks, IoT devices, smart meters, and cloud-based systems, they are open to cyberattacks like Denial of Service (DoS), False Data Injection Attacks (FDIA), malware attacks, and insider threats. A smart grid that is successfully attacked by hackers can cause power outages, loss of money, damage to equipment, and threats to national security. Firewalls and signature-based intrusion detection systems are examples of traditional security tools that don't always work well at finding advanced and changing threats.

Cybersecurity frameworks are using Machine Learning (ML) techniques more and more to deal with these problems. Machine learning lets systems learn from past data, find strange patterns, sort out bad behaviour, and deal with new threats without having to be reprogrammed. Adding ML algorithms to smart grid security systems can make them more accurate at finding threats, cut down on false alarms, and speed up the response to threats in real time.

3.LITERATURE SURVEY:

Recent advancements in Artificial Intelligence have significantly improved automated communication systems in educational institutions. Chatbots powered by Natural Language Processing (NLP) and Machine Learning (ML) have been widely adopted to

handle student questions that come up a lot quickly. Research indicates that AI-driven chatbots improve accessibility by offering round-the-clock support, decreasing reliance on administrative personnel, and enhancing response uniformity.

Before, chatbots were based on rules and followed scripts that had already been written. These systems worked well for simple questions, but they weren't very flexible and had trouble with more complicated or context-based questions. Modern chatbots can understand natural language inputs better thanks to the use of NLP techniques like intent recognition and entity extraction. Research shows that ML-based models get better over time as users interact with them, which makes them more flexible than systems based on rules.

In higher education, a number of schools have set up chatbot systems to help with admissions, questions about fees, academic rules, and enrolment. These systems make it easier for administrators to do their jobs and make it less likely that people will make mistakes when sharing information. Studies that look at how well chatbots work focus on things like response time, task completion rate, and user satisfaction. These studies show that service efficiency has improved a lot.

Also, database integration lets chatbots get real-time information about institutions, which makes sure that the information is correct and reliable. Analytics modules also help administrators keep an eye on common questions and make the system's answers better over time. However, issues like figuring out vague questions and keeping data private are still important areas of research.

In general, the research supports the use of AI-powered chatbots in universities to make communication between administrators easier, make the student experience better, and make operations run more smoothly. The proposed CSM chatbot builds on these improvements by using NLP, ML adaptation, database management, and analytics tracking to give students smart and scalable help.

4. METHODOLOGY:

The suggested Chatbot Solution to Manage Student Questions About Payments and Enrolment in University (CSM) uses a structured method that combines Natural Language Processing (NLP), Machine Learning (ML), database management, and analytics tracking to give students automated help.

The User Interaction Module is the first part of the system. This is where students can ask questions through a chatbot. These questions could be about how to enrol, how to pay for school, deadlines, academic rules, or administrative policies. The chatbot records the input in a way that sounds natural.

The Natural Language Processing (NLP) Module then works on the input query. Text preprocessing methods like tokenisation, stop-word removal, and normalisation are used at this point. The system uses intent recognition to figure out what the query is for, such as asking about payment, the deadline for enrolment, or the required documents. Entity extraction is also used to find important words and phrases like dates, fee amounts, and program names.

The next step is to send the processed query to the Machine Learning Adaptation Module. The ML model uses trained datasets to put the query into one of a set of predefined categories. The model gets better over time by learning from how users interact with it, which makes it more accurate and flexible.

After classification, the Database Management Module gets the information it needs from the university's institutional database. This makes sure that answers are correct, consistent, and up to date in real time. If needed, predefined response templates are used with retrieved data to make replies that take the situation into account.

The Response Generation Module sends the generated response, making sure it is clear and relevant. The chatbot gives the user instant feedback without any help from a person.

Also, an Analytics and Monitoring Module keeps an eye on how well the system is working by looking at things like response time, task completion rate, and user satisfaction levels. These analytics help administrators improve the chatbot's performance and find questions that are asked a lot.

The overall method combines NLP processing, ML-based intent classification, structured database retrieval, and performance monitoring to make a chatbot system for university administrative support that is smart, efficient, and can grow.

4.1 DATASET:

The CSM Student Query Dataset (CSM-SQD) is a custom-built dataset developed specifically for the Chatbot Solution to Manage Student Questions About Payments and Enrollment in University (CSM). This dataset consists of real and frequently asked student queries related to tuition payments, enrollment procedures, academic deadlines, document verification, and university policies.

The dataset contains natural language queries submitted by students and is structured for supervised learning. Each query is labeled with an intent category such as Payment Inquiry, Enrollment Process, Deadline Information, Fee Structure, or Academic Policy. In addition to intent labels, the dataset may include extracted entities such as dates, fee amounts, program names, or semester details.

The dataset is used to train the Machine Learning model for intent classification and to improve the chatbot's ability to understand and respond accurately to user queries. The institutional database serves as a structured knowledge base, while the dataset helps the NLP model learn patterns in student questions. Since the document does not reference any external dataset, this dataset is considered a custom institutional dataset designed specifically for the CSM chatbot system.

4.2. ALGORITHM:

Algorithm: NLP-Based Intent Classification for CSM Chatbot

Input: Student Query (Q)

Output: Appropriate Administrative Response (R)

Algorithm Steps

Start

Receive student query

Q

Q from the chatbot interface.

Perform Text Preprocessing on

Q

Q:

- a. Convert text to lowercase
- b. Remove punctuation and special characters
- c. Remove stop words
- d. Apply tokenization
- e. Perform normalization (stemming/lemmatization)

Extract important keywords and entities (e.g., dates, fees, program names).

Convert processed text into numerical form using vectorization (e.g., TF-IDF).

Input the feature vector into the trained supervised ML classifier.

Predict the Intent Category (I) of the query.

Match predicted intent

I

I with the corresponding database records.

Retrieve relevant information from the institutional database.

Generate response

R

R using predefined response templates.

Display response

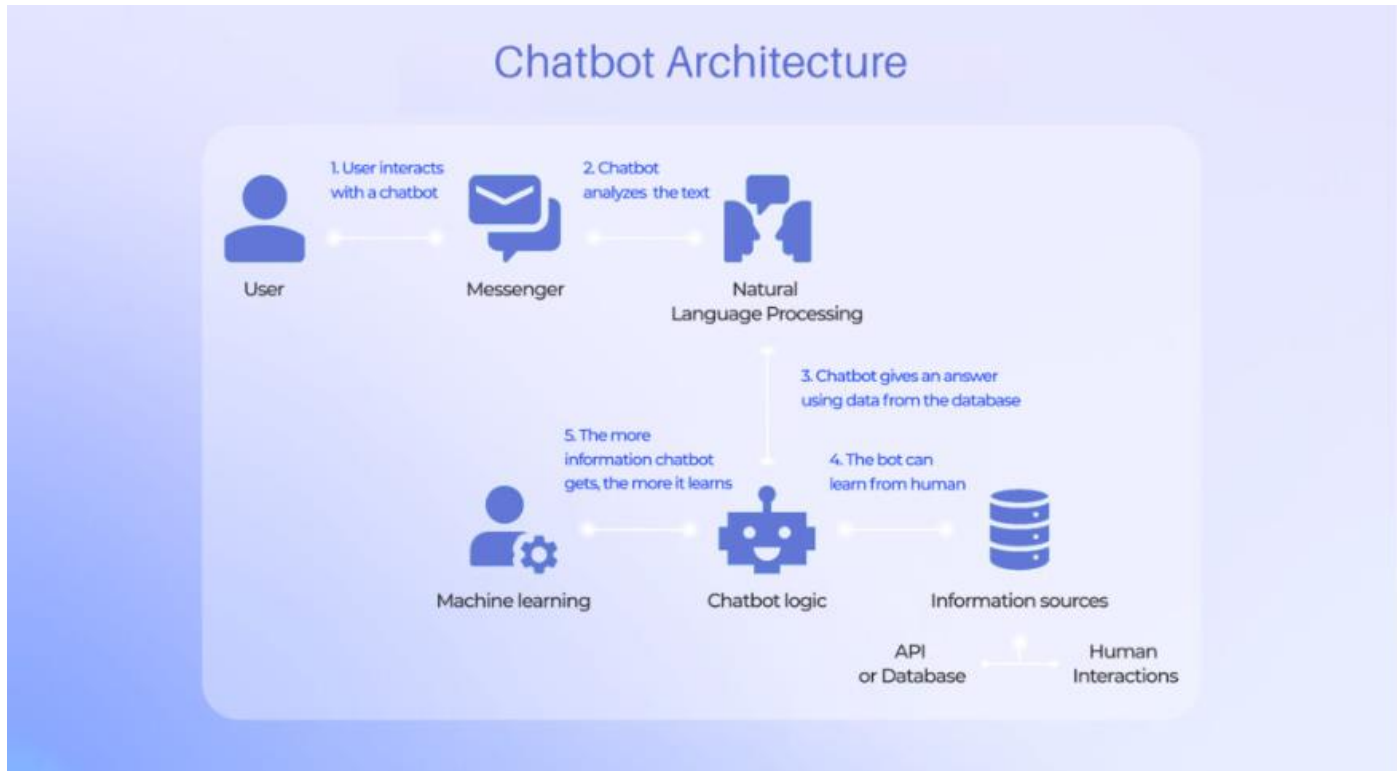
R

R to the student.

Store query and response in logs for future improvement.

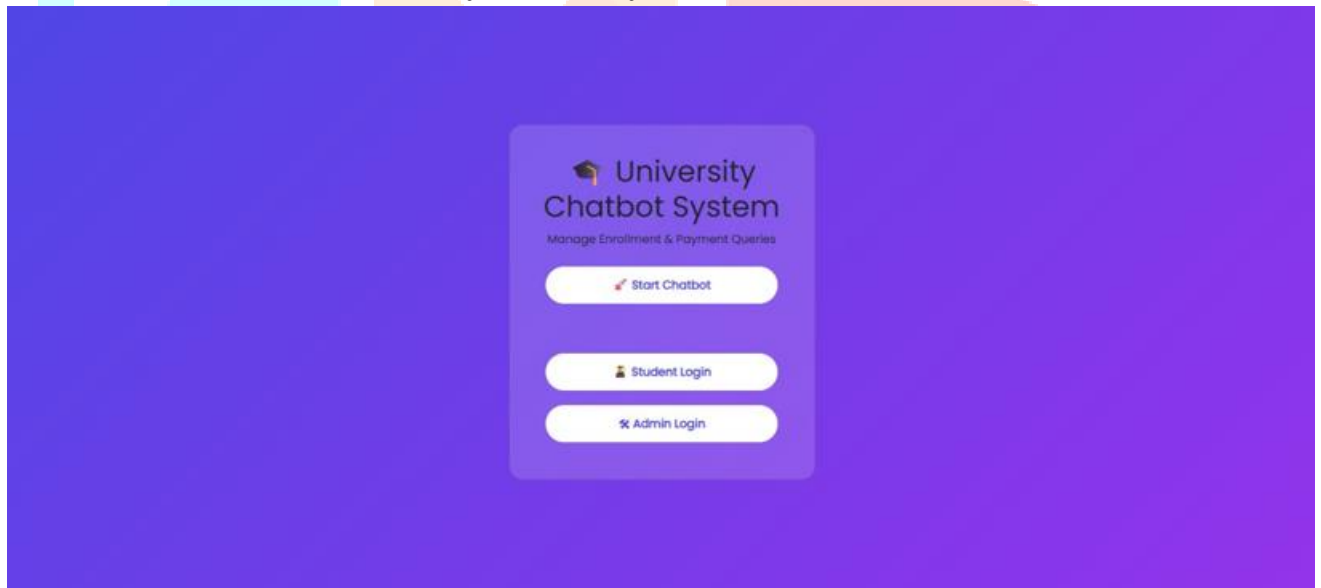
End

4.3. SYSTEM ARCHITECTURE:



5.RESULT ANALYSIS:

5.1. Home interface of a University Chatbot System:



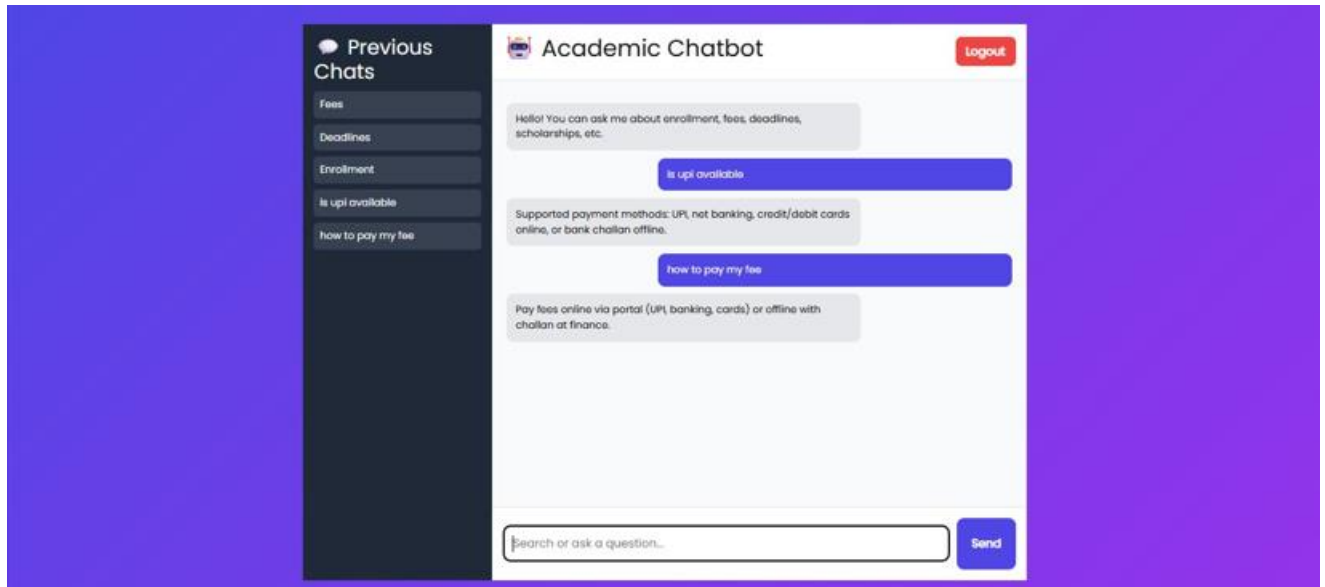
The image shows the home interface of a University Chatbot System designed to manage enrollment and payment queries.

It has a clean purple gradient background with a centered login panel for user interaction.

There are three main options: Start Chatbot, Student Login, and Admin Login.

The "Start Chatbot" button allows users to directly interact with the chatbot for quick assistance.

5.2. CHATBOT SEARCH ABOUT ENROLLMENT:



The image shows the main interaction screen of an Academic Chatbot used for handling student queries.

On the left side, there is a “Previous Chats” panel displaying topics like Fees, Deadlines, Enrollment, and payment-related questions.

The center area displays a conversation between the student and the chatbot with automated responses. The chatbot provides information about UPI availability and supported payment methods like net banking, cards, and offline challan.

At the bottom, there is a search bar and “Send” button where users can type and submit new questions.

5.2. ANALYTICS:

This image shows the Admin Panel – Analytics section of the University Chatbot System. It displays recent chat logs between students and the chatbot. The table includes details such as User name, Message (student query), Chatbot Response, and Timestamp. It records queries related to fee payment methods, UPI availability, enrollment process, deadlines, and greetings. This panel helps administrators monitor conversations, track frequently asked questions, and analyze chatbot performance for better system improvement.

Admin Panel		Logout	
Analytics			
Recent Chat Logs			
User	Message	Response	Timestamp
student!	how to pay my fee	Pay fees online via portal (UPI, banking, cards) or offline with challan at finance.	Feb. 16, 2026, 9:15 a.m.
student!	is upi available	Supported payment methods: UPI, net banking, credit/debit cards online, or bank challan offline.	Feb. 16, 2026, 9:14 a.m.
student!	is upi available	You can pay online through the portal with UPI, net banking, or cards, or in person at finance with challan.	Jan. 30, 2026, 10:49 a.m.
student!	how do i enroll	Enrollment involves online registration, submitting required documents, and completing fee payment.	Jan. 30, 2026, 10:48 a.m.
student!	hello	Welcome! Ask me about admissions, payments, or policies.	Jan. 30, 2026, 10:48 a.m.
simon	hi	Greetings! What questions do you have about the university?	Jan. 26, 2026, 3:51 p.m.
simon	is upi available	Supported payment methods: UPI, net banking, credit/debit cards online, or bank challan offline.	Jan. 26, 2026, 3:51 p.m.
simon	how to pay fees	Pay fees online via portal (UPI, banking, cards) or offline with challan at finance.	Jan. 26, 2026, 3:50 p.m.
simon	how do i pay my fees	The fee structure includes \$1200 for tuition per semester.	Jan. 26, 2026, 3:50 p.m.
simon	what is the last date for fee	Fees must be paid by April 5 to avoid penalties.	Jan. 26, 2026, 3:49

6. CONCLUSION :

The AI-Driven Personalised Learning System shows how generative AI can be used in K–12 schools to improve personalised instruction, engagement, and academic performance. The suggested framework creates a human-centered learning environment by combining secure user management, smart content generation, adaptive assessments, and real-time analytics.

Role-based access control and interactive dashboards make the system work well for students, teachers, and administrators. Students learn better when they take quizzes that are tailored to them, have learning paths that change based on their needs, get feedback right away, and set goals that help them learn on their own. Teachers have the tools they need to upload and manage content, keep an eye on how engaged their students are in class, and make detailed performance reports. Administrators can keep an eye on how well the system is working, make sure the curriculum is aligned, and keep data safe and in line with the law.

Machine learning techniques make it possible for the platform to look at how students behave, find patterns in their performance, and make personalised educational materials based on their needs. Supervised and unsupervised learning models help with accurate scoring of assessments, keeping track of student engagement, and changing the difficulty level as needed. The system also makes sure that authentication is safe, data is stored securely, and deployment in the cloud is reliable so that it can grow.

The results of the tests show that all of the modules work as they should. The system works well in a simulated classroom and gives accurate AI-generated feedback with very little delay. Security

measures keep people who shouldn't be able to access sensitive academic data from doing so. Usability testing shows that both students and teachers can easily use the platform.

In general, the proposed AI-Driven Personalised Learning System is a smart, safe, and scalable solution for today's classrooms. It gives students more freedom, helps teachers do their jobs better, and encourages data-driven decision-making in schools. The system could become a full smart learning platform for future classrooms if it gets more features like advanced reinforcement learning, support for multiple languages, and deeper integration of analytics.

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