

# Student Pilot Pro: A chatbot integrated application for college students

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**Abstract-** *It is now more crucial than ever for students to have quick and easy access to college information given the constantly changing nature of higher education. In this work a student chatbot that offers in-depth information on college campus and information is developed. This chatbot is a useful tool for improving the student experience since it uses artificial intelligence (AI) and natural language processing (NLP) to respond to a variety of questions from students. An inventive artificial intelligence tool created to expedite access to crucial academic information is the student chatbot. With the use of cutting-edge machine learning and natural language processing (NLP) technology, students may ask conversational questions regarding courses, admissions, campus amenities and extracurricular activities through the chatbot's user friendly interface. By making knowledge simpler the chatbot aims to improve the overall college experience by streamlining information retrieval increasing user interaction and putting essential resources at the user's fingertips.*

**Keywords:** *Student Chatbot, Artificial Intelligence, Natural Language Processing, Machine Learning.*

## I. INTRODUCTION

Institutions of higher learning are repositories of heterogeneous data, ranging from course offered and admission policies to campus data and recreational activities students frequently struggle to effectively access this abundance of knowledge. Conventional methods of research, such as browsing through websites or getting in touch with administrative agencies, can be difficult and time consuming. In order to solve this problem, a conversational AI system integrated in an application called Student pilot pro is created, which enables students to ask questions and get precise, instantaneous answers about their college, campus, study materials and so on. By using machine learning and natural language processing, the chatbot can comprehend and reply to a variety of questions, making it easier to access information and enhancing the educational experience for all students.

A ground-breaking solution—the chatbot for college students—in response to the growing demand for more effective communication and resource access is presented. With the purpose of acting as a customized digital assistant, this cutting-edge system provides students with rapid access to a plethora of knowledge regarding their college experience. The chatbot endeavors to streamline student's academic journey by blending in smoothly with their daily life. It does this by promptly and accurately answering a variety of questions, from academic advising and administrative procedures to course schedules and campus events. With its intuitive UI and extensive knowledge base, the chatbot gives pupils the ability to navigate the complexities of higher education with ease, ultimately enhancing their overall educational journey.

The chatbot offers a multitude of uses tailored to meet the diverse needs of students navigating complexities of higher education. Firstly, it serves as a comprehensive information hub, enabling students to quickly retrieve details about course schedules, syllabus and academic deadlines. Additionally, the chatbot facilitates seamless communication with administrative offices, faculties, allowing students to inquire about admission procedures, financial aid, and requirements without the need for lengthy email exchanges or phone calls. Moreover, the chatbot plays a vital role in enhancing student engagement by providing personalized recommendations for campus events, clubs, and academic resources based on individual preferences and interests. Whether students are seeking study tips, career guidance, or mental health support, the chatbot acts as a reliable ally, directing them to the appropriate resources and services available within the institution.

Furthermore, the chatbot's integration with mobile platforms ensures accessibility across various devices, enabling students to seek assistance anytime, anywhere. Whether they are on campus, at home, or on the go, students can rely on the chatbot to provide timely and accurate information, thereby fostering a more efficient and empowering educational experience.

## II. MOTIVATION

In the dynamic journey of academic pursuit, the student chatbot emerges as a beacon of empowerment, illuminating the path to knowledge with the brilliance of artificial intelligence and natural language processing. It stands as a testament to human ingenuity, a digital companion that converses, understands, and guides with unwavering precision. This marvel of technology is not just a tool; it is a catalyst for transformation, reshaping the educational landscape by making information not only accessible but also engaging. As students interact with this chatbot, they are not merely retrieving facts; they are engaging in a dialogue with the future, where barriers to information dissolve and learning becomes as natural as conversation. Let this chatbot be a source of inspiration, a reminder that in the realm of education, innovation knows no bounds, and every query answered is a step towards a brighter, more informed world. Embrace this journey with the student chatbot, for it is here to elevate the college experience to unprecedented heights, ensuring that every student's voice is heard and every question, a gateway to endless possibilities.

## III. LITERATURE SURVEY

In the past few decades, there has been significant research focused on utilizing various algorithms and technologies to develop Chatbots in the field of education. This review assesses the different approaches, methodologies and drawbacks identified in past research on developing chatbots and applications for education purposes.

A. Mondal et al. discuss the development of a chatbot for the educational domain, utilizing an ensemble learning method, random forest, to answer questions. The chatbot achieved an average F-measure of 0.870 in validation tests and is deployed as a Telegram bot. The chatbot is designed to improve responsiveness and availability in educational communication, addressing the challenge of immediate response in multiple conversations. [1]

The chatbot uses features like word count, question type, nouns, verbs, TF, IDF, and TF-IDF to create a retrieval and generative system. It's trained on a dataset of 1000 question-answer pairs from an educational organization. The chatbot's performance is validated using precision, recall, and F-measure scores, achieving an accuracy of 88.60%.

Rout, A. et al. designed a conversational chatbot for educational purposes, capable of answering questions and assisting students with their studies. It utilizes natural language processing and deep learning, specifically the Naïve Bayes model, to understand and solve problems. [2] It's architecture includes data pre-processing, tokenization, stemming, lemmatization, and a sequential model for neural network processing. The chatbot shows a high accuracy rate (97% from dataset, 94% from web scraping) and a low no response rate (17% from dataset, 15% from web scraping).

Kasthuri, E. and Dr. S. Balaji worked on the development of a chatbot to aid online learning during the pandemic, focusing on interaction and doubt clearance without human intervention. [3] It utilizes natural language processing and deep learning to process student queries and provide accurate responses. The chatbot's design follows a sequential model and is trained with a dataset to handle queries in the Java programming language. The chatbot aims to improve the practical performance of e-learners by providing instant replies, thus enhancing the learning experience.

Punith, S. et al. created and designed a chatbot for student admission inquiries using Rasa NLP, Dialogflow, and NLP toolkit, developed with Machine Learning algorithms. It emphasizes the role of Artificial Intelligence in enhancing Human-Computer Interaction (HCI) and the use of chatbots on various platforms like Facebook Messenger, Skype, and Slack. [4] A significant portion is dedicated to explaining Dialogflow's architecture, its request-response model, intent mapping, fulfilment, and integrations for creating conversational interfaces. The chatbot aims to improve the admission process by providing quick, interactive responses, reducing staff workload, and integrating with the college website for easy access by prospective students.

The proposed approach by Chan, C. H. et al. discusses the creation of EASElective, a chatbot designed for advising college students on elective course selection. [5] EASElective includes intent detection, conversation management, dialogue design, and opinion analysis for course information. A study on EASElective's perceived usefulness showed positive feedback, highlighting its unique functions compared to traditional advising. The development will focus on improving information access and adding more analysis and recommendation features.

In the article [6] Jayashri S. Jadhav et al. design and develop a chatbot for college inquiries, highlighting its ability to mimic human conversations and provide rapid responses to students and parents regarding the college admissions process. It reviews various techniques used in chatbot development, such as natural language processing and machine learning, and mentions applications like answering academic questions and assisting with college inquiries. A model using the 'chatterbot' algorithm is proposed for creating a chatbot that can handle college-related queries effectively, providing a user-friendly interface for interaction. The study concludes that the proposed chatbot model is efficient, reduces workload on college administration, and offers a convenient way for students to obtain information without physically visiting the college.

S. Kumari, Z. Naikwadi, A. Akole et al. enhanced a college chat bot with improved human-computer interaction and speech recognition. It aims to provide a better user experience with text and audio modes, reducing queues during admission inquiries. [7]

Thus chatbots represent a significant step towards integrating AI in education to support students and teachers and provide easy access to information in a fast and efficient manner.

#### IV. PROPOSED METHODOLOGY

##### Requirement Analysis:

In-depth discussions with stakeholders, including administrators, faculty and students, guide the identification of essential features and functionalities for both the admin and student applications. Through techniques like user stories and requirement specifications, a thorough understanding of the project's scope and objectives is achieved.

##### System Design:

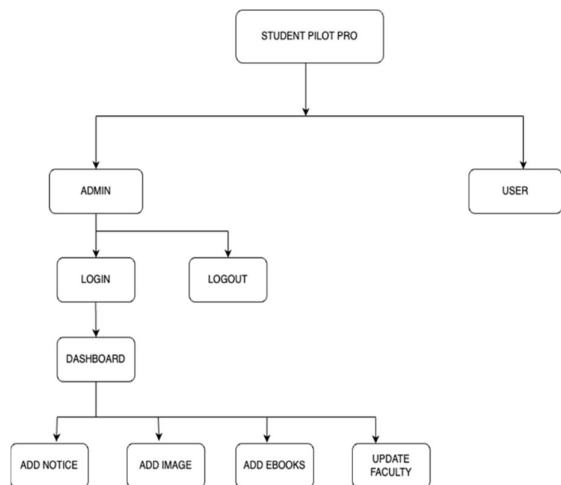


Fig 1. System Design flowchart of the application

The architecture design phase focuses on creating scalable, secure, and user-friendly applications. Considerations such as database schema definition for effective data management and the creation of wireframes to visualize the user interface ensure alignment with end-user needs and expectations.

##### Technology Selection:

Careful consideration of platform compatibility, performance requirements, and developer expertise drives the selection of appropriate technologies and frameworks. Firebase is chosen for its robust features, including authentication, storage, and real-time database capabilities. Complemented by Java or Kotlin for Android development and Android SDK for application building, this technology stack ensures the development of a reliable and feature-rich solution.

##### Development:

The development phase encompasses the implementation of features according to the defined requirements. For the admin application, functionalities like single sign-on and CRUD operations streamline administrative tasks. Meanwhile, the student application integrates Firebase for authentication and facilitates access to essential resources such as notes and notices. Backend services are developed to support data storage, retrieval, and authentication, ensuring seamless communication between the front-end applications and the server.

##### Testing:

Comprehensive testing procedures, including unit testing, integration testing, and user acceptance testing, are conducted to ensure the functionality and usability of the applications. These testing phases help identify and address any issues or bugs, ensuring the delivery of a high-quality final product that meets stakeholders' expectations.

##### Deployment:

Upon successful testing, the applications are deployed to app stores or internal distribution channels. Server infrastructure is configured to host backend services, ensuring reliability and scalability to accommodate user demand.

##### Maintenance and Support:

Post-deployment, ongoing maintenance and support are provided to ensure a positive user experience. Regular updates based on user feedback enhance features, security, and usability. Technical support addresses any queries or issues encountered by administrators and students, ensuring the continued success of the applications.

```

implementation("com.google.firebase:firebase-database:20.3.1")
implementation("com.google.firebase:firebase-storage:20.3.0")
implementation("com.google.firebase:firebase-analytics")
implementation(platform("com.google.firebase:firebase-bom:32.8.1"))
implementation("com.google.firebase:firebase-auth")
implementation("com.google.android.gms:play-services-auth:21.1.1")
  
```

Fig 2. Firebase Implementations in the application

The Firebase implementations listed play crucial roles in enhancing the functionality and performance of Android applications:

##### 1. Firebase-database (version 20.3.1):

Enables real-time data synchronization between the app and Firebase Realtime Database.

##### 2. Firebase-storage (version 20.3.0):

Facilitates efficient storage and retrieval of user-generated content via Firebase Cloud Storage.

##### 3. Firebase-analytics:

Collects and analyzes user engagement and behavior data to optimize app performance.

##### 4. Firebase-bom (version 32.8.1):

Provides centralized dependency management for Firebase SDKs and libraries.

##### 5. Firebase-auth:

Enables secure user authentication and account management within the app.

##### 6. Play-services-auth (version 21.1.1):

Integrates Google Play services authentication for user sign-in using Google accounts.

These Firebase components collectively streamline development, improve user experience, and ensure security for Android applications.

```

implementation("com.squareup.retrofit2:retrofit:2.9.0")
implementation("com.squareup.retrofit2:converter-gson:2.5.0")
implementation("com.squareup.picasso:picasso:2.8")
  
```

Fig 3. Different libraries used in the application

##### 1. Retrofit (version 2.9.0):

Simplifies network requests by defining API endpoints as Java interfaces.

**2. Converter-Gson (version 2.5.0):**

Integrates Gson for automatic JSON serialization/deserialization with Retrofit.

**3. Picasso (version 2.8):**

Streamlines image loading from various sources into ImageView components with caching and transformation support

**V. IMPLEMENTATION**



Fig 4. Login page of the Student Pilot Pro application

The above figure shows the login page of our application, it contains the login for both students and faculties. It also contains new user registration and forgot password option.



Fig 5. Dashboard of the Student Pilot Pro application

The image shows the dashboard of the application, it contains the details like departments, notices, faculties and address of the institution. We can access our chatbot from this page.

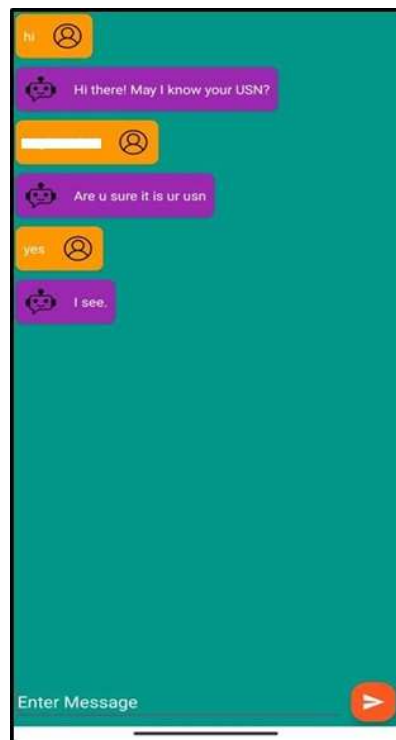


Fig 6. Chatbot conversation interface of the application

This is the user-chatbot conversation interface of the application. We can get the information on student details, notes, results and campus amenities and course details.

The following features and steps are included in the implementation.

**Importing Libraries and dependencies:**

Importing dependencies is vital for leveraging external code libraries, enhancing functionality, saving time, and avoiding reinventing the wheel.

**Firestore Dependencies:**

Importing Firestore dependencies enables integration of Firestore services like analytics, database, and storage, enhancing app functionality and features.

**Integration of Third-Party dependencies:**

Third-party dependencies, like CircleImageView, Retrofit, Picasso, App Compat, and Constraint Layout, enhance Android app development by providing pre-built functionalities for image handling, network requests, UI design, and layout management. Testing frameworks such as JUnit and Espresso ensure app reliability and quality assurance

**Authentication and User Management:**

Admin and user authentication are implemented with firebase authentication and allowed students, teachers and administrations to sign in securely.

**Notices for All function:**

A module is created in the application for the admin to push a notice for the entire college with valid proofs.

**Feedback and Support:**

A channel is provided for students to submit feedback and suggestions with real time assistance by the developers.

Developer contacts were provided in a different module at the start-up page itself.

**Dashboard and Profile:**

Personalized applications for users and admins is created. An environment is created, where users are provided with near to no access in making any changes to the data uploaded by the admin.

**Freedom to Express and Speech:**

A software is developed where any feedback or any suggestion regarding college environment, faculty, architecture is filtered by the admin and all relevant suggestions and feedbacks are escalated to concerned authorities.

**User-College Management:**

This App serves as a vital link between users and college management, facilitating streamlined interactions for essential function.

**Dynamic Notice Management Feature:**

Separate modules are designed in the application for efficiently managing both general announcements and targeted communications for enhanced user engagement.

VI. CONCLUSION

The development of an Android-based Chatbot integrated Student ERP application represents a significant stride towards modernizing administrative and academic processes within educational institutions. The project involved the creation of two distinct applications catering to administrators and students, offering a seamless user experience and enhanced functionality.

Upon deployment, the system demonstrated notable advantages. The implementation of a single sign-on mechanism for administrators eliminated the need for repetitive login procedures, thereby optimizing workflow efficiency. Additionally, the integration of Firebase authentication streamlined user access for students, ensuring both security and ease of use.

A key feature of the system was the consolidation of essential information within a single application. Students could conveniently access a variety of resources including notes, notices, faculty and college details, departmental information, and circulars, facilitating improved communication and information dissemination across the institution.

In summary, the Android-based Student ERP application represents a significant advancement in leveraging technology to improve educational processes.

The project underscores the importance of user-centric design and streamlined processes in fostering a conducive learning environment.

As educational institutions continue to embrace digital transformation, innovative solutions like the Student ERP applications integrated with chatbot pave the way for future advancements in academia while adhering to the highest standards of integrity and originality.

VII. REFERENCES

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