

SnipX



FYP Team

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1. Introduction

SnipX is your Gateway to Simplified Video Editing, Subtitling, and Summarization. In a world where video content reigns supreme, we've created a groundbreaking platform that simplifies video editing, and subtitling and ensures high-quality audio and video.

Our mission is to streamline video enhancement, enhance accessibility, and provide summarization tools. Additionally, we're committed to making Urdu content accessible globally, thus bridging language barriers.

SnipX offers automated voice cutting, user-friendly video editing tools, and Urdu subtitling for consistent video excellence. But that's not all – we're taking it a step further by introducing video summarization, allowing you to distill your video content into engaging, concise summaries.

Join us on this journey to unlock your video enhancement and summarization potential, captivate audiences worldwide, and leave your mark in the dynamic world of video content creation.

SnipX: Where video editing, subtitling, and summarization converge with excellence.

2. Related System Analysis / Literature Review

Application Name	Weakness	Proposed Project Solution
Adobe Premiere Pro	No AI-powered subtitle generation, lacks automation for noise removal & summarization	SnipX provides AI-powered subtitle generation, automatic noise removal, and summarization
Kapwing	Limited editing features, lacks AI-driven enhancements	SnipX offers AI-based editing tools for better efficiency
VEED.io	No video summarization, limited automation	SnipX integrates AI-based video summarization and recommendation system
Other Video Editors	No Urdu subtitle support, limited accessibility features	SnipX provides Urdu subtitle generation , accessibility tools, and AI-driven video enhancements

This comparison highlights the gaps in existing solutions and how SnipX addresses them with AI-powered features, including **Urdu subtitling support**.

3. Project Vision

3.1. Problem Statement

SnipX addresses prevalent issues in video editing, subtitling, accessibility, and summarization. The key challenges include:

- **Complex & Time-Consuming Video Editing:** Editing requires expertise and consumes significant time, making it difficult for beginners.
- **Manual Subtitling Challenges:** Creating subtitles manually is tedious, error-prone, and lacks support for non-English languages like **Urdu**.
- **Audio & Video Quality Preservation:** Maintaining high quality while editing, compressing, or enhancing video and audio is a challenge.
- **Overwhelming Volume of Videos:** Managing and organizing large amounts of video content efficiently is difficult.
- **Lack of Summarization Tools:** Users struggle to condense video content into **short, engaging summaries** for quick consumption.

These challenges collectively hinder the production of **high-quality, accessible, and engaging videos**, making **AI-driven automation** essential.

3.2. Problem Solution

SnipX is designed to address the inefficiencies and challenges in video editing, subtitling, accessibility, and summarization. The platform leverages AI-driven tools to streamline the editing process, enhance accessibility, and simplify content creation. Key solutions include:

- **AI-Powered Subtitle Generation:** Automates subtitle creation, reducing manual effort and supporting multiple languages, including **Urdu**.
- **Natural Language Processing (NLP) for Subtitles:** Uses NLP algorithms to improve subtitle accuracy and contextual relevance.
- **Automatic Noise Removal:** Uses AI to filter out background noise and enhance audio clarity.
- **Video Summarization & Keyframe Extraction:** AI-based summarization extracts key moments, making video content more engaging.
- **AI-Powered Thumbnail Selection:** Automatically selects the most engaging frame for thumbnails.
- **Accessibility Features:** Provides text-to-speech (TTS), color-blind-friendly UI, and assistive tools for inclusivity.
- **User-Friendly Interface:** Offers an intuitive UI to simplify the editing process, making it accessible to both beginners and professionals.

Business Opportunity

SnipX strategically seizes a significant business opportunity by simplifying video enhancement, accessibility, and summarization. Key business opportunities include:

- **Integrated Video Editing & AI Features:** Unlike competitors, SnipX combines AI-powered **subtitling, noise removal, and summarization** into a single platform.
- **Urdu Subtitle Market:** Catering to a niche market with **AI-driven Urdu subtitling**, making content accessible for a broader audience.
- **Educational Sector Partnerships:** Licensing agreements with **schools and universities** for AI-powered **lecture subtitling and video summarization**.
- **Business & Marketing Use Cases:** Businesses can use SnipX for **fast video content creation**, boosting marketing and customer engagement.
- **Content Creator Support:** Simplifies **video production for YouTubers, educators, and influencers** by reducing editing time.
- **Potential Revenue Streams:**
 - **Subscription-Based Model:** Offering free and premium plans for individuals and businesses.

- **Advertising Partnerships:** Collaborating with brands for sponsored features.
- **AI-Powered API Licensing:** Providing SnipX's AI capabilities to other video platforms.

3.3. Objectives

- **Simplify Video Editing** – Provide an intuitive and user-friendly interface for efficient video trimming, cutting, and enhancement.
- **AI-Based Subtitle Generation** – Automatically generate subtitles using **NLP** and speech recognition, with support for multiple languages, including **Urdu**.
- **Enhance Audio Quality** – Implement AI-driven noise removal and voice enhancement to improve audio clarity.
- **Summarize Video Content** – Utilize AI to extract keyframes and generate concise video summaries for quick content consumption.
- **Improve Accessibility** – Support features like subtitles, text-to-speech, and UI adjustments for visually and hearing-impaired users.
- **Enable Video Compression & Format Conversion** – Allow users to compress large files without significant quality loss and convert them into various formats.
- **Ensure Secure User Authentication** – Implement **JWT-based authentication** and **two-factor authentication (2FA)** for secure user login.
- **AI-Powered Thumbnail Selection** – Automate thumbnail selection based on the most engaging frames.
- **Optimize User Dashboard & Management** – Provide a structured dashboard for users to manage their projects effectively.
- **Scalable and Efficient System** – Develop a system that can handle high-performance video processing and AI tasks efficiently.

3.4. **Project Scope**

- **Versatile video editing platform** focusing on automation in **voice cutting and Urdu subtitling**.
- **Enhances video accessibility and quality** while bridging **language gaps**.
- **Target audience** includes **YouTubers, businesses, content creators, and educators**.
- **Key features:**
 - Automated voice cutting
 - User-friendly video editing tools
 - Automated Urdu subtitling
 - Video summarization
- **Unique Selling Proposition (USP):** Integrated approach leveraging **advanced video processing and NLP tools**.
- **Possible limitations:** Limited **language diversity** and **content quality concerns**.
- **Expected outcome:**
 - High-quality, accessible video content.
 - Increased availability of Urdu content.
 - Simplified and user-friendly video editing experience.

Software Requirement Specifications:

4.1 Features

SnipX is divided into two feature levels:

- **High-Level:** Audio cutting, subtitling, and video summarization.
- **Secondary-Level:** Thumbnail generation and audio-visual enhancement.

4.1.1 High-Level Features

- **Audio Cutting** – Removes filler words, stutters, and background noise for clarity.
- **Subtitling** – Generates Roman Urdu subtitles for accessibility.
- **Video Summarization** – Creates short video summaries using AI-based keyframe selection.

4.1.2 Secondary-Level Features

- **Audio-Visual Enhancement** – Improves video stability, color, and audio clarity.
- **Thumbnail Generation** – Generates engaging thumbnails to boost viewer attraction.

4.2 Functional Requirements

4.2.1 Audio Cutting

- Extracts and converts audio to text.
- Detects and removes filler words and pauses.
- Ensures seamless audio trimming.

4.2.2 Subtitling

- Uploads and transcribes videos.
- Allows users to edit and style subtitles.
- Supports multiple languages.

4.2.3 Video Summarization

- Analyzes and extracts key video segments.
- Maintains quality and coherence.

4.2.4 Audio-Visual Enhancement

- Offers image stabilization, color correction, and audio enhancement.
- Provides file management and compression tools.

4.2.5 Thumbnail Generation

- Selects key frames for thumbnails.
- Provides editing tools for customization.

4.3 Quality Attributes

4.3.1 Audio Cutting

- **Efficient, reliable,** and **accurate** with a user-friendly interface.

4.3.2 Subtitling

- Ensures **usability, customization,** and **accessibility**.

4.3.3 Video Summarization

- Maintains **coherence, performance,** and **customization** options.

4.3.4 Audio-Visual Enhancement

- Focuses on **effectiveness, usability,** and **compatibility**.

4.3.5 Thumbnail Generation

- Provides **visual appeal, simplicity,** and **speed**.

4.4 Non-Functional Requirements

4.4.1 Performance

- Fast response times and scalable video processing.

4.4.2 Usability & UI

- Intuitive, multilingual, and accessible design.

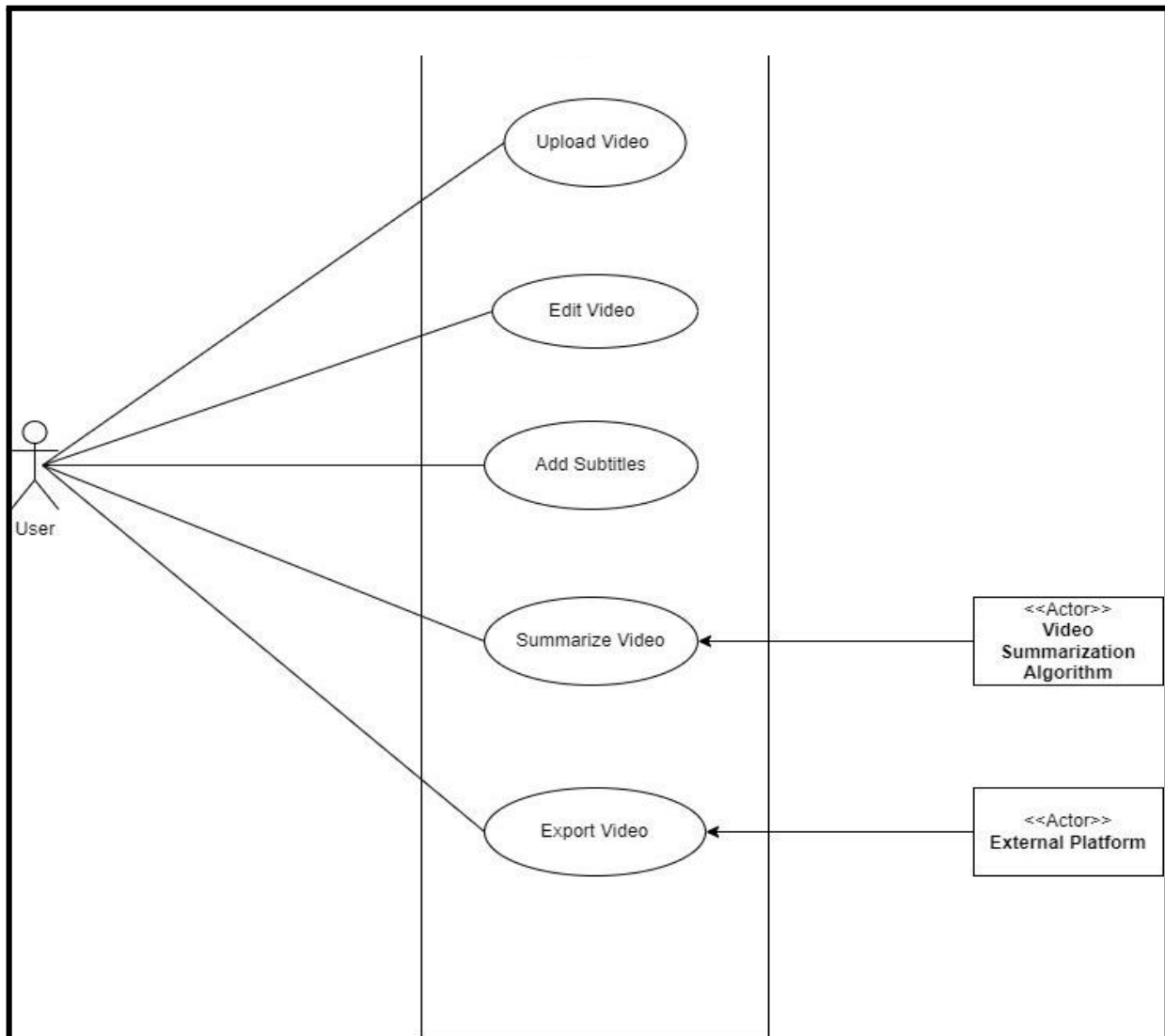
4.4.3 Compatibility

- Supports various devices, OS, and web browsers.

4.4.4 Reliability & Availability

- High uptime and effective error handling.

4. Use Case Diagram:



5.High-level Use Case:

5.1 Upload Video

Use Case	Upload Video
Actors	User
Type	Primary
Description	Users upload video into the SnipX app from various sources, such as their device's gallery, or external platforms.

5.2 Edit Video

Use Case	Edit Video
Actors	User
Type	Primary
Description	Users engage in video editing tasks within the SnipX app, enhancing audio and visual quality, and making other creative adjustments to their videos.

5.3 Add Subtitles

Use Case	Add Subtitles
Actors	User
Type	Primary
Description	Users add subtitles to their videos using SnipX, utilizing automated subtitle generation features.

5.4 Summarize Video

Use Case	Summarize Video
Actors	User, Video Summarization algorithm
Type	Primary
Description	Users create condensed versions of lengthy videos using SnipX's
	summarization feature.

5.5 Export Video

Use Case	Export Video
Actors	User, External Platform
Type	Primary
Description	Users export the final version from SnipX to various external platforms, including social media, or storage.

6.Modules

6.1 Video Upload & Management

- Allow users to upload videos in multiple formats (MP4, AVI, MOV, etc.).
- Provide options to rename, categorize, and manage uploaded videos.
- Enable users to delete or re-upload videos if needed.

6.2 Video Editing & Trimming

- Implement a video trimming tool to allow users to cut specific sections.
- Provide timeline-based editing for precise cuts.
- Allow frame-by-frame navigation for accurate editing.

6.3 AI-Based Subtitle Generation & Translation

- Generate subtitles automatically using speech recognition.
- Support multiple languages, including Urdu.
- Provide editing options to adjust subtitle timing and text.
- Offer subtitle translation services.

6.4 Automatic Noise Removal & Voice Enhancement

- Use AI-based noise filtering to remove background disturbances.
- Enhance voice clarity for better audio output.
- Provide an adjustable noise reduction slider.

6.5 Video Summarization & Keyframe Extraction

- Generate video summaries by extracting key moments.

- Allow users to adjust summary length.
- Use AI to highlight important segments.

6.6 AI-Powered Thumbnail Generation

- Automatically select the most engaging frame for thumbnails.
- Allow users to manually pick a thumbnail from keyframes.
- Provide options for basic thumbnail editing (brightness, text overlay, etc.).

6.7 Video Compression & Format Conversion

- Enable users to compress large video files without significant quality loss.
- Provide format conversion options (MP4, AVI, WEBM, etc.).

6.8 User Authentication & Profile Management

- Allow users to sign up and log in using email or third-party authentication.
- Enable users to manage their profile details and preferences.
- Implement security mechanisms like password encryption and two-factor authentication (2FA).

6.9 User Dashboard & Project Management

- Provide a personalized dashboard showing all uploaded and edited videos.
- Display recent projects, completed tasks, and storage usage.

6.10 Admin Panel

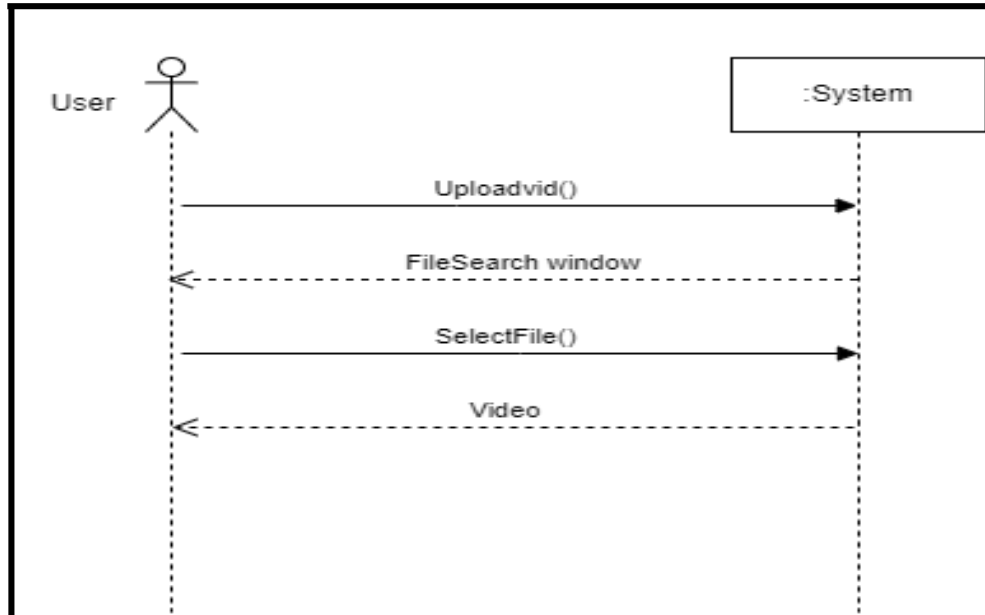
- Allow admins to manage user accounts (suspension, banning, etc.).
- Provide analytics on system usage, most edited videos, and active users.
- Allow admins to approve or review AI-generated content before publishing.

6.11 Help & Support

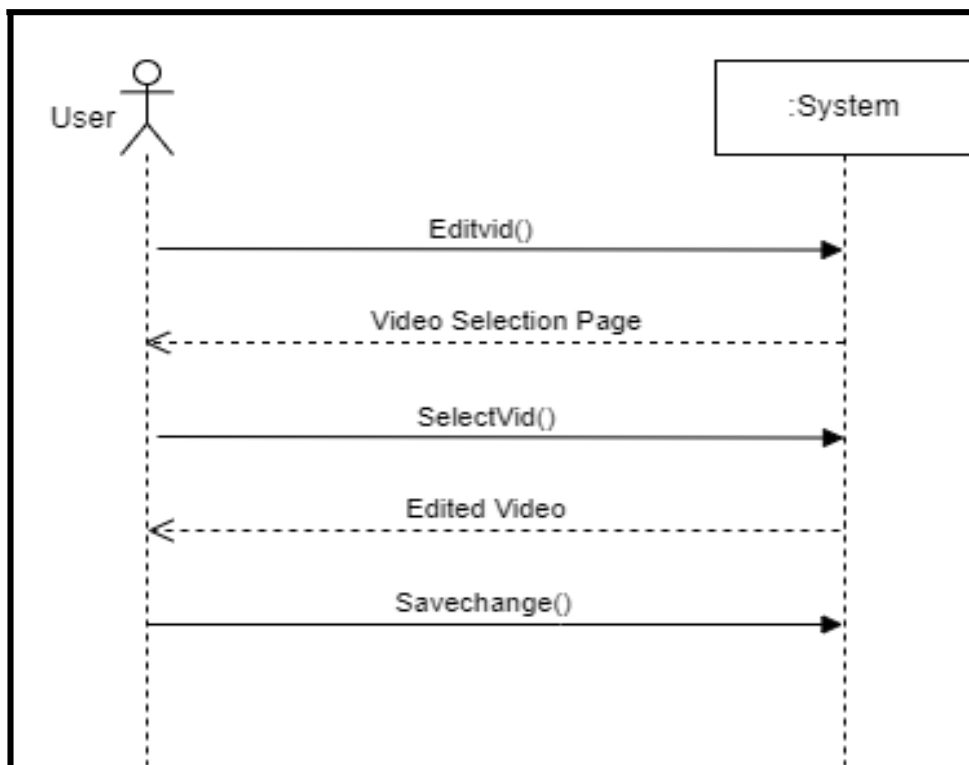
- Offer a help center with tutorials on how to use SnipX features.
- Implement a chatbot or live support for user assistance.

7. System Sequence Diagram

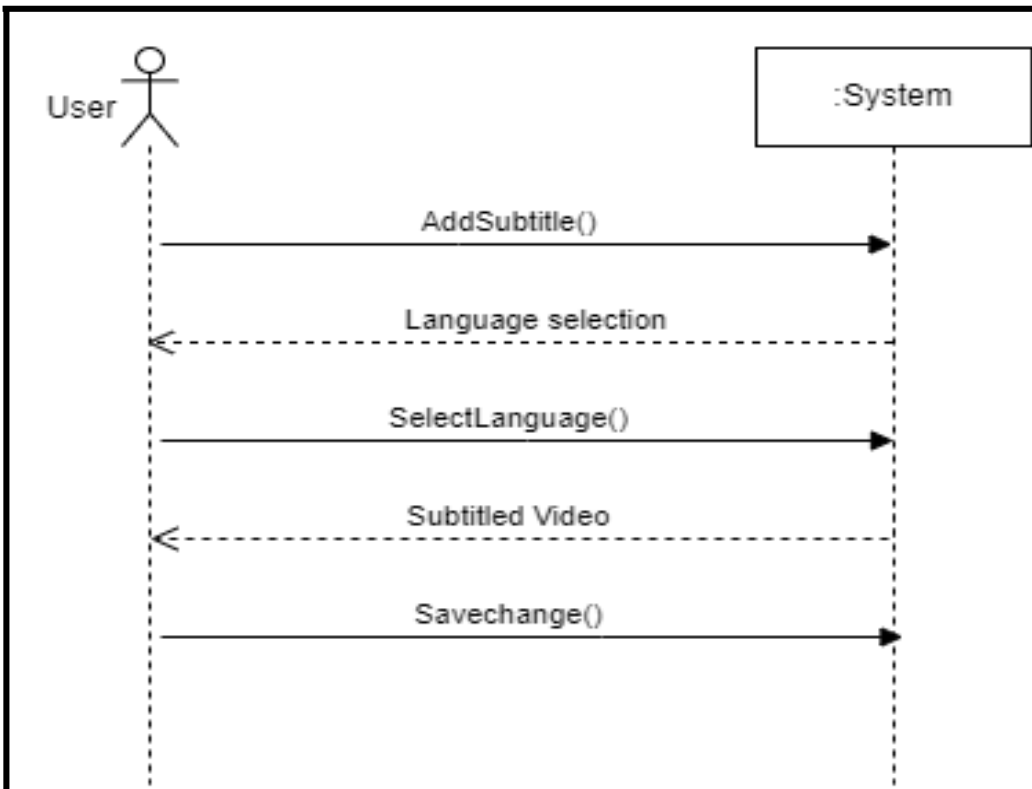
7.1 Upload Video



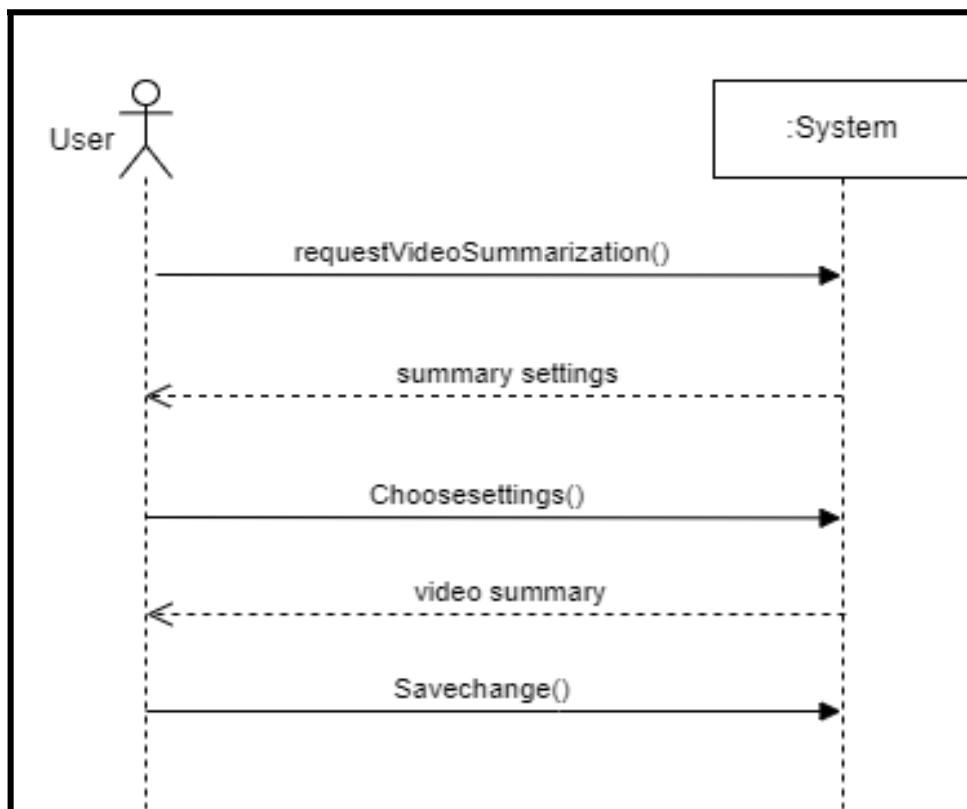
7.2 Edit Video



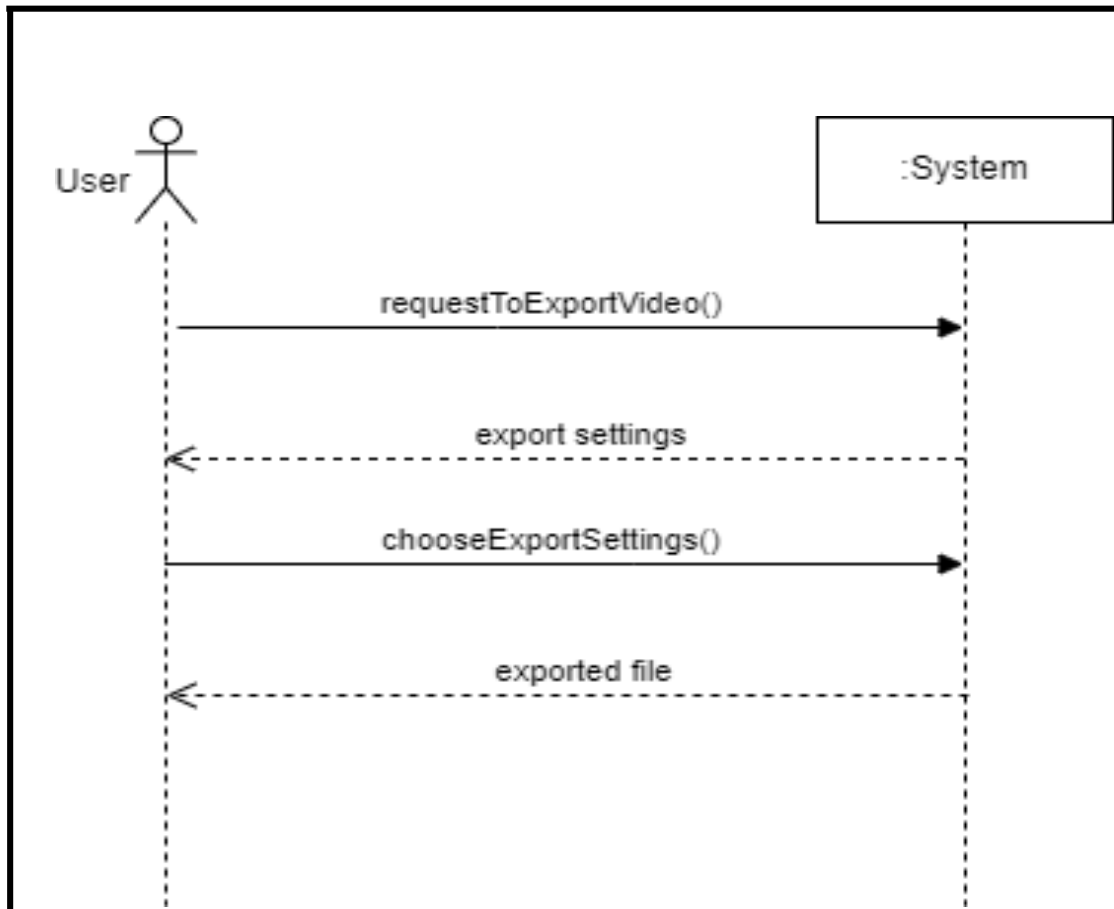
7.3 Add Subtitles



7.4 Summarize Video

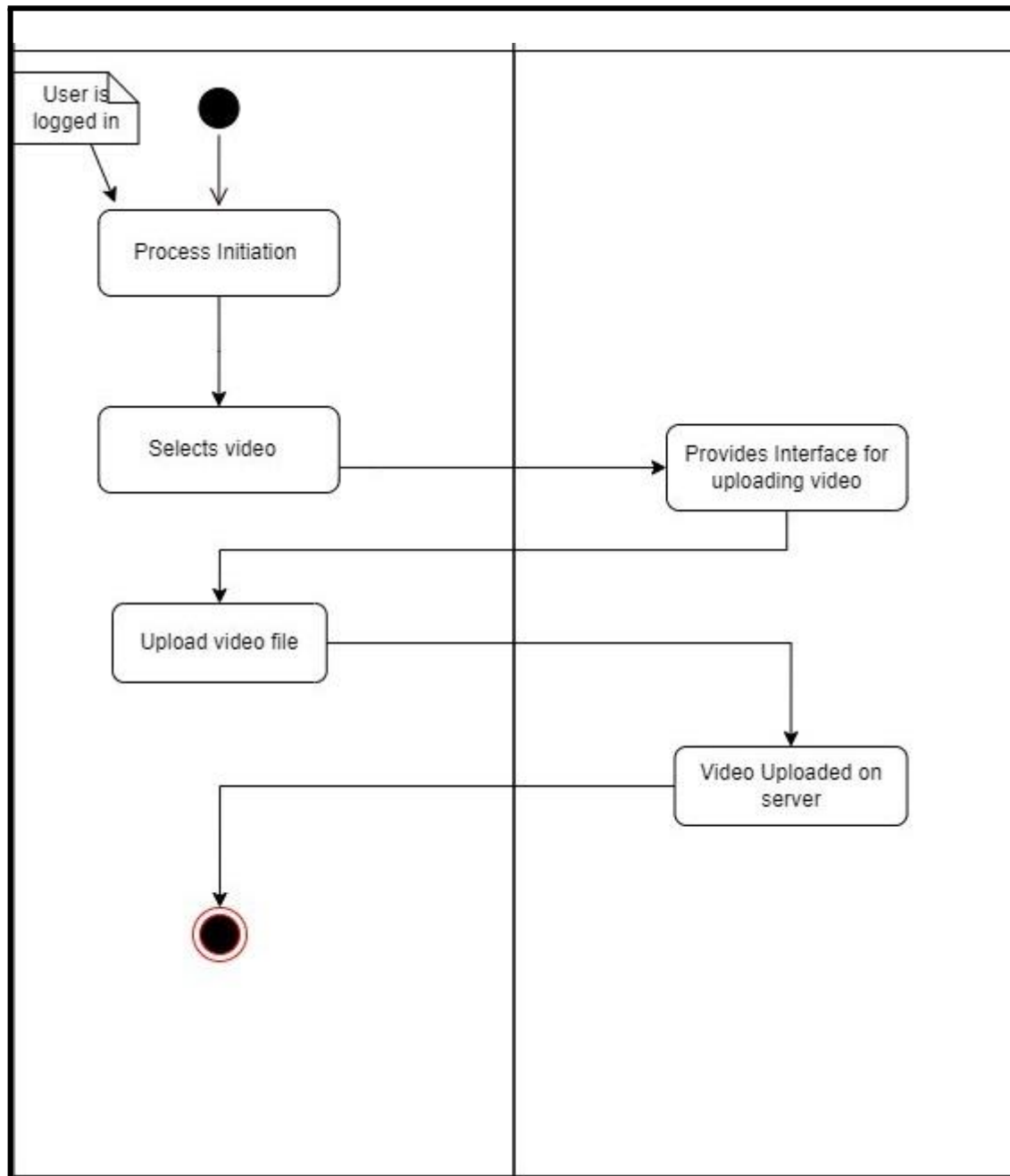


7.5 Export Video

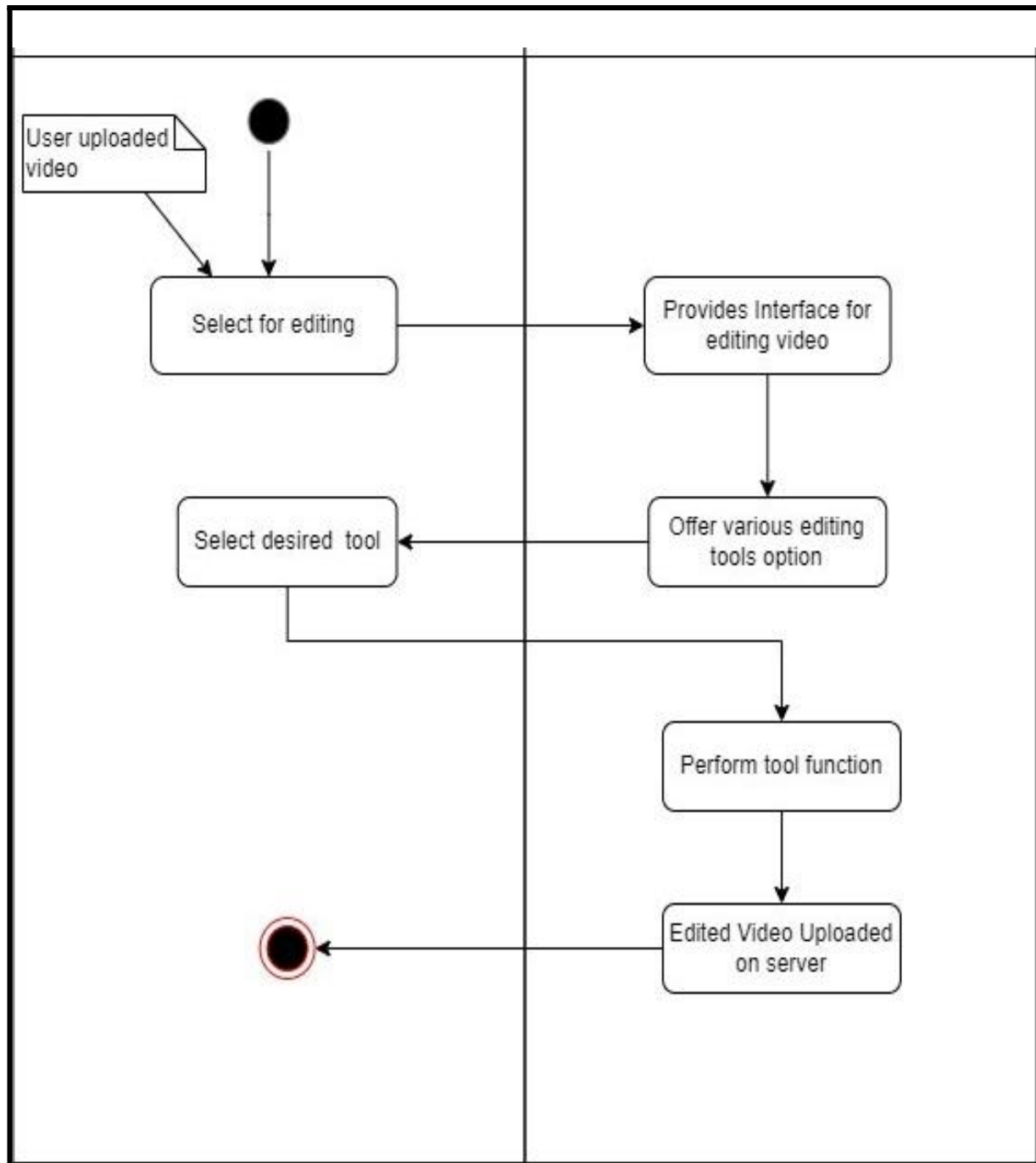


Activity Diagram/ Data Flow Diagram

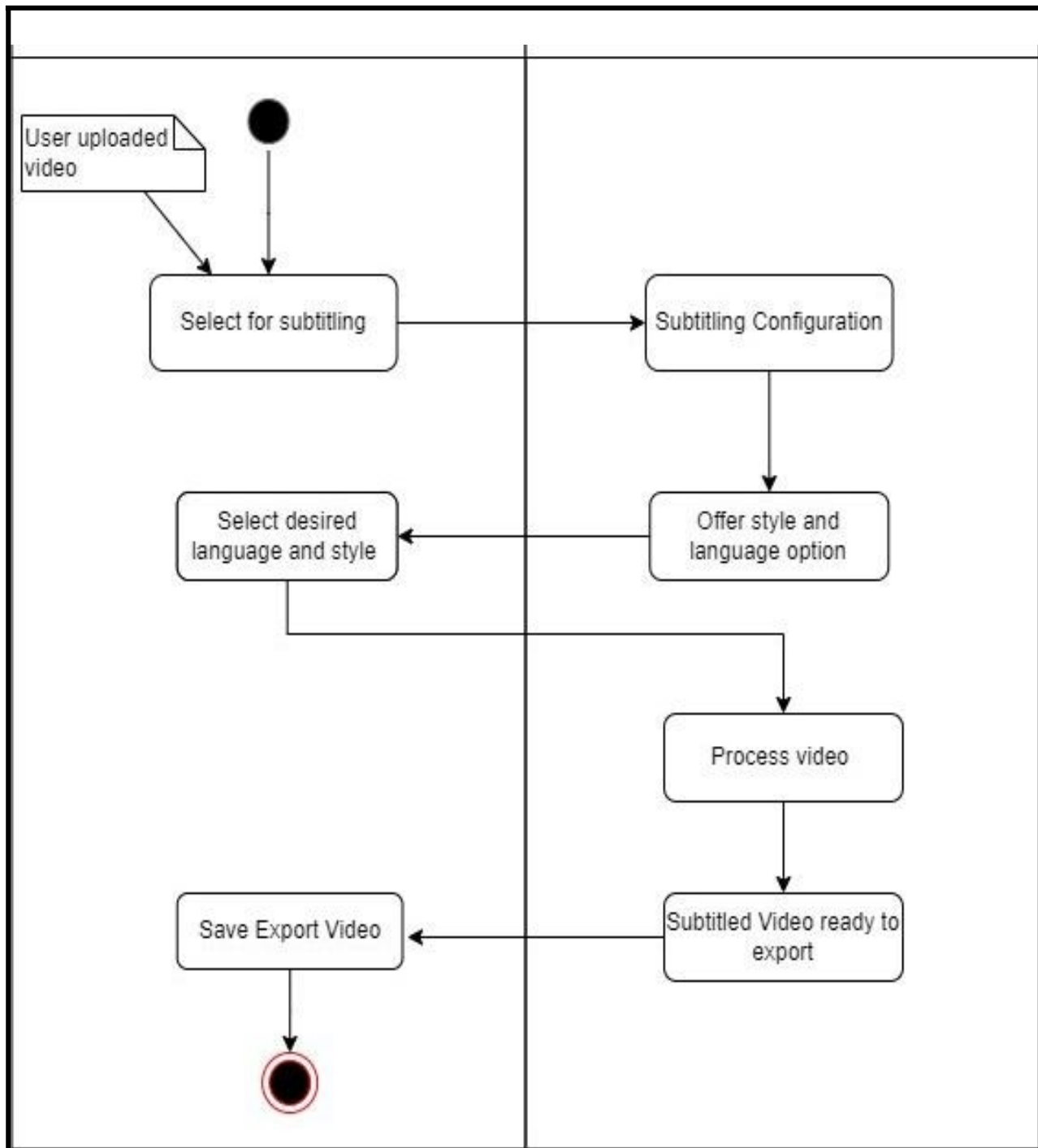
1. Upload Video

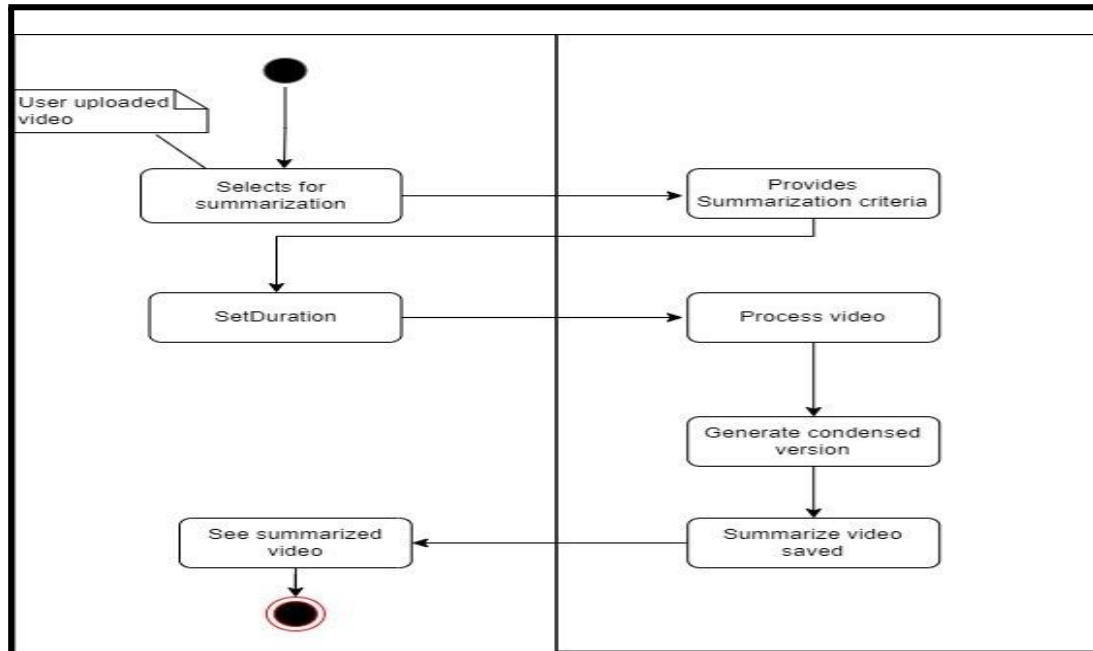


2. Edit Video

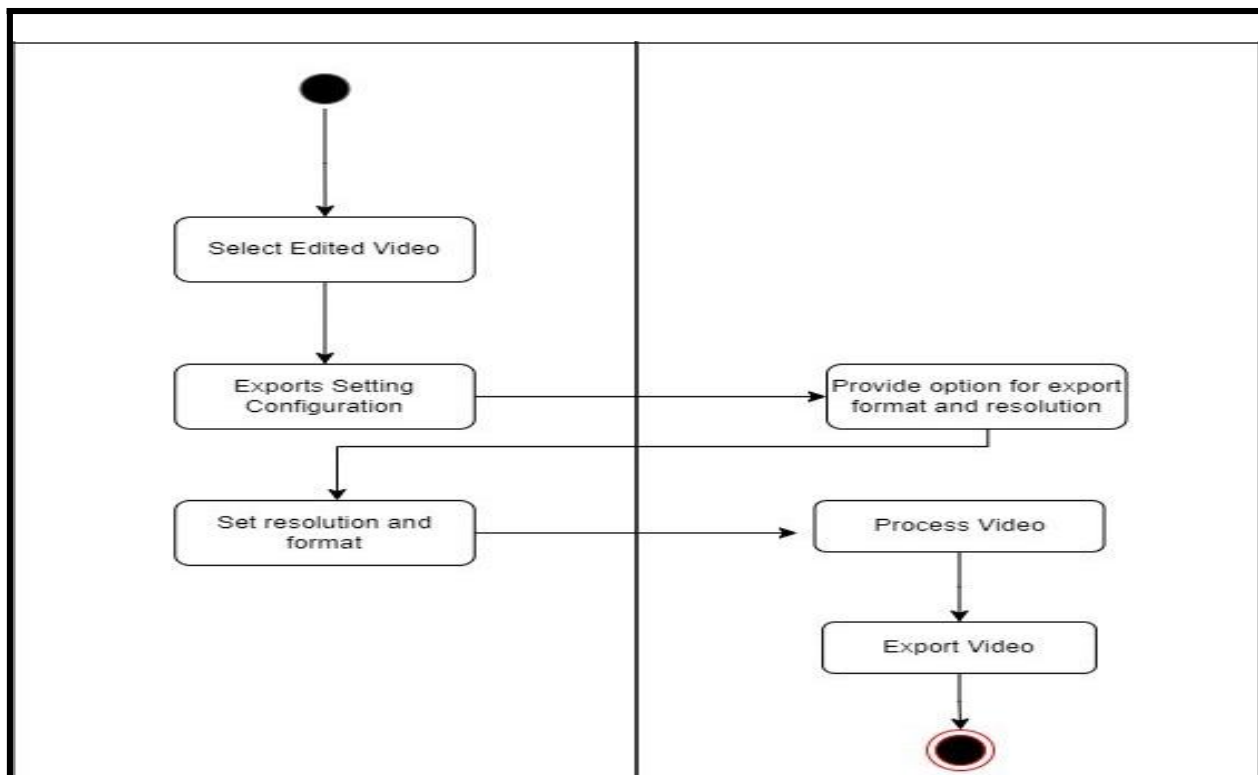


3. Add Subtitles





5. Export Video

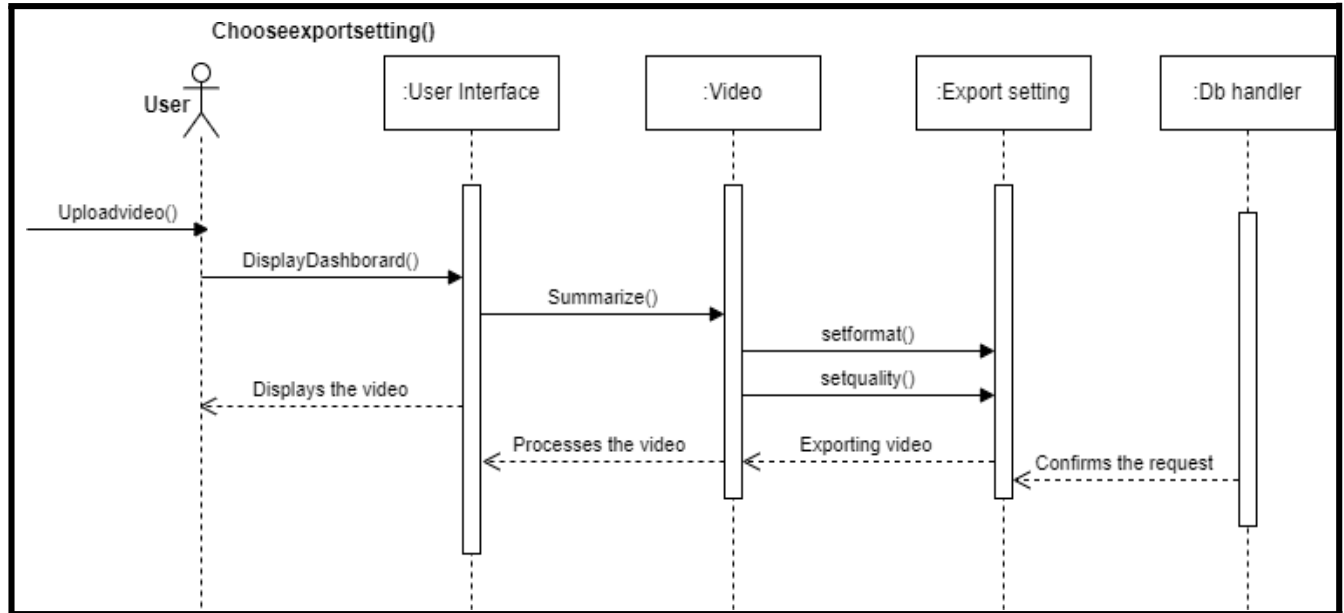


8. Tools and Technologies

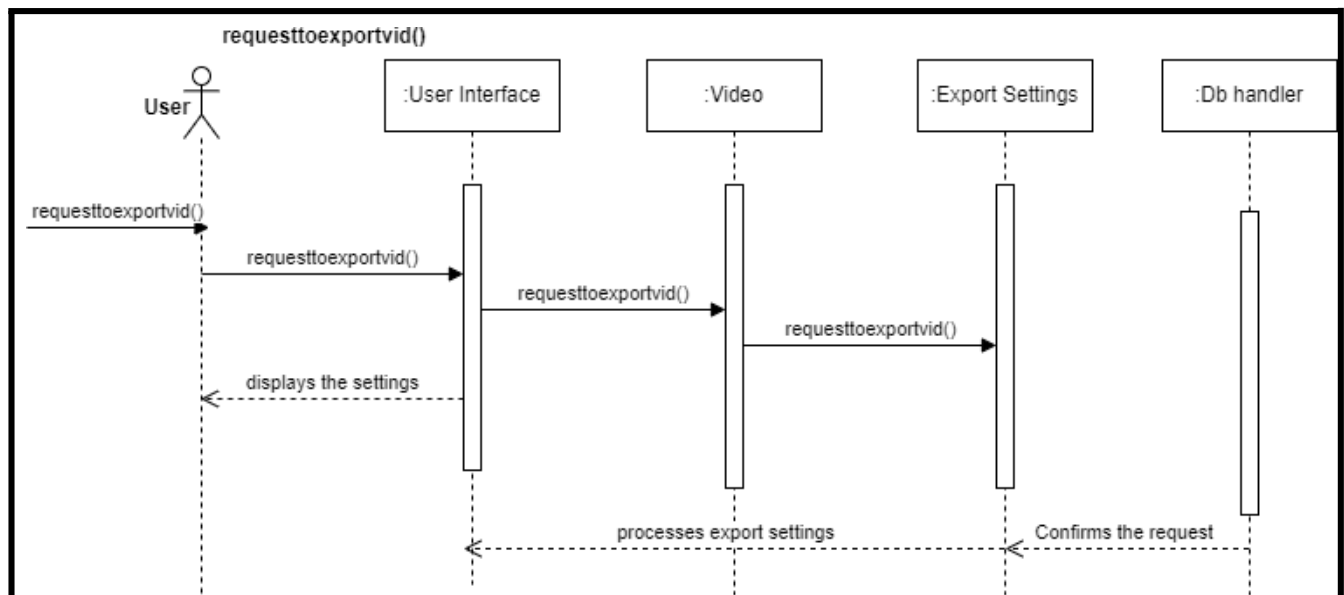
Category	Technology/Tool	Purpose
Frontend Development	React.js	User Interface (UI) for SnipX
Backend Development	Flask	Handles API requests, AI processing, and business logic
Database Management	MongoDB (Self-hosted)	Stores user data, video metadata, and AI-generated content
Video Processing	FFmpeg	Video trimming, compression, format conversion, merging subtitles & dubbing
Speech-to-Text (Transcription)	OpenAI Whisper (Local)	Converts spoken audio into text for subtitles
Language Translation	MarianMT	Converts English subtitles to Urdu
Text-to-Speech (TTS) (Dubbing)	Tacotron 2, WaveNet (Local)	Generates Urdu voiceovers from translated text
Noise Removal & Audio Enhancement	RNNoise, DeepFilterNet	Removes background noise and enhances voice clarity
Video Summarization	BART, T5 NLP Models	Detects key moments and generates short summaries
Thumbnail Generation	YOLO (Object Detection AI)	Selects the best video frame for a thumbnail
Authentication & Security	JWT Authentication	Ensures secure login and user access control
User Interface Enhancements	WebRTC, Color-blind UI	Improves accessibility and live interactions
Admin & User Management	Role-Based Access Control (RBAC)	Allows admins to manage users and system settings
AI Chatbot for Help & Support	GPT-based Chatbot (Local)	Assists users with SnipX-related queries

9. Sequence Diagram

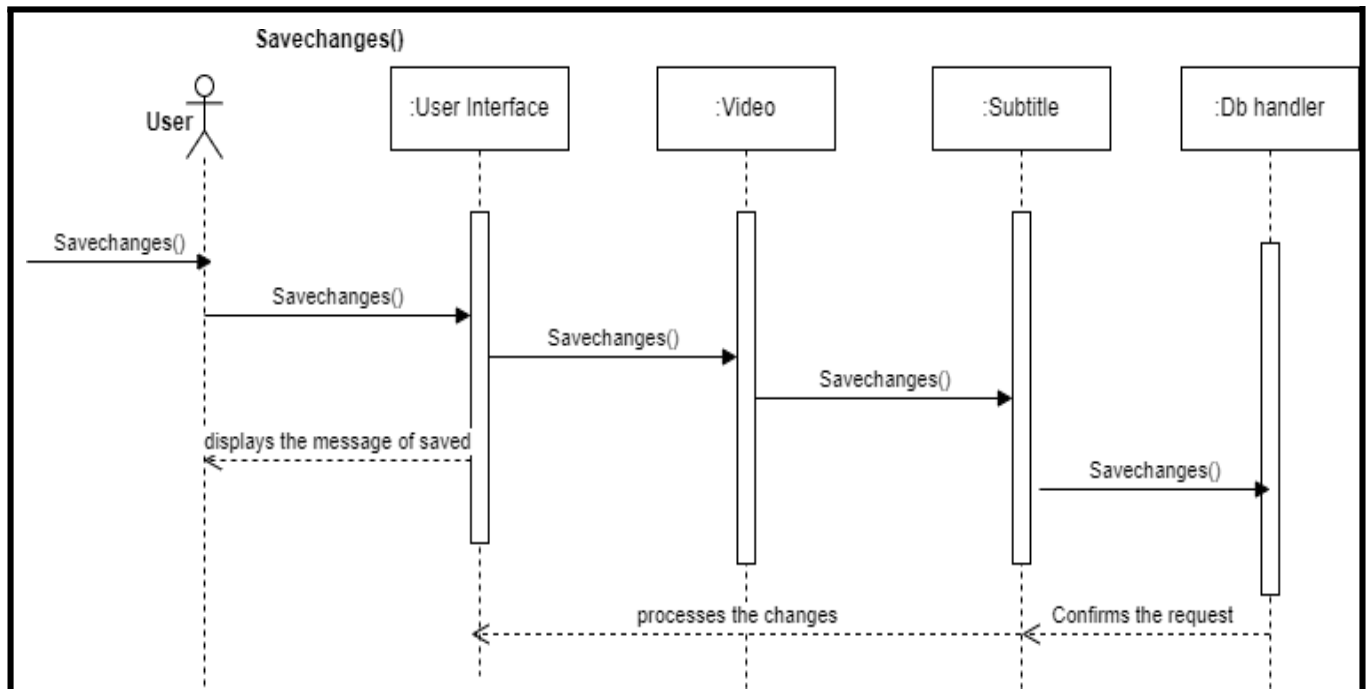
.1. ChooseExportSetting()



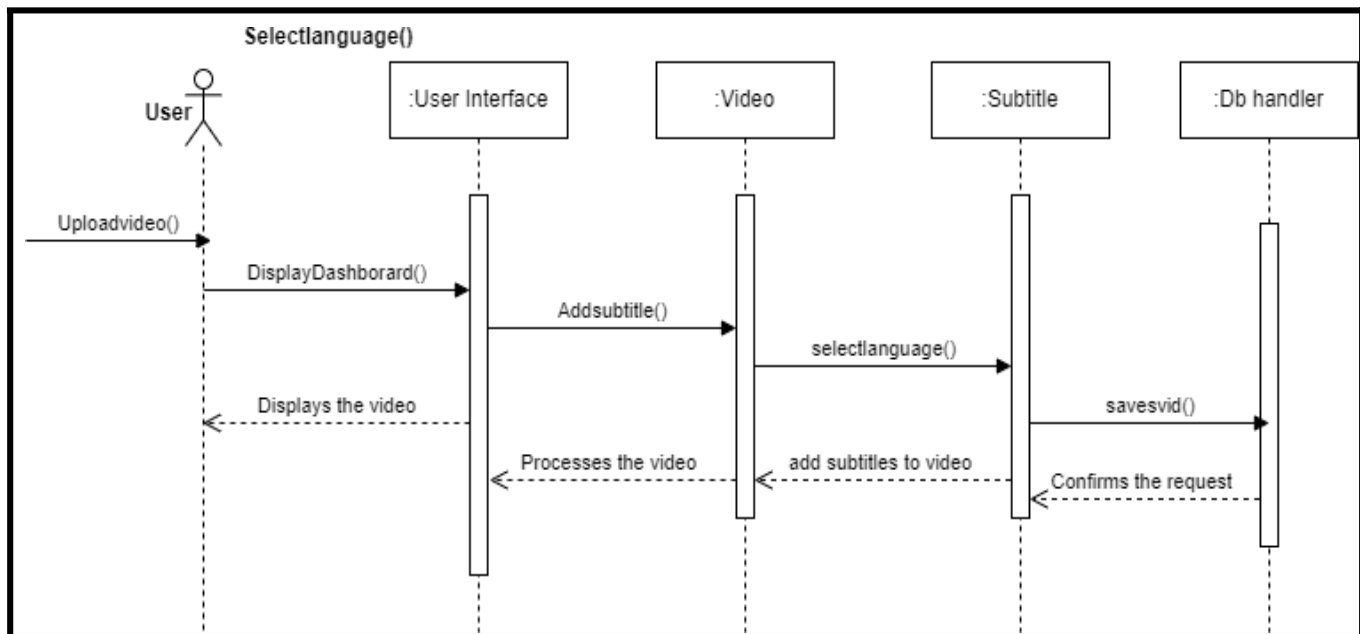
2. RequestToExportVid()



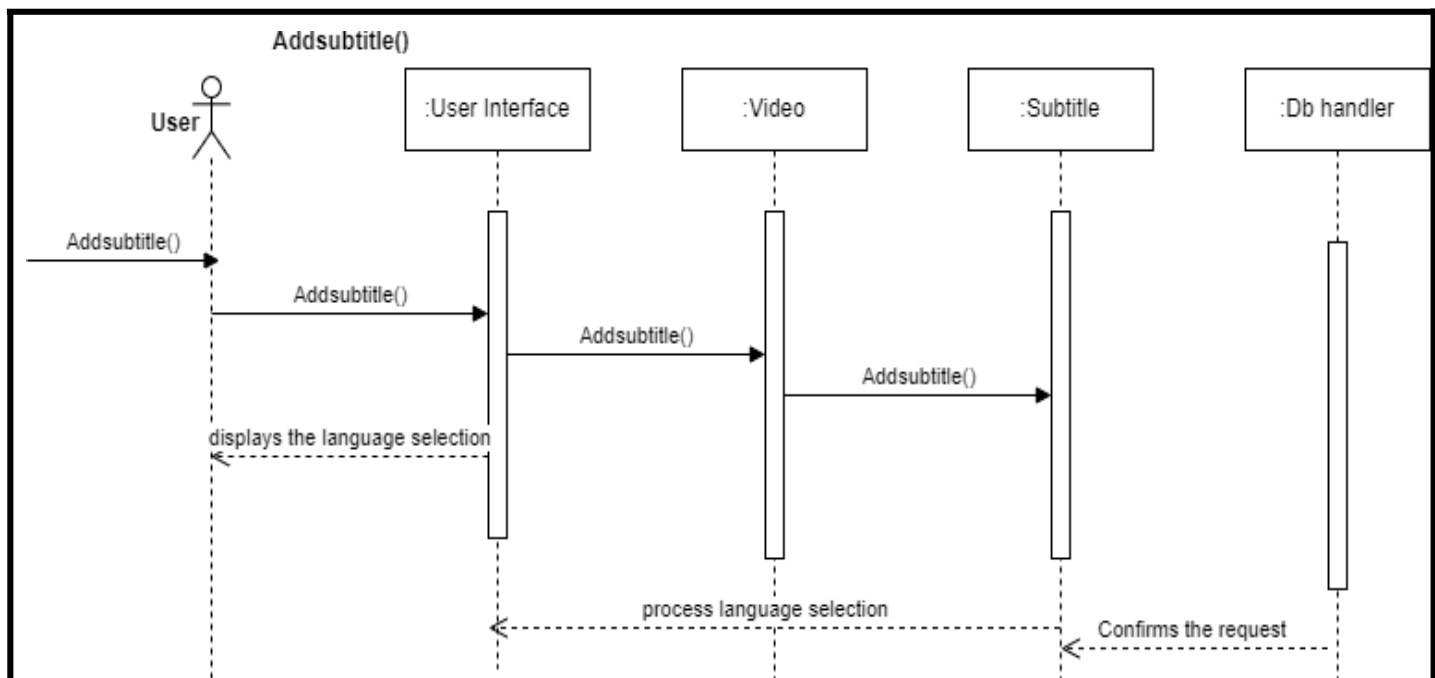
3. SaveChanges()



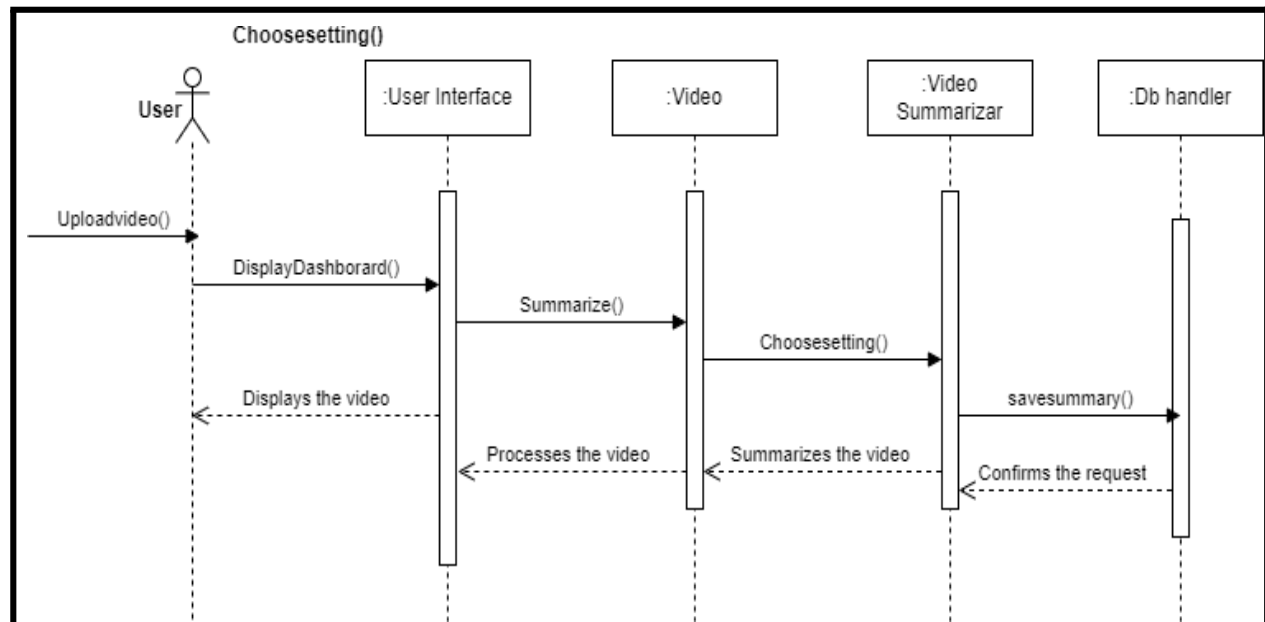
4. SelectLanguage()



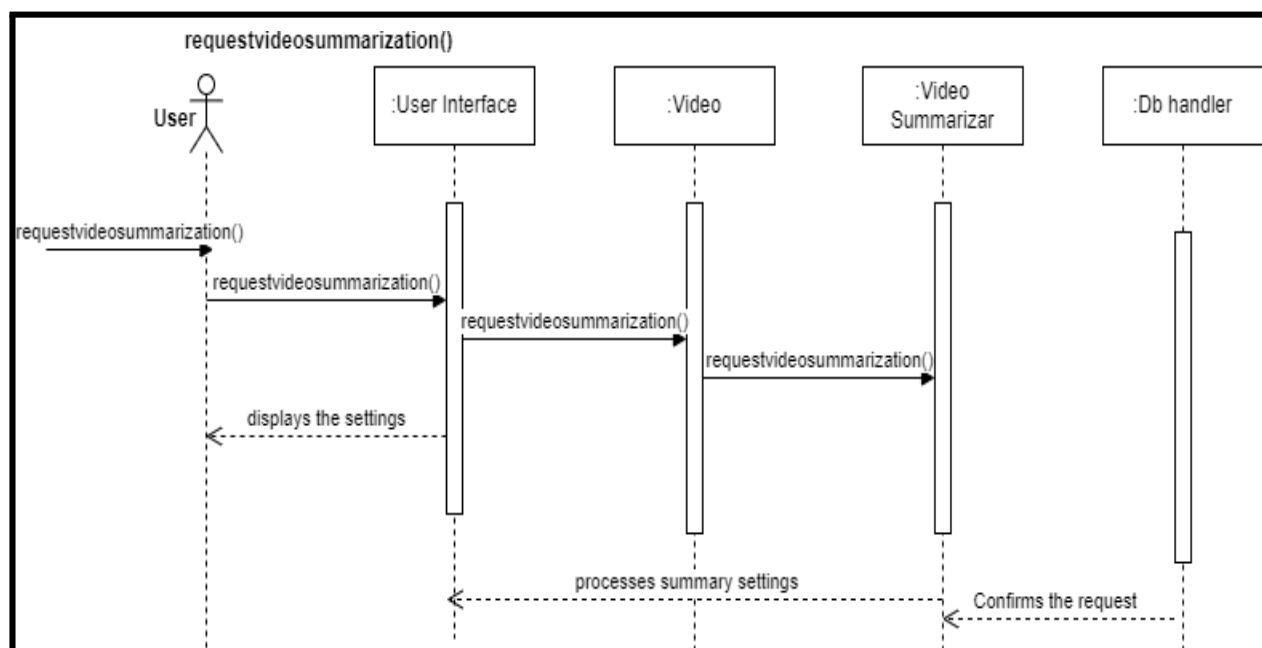
5. AddSubtitle()



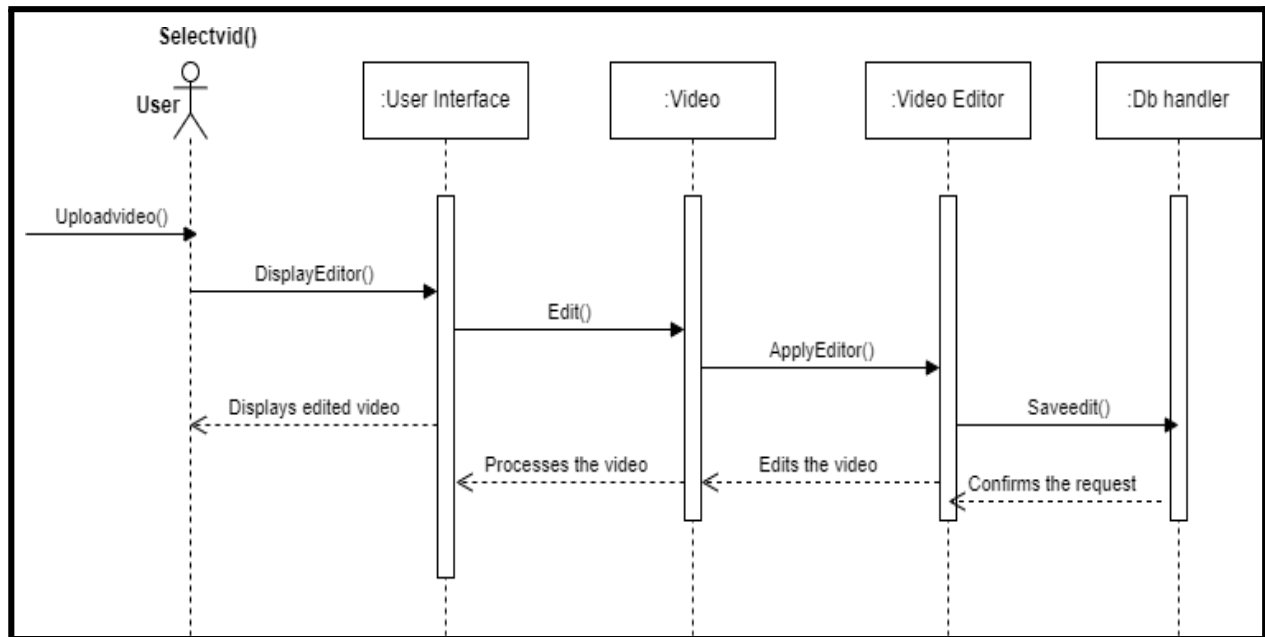
6. ChooseSetting()



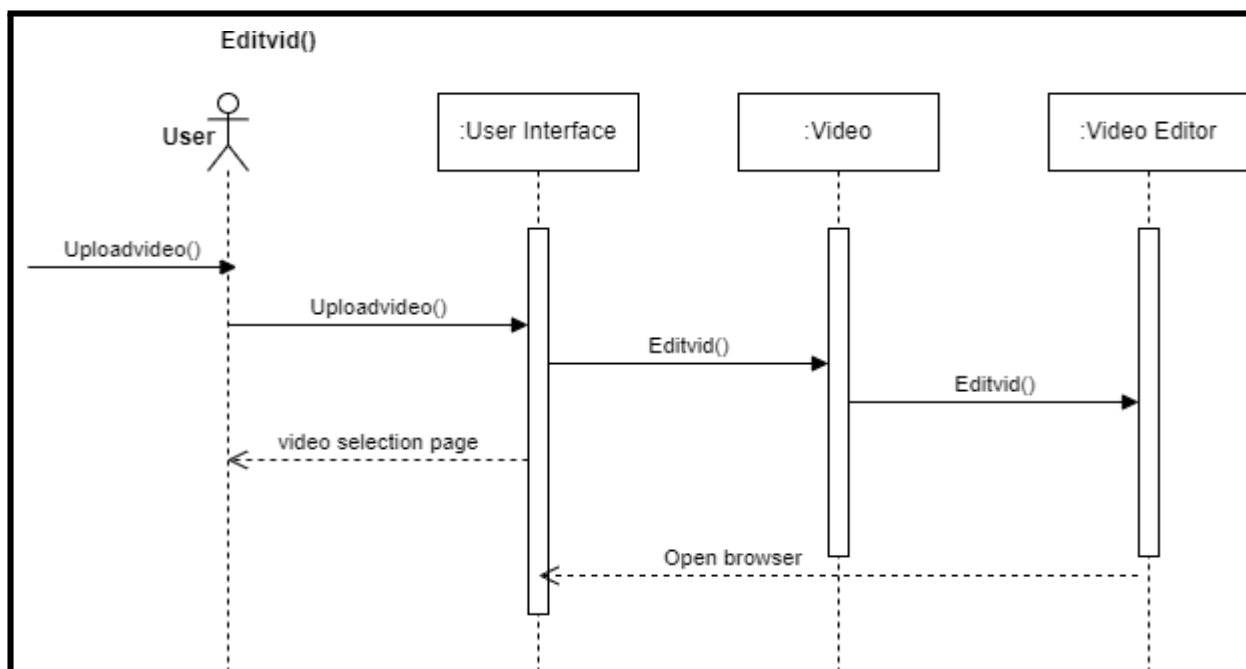
7. Requestvideosummarization()



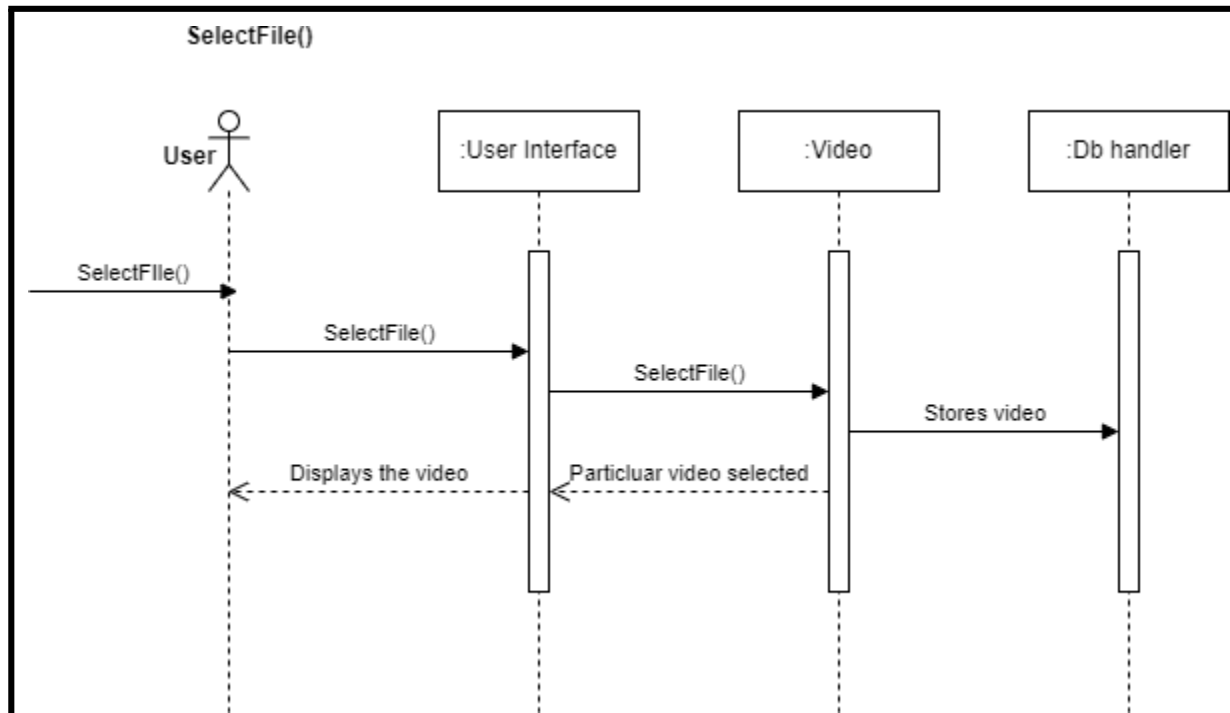
8. Selectvid()



9. Editvid()



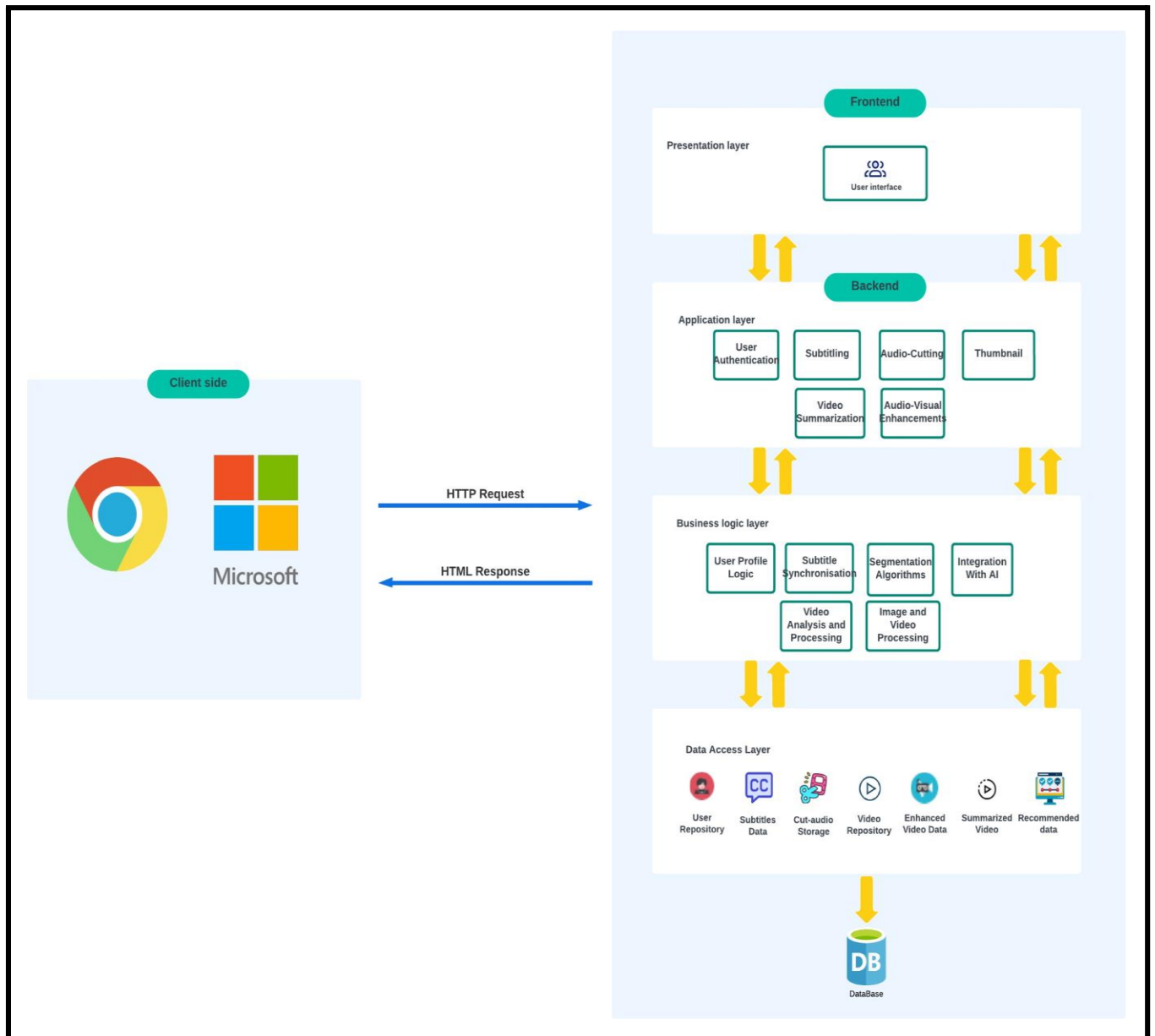
10. SelectFile()



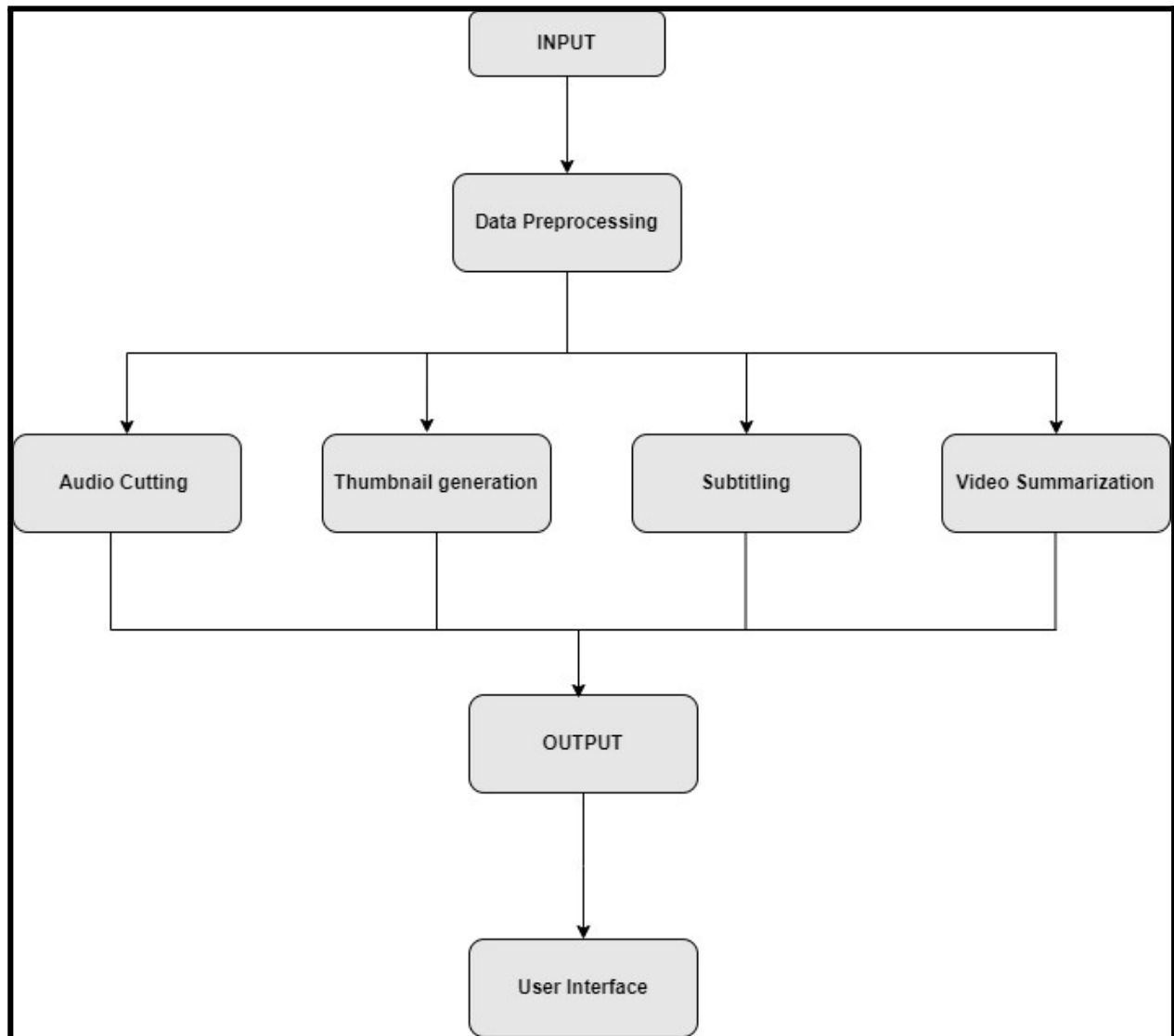
10. Module based Work Division

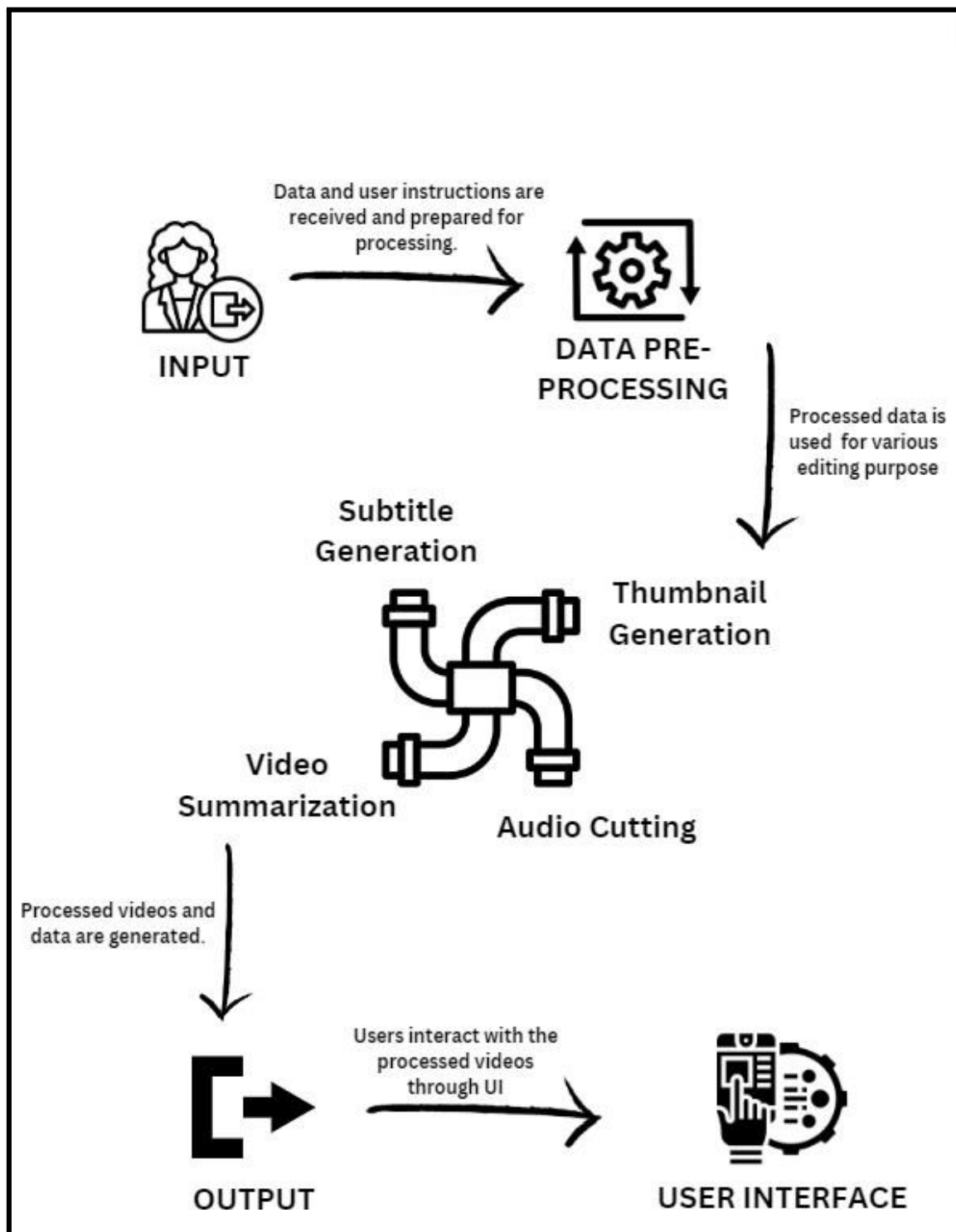
Student Name	Student Roll Number	Responsibility/ Module / Feature
Hassan Abbasi (Full Stack)	221053	Works on both frontend and backend, coordinates development, ensures progress User Authentication & Profile Management – Admin Panel – AI-Based Subtitle Generation & Translation – AI Features – Overall System Integration
Jawad Manzoor (Backend & Database)	221567	Handles backend logic, AI processing, and database management Video Upload & Management – Automatic Noise Removal & Voice Enhancement – Video Summarization & Keyframe Extraction – AI-Powered Thumbnail Generation – Video Compression & Format Conversion – Database Design & Management – API Development – Analytics & Reporting
Fatima Ali (Frontend)	221091	Designs and implements the user interface (UI) and user experience (UX) - Video Editing & Trimming – User Dashboard & Project Management – Accessibility Features – Help & Support – Search & Filtering (Find & Organize Edited Videos)

11. Architecture Diagram



12. Flow Diagram





13. Implementation And Testing

Frontend and Backend Implementation in SnipX

Frontend Implementation (React)

- Developed using **React**, ensuring a **responsive and modular UI**.
- Uses a **component-based architecture** for **scalability and maintainability**.
- Includes **user registration, login, and video processing pages**.
- Utilizes **state management (hooks & Context API)** for efficient data handling.
- Communicates with the backend via **RESTful APIs**, allowing dynamic updates without full page reloads.

Backend Implementation (Flask & Python)

- Built with **Flask**, a lightweight and flexible **Python web framework**.
- Manages **user authentication, input validation, and video processing** (audio cutting, summarization, subtitling, thumbnail generation).
- Well-structured **endpoints and routes** for organized code and easy maintainability.

Database Integration (MongoDB)

- Uses **MongoDB** for **scalability and flexibility** in handling unstructured data.
- Stores **user data, video metadata, and application-specific information**.
- Flask manages **CRUD operations** for seamless data handling.
- **Asynchronous database operations** keep the application responsive under heavy load.

Frontend-Backend Integration

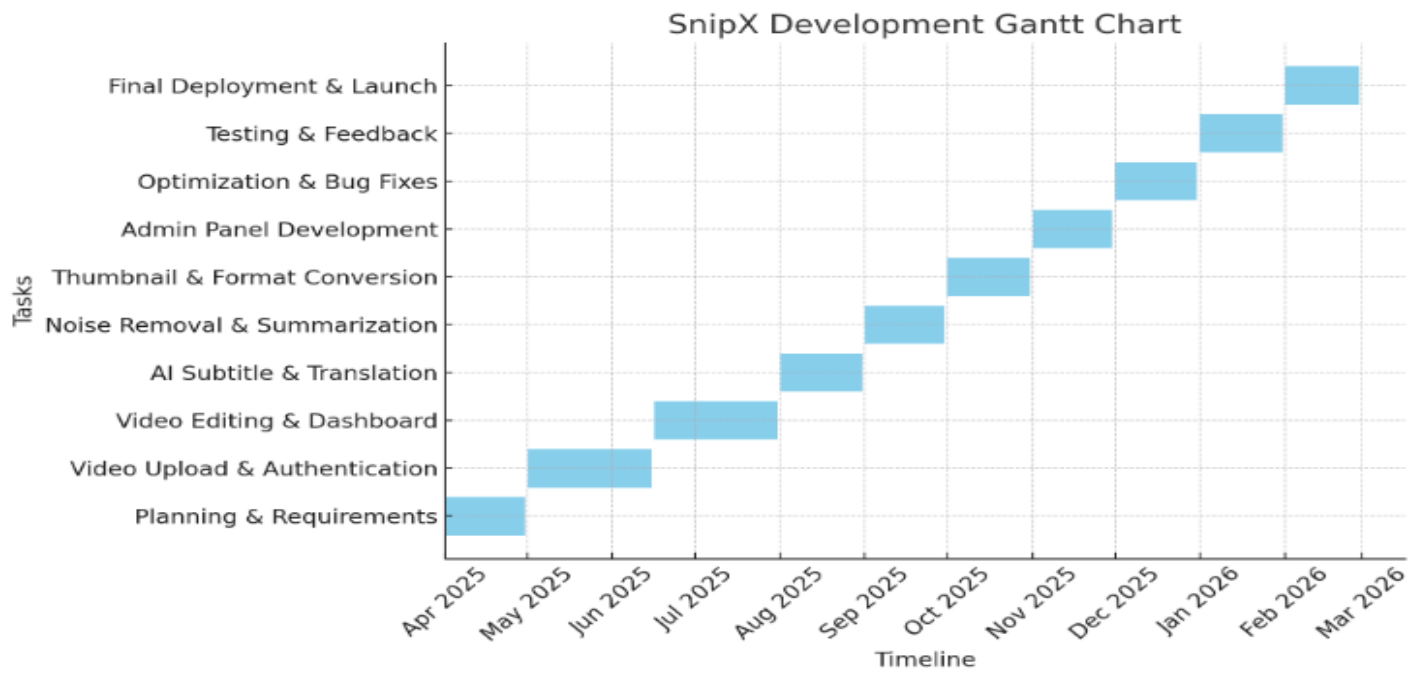
- **RESTful API communication** between React frontend and Flask backend.
- The **frontend sends HTTP requests**, backend processes them, interacts with MongoDB, and responds with data.
- Decoupled architecture allows **independent development and scalability** of frontend and backend.

By combining **React, Flask, and MongoDB**, SnipX ensures **high performance, scalability, and a smooth user experience**.

Unit Testing

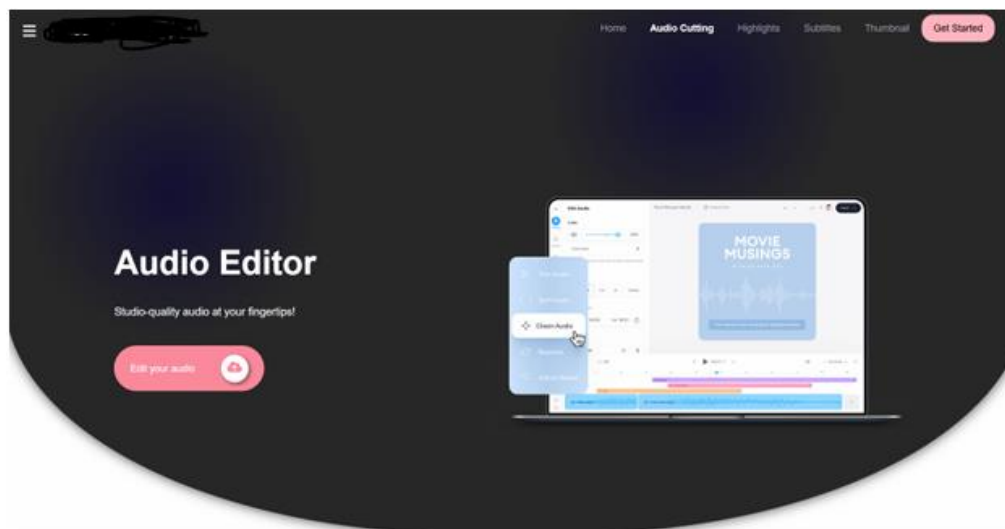
- Ensures individual components function correctly in isolation.
- Helps detect and fix bugs early, improving reliability.
- Essential for features like user authentication and video processing.
- Prevents errors in user interactions and enhances maintainability.
- Supports code refactoring without breaking functionality.
- Acts as documentation for developers, aiding future updates.
- Strengthens the overall stability and usability of SnipX

Gantt chart

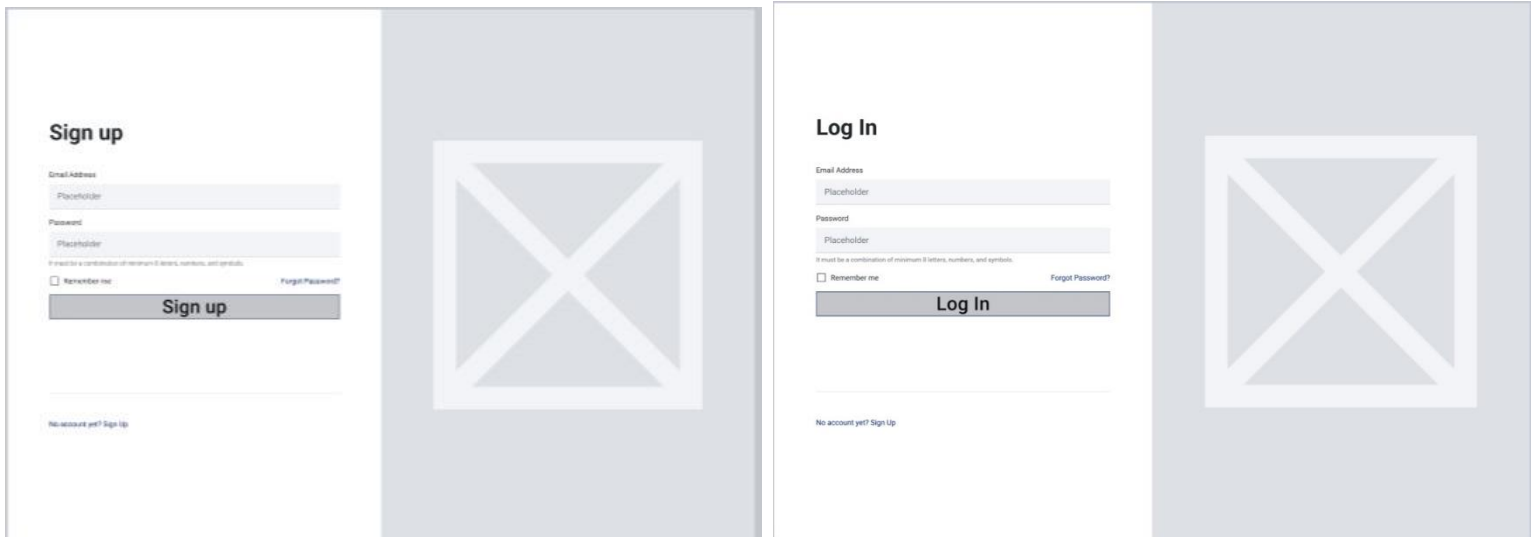


Mockup

Audio Editor

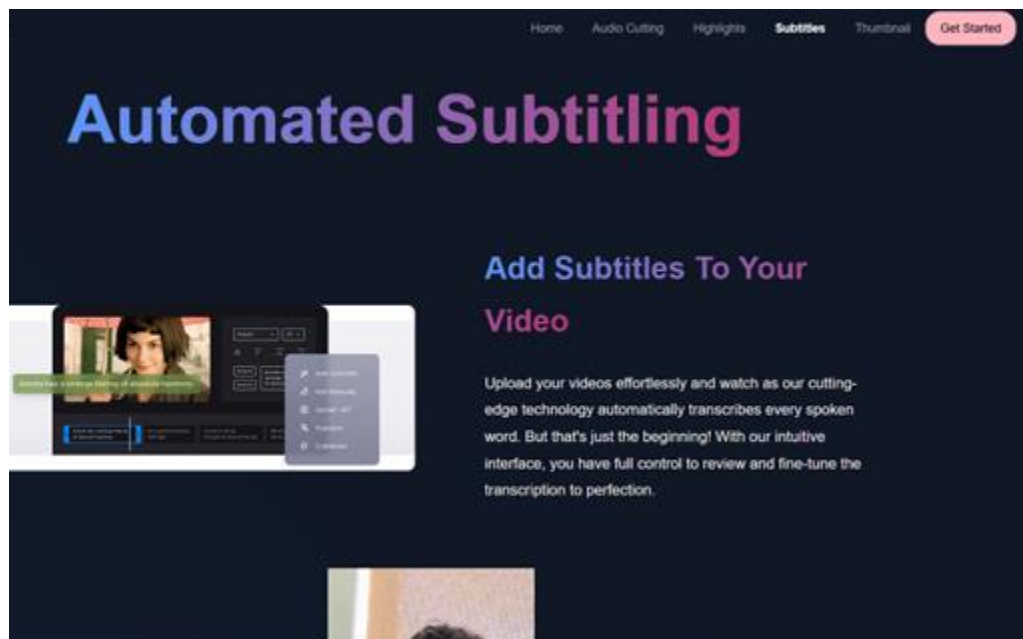


Log in and Sign up Pages

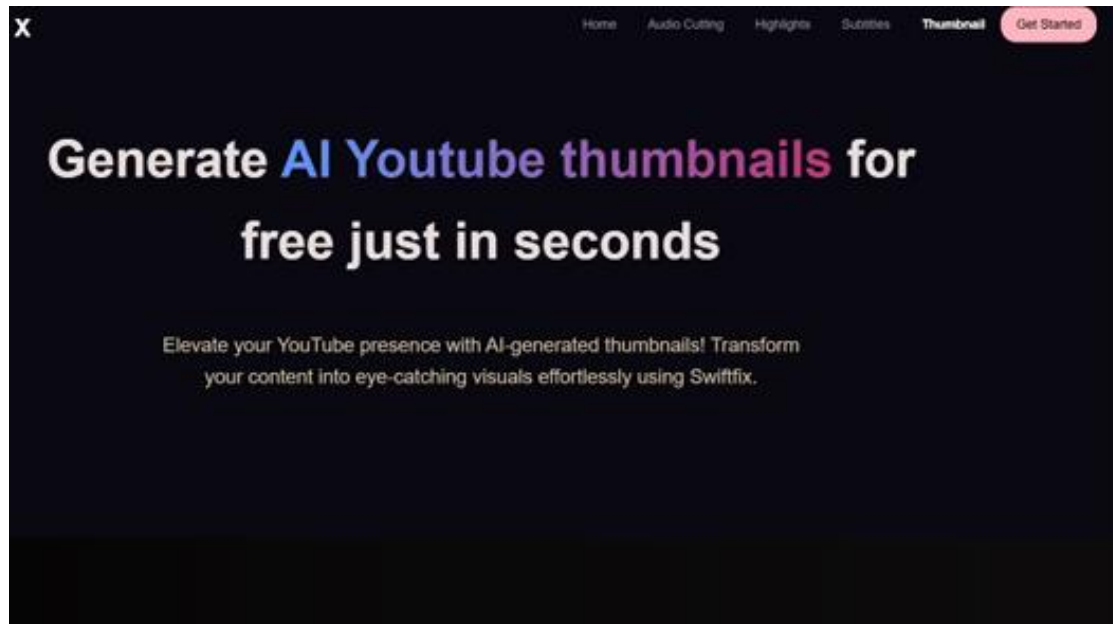


The image displays two side-by-side wireframes for a web application's authentication section. The left wireframe is titled "Sign up" and features a form with fields for "Email Address" and "Password", both containing "Placeholder" text. Below the password field is a small note: "It must be a combination of minimum 8 letters, numbers, and symbols." There is a "Remember me" checkbox and a "Forgot Password?" link. A "Sign up" button is at the bottom. Below the form is a link: "No account yet? Sign Up". The right wireframe is titled "Log In" and has a similar form with "Email Address" and "Password" fields, the same password requirement note, "Remember me" checkbox, and "Forgot Password?" link. A "Log In" button is at the bottom. Below the form is a link: "No account yet? Sign Up". Both wireframes are set against a light gray background with a large white 'X' placeholder.

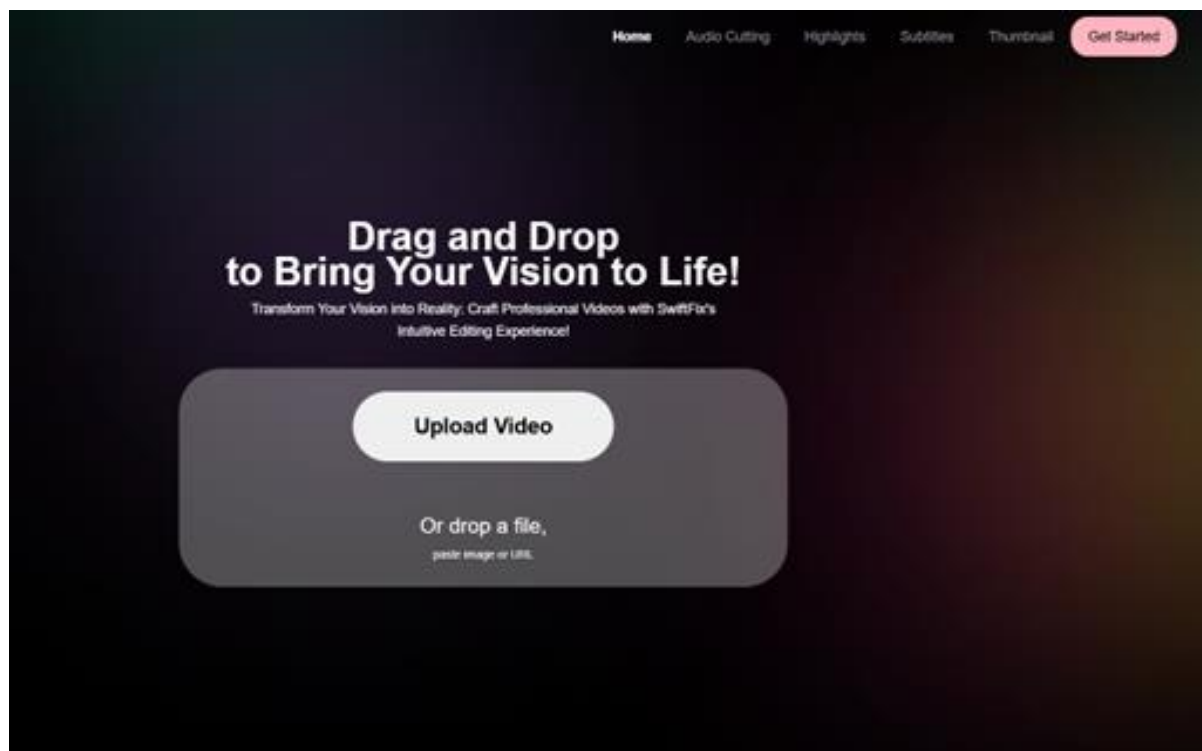
Automatic Subtitling



Thumbnail Generation



Upload Video



● **Conclusion**

Engage Your Audience: SnipX condenses long videos into captivating summaries, keeping viewers hooked.

- **Effortless Editing:** Automates silences removal, noise reduction, and Urdu subtitle generation for a seamless experience.
- **For Everyone:** Perfect for YouTubers, educators, businesses, and storytellers.
- **Powerful & User-Friendly:** No complex software—just smart, automated tools.
- **Break Barriers:** Reach a global audience with multilingual accessibility.
- **Unlock Creativity:** Create compelling educational, marketing, and travel content with ease.

● References

1. *How long does it take to edit a YouTube video?* (n.d.). TubeRanker.
<https://tuberanker.com/blog/how-long-does-it-take-to-edit-a-youtube-video#:~:text=Editing%20a%205%2Dminute%20YouTube,it%20takes%20to%20edit%20footage>
2. Bernardes, V. (2023, November 27). *How to analyze customer reviews with NLP: a case study.* Blog | Imaginary Cloud.
<https://www.imaginarycloud.com/blog/how-to-analyze-customer-reviews-with-nlp-case-study/>
3. Stanciu, C. (2023, February 10). *How long does it take to edit a video?* Veedyou Media.
<https://www.veedyou.com/how-long-does-it-take-to-edit-a-video/#:~:text=On%20average%2C%20it%20takes%2045%20%E2%80%93%2060%20minutes%20to%20edit%20a,videos%20can%20keep%20someone%20busy>
4. Team, P. (2023, July 7). *How AI in Audio and Video Editing is Saving Time and Effort.* Podcastle Blog. <https://podcastle.ai/blog/benefits-of-ai-in-audio-and-video-editing/>
5. Zhang, X., Li, Y., Han, Y., & Wen, J. (2022). *AI Video Editing: a Survey. Video Summarization Using Deep Neural Networks: A Survey.*
<https://doi.org/10.20944/preprints202201.0016.v1>
6. Wu, J. (2023). *Visual enhanced hierarchical network for sentence-based video thumbnail generation.*
<https://www.semanticscholar.org/paper/Visual-enhanced-hierarchical-network-for-video-Wu-Zhang/965eedb20087d86b3b4c746fa6e6053d9a763be3>