Archbishop Porter Past Students Association Web Application: An online interactive platform for alumni

Miriam Uwingabiye
Computer Science Department
Ashesi University
Accra, Ghana
miriam.uwingabiye@ashesi.edu.gh

Terence Yebuah
Computer Science Department
Ashesi University
Accra, Ghana
terence.yebuah@ashesi.edu.gh

Abigail Owusu
Computer Science Department
Ashesi University
Accra, Ghana
abigail.owusu@ashesi.edu.gh

Cyril Kujar
Computer Science Department
Ashesi University
Accra, Ghana
cyril.kujar@ashesi.edu.gh

***Abstract*—The "Archbishop Porter Past Students Association Web Application" project is dedicated to advancing alumni engagement and management for Archbishop Porter Girls' Senior High School. Leveraging Scrum methodology, this initiative focuses on developing a comprehensive online platform tailored to the specific needs of alumni, offering features such as user registration, messaging systems, member profiles, discussion forums, chatbot integration, and fundraising capabilities. Stakeholder feedback has guided the incorporation of additional features like events calendars, alumni directories, mentorship programs, news and updates sections, and job boards, ensuring the platform aligns with alumni expectations. Furthermore, an emphasis on user-friendliness and up-to-date information is integrated into the project, addressing the limitations identified in the existing alumni association management system. The project's objective is to provide an intuitive, secure, and feature-rich platform for enhancing alumni interactions, ultimately benefiting Archbishop Porter Girls' Senior High School.**

Keywords—Alumni engagement, Scrum methodology, User registration, Messaging systems, Feature-rich platform, Alumni expectations, Data security, User-friendly, Online platform, Comprehensive alumni management.

I. INTRODUCTION

A. Overview

The Archbishop Porter Past Students Association web application is a project aimed at providing an interactive online platform for the alumni of Archbishop Porter Girls' Senior High School. This platform will serve as the central hub for alumni to register, communicate, and engage with the alumni association/community, as well as donate money to the school. Some key features of this system include:

- User registration.
- Integrated messaging systems to allow for communication between alumni.
- Member profiles, including personal, academic, and professional achievements.
- Discussion forums for members to engage and share ideas.
- Chatbot integration
- Donations and Fundraising for the development of the school

B. Software Engineering Methodology

For this project, incremental agile driven development, specifically Scrum, was the chosen methodology. The reasons for this choice are outlined below:

- Iterative and Incremental Development: Scrum is an incremental and iterative framework that breaks down projects into small manageable pieces known as sprints, developed one at a time. Considering this web application demands a wide range of features and functionalities, this approach will allow features to be delivered and tested in an incremental manner.
- Flexibility: Scrum is known for its adaptability and flexibility which comes in handy in a project like this where the requirements may evolve, and stakeholders' needs might change as the project progresses.
- Regular Feedback: Scrum allows for regular feedback and reviews from stakeholders. This is important for a project which involves alumni members to ensure the output meets their expectations.
- Transparency: The Scrum methodology provides clear visibility into the project's progress, allowing stakeholders to see how the project is advancing and whether it is on track to meet its goals.
- Efficient Collaboration: Scrum promotes efficient collaboration across teams and stakeholders. This is essential for a project like this where clear communication with and engagement with alumni is important.

In summary, Scrum was chosen for the project due to its flexibility, iterative approach, regular stakeholder feedback, transparency, and efficient collaboration. These attributes make it well-suited for developing the Archbishop Porter Past Students Association Website, ensuring adaptability, gradual feature delivery, and alignment with alumni members' expectations.

II. JUSTIFICATION/MOTIVATION

A. User Needs Assessment

The data collected from stakeholders provides valuable insights into their engagement with the alumni association

and their preferences for the upcoming online platform. It is evident that a significant portion of the stakeholders engage with the association's activities regularly, primarily through messaging platforms such as WhatsApp and Facebook. While the current communication methods receive a mix of satisfaction ratings, stakeholders express a strong desire for specific features on the online platform. User registration, messaging systems, member profiles, and discussion forums are deemed crucial. Additionally, chatbot integration and fundraising capabilities are highlighted as important functionalities. Stakeholders also emphasize the need for features like an events calendar, an alumni directory, a mentorship program, news and updates sections, and a job board. The satisfaction levels with the current alumni association's website or communication tools vary, indicating room for improvement. The stakeholders recommend organizing online events or webinars regularly to enhance member engagement. Notably, they stress the importance of user-friendliness and up-to-date information on the platform. These insights provide a solid foundation for the design and development of the online platform, ensuring that it aligns with the stakeholders' needs and expectations while addressing the limitations identified in the current alumni association management system. Lastly, from the interviews, more insights were gained into which subsystems to prioritize in the development process, the functional and non-functional requirements.

From the survey, 80% confirmed that they regularly have alumni engagements.

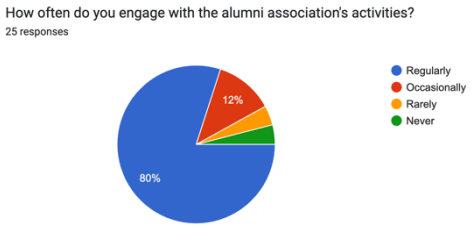

Fig. 1.1

In addition, 88% of the Alumni who filled out the form indicated that WhatsApp is the most frequently used means of communication.

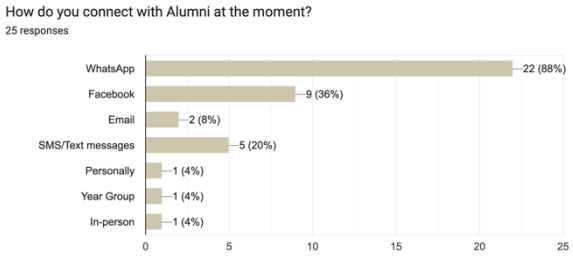

Fig 1.2

Lastly, the potential users informed us that they are very much interested in having a messaging and donation feature on the application.

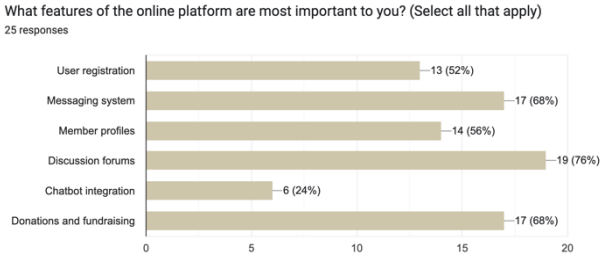

Fig 1.3

B. Literature Review

Over time, different alumni management systems have been proposed and implemented, each demonstrating varying degrees of effectiveness. This literature review aims to assess prior research on alumni management systems, highlighting their strengths and limitations, and identifying areas requiring further investigation. This section contributes to a comprehensive understanding of the current research landscape within this domain and points to potential areas for improvement in alumni management systems, which aligns with the goals of this project.

Rajini et al. in a paper focused on an alumni management and networking system [2] discuss the goal of bridging the gap between educational institutions and their alumni. This paper reviews existing research on alumni management systems and evaluates various approaches, including centralized systems, data collection methods, interactive questionnaires, secure messaging, and tag recommendation systems. While these approaches have their merits, the article highlights several limitations, such as the lack of comprehensive evaluations for centralized systems, challenges in data collection and integration, low user engagement in interactive questionnaires, potential security and performance concerns in secure messaging, and inefficiencies in tag recommendation.

Similar to the system this article proposes, the Archbishop Porters Past Student Association (APPSA) online platform also plans to incorporate content-based tagging and end-to-end encryption for secure messaging. However, this system will go a step further by addressing the identified limitations. This system aims to offer a dynamic and user-friendly platform that promotes active alumni engagement, ensuring that alumni can easily update their information and stay connected. Data and security are prioritized through robust end-to-end encryption, addressing potential concerns raised in the article. Furthermore, the proposed system for APPSA leverages artificial intelligence by integrating a chatbot to assist users on the application further. In summary, this platform aims to provide a comprehensive solution that overcomes the limitations discussed in the article, making alumni engagement and management more effective and secure.

Another study [4] delves into the challenges faced by the former student's association of the Industrial and Commercial School of Braga in managing their members' data and documentation. It emphasizes the heavy reliance on manual methods, including outdated paper forms and disorganized filing systems, which have posed significant hurdles in the efficient management of their alumni association. One prominent issue highlighted is the renumbering of members

over time, causing confusion and difficulties in maintaining consistent member records.

To address these limitations, the proposed online platform for Archbishop Porters alumni offers a more comprehensive solution. The system introduces a digitization process that eliminates the need for manual data entry and paper forms, streamlining the data management process. Members can conveniently input and update their information digitally, ensuring greater efficiency and accuracy. Additionally, the platform provides a structured and organized database for members' information, replacing disorganized paper archives with systematic and searchable records. This enhancement greatly improves data accessibility, reducing the time and effort required for administrative tasks.

The alumni online Platform aims to maintain consistent member records by assigning unique identification to each member, eliminating the need for successive renumbering. Members have the flexibility to manage their digital profiles, ensuring that their data remains accurate and up to date.

Additionally, the German-Malaysian Institution, a higher education institution, conducted research to rebuild its website for a better user experience [5]. The goal of this application was to disseminate information about current events and activities, to recruit additional graduates as alumni members, and to serve as a resource for prospective students to see how GMI alumni stay connected. Limitations of the prior website included a lack of user-centered design, increased awareness, and consistent user experiences. GMI chose to revamp the website using a user-centered strategy to solve these challenges. While this model has drawbacks, including resource requirements, subjectivity, scope creep, and matching user feedback with project goals, it is nevertheless a helpful approach. In developing a system for APPSA, a similar approach will be used. However, to prevent some of these challenges, stakeholder interviews were conducted to learn about user experiences and expectations.

Another study focused on an alumni networking website that connects students and alumni titled Alma Hub was introduced by Patil et al [1]. The website's features include profile management, job posting, and communication options. It encourages networking, professional development, and a sense of community. Alma Hub's methods include cross-platform mobile and web applications, Firebase for database administration, and modules for user registration, profile maintenance, job postings, and text messaging. Potential limitations of this system include data security, user engagement, privacy, and scalability. Similar to this research, the proposed system would also utilize a cross platform mobile and web application. PostgreSQL is the chosen database for this system with a focus on scalability.

C. Related Work

To justify the aims of this project further, some notable software systems related to this project were examined to gain insights into their layout, key functionalities, and potential drawbacks. The Harvard Alumni [6] and Ghana International School (GIS) Alumni websites [3] serve as hubs for alumni to maintain their connection with their respective institutions and with each other. These platforms cater to a diverse audience, including alumni, students, faculty, and staff. Their feature sets exhibit a substantial degree of overlap, encompassing functionalities such as alumni profile registration, an alumni directory, event listings, real-time news and updates, and donor management. These provide insights and an avenue to refer to while developing similar features on our platform.

Although there is some degree of overlap, distinctions emerge when evaluating the features of these two alumni systems in-depth. For instance, the GIS system introduces a unique gallery feature, which, the Harvard platform lacks. Conversely, the Harvard system provides a valuable search bar to facilitate resource location within the website, a functionality absent from the GIS system. Furthermore, the Harvard system boasts an array of supplementary features, including a travel section, although these functions may be considered non-essential in the context of alumni engagement. The varying functionalities these systems encompass provide a basis to determine what is essential to include in the proposed system.

In terms of user interface and user experience, both websites uphold commendable standards. They present users with responsive pages that adapt seamlessly to various devices, and their intuitive navigation bars situated at the top of the screen facilitate easy exploration of content. The design choices on these platforms are notably uncluttered, employing card-based layouts to present information in a user-friendly, digestible format. This approach would be employed in developing the APPSA system as it promotes a clean, organized, and user focused approach to representing information. This will enhance user engagement, navigation, and overall satisfaction with the platform, as emphasized by our client. Regarding the security measures in place, comprehensive documentation is not provided. Both systems employ HTTPS, ensuring secure connections and data transmission. The use of HTTPS underscores a commitment to safeguarding user data and maintaining the integrity of the platforms.

Potential limitations of these systems are that they are not guaranteed to drive alumni engagement, scalability, privacy issues and competing social media. By employing an intuitive user design, scalable architecture, data protection, and transparent policies, the proposed system aims to overcome these challenges.

D. Sustainable Development Goals

Sustainable Development Goals (SDGs) aim to transform our communities. As much as technology is adopted in these communities, technological-oriented solutions should take the SDGs into account as well. In the development of the Archbishop Porter Past Students Association (APPSA) alumni platform, the team will consider two SDGs, which are quality education (SGD 4) and partnership for goals (SDG 17). This alumni website will provide a forum for knowledge sharing, mentorship, and networking among alumni and current students, contributing to educational excellence. Additionally, the alumni website will support collaborative activities between educational institutions, alumni, and other stakeholders.

III. System Requirements

A. Requirements Elicitation Process

Surveys were conducted among alumni who have diverse professions within Archbishop Porter Girls' Secondary School. These surveys aimed to assess the practicality and significance of the proposed platform. They sought insights

on how alumni engage with each other online, their opinions regarding an online platform tailored to their needs, and their feedback on the features being considered.

Despite the geographical and professional diversity among the respondents, they all expressed a common desire for a platform to reconnect with their alma mater and fellow alumni. The consensus was that essential features for the system include user registration, a messaging system, member profiles, discussion forums, chatbot integration, and functionalities for donations and fundraising. These features are designed to enhance communication and provide users with diverse options for staying connected and informed.

Additionally, the survey revealed a strong demand for additional features like an events calendar, alumni directory, mentorship program, news and updates section, and a job board. Based on the survey responses, it was evident that our primary target audiences are highly receptive to our proposed platform.

Interviews were also conducted with the head of the alumni board, aiming to understand the requirements of our key stakeholders and the system they envision. During this interview, we presented the proposed functionalities, which were all well received. A priority list with deadlines was established, with the registration and donation system taking precedence to coincide with their 25th-anniversary celebration. Furthermore, the main target audience was refined to include alumni, faculty, and staff.

B. Functional Requirements

Label	Story	Priority
US001	As an alumni member, I want to create an account on the platform to use platform services and engage with my fellow alumni within the community. I should input my personal information, such as a username, email address, and password, and I anticipate receiving a registration confirmation email.	High
US002	As a member of the alumni community, I want to use the platform to engage and communicate with other alumni to keep connected through messages. I should be able to send and receive messages and be notified when new messages and updates are received within the messaging system.	Medium
US003	As a member of the alumni association community, I want to create and update my profile that shows my personal, academic, and professional achievements. I should be able to add and edit my additional personal information, like a profile photo or links to my other social media sites.	Medium
US004	As a member of the alumni association community, I want to be part of a discussion platform to communicate with my colleagues, share ideas, and collaborate. I want the ability to create posts and comment on my fellow's posts, and my fellow alumni should possess the same ability towards my post as well.	Medium
US005	As an alumni member and a web application user, I want to have access to a chatbot to help in case I need guidance on the platform and answer frequently asked questions about the school and the platform.	Low
US006	As an alumni member, I want to make donations or support fundraising activities posted on the platform online directly to the school's bank account or mobile money number. The system should offer me secure payment channels for contributions, and it should be a quick and straightforward payment method.	High

C. Non-Functional Requirements

Label	Story	Priority
NFR001	I am part of the board of directors at the school. I want the system to be snappy and fast which is good for user experience and will help retain our users.	N/A
NFR002	I am an alumnus with a family that likes to maintain privacy. I want a system that uses great security measures and protocols to ensure our data is kept securely as well as my donations being secure.	N/A
NFR003	I am part of the board of directors at the school. I want a system to accommodate the growing number of alumni that will join the platform each year.	N/A
NFR004	I am an alumnus that works in the technological sector. I have various devices, so I want a system that can run efficiently and properly on multiple devices,	N/A
NFR005	I am an alumnus that is not that well versed in technology. I want a system that has an intuitive user interface that will make navigation and using its features easy and straight forward.	N/A
NFR006	I am a member of the board of directors at the school. I want a system that will have easy and efficient upkeeping with good server infrastructure and good coding practices.	N/A

D. Constraints

- **Internet Connectivity:** The quality of internet connectivity could affect the performance and accessibility of the system. Slow or unreliable connection could impact user experience.
- **Third-Party Service:** The proposed system relies on third-party services such as payment APIs. Any outages or service disruptions from these providers could affect the system's functionality.
- **Market Competition:** The presence of competitive alumni platforms or similar services could impact user retention and engagement.
- **Economic Factors:** Factors such as inflation, currency fluctuations, etc. could affect the project's budget and financial constraints. Server and space resources could be restricted by this constraint.

IV. SYSTEM DESIGN

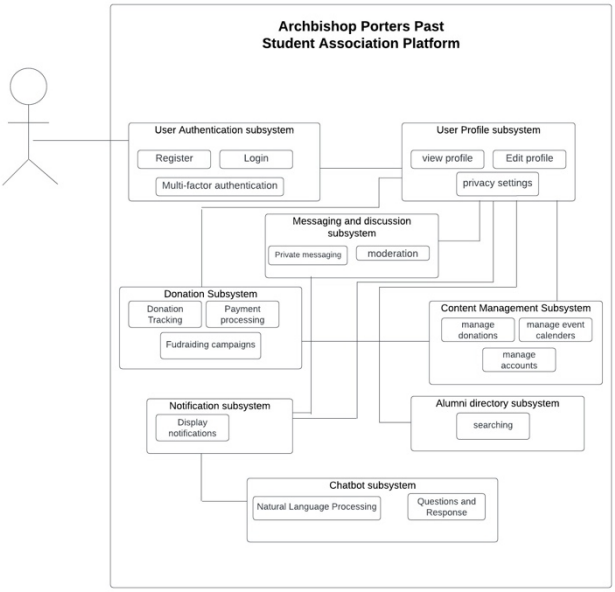

Figure 2.1: High Level System Diagram

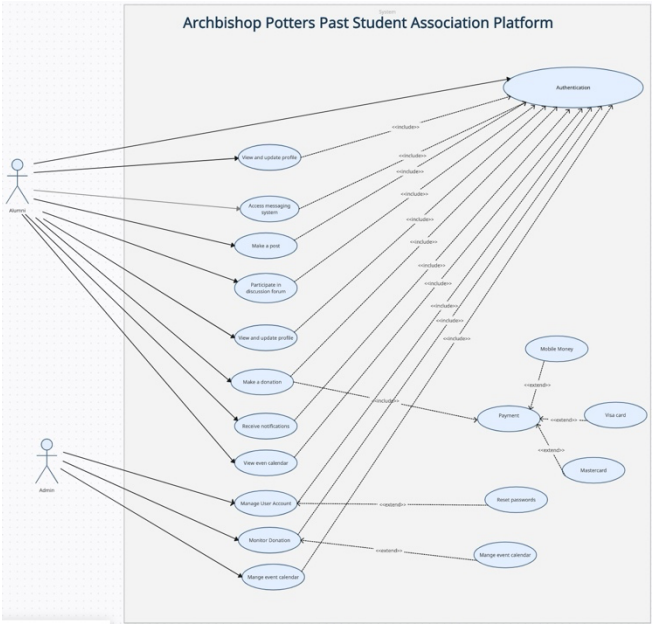

Figure 2.2: Use case diagram for APPSA online platform

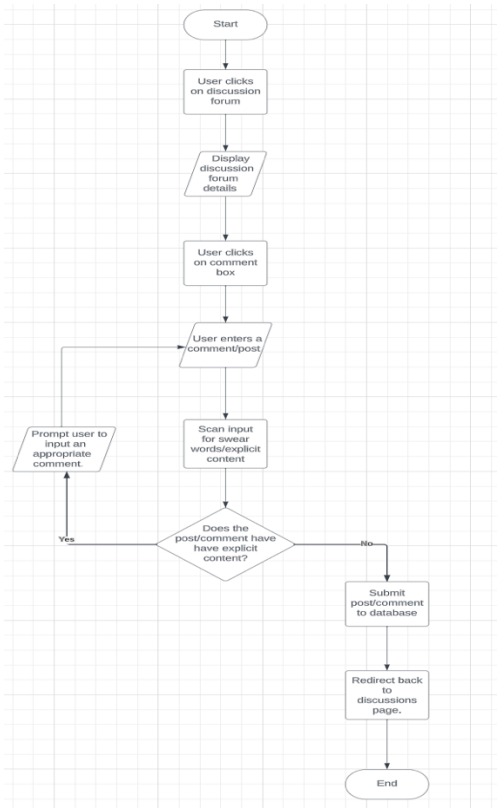

Figure 2.3: Flow Diagram for making a post/comment on discussion forums.

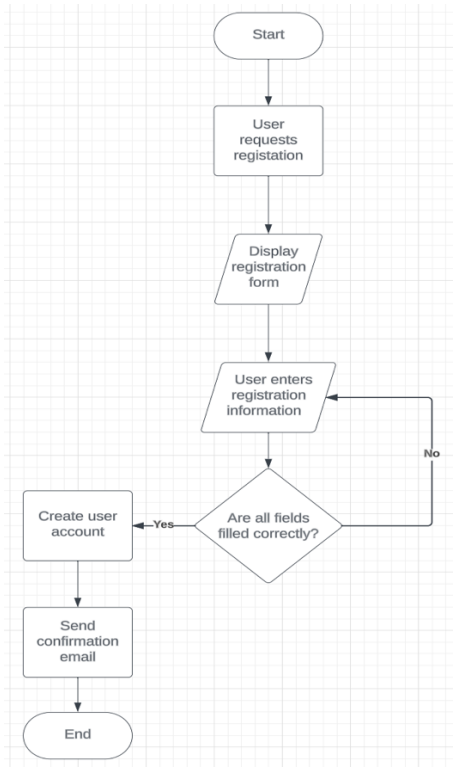

Fig 2.4: Flow Diagram for User Registration

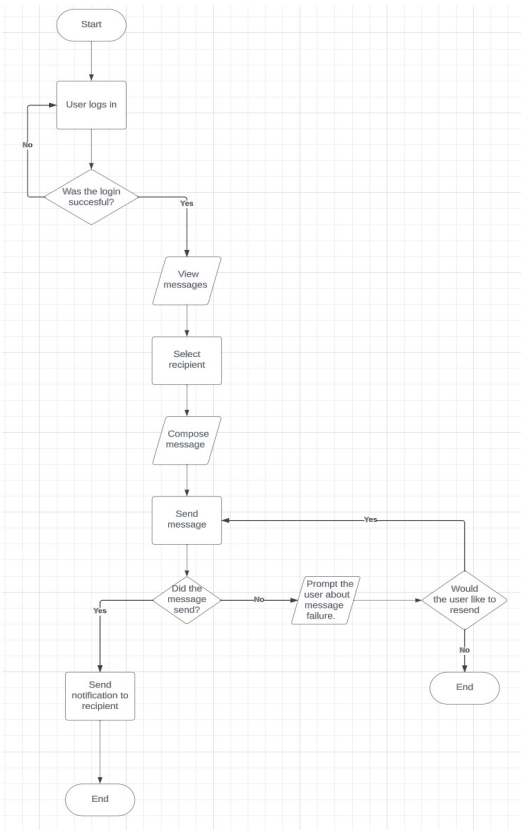

Figure 2.5: Flow Diagram for sending a message.

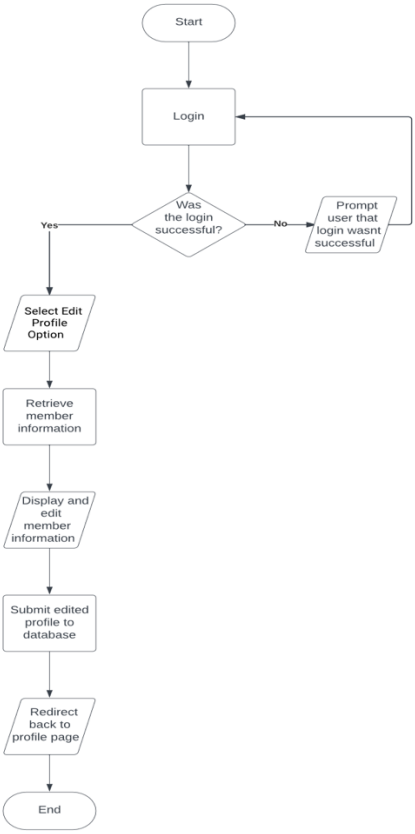

Figure 2.6: Flow Diagram for editing member profiles.

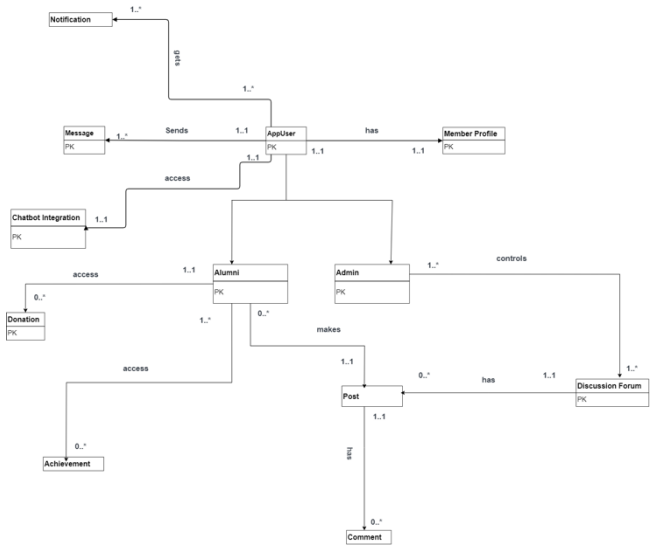

Fig 2.7: Entity Relationship Diagram

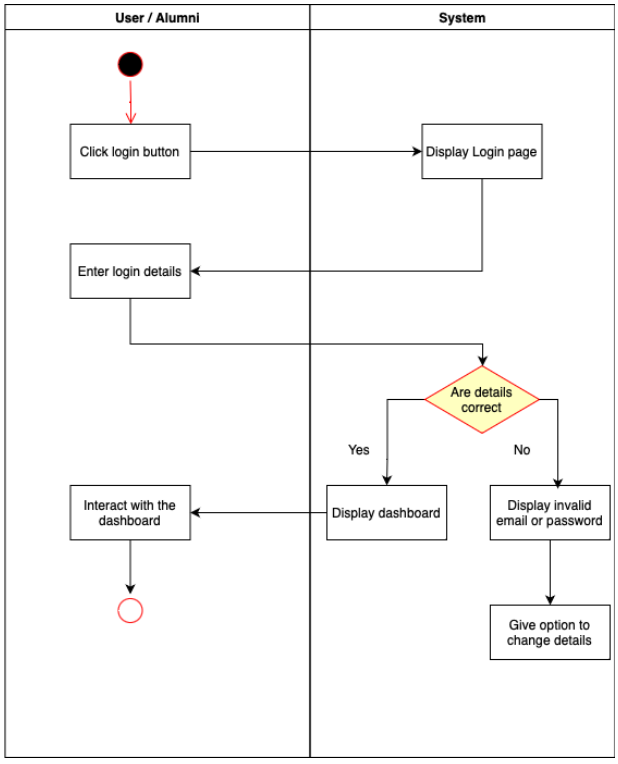

Fig 2.8: Activity Diagram for User Login

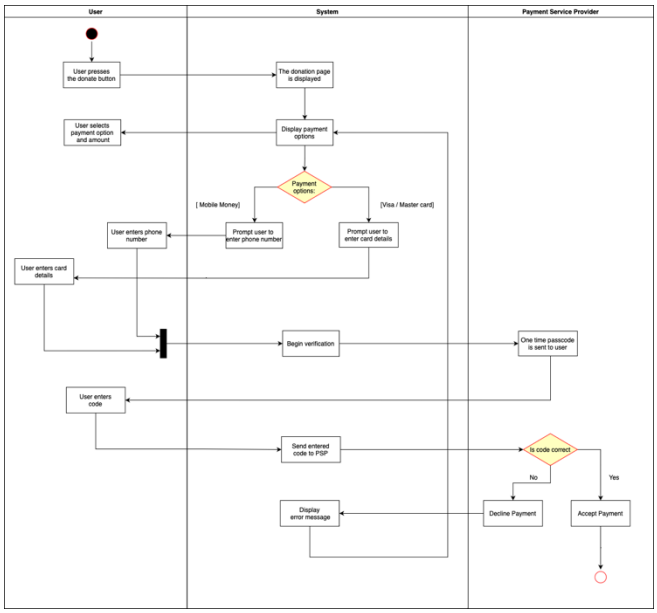

Fig 2.9: Activity Diagram for User Donations

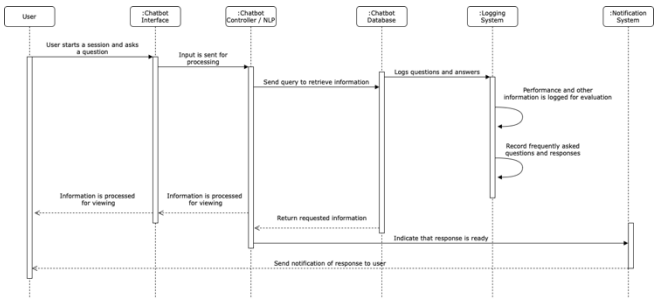

Fig 2.10: Sequence Diagram for Chatbot Interaction

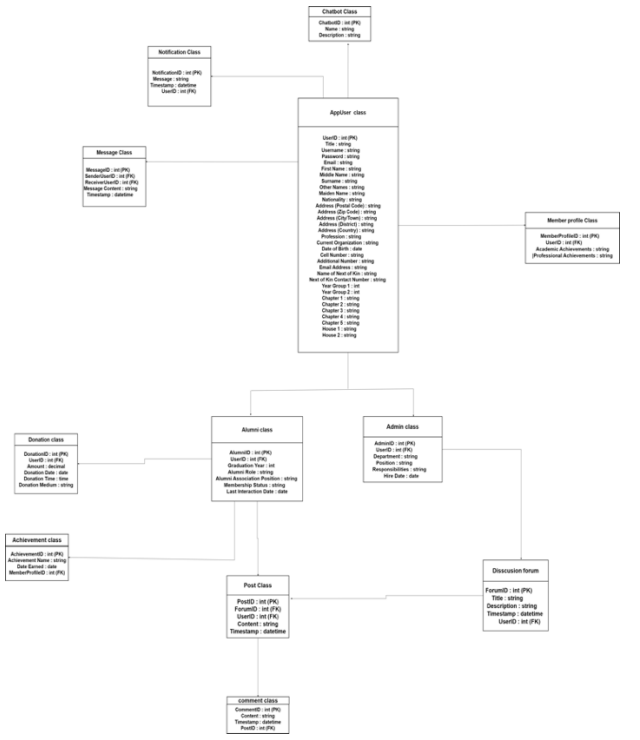

Fig 2.11: Connected Class Diagram

Find the link to the Figma diagrams here.

V. SYSTEM IMPLEMENTATION

A. Django Rest Framework for Backend

Django Rest Framework is selected for the backend, providing rapid setup and management of the alumni database. Its built-in admin interface simplifies data entry and updates, while robust security features prioritize the protection of personal alumni information. The scalability of Django is crucial as the alumni network grows, with its modular design and ORM streamlining database interactions for a responsive and efficient system.

B. React for frontend

React offers a dynamic and engaging user experience. Its declarative and component-based architecture is ideal for creating dynamic user profiles, and the efficient Virtual DOM rendering ensures responsive displays of alumni events and updates. React's strong ecosystem and community support enable the development of interactive components, fostering community engagement through forums, event calendars, and news feeds.

C. GitHub for version control

GitHub acts as the project's version control system, ensuring organized collaboration and code management. Leveraging Git facilitates version tracking, team collaboration, and an efficient workflow. GitHub's features, including pull requests and issue tracking, contribute to a transparent and quality-oriented development process.

D. Microsoft Azure for Deployment

For deployment, Microsoft Azure offers a scalable and reliable cloud infrastructure. Azure's seamless integration with development tools simplifies deployment, and services like Azure App Service provide a robust platform for hosting web applications. Leveraging Azure enhances the application's performance, scalability, and security, ensuring a smooth and efficient deployment process.

E. Paystack

The Paystack API integration is a strategic choice for secure and reliable payment processing on the APPSA alumni website. Aligned with the goal of supporting the school's growth, Paystack seamlessly integrates with the Django backend, offering flexible payment methods, including mobile money for users in Africa, especially Ghana. This enhances the user experience, promotes financial support, and ensures a smooth, secure transaction process.

VI. REFERENCES

[1] S. S. Patil, A. Bhasme, P. Bobade, A. Barkade, and P. Pore, "AlmaHub: An Engaging, Supportive Alumni-Students Interaction Platform," in *2023 IEEE 8th International Conference for Convergence in Technology (I2CT)*, Lonavla, India: IEEE, Apr. 2023, pp. 1–6. doi: 10.1109/I2CT57861.2023.10126226.

[2] R. S, H. P. B, and U. A, "Alumni Management and Networking System," in *2023 2nd International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA)*, Coimbatore, India: IEEE, Jun. 2023, pp. 1–5. doi: 10.1109/ICAECA56562.2023.10200060.

[3] "Home," GIS Alumni Ghana. Accessed: Oct. 31, 2023. [Online]. Available: https://gisalumni.org.gh/

[4] G. Martins, V. Carvalho, S. Teixeira, and C. S. Rodrigues, "Implementation of a digital transition process for the documentation of an alumni association," in *2023 18th Iberian Conference on Information Systems and Technologies (CISTI)*, Aveiro, Portugal: IEEE, Jun. 2023, pp. 1–6. doi: 10.23919/CISTI58278.2023.10211411.

[5] Noor Azura Zakaria and M. A. Ayu, "User-centered web development for GMI alumni website," in *Proceeding of the 3rd International Conference on Information and Communication Technology for the Moslem World (ICT4M) 2010*, Jakarta, Indonesia: IEEE, Dec. 2010, pp. A32–A36. doi: 10.1109/ICT4M.2010.5971880.

[6] "Welcome to Harvard Alumni." Accessed: Oct. 31, 2023. [Online]. Available: https://alumni.harvard.edu/