AA TV

Development of Android TV Box Application to Broadcast Imus LGU Activities

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SUMMARY

The AA TV project aims to provide internet accessibility for indigent families in the Imus community by providing Android TV boxes equipped with a custom application. This document details the development and implementation of the AA TV application, including its design, functionality, and user guide.

The AA TV application is designed to broadcast activities of the Imus Local Government Unit (LGU) and includes a game feature that allows users to increase their internet speed. The main objectives are to broadcast LGU news, announcements, and events and to develop a game that offers users a chance to increase their internet speed. The application's main function is to broadcast news, live events, and community announcements. Its primary limitation is that it is designed solely for Android TV boxes.

Designing the AA TV application was tailored to fit for viewing on television screens. The design uses larger fonts and darker backgrounds for readability on larger screens. The application communicates with a back-end system via APIs, using token-based authentication to ensure secure data requests. Data is fetched from the back-end and stored locally for offline use. The project utilizes hardware such as desktops, monitors, and Android TV boxes, and software such as Visual Studio Code, XAMPP, and Figma for development and design. The AA TV application was developed using the Flutter framework with the Dart language, while the back-end system for AA TV was developed using the Laravel framework.

The AA TV project has made significant progress in development and implementation, achieving many key functions. However, it remains incomplete and unfit for public release due to missing features and the need for further back-end system development. Ensuring error-free performance is essential for minimizing maintenance requirements.

INTRODUCTION

Purpose and Description

AA TV is an application designed to be installed on Android TV boxes. This project aims to develop an application that will be used to broadcast activities of the Imus Local Government Unit (LGU). The app will be installed on Android TV boxes that will be distributed to indigent families. Additionally, these Android TV boxes will serve as a medium to provide free Wi-Fi to these families. A game within the application will offer indigent families an opportunity to increase their internet speed for a day.

Objectives

1. Provide a module to broadcast LGU news, announcements, and events.
2. Develop a game to be use for giving the user a chance to increase their internet speed.

Scopes and Limitations

Scopes

- Broadcast LGU latest news
- Live broadcast of events like flag raisings, etc.
- Live streams in case of pre-disaster information.
- Disseminate LGU community announcements and events
- Daily game that offers to upgrade free internet speeds.

Limitations

- The application is intended to be installed only on Android TV boxes and therefore cannot be installed or used on mobile devices and other platforms.

DESIGN AND IMPLEMENTATION

User Interface Design

The UI design of the AA TV application is tailored to provide a seamless and intuitive user experience on an Android TV box. The design emphasizes simplicity, ease of navigation, and accessibility, ensuring that users can quickly access and interact with the various modules and features of the application. Font sizes and certain components are intentionally made larger to enhance readability and visibility for users. The background colors are chosen to be darker, reducing light emission since the application is viewed on a larger screen. The color scheme is specifically selected to align with the preferred colors of the current Mayor of Imus.

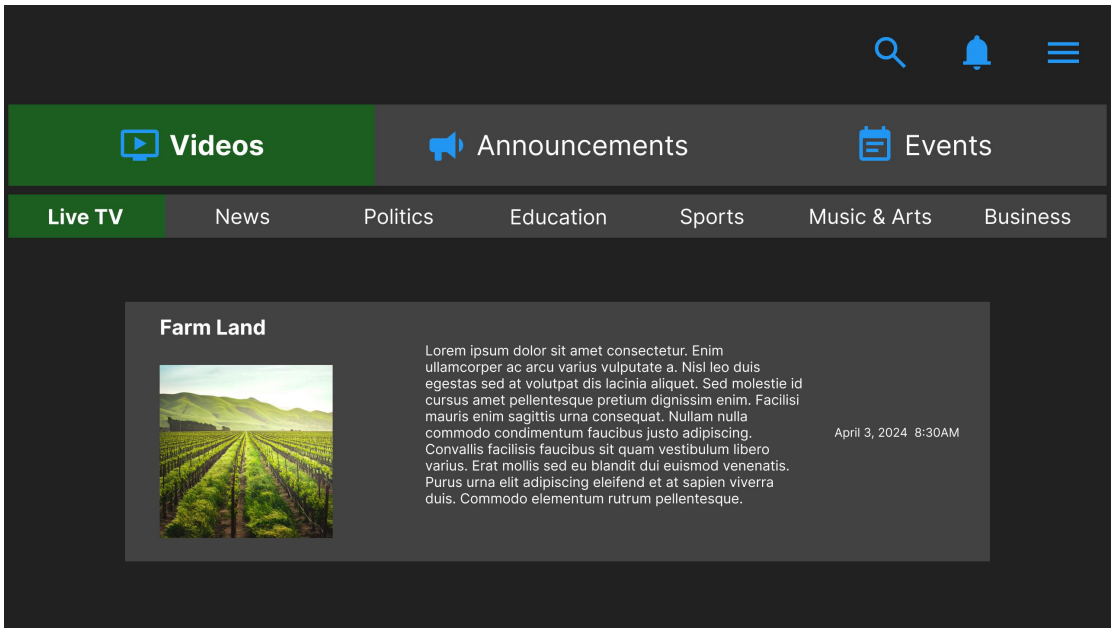

Figure 1: Initial Design of Videos Screen

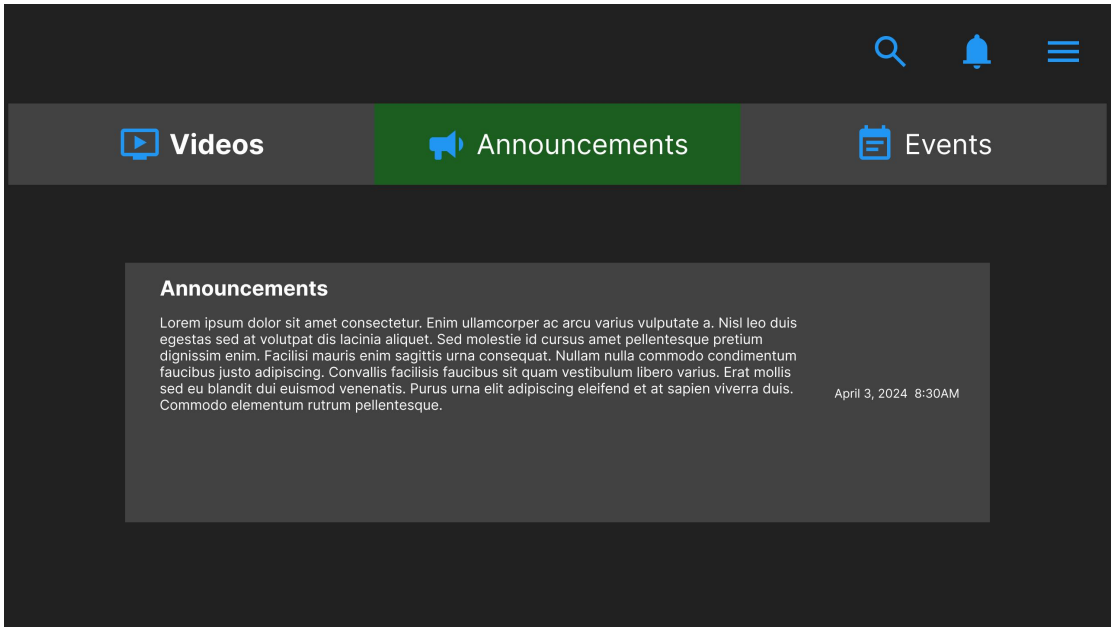

Figure 2: Initial Design of Announcements Screen

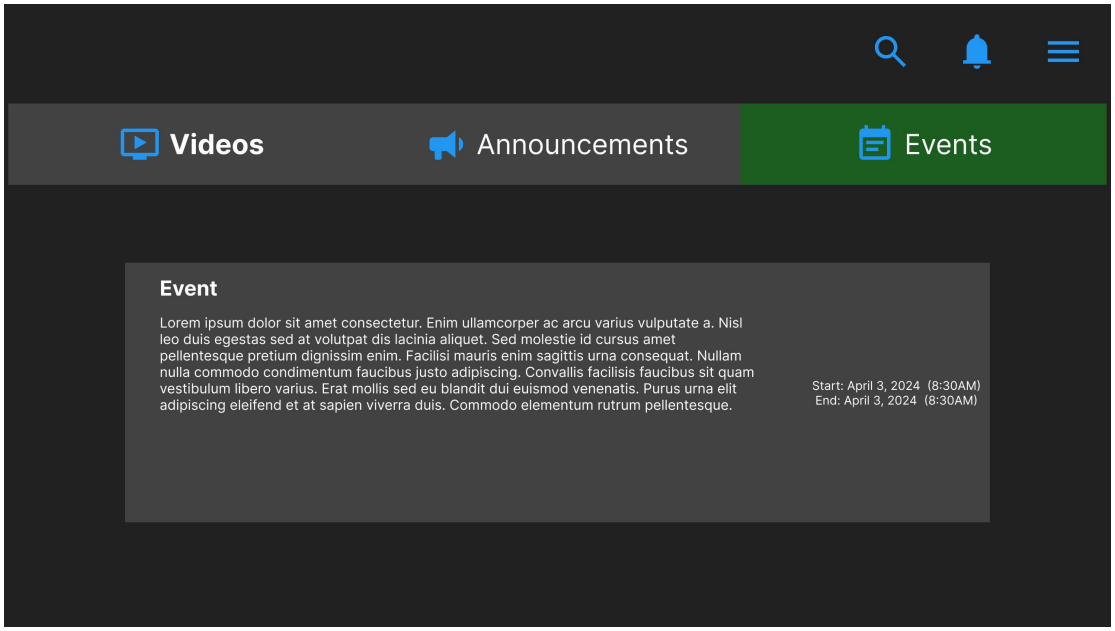

Figure 3: Initial Design of Events Screen

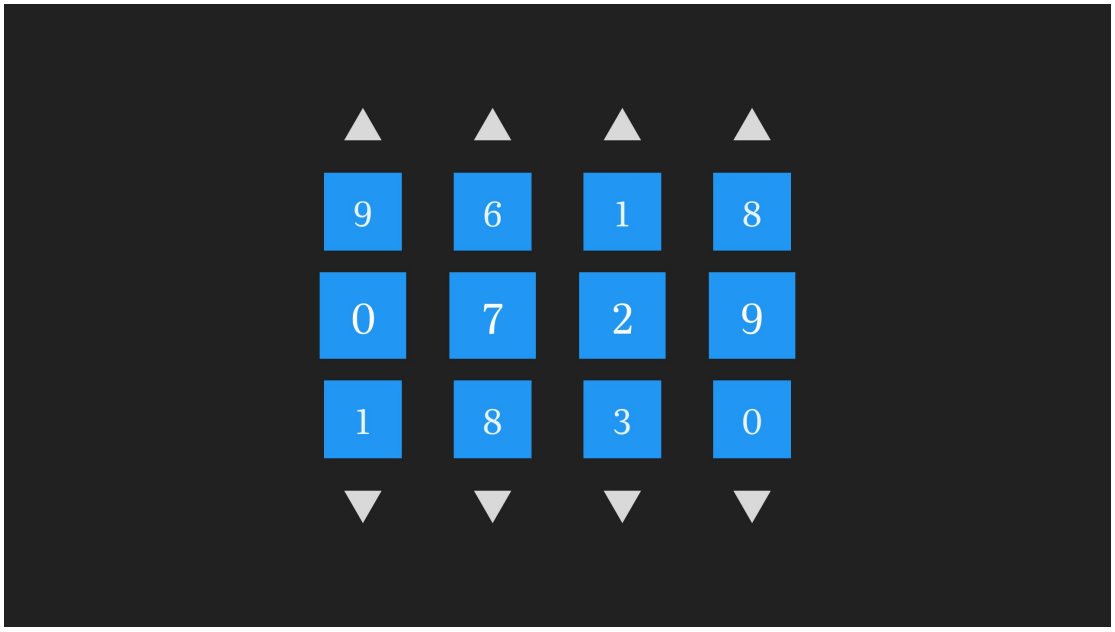

Figure 5: Prototype Design for Number Padlock Game

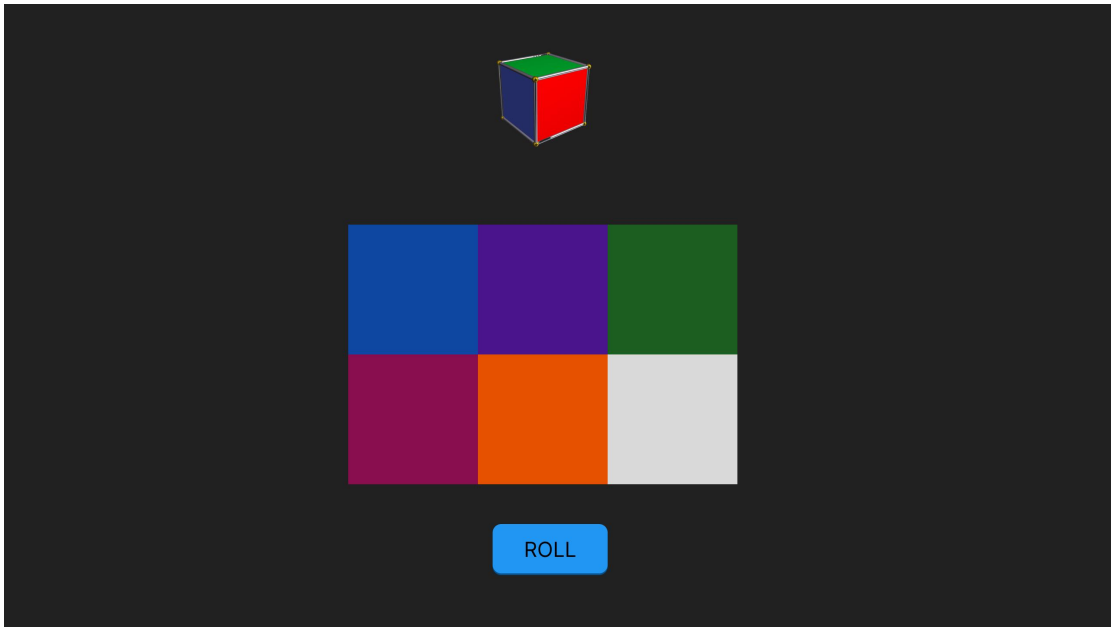

Figure 5: Prototype Design for Color Game

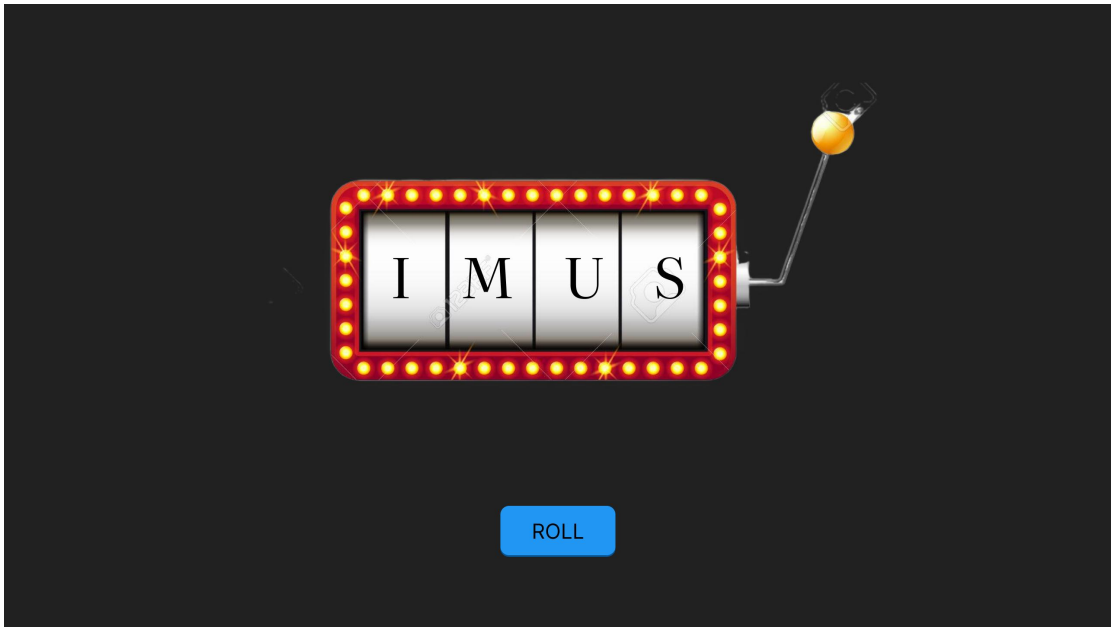

Figure 6: Prototype Design for Slot Machine

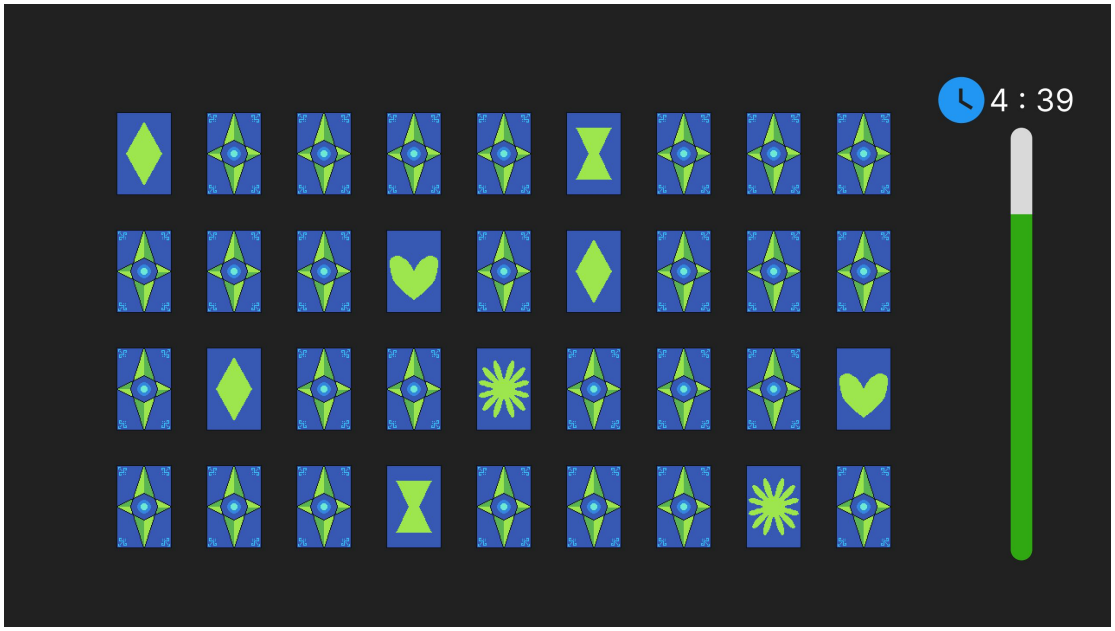

Figure 7: Prototype Design for Memory Card Game

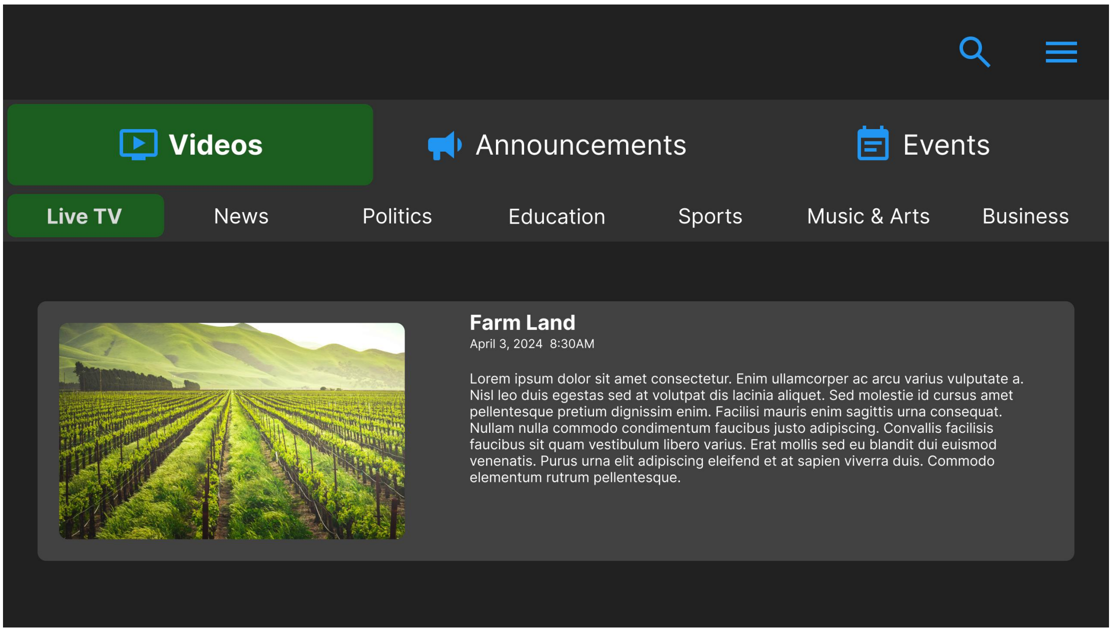

Figure 8: Latest Design of Videos Screen

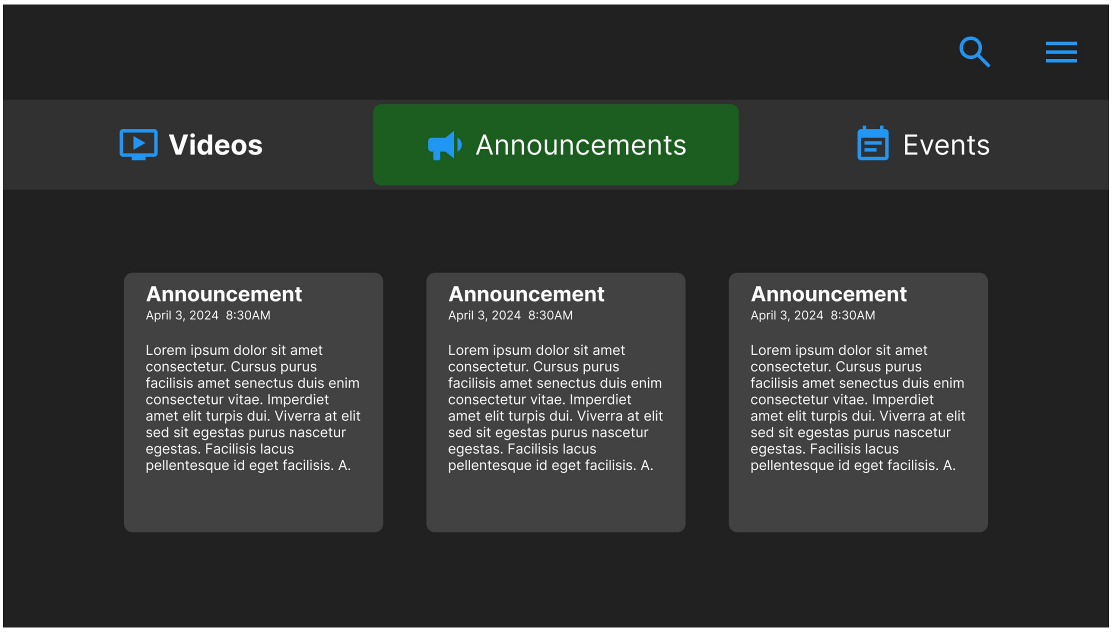

Figure 9: Latest Design of Announcements Screen

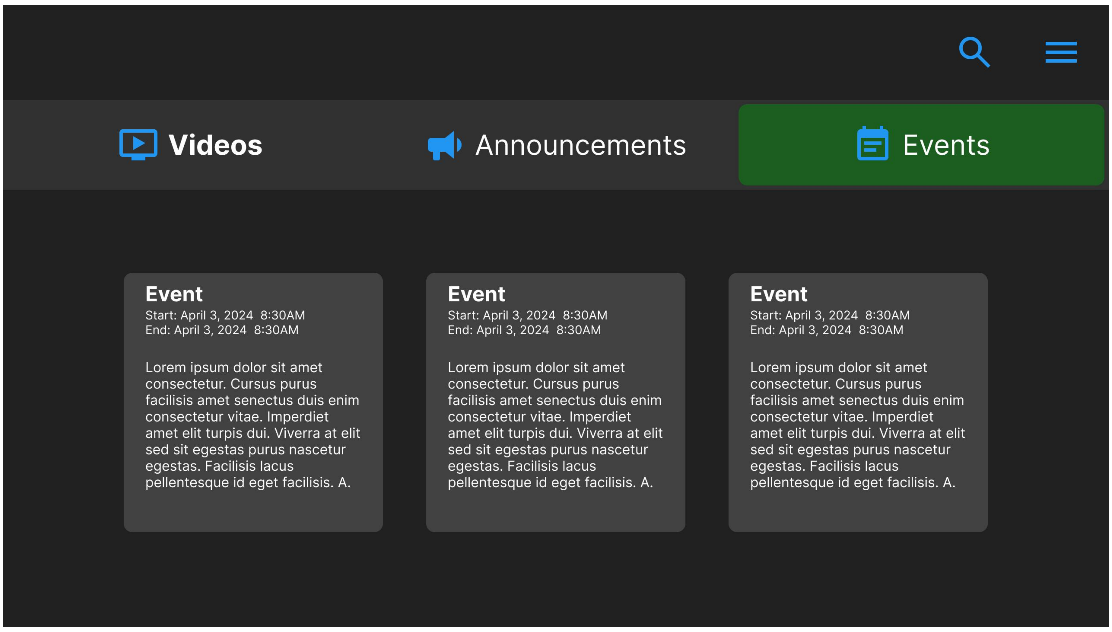

Figure 10: Latest Design of Events Screen

Application Logic

AA TV requires the capability to broadcast or livestream videos and to disseminate announcements and events. To implement this functionality, a separate system has been developed to handle the back-end operations and manage the data and resources required for AA TV. This back-end system is a web application that stores and manages the data. Communication between AA TV and the back-end system is facilitated through an API. To ensure that only AA TV can request the data, a specific token is used for authentication.

When the AA TV app is launched, it first initializes the necessary data by fetching it from the back-end and storing it in a local database for offline use. Subsequently, the app displays the data stored in the database. While images and videos are not stored locally, they still require an internet connection to be accessed from the back-end system. Loaded images are cached for offline viewing, but videos require an internet connection for playback.

Regarding the game feature of AA TV, if the user wins a game, the app sends the game result to the back-end system. The back-end system's operator will then decide how to adjust the user’s internet speed based on the game results.

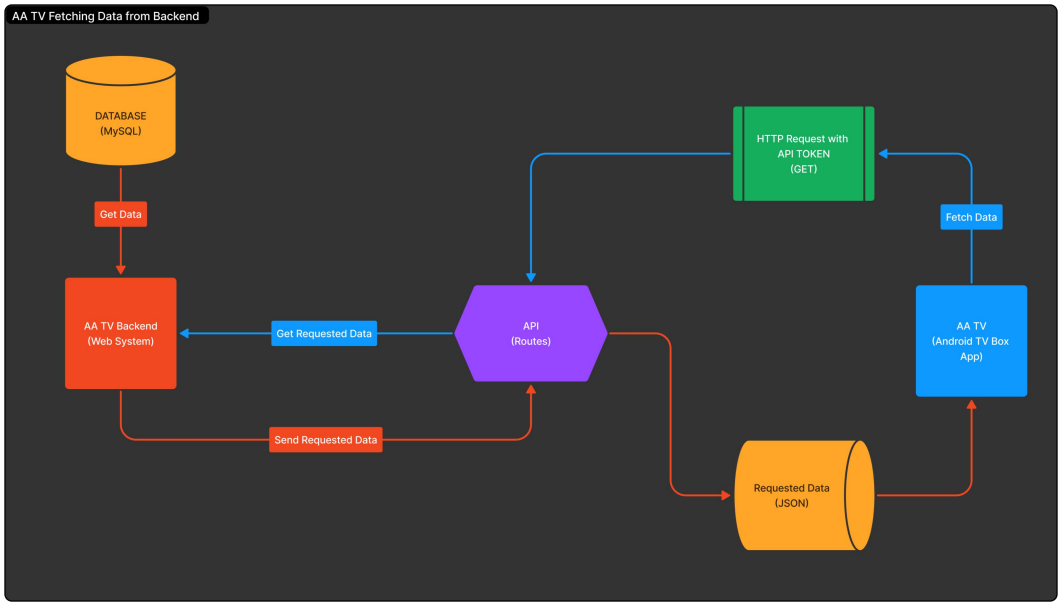

Figure 11: Diagram of AA TV fetching data from back-end

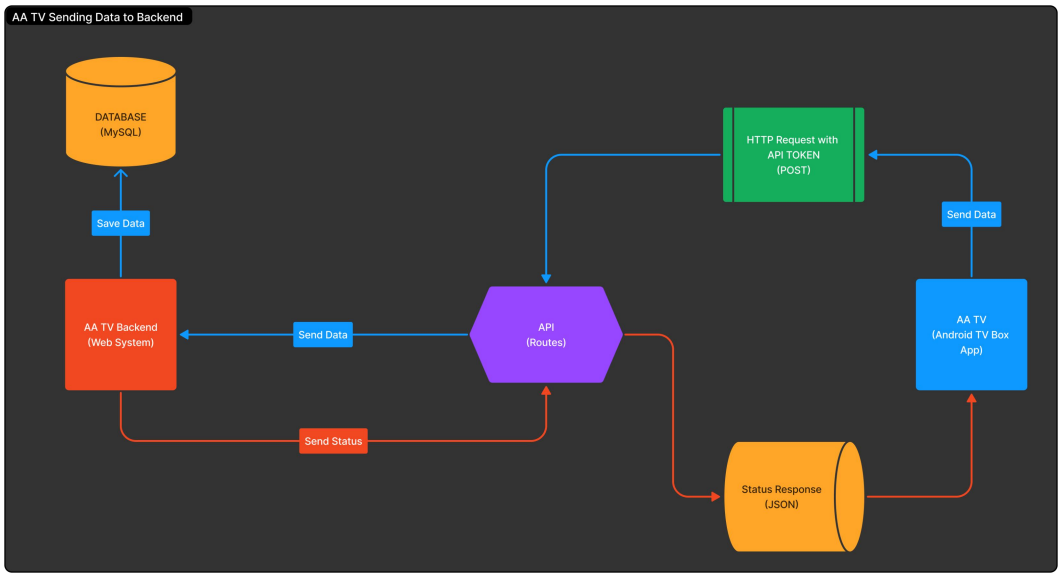

Figure 12: Diagram of AA TV sending data from back-end

Resources

Hardware

- Desktop/Laptop
- Monitor
- Android TV Box with Remote
- HDMI Cable (for displaying the Android TV box on a monitor)
- Mouse
- Keyboard

Software

- Visual Studio Code: The primary IDE for developing the project.
  a) Languages
     - Dart
     - PHP
     - HTML
     - CSS
     - JavaScript
     - MySQL
  b) Frameworks
     - Flutter
     - Laravel
     - Livewire
     - Bootstrap
- XAMPP: Used to create a local MySQL database for the system and host the back-end of AA TV.
- Localtunnel: Used to expose the back-end system of AA TV to be accessed publicly.
- Figma: Used to design the UI/UX, wireframes, and create assets for both AA TV and its back-end system.
- LibreSprite: Used to create game assets for AA TV.

USER GUIDE

Installation Instructions

AA TV (Android TV Box App)

1. Download the APK File: The APK file of AA TV can be downloaded from the following link: https://github.com/Kheemwel/aa-tv-app/releases/download/v1.0.0-alpha/AA.TV.Demo.apk
2. Install the APK: Once the APK file is downloaded, install it on your Android TV box.

AA TV (Back-end System)

1. Download the Back-end System: The back-end system of AA TV can be downloaded from the following link: https://github.com/Kheemwel/aa-tv-backend/archive/refs/heads/main.zip
2. Extract the Files: Once downloaded, extract the ZIP folder. Navigate to the extracted folder.
3. Open Command Prompt: Open the Command Prompt or terminal in the directory of the extracted folder.
4. Install Dependencies: Run the following command to install the necessary dependencies: ***composer install***
5. Set Environment Variables: Copy the example environment file to create a new .env file: ***copy .env.example .env***
6. Generate Application Key: Run the following command to generate the application key: ***php artisan key:generate***
7. Run Migrations: Execute the migration command to set up the database tables: ***php artisan migrate***
8. Start the Server: Start the Laravel development server with the following command (ensure that the Apache and MySQL servers are running using XAMPP): ***php artisan serve***

LocalTunnel (for API to Work)

1. Install LocalTunnel: Run the following command to install LocalTunnel globally: ***npm install -g localtunnel***
2. Expose the Back-end System: Once the AA TV back-end system is running using php artisan serve, run the following command to expose the service of the back-end system to the public: ***lt --port 8000 --subdomain android-tv-test --local-host 127.0.0.1*** .This will make the back-end system accessible from other devices.

Application Instructions

AA TV (Back-end System)

1. Login: Once the system is running, log in using the username **admin** and the password **admin123**.
2. Game Page: This page displays all the game results sent by the AA TV app.
3. Announcements Page: Manage announcements here. To upload a new announcement, provide the necessary title and message in the form.
4. Events Page: Manage events here. To upload a new event, provide the necessary title, description, and the start and end date and time.
5. Video Categories Page: Manage video categories here. Categories are used to organize types of videos. To add a new category, provide the desired name.
6. Videos Page: Manage uploaded videos here. To upload a new video, provide the necessary title, description, select a category, upload a thumbnail, and upload the video file.

AA TV (Android TV Box App)

1. Navigation: Use the arrow keys on the remote to move left, right, up, and down. Press the enter/ok button to select an element or widget in the application.
2. Shuffle Cups Game: Press the "Shuffle" button to shuffle the cups. After shuffling, three arrows point to different cups. Press an arrow to select

the cup it points to, revealing if there is a ball behind it. If there is a ball, you win; if not, you lose.

3. Memory Card Game: There are 12 pairs of cards to match. All cards are initially face-down. You can select two cards at a time to check if they match. If the selected cards do not match, they will flip back to hide their content.
4. Color Game: Select two colors from six choices. Press the "Roll" button to shuffle the color cube at the top. The color on the top face of the cube is the winning color. If one of your selected colors matches the top color, you win.
5. Number Padlock Game: Guess the 4-digit secret number within 60 seconds by moving the number selector. If you guess the number correctly within the time limit, you win.
6. Slot Machine Game: Press the "Roll" button to start the slot machine. You win by getting the “IMUS” combination on the slot machine.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The development and implementation of AA TV have successfully achieved most of the major functions. However, the application is still incomplete and not ready for public release. It lacks some important features, and the back-end system requires further development. Additionally, the application needs to be free of errors and bugs to ensure low maintenance.

Recommendations

The following recommendations here are made for future improvement of this project.

- Optimize remote control compatibility to make navigation easier for users.
- Improve the game mechanics and UI design.
- Add a notification module or feature for both the back-end and AA TV.
- Enable events to be set locally on Android TV boxes for offline notifications.
- Enhance the overall UI design of AA TV.
- Implement unit testing for both the back-end and AA TV.
- Improve the overall UI and functionality of the back-end system.
- Consider using a different language or framework that could facilitate faster development and easier maintenance.
- Incorporate feedback from initial users to refine the application's features and usability.
- Ensure that the application and back-end system are secure, especially since they will be providing internet access and broadcasting information.
- Design the system to be scalable to accommodate future updates and additional features.
- Provide comprehensive documentation for future developers to ensure the project can be easily maintained and enhanced.

APPENDICES

Sources

1. AA TV Source Code: https://github.com/Kheemwel/aa-tv-app
2. AA TV (Back-end) Source Code: https://github.com/Kheemwel/aa-tv-backend
3. UI Design and Wireframing: https://www.figma.com/design/JbNUKncMCpg0KMQHXC2Drc/Android-TV-Box-App-Project?t=hDDtQvdhLfR3S9Mf-1
4. Project Planning and Designing: https://www.figma.com/board/IcIwrFlTfNDQA1GSzKGUp0/Android-TV-Box-Whiteboard?node-id=0%3A1&t=hDDtQvdhLfR3S9Mf-1
5. AA TV Application: https://github.com/Kheemwel/aa-tv-app/releases/download/v1.0.0-alpha/AA.TV.Demo.apk