



Technological Institute of the Philippines
Computer Engineering Department
Quezon City

Development of a Mobile Application for Recommendation of Student Elective

In partial fulfillment of the requirements in
CPE 026 – Emerging Technology 3 (Mobile Computing)

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Chapter 1 Problem Background and Validation

1.1 The Problem

In the field of computer engineering at the Technological Institute of the Philippines, elective courses can be broad and diverse, including categories such as cyber-physical systems, system administration, human-computer interaction, and data science. Each elective offers unique learning opportunities, allowing us to explore into certain areas of interest relevant to our career goals. Some computer engineering students at the Technological Institute of the Philippines are having a hard time choosing what is the best elective for them. In addition, some students have regrets about the elective they chose but realized they should enroll in a different elective instead.

1.2 Problem Validation

TechThinker mobile application conducts surveys among students in order to identify the factors impacting their elective choices and any constraints they encounter.

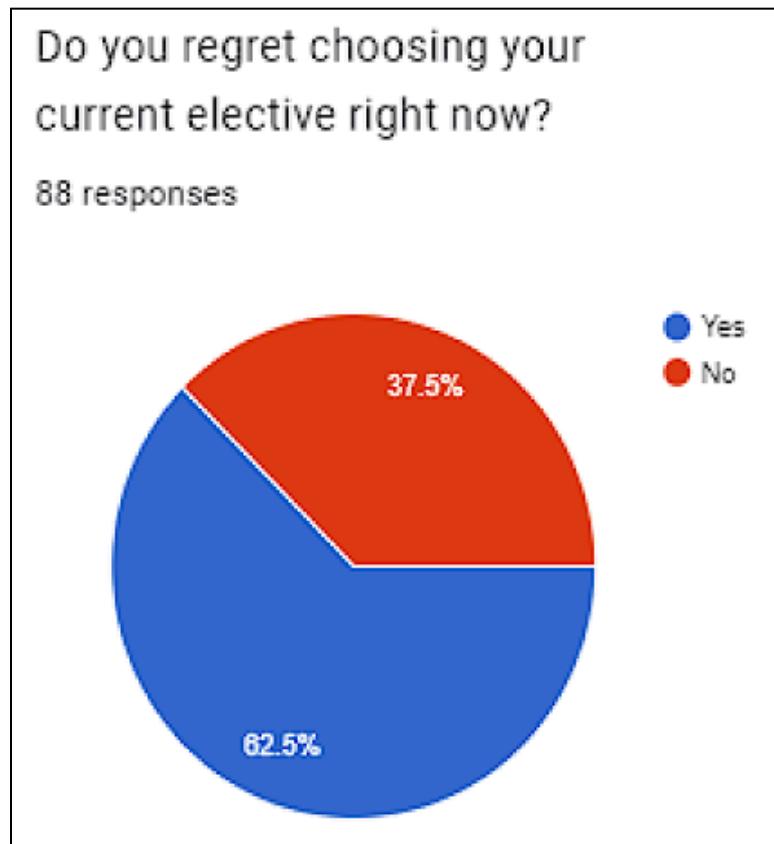


Figure 1. The Pie Chart of Problem Validation for Electhinker

Figure 1 illustrates that 62.5% out of 88 students regret choosing their current elective now. While 37.5% are okay with the elective course they took.

1.3 The Project

The project aims to develop Electhinker, a mobile app that helps computer engineering students choose elective courses with ease and confidence. Electhinker offers a quiz assessment for elective recommendation, video posting function to allow students to share videos about their experience and thoughts about different electives and lastly a user profile that keeps track of the user videos.

1.3.1 Project Description

The “ElecThinker” mobile application is designed to assist students of computer engineering in selecting their elective courses with confidence and ease. As students progress through their academic journey, they often encounter the challenge of choosing elective courses that align with their interests, career goals, and academic courses.

1.3.2 General Objectives

The primary goal of this project is to develop a mobile application that aims to lower the probability of students having a wrong decision about the elective they chose.

1.3.3 Specific Objectives

Specifically, it aims to develop a mobile application that can:

1. Allow students to register using their email and password.
2. Allow students to upload educational and informative videos related to their elective.
3. Provide an elective recommendation in the end after taking the test.

1.4 Software Requirements Specification

To ensure optimal performance, security, and user experience for Electhinker, the following software requirements are specified:

1.4.1 Functional and Non-Functional Requirements

Ensure operational usability by allowing users to interact with the system in an easy and consistent way. Using the Android app's UI for easier navigation. Set up clear instructions and error notifications to help users complete the registration process.

1.4.2 Functional Usability

Functional usability ensures that users can easily and efficiently interact with a system, completing tasks accurately and with satisfaction.

User Registration and Profile Creation

Users should be able to create an account using their student number and password. During registration, they must provide information such as their name, student number, username, and password.

Elective Recommendation

The application provides a list of elective courses related to computer technology programs. Students can take an assessment of their interest as a basis for recommendation . This simplified format allows students to easily choose courses that match their interests and learning goals, enhancing their educational experience.

Video Posting

Students should be able to post videos related to their elective courses and explore videos posted by others too. This community interaction enables students to share their first hand experience and thoughts on their respective elective courses.

1.4.3 Non-Functional Usability

Conduct user testing to ensure that the application UI is intuitive and easy to navigate for android. Provide clear and concise instructions and error messages to guide users through the enrollment process.

Security

To protect users, personal information and elective preferences should be securely stored and safeguarded against unauthorized access, ensuring that all data remains confidential and protected. This enhances user trust and complies with privacy standards and regulations.

Performance

The application should aim to minimize its size and resource consumption to preserve device storage and battery life while ensuring reliable performance across different devices and network conditions.

Scalability

consider future developments and potential future uses to ensure flexibility and accommodate increased demand efficiently, in order to maintain optimal performance and user satisfaction.

1.4.4 Android Requirements

To ensure optimal performance, security, and user experience for Electhinker, the following Android requirements are specified:

Minimum Android Version

Target Android 7.0 (Nougat) or above to ensure compatibility with modern features and a larger user base.

User Interface Guidelines

Adhere to material Design guidelines for a visually appealing and intuitive user interface. Ensure responsiveness and compatibility across different screen sizes.

Performance Optimization

Implementing data caching mechanisms to reduce loading time and minimize network usage, particularly when retrieving elective course information.

Security

Implement secure data transmission over HTTPS and proper handling of user authentication to protect user data and privacy.

Device Compatibility

The app's support android tablet and both portrait and landscape orientation to accommodate user preferences and device usage

1.4.5 iOS Requirements

To ensure optimal performance, security, and user experience for Electhinker, the following iOS requirements are specified:

Minimum iOS Version

Target iOS 11 or later to ensure compatibility wide range of devices and access to the latest iOS features

Device Compatibility

The app's support iPhone and iPad devices and both portrait and landscape orientation to accommodate user preferences and device usage.

User Interface Guidelines:

Adhere to Apple's Human Interface Guidelines, to ensure consistency and familiarity with iOS design patterns.

Security

Implement iOS security using secure communication protocols (HTTPS), and proper handling of user authentication to protect user data and privacy.

Performance Optimization

Implement an efficient algorithm and data structures to ensure smooth user experience, especially when handling large datasets.

1.5 Development Team

Team Description

A unified and dynamic team of three excellent computer engineering students who are passionately committed to offering creative solutions and taking on challenging technical problems.

1.5.1 Profile

<p>Michael Vincent Alcoseba 1913738 Bachelor of Science in Computer Engineering Railway Engineering gmvralcoseba@tip.edu.ph</p> <p>Role: Lead Programmer</p>	
<p>Jethro Hans L. Conde 2013317 Bachelor of Science in Computer Engineering Technopreneurship gjhlconde@tip.edu.ph</p> <p>Role: UI/UX Designer</p>	
<p>Sheina Mae B. De Leon 1911511 Bachelor of Science in Computer Engineering Intelligent System qsmbdeleon@tip.edu.ph</p> <p>Role: Research Analyst</p>	

1.5.2 Roles and Responsibilities

Lead Developer

The Lead Developer for the ElecThinker mobile application has responsibility for the technical development of a platform that allows computer engineering students to confidently choose electives. As the driving force behind the application's development, the lead makes sure the platform is intuitive, dependable, and personalized to the individual needs of the students as they progress through their learning journey. This involves monitoring the design and implementation of solutions that are consistent with student interests, professional goals, and academic achievement.

Research Analyst

The role of research analysts in the development of the "ElecThinker" mobile application is essential for ensuring that computer engineering students may confidently and easily choose their elective subjects. By conducting comprehensive market research, the researcher identifies specific needs and preferences among the target audience, as well as information on the most common problems students experience when selecting electives.

UI/UX Design

The designer focuses on understanding the user journey, mapping out the steps students take as they navigate their academic paths and make elective choices. By conducting user research and usability testing, the UI/UX designer identifies pain points and user preferences, ensuring the app's interface is both visually appealing and functionally efficient. A simple, user-friendly system allows students to explore options quickly, based on their interests and career objectives.

1.6 Value Proposition

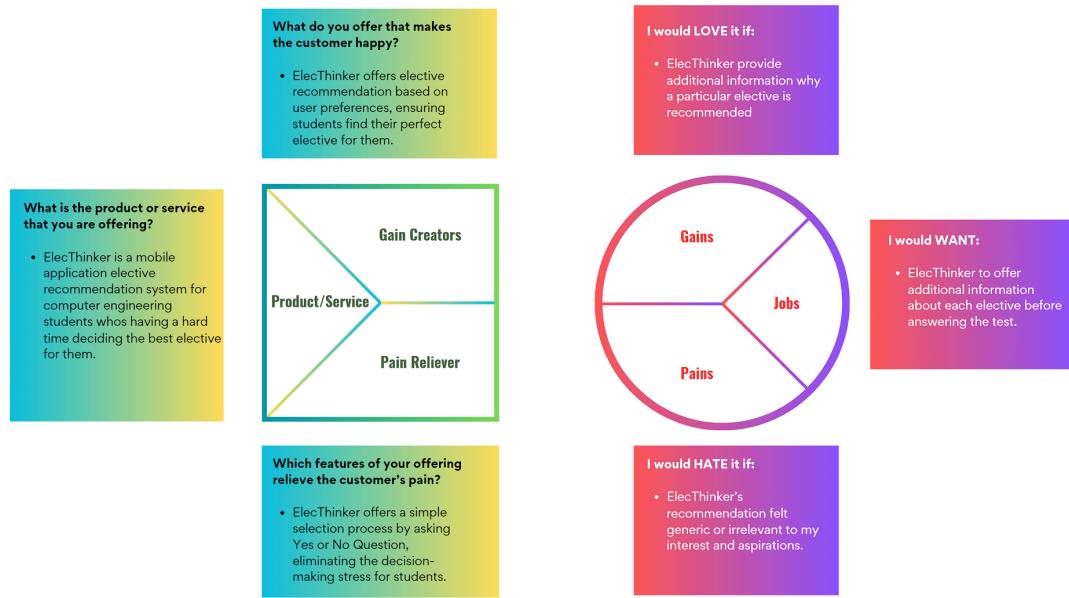


Figure 2. Value Proposition for Electhinker

In this section, we determine the value proposition of electhinker to ensure that computer engineering students can confidently and efficiently choose electives that will benefit their academic and professional futures.

1.7 Market Feasibility

Marketability is an assessment of whether a product or service has the potential to succeed in a particular market based on factors such as demand, competition and economic conditions

1.7.1 Target Users

Our target users are Technological Institute of the Philippines computer engineering students who are having a hard time deciding which elective course is best for them academically. This particular set of people is the target audience for our program, which offers a user-friendly platform to simplify the elective selection procedure and reduce anxiety associated with making decisions.

1.7.2 Sample User Profiles

Miguel Roldan Blanco 2114875 Bachelor of Science in Computer Engineering Railway Engineering The user regrets choosing the wrong elective.	
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1.7.3 Competition Analysis

Direct Competitors

Currently, there are no direct competitors offering a similar survey application specifically for college students to offer them assistance in the selection of elective tracks.

Secondary Competitors

Similarly, there are no secondary competitors providing a comparable solution for assisting college students in choosing elective tracks.

Indirect Competitors

Although there are no direct or secondary competitors, we identify one indirect competitor which is the Aris Student Portal. While Aris primarily serves as a student information system, it indirectly competes with our application by offering some features related to academic planning and course selection.

Direct Competitor	Secondary Competitor	Indirect Competitor
- None	- None	- Aris Student Portal

1.8 Mobile Application

The mobile application's design and development process are described in . The two primary sections of it are the application's front end and the design mockup. Collectively, these elements outline the application's visual framework and functionalities.

1.8.1 Design Mockup

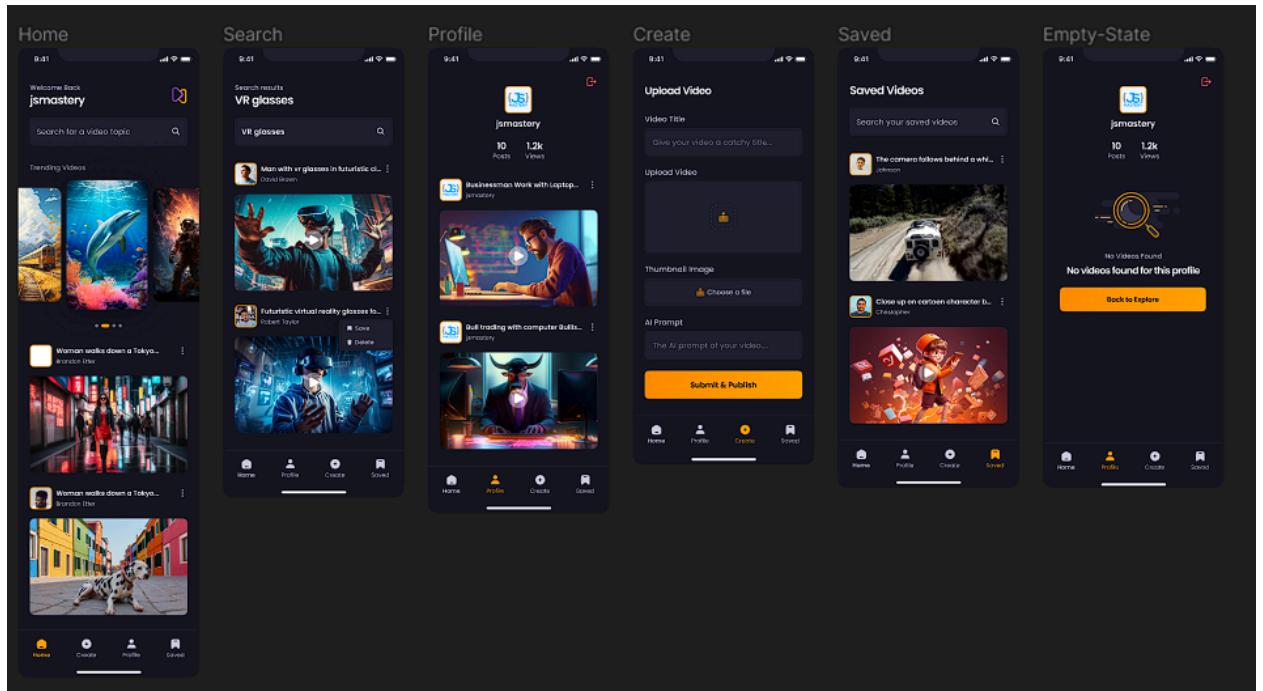


Figure 3.1 Figma reference design for Electhinker

Figure 3.1 illustrates the design reference of the mobile application, this figma design becomes the starting point for the whole application layout.

1.8.2 Frontend

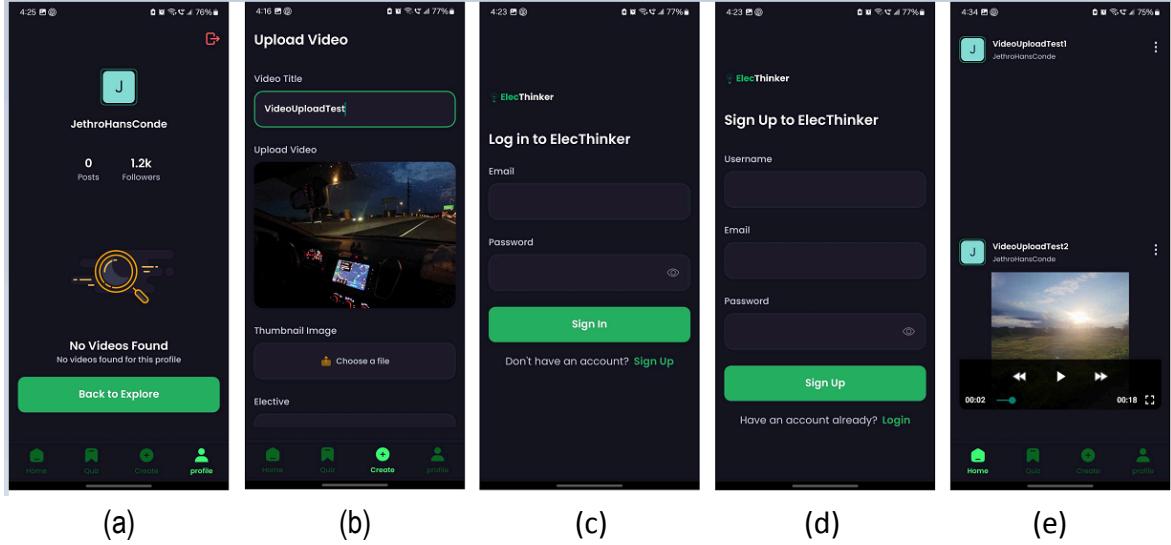


Figure 4.1. Electhinker UI Frontend Design

Figure 4.1 illustrates the final output of the mobile application frontend, showcasing the completed user interface (UI). The main application is organized into five (5) subsections:

- The profile section, which displays the user's profile, their uploaded videos, and a logout button.
- The upload section, where users can post a video by providing a title, an MP4 video file, a thumbnail image, and the elective it belongs to.
- The login page, where users enter their username and password to access their account, with credentials verified against the database.
- The sign-up page, allowing new users to create accounts, which are then recorded in the backend database.
- The homepage, displaying all videos posted by users.

1.8.3 Backend

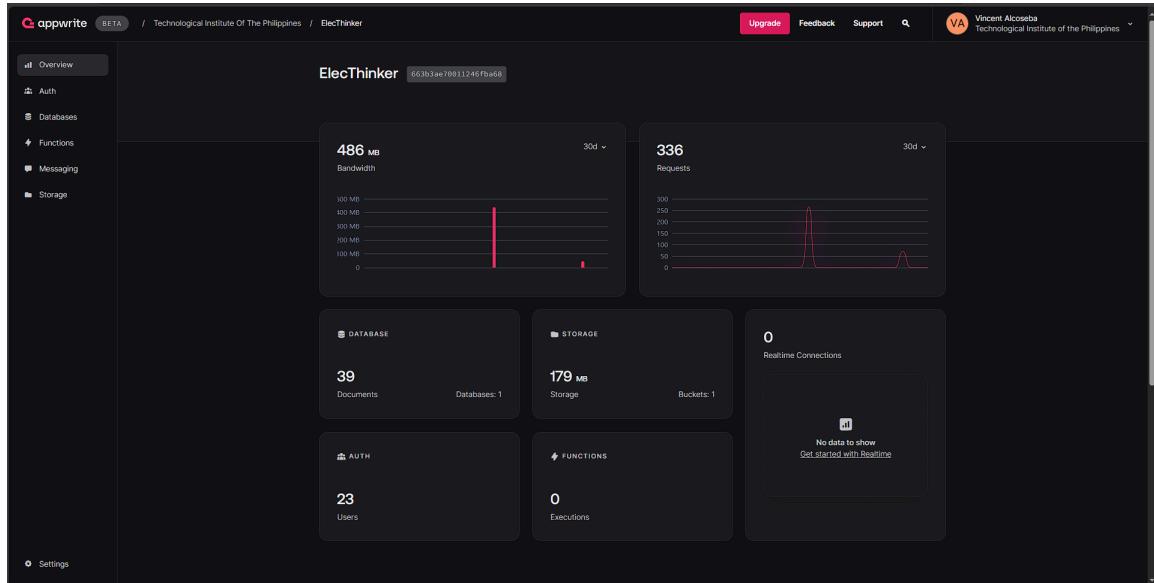


Figure 4.2 Overview of ElecThinker in Appwrite cloud

Figure 4.2 is the screenshot of the overview of the mobile application's backend in appwrite.io. This shows how many documents were in the database, how many users are currently logged in, database bandwidth, requests, and executions.

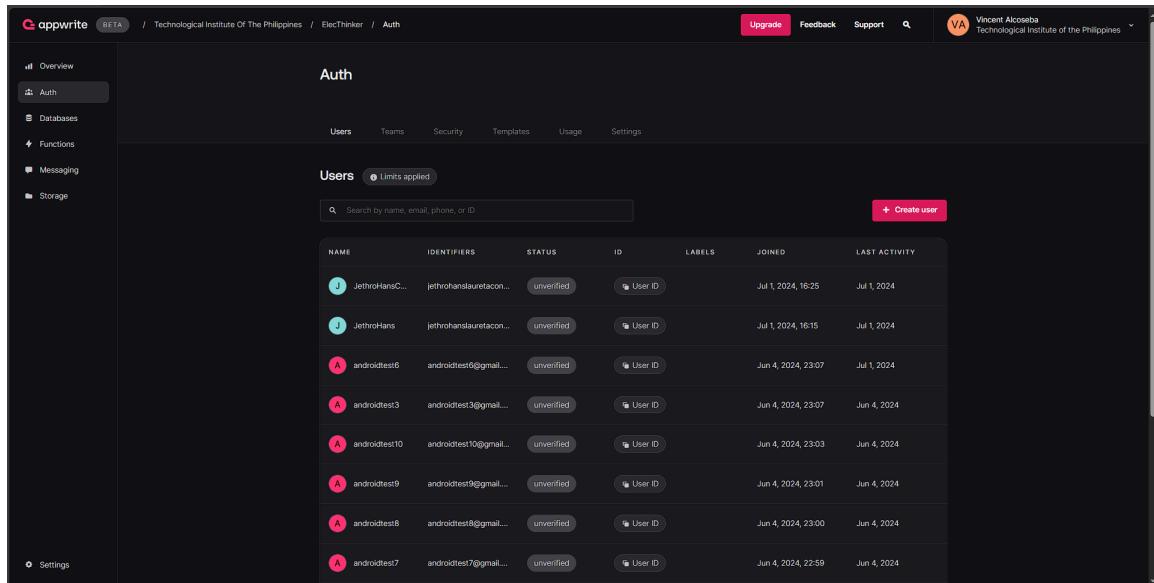


Figure 4.3 Database for User Authentication

Figure 4.1 illustrates the user authentication details for currently logged-in users. The authentication page displays the user's name, email identifier, status (indicating whether the email is verified or unverified), unique user ID, account creation date ("Joined"), and the timestamp of the user's last activity (the last time the account was accessed).

The screenshot shows the Appwrite database interface with the 'videos' collection selected. The left sidebar shows 'COLLECTIONS' with 'users' and 'videos' listed. The main area displays the 'Documents' table with the following data:

	Document ID	title	thumbnail	prompt	video
<input type="checkbox"/>	6682722_4e1198c	VideoUploadTest10	https://cloud.appwri...	Sys Ad	https://cloud.appwri...
<input type="checkbox"/>	6682720_9493d4f	VideoUploadTest9	https://cloud.appwri...	Data Science	https://cloud.appwri...
<input type="checkbox"/>	668271b_a39ee50	VideoUploadTest8	https://cloud.appwri...	Data Science	https://cloud.appwri...
<input type="checkbox"/>	6682718_ax602c1	VideoUploadTest7	https://cloud.appwri...	Cyber Physical Syste...	https://cloud.appwri...
<input type="checkbox"/>	6682714_52397d8	VideoUploadTest6	https://cloud.appwri...	HCI	https://cloud.appwri...
<input type="checkbox"/>	6682710_b0647c3	VideoUploadTest5	https://cloud.appwri...	Data Science	https://cloud.appwri...
<input type="checkbox"/>	668270c_0a2f9ad	VideoUploadTest4	https://cloud.appwri...	System Administratio...	https://cloud.appwri...
<input type="checkbox"/>	6682708_c7a7db7	VideoUploadTest3	https://cloud.appwri...	Data Science	https://cloud.appwri...

Figure 4.3 Database for Videos Posted

Figure 4.3 illustrates the details of the videos stored in the backend of the mobile application. These details include the document ID (a unique identifier for each video), the video title, the thumbnail (provided as a link), the associated elective (used as a search prompt), and the video link itself.

The screenshot shows the Appwrite.io database interface. The left sidebar has a 'COLLECTIONS' section with '+ Create collection' and two collections: 'users' (selected) and 'videos'. The main area shows the 'users' collection with a table titled 'Documents'. The table has columns: Document ID, username, email, avatar, and accountID. There are 8 rows of data, each with a checkbox and a delete icon. The data includes various user profiles such as JethroHansConde, JethroHans, androidtest6, androidtest3, androidtest10, androidtest9, androidtest8, and androidtest7.

Figure 4.4 Database for User Accounts

Figure 4.4 presents a screenshot of the user database in Appwrite.io. The database displays key user details, including the Document ID (a unique identifier for each user), username, email, avatar URL, and account ID.

The screenshot shows the Appwrite.io storage interface. The left sidebar has sections: Overview, Auth, Databases, Functions, Messaging, and Storage (selected). The main area shows the 'files' collection with a table titled 'Files'. The table has columns: FILENAME, TYPE, SIZE, and CREATED. There are 8 rows of data, each with a file thumbnail, filename, type, size, and creation date. The files include various media types like mp4 and png, mostly from a messenger application.

Figure 4.5 Storage for the files that are saved in the backend of the mobile application.

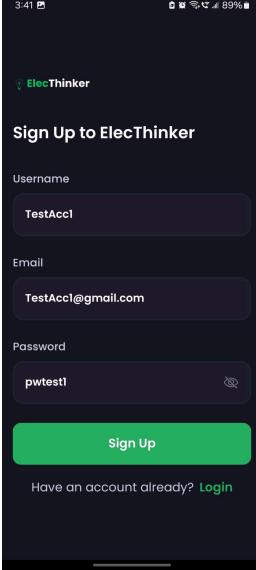
Figure 4.5 shows a screenshot of the storage system for files saved in the backend of the mobile application. This section displays the uploaded files along with their file type, size, author, and the date they were created or posted.

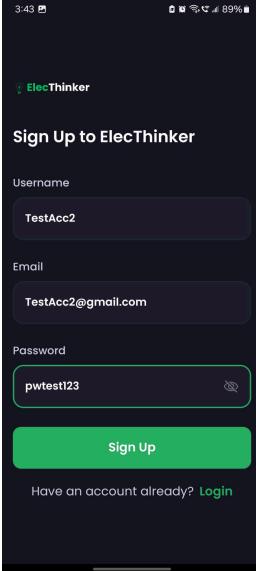
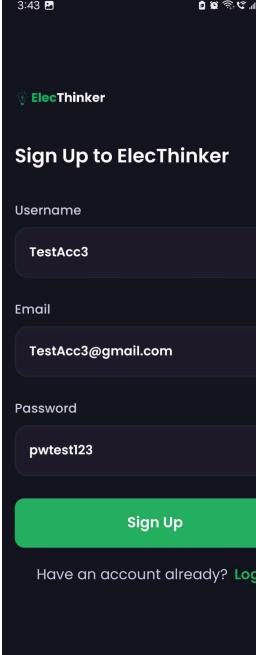
1.9 Testing

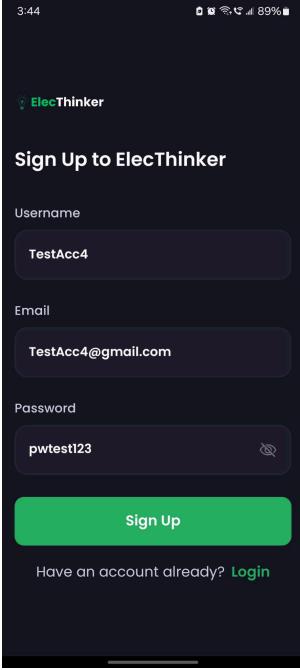
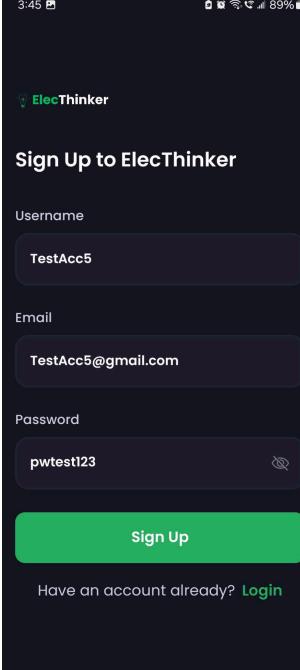
The ElecThinker application's intended function and objectives are ensured by the testing phase. Systematic testing was used to assess each goal in order to confirm the accuracy, efficiency, and reliability of the program. However, testing was constrained to Android devices as iOS testing was unavailable due to the premium subscription requirement of Expo. Deploying or scanning the application with an iOS device requires a paid subscription, which was not accessible during the testing phase. The following outlines the key objectives tested during this phase:

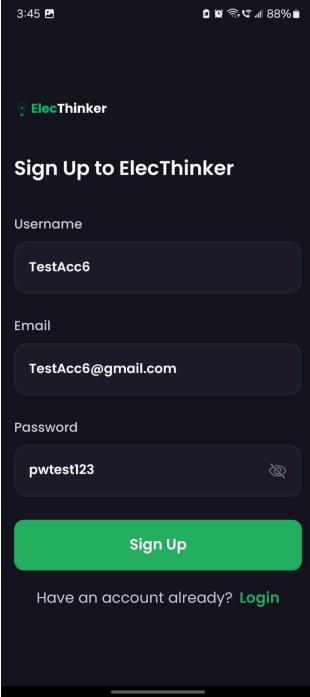
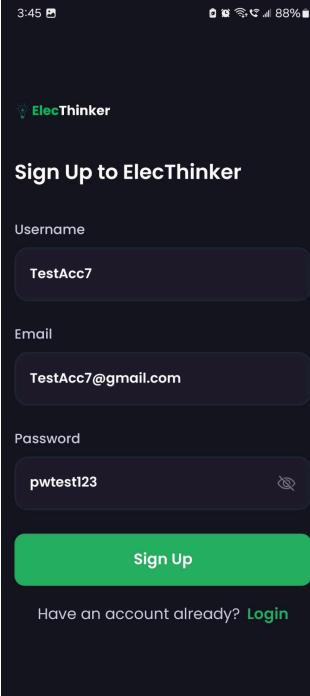
Objective 1: User Registration

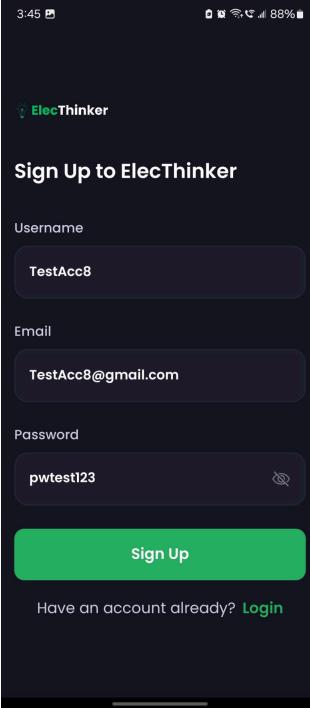
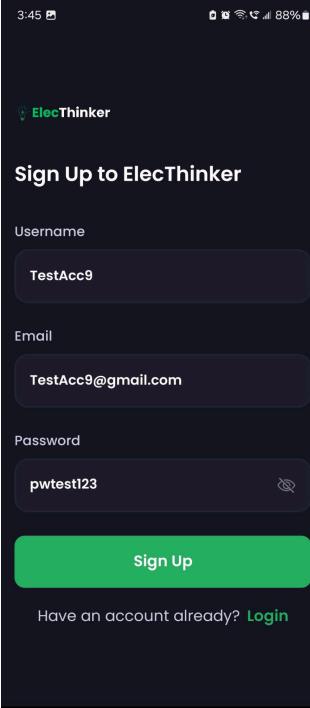
The application was tested to ensure that users can successfully register on the ElecThinker platform. This included verifying the functionality of the signup page, ensuring proper storage of user details in the backend, and validating the system's ability to assign unique identifiers to each user.

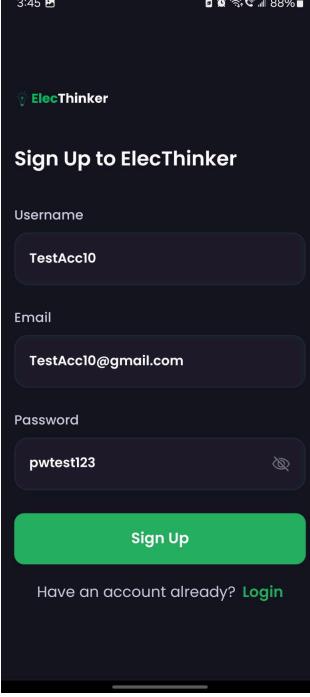
Trial No.	Input	Output	Remark
1.		<p>username*</p> <p>androidtest1</p> <p>email* Email</p> <p>androidtest1@gmail.com</p> <p>accountId*</p> <p>665f29f8003404dfc08b</p>	Matched

Trial No.	Input	Output	Remark
2.	 <p>Sign Up to ElecThinker</p> <p>Username TestAcc2</p> <p>Email TestAcc2@gmail.com</p> <p>Password pwtest123</p> <p>Sign Up</p> <p>Have an account already? Login</p>	<p>username* androidtest2</p> <p>email* Email androidtest2@gmail.com</p> <p>accountId* 665f2a6600110f3b2b48</p>	Matched
3.	 <p>Sign Up to ElecThinker</p> <p>Username TestAcc3</p> <p>Email TestAcc3@gmail.com</p> <p>Password pwtest123</p> <p>Sign Up</p> <p>Have an account already? Login</p>	<p>username* androidtest3</p> <p>email* Email androidtest3@gmail.com</p> <p>accountId* 665f2a8e00370f6d54ce</p>	Matched

Trial No.	Input	Output	Remark
4.	 <p>Sign Up to ElecThinker</p> <p>Username TestAcc4</p> <p>Email TestAcc4@gmail.com</p> <p>Password pwtest123</p> <p>Sign Up</p> <p>Have an account already? Login</p>	<p>username* androidtest4</p> <p>email* Email androidtest4@gmail.com</p> <p>accountId* 665f2abe002436747949</p>	Matched
5.	 <p>Sign Up to ElecThinker</p> <p>Username TestAcc5</p> <p>Email TestAcc5@gmail.com</p> <p>Password pwtest123</p> <p>Sign Up</p> <p>Have an account already? Login</p>	<p>username* androidtest5</p> <p>email* Email androidtest5@gmail.com</p> <p>accountId* 665f2b26003979e8360f</p>	Matched

Trial No.	Input	Output	Remark
6.	 <p>Sign Up to ElecThinker</p> <p>Username TestAcc6</p> <p>Email TestAcc6@gmail.com</p> <p>Password pwtest123</p> <p>Sign Up</p> <p>Have an account already? Login</p>	<p>username*</p> <p>androidtest6</p> <p>email* Email</p> <p>androidtest6@gmail.com</p> <p>accountId*</p> <p>665f2b8b00205c910a52</p>	Matched
7.	 <p>Sign Up to ElecThinker</p> <p>Username TestAcc7</p> <p>Email TestAcc7@gmail.com</p> <p>Password pwtest123</p> <p>Sign Up</p> <p>Have an account already? Login</p>	<p>username*</p> <p>androidtest7</p> <p>email* Email</p> <p>androidtest7@gmail.com</p> <p>accountId*</p> <p>665f2bc70039eab89c0b</p>	Matched

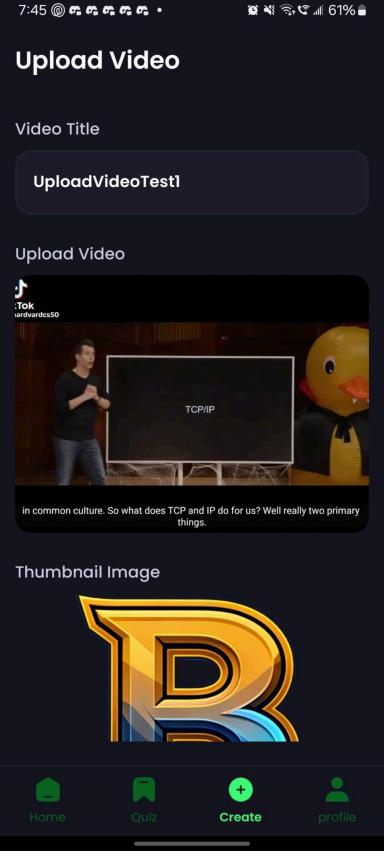
Trial No.	Input	Output	Remark
8.		<p>username*</p> <p>androidtest8</p> <p>email* Email</p> <p>androidtest8@gmail.com</p> <p>accountId*</p> <p>665f2bfd002729a1e2ca</p>	Matched
9.		<p>username*</p> <p>androidtest9</p> <p>email* Email</p> <p>androidtest9@gmail.com</p> <p>accountId*</p> <p>665f2c5a0023eb881170</p>	Matched

Trial No.	Input	Output	Remark
10.	 <p>The input from the application's sign-up page was successfully processed and recorded in the backend (Output), where each entry was assigned a unique ID in the authentication database.. It is evident from every trial that it was successful at 100% accuracy that confirmed how reliable the register/login was. This consistent performance across multiple trials shows how strong the system is to ensure accurate operation of the register in accordance with set standards.</p>	<p>username*</p> <p>androidtest10</p> <p>email* Email</p> <p>androidtest10@gmail.com</p> <p>accountId*</p> <p>665f2cb0001551973047</p>	Matched

Legend:

The input from the application's sign-up page was successfully processed and recorded in the backend (Output), where each entry was assigned a unique ID in the authentication database.. It is evident from every trial that it was successful at 100% accuracy that confirmed how reliable the register/login was. This consistent performance across multiple trials shows how strong the system is to ensure accurate operation of the register in accordance with set standards.

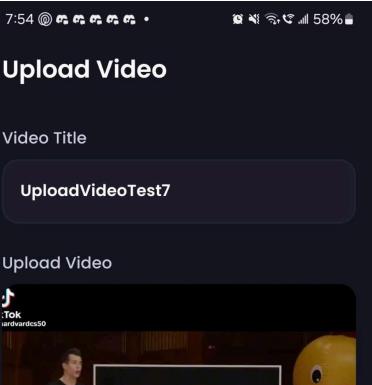
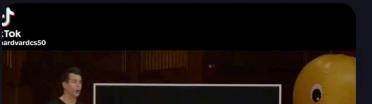
Objective 2: Video Upload Functionality To evaluate this feature, sample educational and informative videos related to specific electives were uploaded to the application. The test confirmed the proper handling of uploads, including the acceptance of video files, thumbnails, titles, and elective tags. Additionally, the system was validated to ensure that all uploaded files were stored accurately in the backend with corresponding metadata.

Trial No.	Input	Output	Remark
1.		<p>title* UploadVideoTest1</p> <p>thumbnail* URL https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>prompt* SystemAdmin</p> <p>video* URL https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>creator Relationship ...8267fe001e6b3a5118</p> <p>677dbcae002aa0c2a89e Last updated: Jan 8, 2025, 07:45</p>	Matched

Trial No.	Input	Output	Remark
2.	<p>7:49 @ 60% •</p> <h3>Upload Video</h3> <p>Video Title UploadVideoTest2</p> <p>Upload Video </p> <p>Thumbnail Image </p> <p>Home Quiz Create profile</p>	<p>title* UploadVideoTest2</p> <p>thumbnail* URL https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>prompt* Intelligent Systems</p> <p>video* URL https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>creator Relationship -8267fe001e6b3a5118</p> <p>677dbda40002f7227855 Last updated: Jan 8, 2025, 07:49</p>	Matched

Trial No.	Input	Output	Remark
3.	<p>7:51 ⓘ 59%</p> <p>Upload Video</p> <p>Video Title</p> <p>UploadVideoTest3</p> <p>Upload Video</p>  <p>Thumbnail Image</p>  <p>Home Quiz Create profile</p>	<p>title*</p> <p>UploadVideoTest3</p> <p>thumbnail* URL</p> <p>https://cloud.appwrite.io/v1/storage/buckets/663b3e870054</p> <p>prompt*</p> <p>Intelligent Systems</p> <p>video* URL</p> <p>https://cloud.appwrite.io/v1/storage/buckets/663b3e870054</p> <p>677dbdeb003b86009161 Last updated: Jan 8, 2025, 07:51</p>	Matched

Trial No.	Input	Output	Remark
5.	<p>7:53 @ 59% ●</p> <h3>Upload Video</h3> <p>Video Title UploadVideoTest5</p> <p>Upload Video </p> <p>Thumbnail Image </p> <p>Home Quiz Create profile</p>	<p>title* UploadVideoTest5</p> <p>thumbnail* URL https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>prompt* Technopreneurship</p> <p>video* URL https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>creator Relationship ...8267fe001e6b3a5118</p> <p>677dbe6a0021b30aacc9 Last updated: Jan 8, 2025, 07:53</p>	Matched

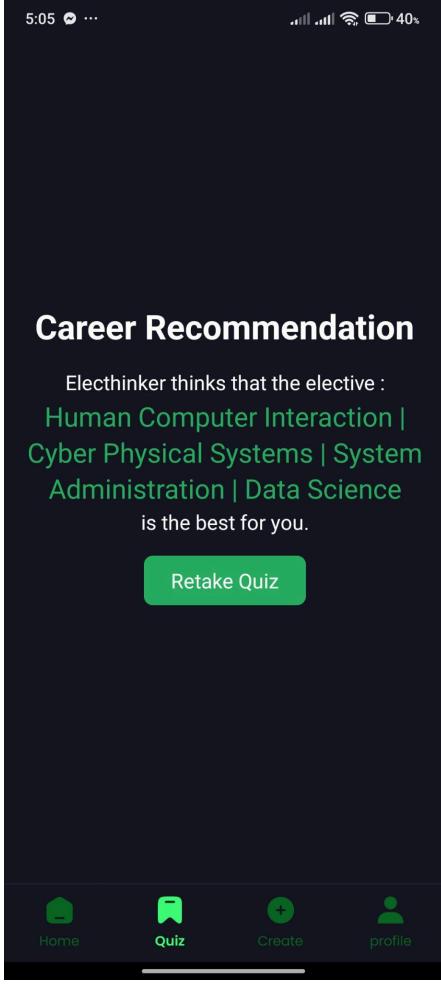
Trial No.	Input	Output	Remark
7.	 <p>7:54 @ 58% •</p> <h3>Upload Video</h3> <p>Video Title</p> <p>UploadVideoTest7</p> <p>Upload Video</p> <p></p> <p>Tok ardwickcs50</p> <p>in common culture. So what does TCP and IP do for us? Well really two primary things.</p> <p>Thumbnail Image</p>  <p>Home Quiz Create profile</p>	<p>title*</p> <p>UploadVideoTest7</p> <p>thumbnail* URL</p> <p>https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>prompt*</p> <p>Data Science</p> <p>video* URL</p> <p>https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>creator Relationship</p> <p>_8267fe001e6b3a5118</p> <p>677dbed2002b866e0bec</p> <p>Last updated: Jan 8, 2025, 07:54</p>	Matched

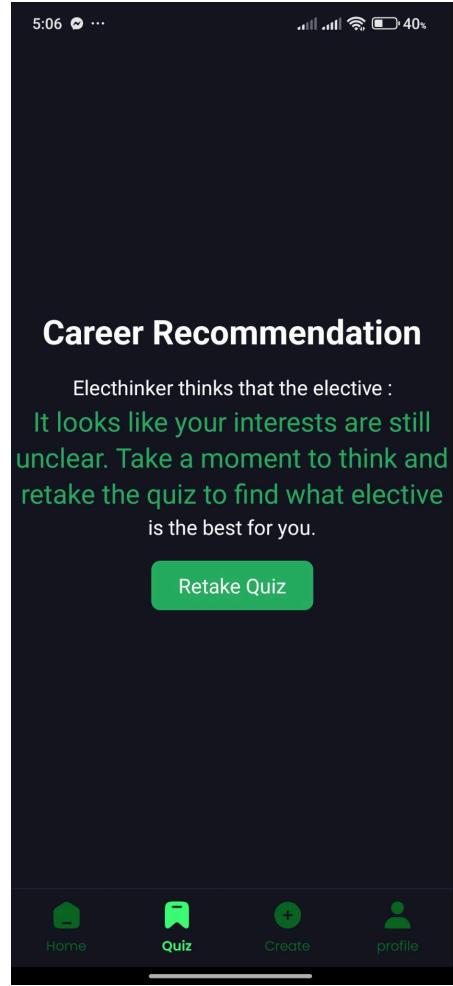
Trial No.	Input	Output	Remark
9.	<p>7:56 @ 58% •</p> <h3>Upload Video</h3> <p>Video Title</p> <p>UploadVideoTest9</p> <p>Upload Video</p>  <p>Thumbnail Image</p>  <p>Home Quiz Create profile</p>	<p>title*</p> <p>UploadVideoTest9</p> <p>thumbnail* URL</p> <p>https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>prompt*</p> <p>System Administration</p> <p>video* URL</p> <p>https://cloud.appwrite.io/v1/storage/buckets/663b3e8700054</p> <p>creator Relationship</p> <p>...8267fe001e6b3a5118</p> <p>677dbf310033b5890672 Last updated: Jan 8, 2025, 07:56</p>	Matched

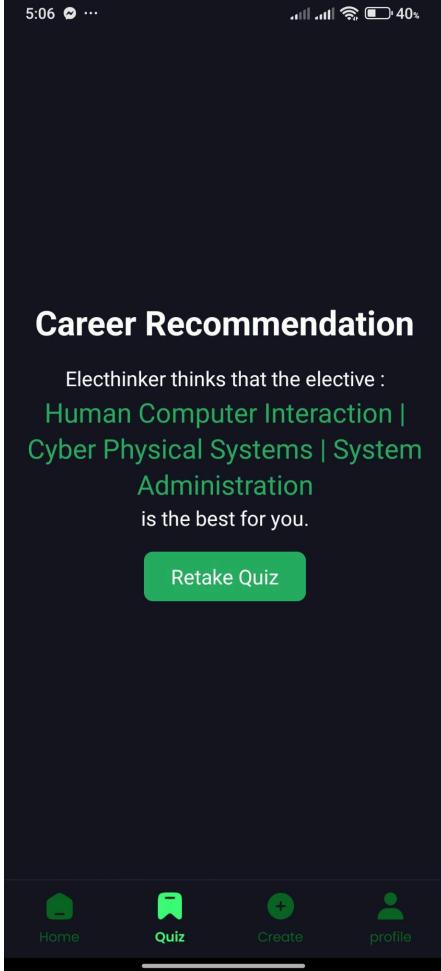
Legend:

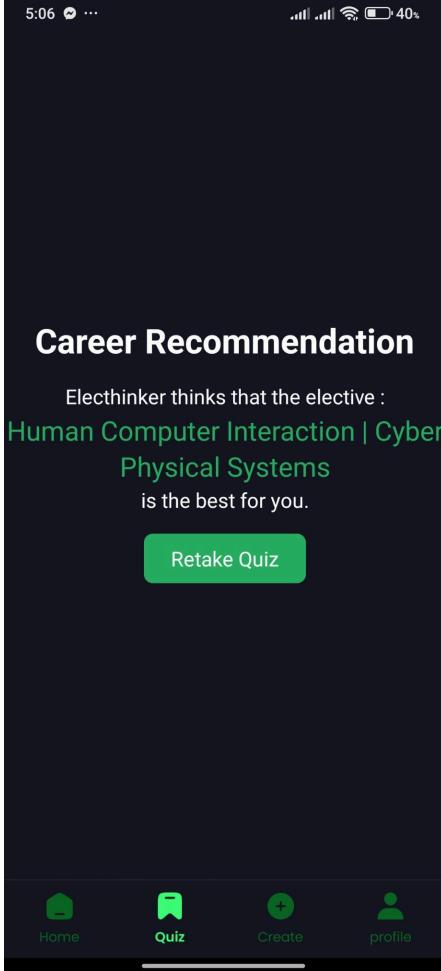
After conducting 10 trials of uploading educational and informative videos to the app, the actual outcomes aligned precisely with our expectations. Each video was assigned a unique ID on the backend, which also correctly reflected the video title, thumbnail, prompt, video URL, and creator information. All attributes matched the intended results, achieving a perfect score of ten out of ten "matched" cases and attained 100% accuracy. This confirms that our approach was effective and reliable, ensuring that the content met the intended quality and performance standards.

Objective 3: Elective Recommendation The recommendation system was tested by simulating user quiz interactions. The test ensured that the application correctly tallied quiz responses and provided an elective recommendation based on the highest scores. Cases with ties were also verified to confirm the accurate display of multiple recommendations. For users with no preferences, the application suggested revisiting their interests and retaking the quiz.

Trial No.	Expected Output	Actual Output	Remark																								
1.	<p>Result should display all electives</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>1</td></tr> <tr><td>Q5</td><td>1</td></tr> <tr><td>Q6</td><td>1</td></tr> <tr><td>Q7</td><td>1</td></tr> <tr><td>Q8</td><td>1</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	1	Q2	1	Q3	1	Q4	1	Q5	1	Q6	1	Q7	1	Q8	1	Q9	1	Q10	1	Q11	1	Q12	1	 <p>The screenshot shows a mobile application interface. At the top, there is a status bar with the time 5:05, signal strength, battery level at 40%, and other icons. Below the status bar, the main content area has a dark background. In the center, the text "Career Recommendation" is displayed in bold white font. Below it, a message from "Electhinker" says: "Electhinker thinks that the elective : Human Computer Interaction Cyber Physical Systems System Administration Data Science is the best for you." A green button labeled "Retake Quiz" is located below the message. At the bottom of the screen, there is a navigation bar with four items: "Home" (represented by a house icon), "Quiz" (represented by a book icon), "Create" (represented by a plus sign icon), and "profile" (represented by a person icon). The "Quiz" item is highlighted with a green outline.</p>	Matched
Q1	1																										
Q2	1																										
Q3	1																										
Q4	1																										
Q5	1																										
Q6	1																										
Q7	1																										
Q8	1																										
Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
2.	<p>Result should display: "It looks like your interests are still unclear. Take a moment to think and retake the quiz to find what elective is the best for you."</p> <table border="1" data-bbox="437 487 804 1290"> <tr><td>Q1</td><td>0</td></tr> <tr><td>Q2</td><td>0</td></tr> <tr><td>Q3</td><td>0</td></tr> <tr><td>Q4</td><td>0</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>0</td></tr> <tr><td>Q10</td><td>0</td></tr> <tr><td>Q11</td><td>0</td></tr> <tr><td>Q12</td><td>0</td></tr> </table>	Q1	0	Q2	0	Q3	0	Q4	0	Q5	0	Q6	0	Q7	0	Q8	0	Q9	0	Q10	0	Q11	0	Q12	0	 <p>The screenshot shows a dark-themed mobile application interface. At the top, there's a status bar with the time 5:06, signal strength, battery level at 40%, and other icons. Below the status bar, the main content area has a heading 'Career Recommendation' in bold. Underneath it, a message from 'Electhinker' reads: 'Electhinker thinks that the elective : It looks like your interests are still unclear. Take a moment to think and retake the quiz to find what elective is the best for you.' A green button labeled 'Retake Quiz' is centered below the message. At the bottom of the screen, there's a navigation bar with four items: 'Home' (a house icon), 'Quiz' (a bookmark icon), 'Create' (a plus sign icon), and 'profile' (a person icon). The overall layout is clean and modern. </p>	Matched
Q1	0																										
Q2	0																										
Q3	0																										
Q4	0																										
Q5	0																										
Q6	0																										
Q7	0																										
Q8	0																										
Q9	0																										
Q10	0																										
Q11	0																										
Q12	0																										

Trial No.	Expected Output	Actual Output	Remark																								
3.	<p>Result should display: Human Computer Interaction, Cyber Physical Systems, and System Administration. (3 equally tallied electives)</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>0</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	1	Q2	1	Q3	1	Q4	0	Q5	0	Q6	0	Q7	0	Q8	0	Q9	1	Q10	1	Q11	1	Q12	1	 <p>The screenshot shows a smartphone interface with a dark theme. At the top, there are signal strength, battery level (40%), and time (5:06). Below this is a large black area containing white text. The text reads:</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Human Computer Interaction Cyber Physical Systems System Administration is the best for you.</p> <p>At the bottom of this text area is a green button labeled "Retake Quiz". At the very bottom of the screen, there is a navigation bar with four items: "Home" (a house icon), "Quiz" (a bookmark icon), "Create" (a plus sign icon), and "profile" (a person icon).</p>	
Q1	1																										
Q2	1																										
Q3	1																										
Q4	0																										
Q5	0																										
Q6	0																										
Q7	0																										
Q8	0																										
Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
4.	<p>Result should display: Human Computer Interaction and Cyber Physical Systems (2 equally tallied electives)</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>0</td></tr> <tr><td>Q4</td><td>0</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	1	Q2	1	Q3	0	Q4	0	Q5	0	Q6	0	Q7	0	Q8	0	Q9	1	Q10	1	Q11	1	Q12	1	 <p>5:06 ⏱ 40%</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Human Computer Interaction Cyber Physical Systems is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	
Q1	1																										
Q2	1																										
Q3	0																										
Q4	0																										
Q5	0																										
Q6	0																										
Q7	0																										
Q8	0																										
Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
5.	<p>Human Computer Interaction</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>0</td></tr> <tr><td>Q3</td><td>0</td></tr> <tr><td>Q4</td><td>0</td></tr> <tr><td>Q5</td><td>1</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	1	Q2	0	Q3	0	Q4	0	Q5	1	Q6	0	Q7	0	Q8	0	Q9	1	Q10	1	Q11	1	Q12	1	<p>5:07 ⚡ ...</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Human Computer Interaction is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	1																										
Q2	0																										
Q3	0																										
Q4	0																										
Q5	1																										
Q6	0																										
Q7	0																										
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Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
6.	<p>Cyber Physical Systems</p> <table border="1"> <tr><td>Q1</td><td>0</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>0</td></tr> <tr><td>Q4</td><td>0</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>1</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	0	Q2	1	Q3	0	Q4	0	Q5	0	Q6	1	Q7	0	Q8	0	Q9	1	Q10	1	Q11	1	Q12	1	<p>5:07 ⚡ ...</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Cyber Physical Systems is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	0																										
Q2	1																										
Q3	0																										
Q4	0																										
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Q7	0																										
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Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
7.	<p>System Administration</p> <table border="1"> <tr><td>Q1</td><td>0</td></tr> <tr><td>Q2</td><td>0</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>0</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>1</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	0	Q2	0	Q3	1	Q4	0	Q5	0	Q6	0	Q7	1	Q8	0	Q9	1	Q10	1	Q11	1	Q12	1	<p>5:07 4G ...</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : System Administration is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	0																										
Q2	0																										
Q3	1																										
Q4	0																										
Q5	0																										
Q6	0																										
Q7	1																										
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Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
8.	<p>Data Science</p> <table border="1"> <tr><td>Q1</td><td>0</td></tr> <tr><td>Q2</td><td>0</td></tr> <tr><td>Q3</td><td>0</td></tr> <tr><td>Q4</td><td>1</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>1</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	0	Q2	0	Q3	0	Q4	1	Q5	0	Q6	0	Q7	0	Q8	1	Q9	1	Q10	1	Q11	1	Q12	1	<p>5:08 ⚡ ...</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Data Science is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	0																										
Q2	0																										
Q3	0																										
Q4	1																										
Q5	0																										
Q6	0																										
Q7	0																										
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Q9	1																										
Q10	1																										
Q11	1																										
Q12	1																										

Trial No.	Expected Output	Actual Output	Remark																								
9.	<p>Human Computer Interaction</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>1</td></tr> <tr><td>Q5</td><td>1</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>1</td></tr> <tr><td>Q10</td><td>0</td></tr> <tr><td>Q11</td><td>0</td></tr> <tr><td>Q12</td><td>0</td></tr> </table>	Q1	1	Q2	1	Q3	1	Q4	1	Q5	1	Q6	0	Q7	0	Q8	0	Q9	1	Q10	0	Q11	0	Q12	0	<p>5:08 ⌂ ⌂ ⌂ 39%</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Human Computer Interaction is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	1																										
Q2	1																										
Q3	1																										
Q4	1																										
Q5	1																										
Q6	0																										
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Q9	1																										
Q10	0																										
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Trial No.	Expected Output	Actual Output	Remark																								
10.	<p>Cyber Physical Systems</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>1</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>1</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>0</td></tr> <tr><td>Q10</td><td>1</td></tr> <tr><td>Q11</td><td>0</td></tr> <tr><td>Q12</td><td>0</td></tr> </table>	Q1	1	Q2	1	Q3	1	Q4	1	Q5	0	Q6	1	Q7	0	Q8	0	Q9	0	Q10	1	Q11	0	Q12	0	<p>5:09 ⌂ ⌂ 39%</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : Cyber Physical Systems is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	1																										
Q2	1																										
Q3	1																										
Q4	1																										
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Q10	1																										
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Trial No.	Expected Output	Actual Output	Remark																								
11.	<p>System Administration</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>1</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>1</td></tr> <tr><td>Q8</td><td>0</td></tr> <tr><td>Q9</td><td>0</td></tr> <tr><td>Q10</td><td>0</td></tr> <tr><td>Q11</td><td>1</td></tr> <tr><td>Q12</td><td>0</td></tr> </table>	Q1	1	Q2	1	Q3	1	Q4	1	Q5	0	Q6	0	Q7	1	Q8	0	Q9	0	Q10	0	Q11	1	Q12	0	<p>5:12 ⏱ 39%</p> <p>Career Recommendation</p> <p>Electhinker thinks that the elective : System Administration is the best for you.</p> <p>Retake Quiz</p> <p>Home Quiz Create profile</p>	Matched
Q1	1																										
Q2	1																										
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Trial No.	Expected Output	Actual Output	Remark																								
12.	<p>Data Science</p> <table border="1"> <tr><td>Q1</td><td>1</td></tr> <tr><td>Q2</td><td>1</td></tr> <tr><td>Q3</td><td>1</td></tr> <tr><td>Q4</td><td>1</td></tr> <tr><td>Q5</td><td>0</td></tr> <tr><td>Q6</td><td>0</td></tr> <tr><td>Q7</td><td>0</td></tr> <tr><td>Q8</td><td>1</td></tr> <tr><td>Q9</td><td>0</td></tr> <tr><td>Q10</td><td>0</td></tr> <tr><td>Q11</td><td>0</td></tr> <tr><td>Q12</td><td>1</td></tr> </table>	Q1	1	Q2	1	Q3	1	Q4	1	Q5	0	Q6	0	Q7	0	Q8	1	Q9	0	Q10	0	Q11	0	Q12	1	<p>The screenshot shows a dark-themed mobile application interface. At the top, there's a status bar with the time 5:12, signal strength, battery level at 39%, and other icons. Below the status bar, the main content area has a dark background with white text. It displays the heading "Career Recommendation" and a message from "Electhinker" stating: "Electhinker thinks that the elective : Data Science is the best for you." A green button labeled "Retake Quiz" is visible. At the bottom of the screen, there are four navigation icons with labels: "Home" (person icon), "Quiz" (book icon), "Create" (plus icon), and "profile" (person icon).</p>	Matched
Q1	1																										
Q2	1																										
Q3	1																										
Q4	1																										
Q5	0																										
Q6	0																										
Q7	0																										
Q8	1																										
Q9	0																										
Q10	0																										
Q11	0																										
Q12	1																										

Legend:

"Each 'Yes' answer is tallied, and the elective with the most affirmative responses will be recommended by the application. If the user shows interest in multiple electives, all equally preferred electives will be recommended. If no preferences are indicated, the application will suggest that you reconsider your interests and retake the quiz.". The tests are also limited to selected samples as there are 4096 rows for 12 questions. The questions and their corresponding electives are outlined in the table below:

Question No.	Question	Elective
1	Do you enjoy designing user interfaces?	Human Computer Interaction
2	Are you interested in working with embedded systems?	Cyber Physical Systems
3	Do you like managing networks and systems?	System Administration
4	Do you have a passion for analyzing data?	Data Science
5	Do you find yourself interested in human-centered design?	Human Computer Interaction
6	Are you fascinated by the Internet of Things (IoT)?	Cyber Physical Systems
7	Do you enjoy solving technical issues in IT environments?	System Administration
8	Are you interested in machine learning and AI?	Data Science
9	Do you enjoy creating prototypes and testing them?	Human Computer Interaction
10	Are you interested in robotics?	Cyber Physical Systems
11	Do you like setting up and configuring servers?	System Administration
12	Do you enjoy visualizing data and creating reports?	Data Science

2.1 CONCLUSION

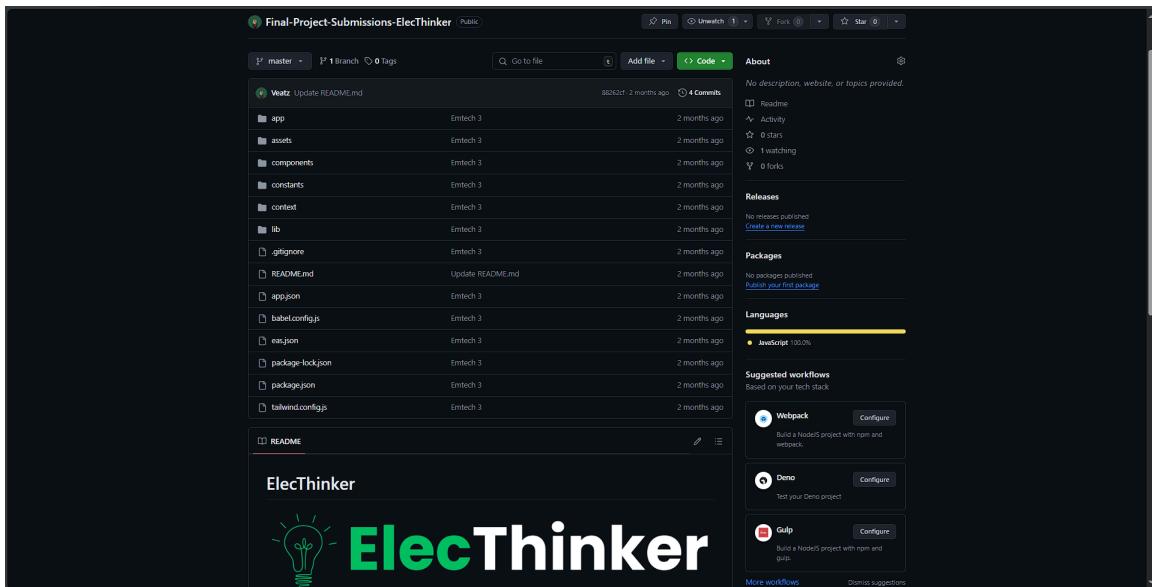
In summary, the development journey of "Elechinker", our elective recommendation mobile app, has seen significant progress and accomplishments. From conceptualization to execution of the design mockup, which includes key features like "Get Started," "Sign In," and "Sign Up," each stage displays our team's dedication to user-friendly design and functionality. Furthermore, our proactive survey of second-year computer engineering students confirmed the relevance and requirement of our solution. Moving forward, we will continue to work on improving Elechinker's usability and efficiency through the use of user feedback. With each milestone achieved, we get closer to our goal of providing students with a comprehensive tool for making educated elective choices.

2.2 REFERENCES

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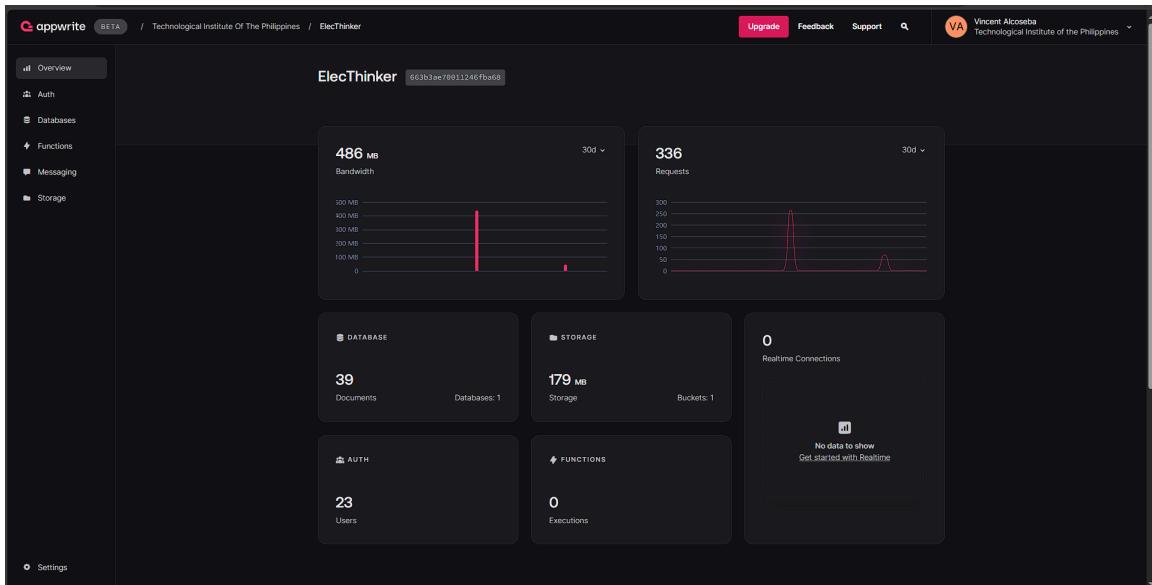
2.3 APPENDICES

APPENDIX A: GITHUB REPOSITORY



[ElecThinker \(github.com\)](https://github.com/ElecThinker/Final-Project-Submissions-ElecThinker)

APPENDIX B: APPLICATION DATABASE (APPWRITE)



[Console - Appwrite](#)