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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

A Major Project Phase-II on

"RGAC VIRTUAL UNIVERSITY"

Presented by

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Abstract

The rapid advancement of digital technologies has revolutionized education, leading to the emergence of Virtual Universities as a transformative alternative to traditional higher education. A Virtual University leverages online learning platforms, multimedia resources, and interactive tools to deliver flexible, accessible, and cost-effective education to students worldwide. This model eliminates geographical barriers, supports self-paced learning, and integrates innovative pedagogies such as MOOCs (Massive Open Online Courses), AI-driven tutoring, and virtual classrooms. This paper explores the evolution, benefits, challenges, and future trends of Virtual Universities, highlighting their potential to democratize education in the digital age.

Contents

10. Design
    - 10.1 Context Diagram
    - 10.2 Data Flow Diagram
    - 10.3 Use Case Diagram
    - 10.4 Sequence Diagram
    - 10.5 Activity Diagram
11. Implementation
12. Expected Outcomes
13. Applications
14. Timeline
15. Conclusion

Refernces

1. Introduction

The traditional education system faces critical challenges such as exorbitant fees, lack of practical training, and inefficient time utilization. Students often graduate without industry-ready skills, while financial and social barriers further limit accessibility. RGAC Virtual university reimagines education by leveraging metaverse technology to create an immersive, interactive, and affordable virtual university. By integrating 3D virtual campuses, VR-based labs, and real-time collaboration tools, RGAC Virtual university bridges the gap between theoretical knowledge and hands-on technical learning.

2. Objectives

- To provide affordable, high-quality education.
- To emphasize skill-based, job-oriented training.
- To reduce dependency on physical infrastructure and exams.
- To ensure equal access to education, regardless of financial or social background.
- To leverage technology (like Virtual Reality and online platforms) for practical learning.

3. Problem Statement

This project aims to address the critical inefficiencies and barriers to access that burden the traditional higher education system. By leveraging virtual technology, it seeks to dismantle the financial and geographic hurdles of physical campuses, offering an affordable and accessible alternative for all students, including those from rural and marginalized communities. Furthermore, this project aims to bridge the gap between academic knowledge and real-world employability by prioritizing practical, hands-on training with industry-standard tools, ultimately creating a more equitable and industry-aligned educational model.

4. Scope of the Project

- Educational Access & Affordability.
- Technology Integration.
- Skill-Based Learning.
- Inclusivity & Equality.

5. Literature Survey

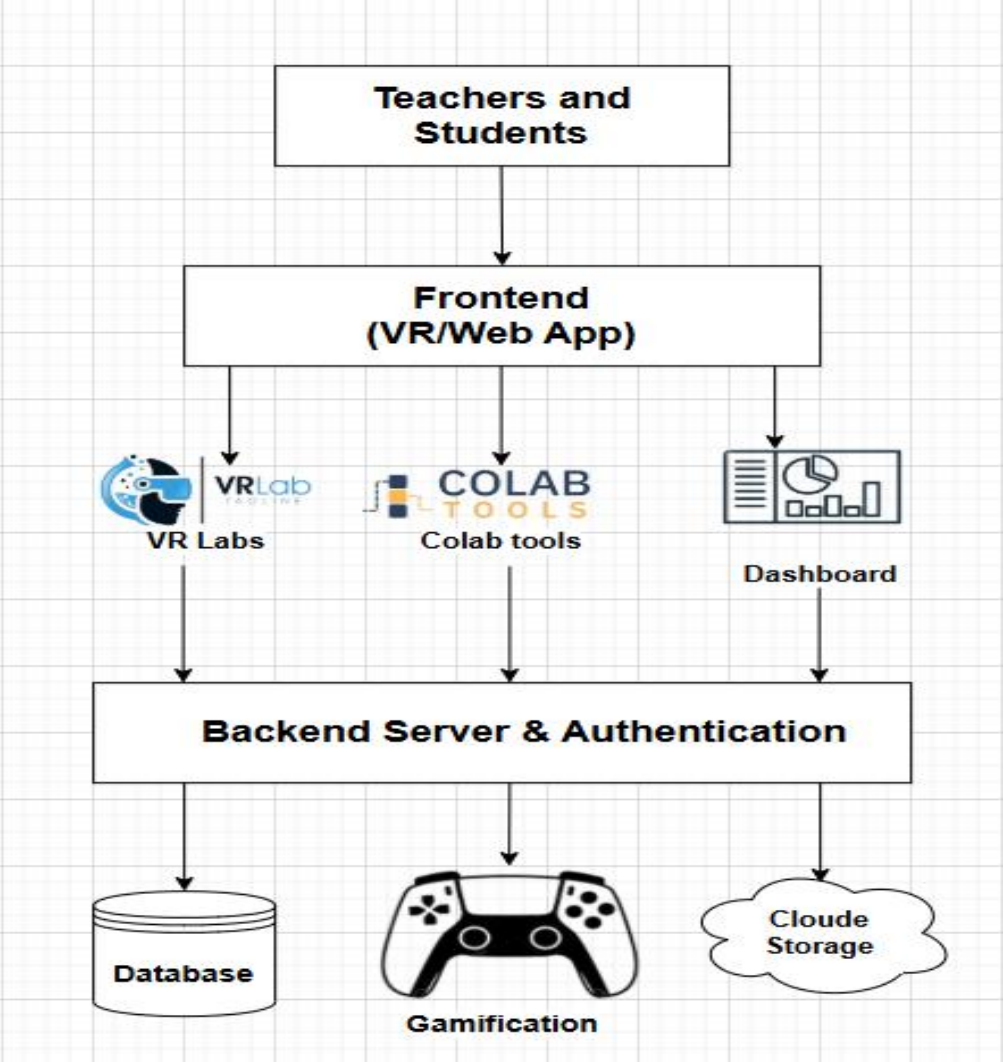
Title	Year	Summary	Gaps Addressed
"Metaverse in Education" By Leonard Zophan and Karin Northus	2018	Highlights the metaverse's potential for immersive learning through avatars and 3D environments.	The app's reliance on internet and manual activation limits
"Virtual Labs" By Raghu Raman and Vinit Kumar Nair	2020	A study by IEEE (2023) shows VR labs increase retention rates by 40% compared to traditional methods.	The device raises privacy concerns, has uncertain emergency reliability and battery life, and needs better usability in high- stress situations.
"Gamification" By Fabricio Inocencio	2022	prove gamified elements boost student engagement.	The app needs manual data sync, lacks emergency service integration, and relies on user-triggered alerts, risking failure in critical moments.

6.Domain

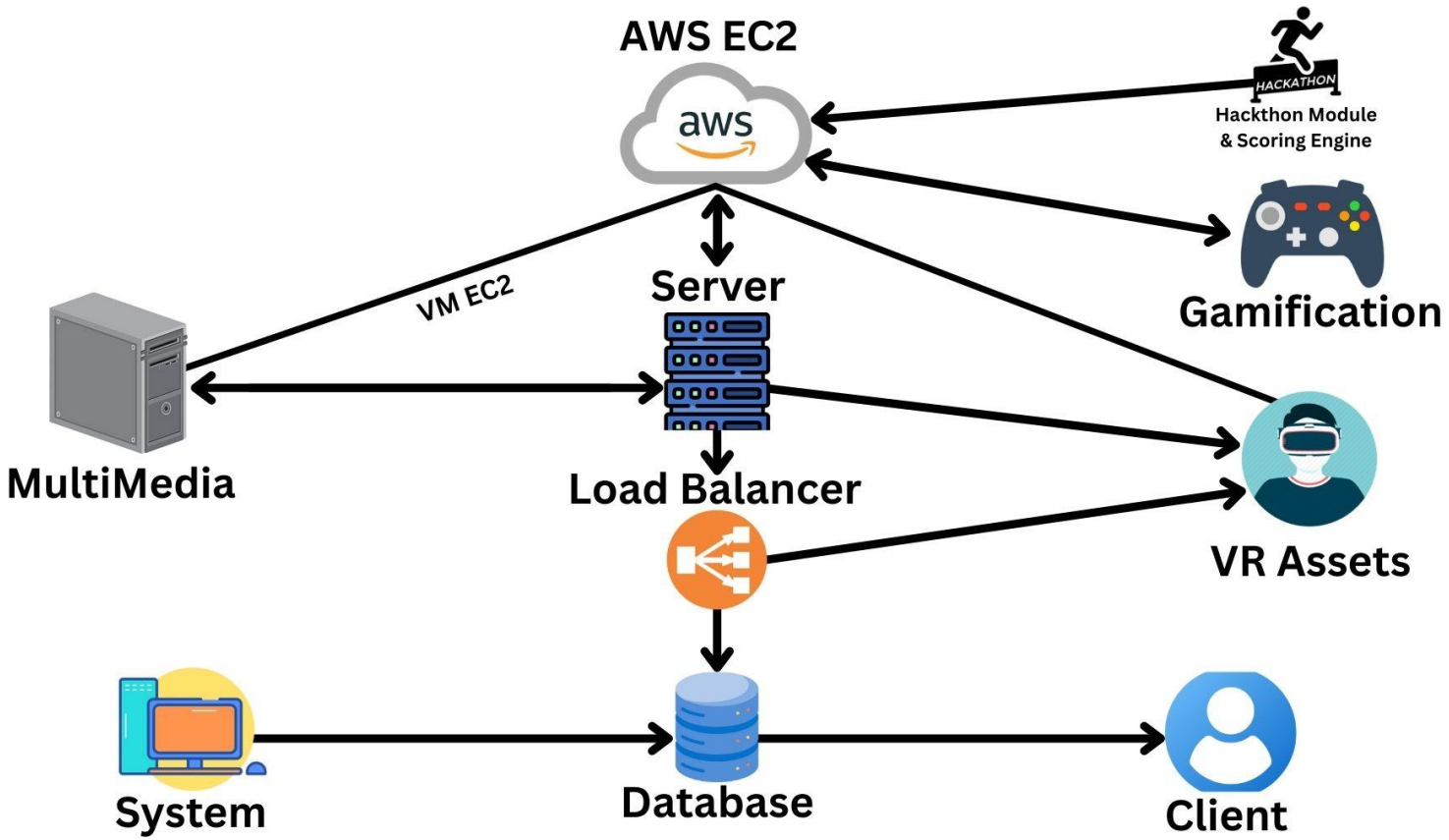
- **Core Domain (Technical focus):** Learning Management Systems (LMS), Artificial Intelligence (AI), Mobile Learning (m-Learning), Extended Reality (AR/VR).
- **Application Domain (Real-world Area):** Education (Focusing on educational content delivery and learn new skills through VR).

7.Proposed System

7.1 Block Diagram



7.2 Architectural Diagram



7.3 Modules And Their Functionality

- **Login & Register** : Secure accounts for students and teachers.
- **Teacher Upload Module**: Teachers upload videos, notes, and AR/VR content.
- **Student Learning Module**: Students learn through videos and interactive VR labs.
- **Virtual Reality (VR) Labs**: Real-like experiments in chemistry, robotics, circuits, and simulations.
- **Evaluation & Skill Testing**: Hackathons, projects, and problem-solving instead of traditional exams.

8.Methodology

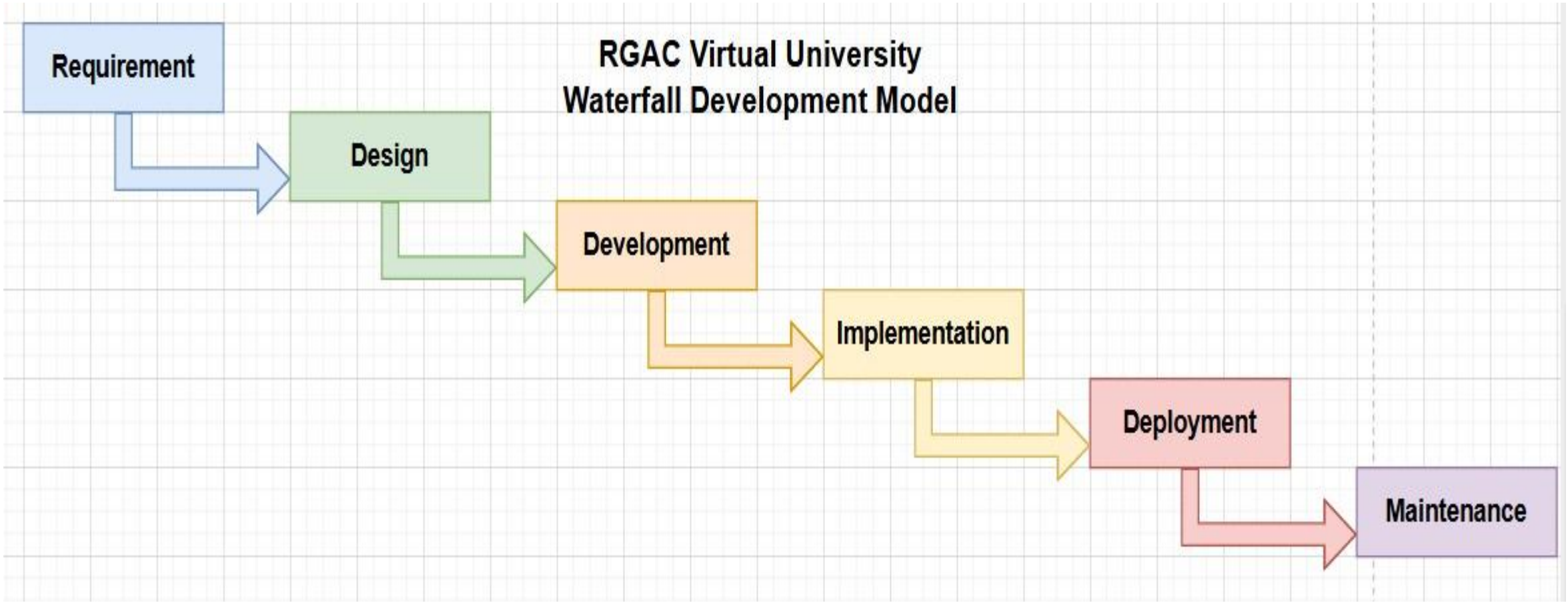
8.1 Techniques & Alogrithms :

- **AI-Based Algorithms**: Evaluates student abilities in hackathons.
- **Real-Time Sync**: WebSockets for instant client-server updates.
- **Virtual Reality Rendering**: WebXR + Unity 3D for immersive labs.
- **User Authentication**: OAuth 2.0 + JWT for secure login.

8.2 Development Model

- **Public Cloud Deployment Model :** This means the entire "RGAC Virtual University" application is hosted on infrastructure owned and operated by a third-party provider like Amazon Web Services (AWS).
- **Waterfall Development Model :** The project's structure and timeline strongly suggest it follows a traditional Waterfall development model. This is evident from the project timeline, which breaks the work into distinct, sequential phases.

8.2 Waterfall Development Model :



8.3 Tools & Technologies

1.AI Tools : Power AI tutors and skill evaluation.

2. Cloud Services – For hosting, scalability, and VR rendering.

3. GitHub Storage – Used to reduce cloud costs by storing lightweight VR configs.

4. React.js – For the Learning Management System (LMS) and 3D graphics in browser.

5.WebXR – Lets students access VR/AR labs directly from a browser.

9. Requirements Specifications

9.1 Functional Requirements

- **User Registration**: OAuth 2.0 for secure sign-up.
- **Virtual Lab Interactions**: Drag-and-drop sensors, code compilation, real-time output visualization.
- **Collaboration Tools**: Voice/chat features, screen sharing.
- **Performance Dashboard**: Track completed experiments, coding scores, and achievements.

9.2 Non Functional Requirements :

- **Scalability**: AWS EC2 for cloud rendering; support 10,000+ concurrent users.
- **Latency**: 100ms for VR interactions using WebSockets.
- **Security**: GDPR-compliant data policies; JWT token authentication.
- **Reliability & Uptime :** Ensure 99.9% system availability for learning.
- **Usability & Accessibility :** Intuitive design with support for desktop, and low-cost VR devices to include rural students.

9.3 Hardware Requirements:

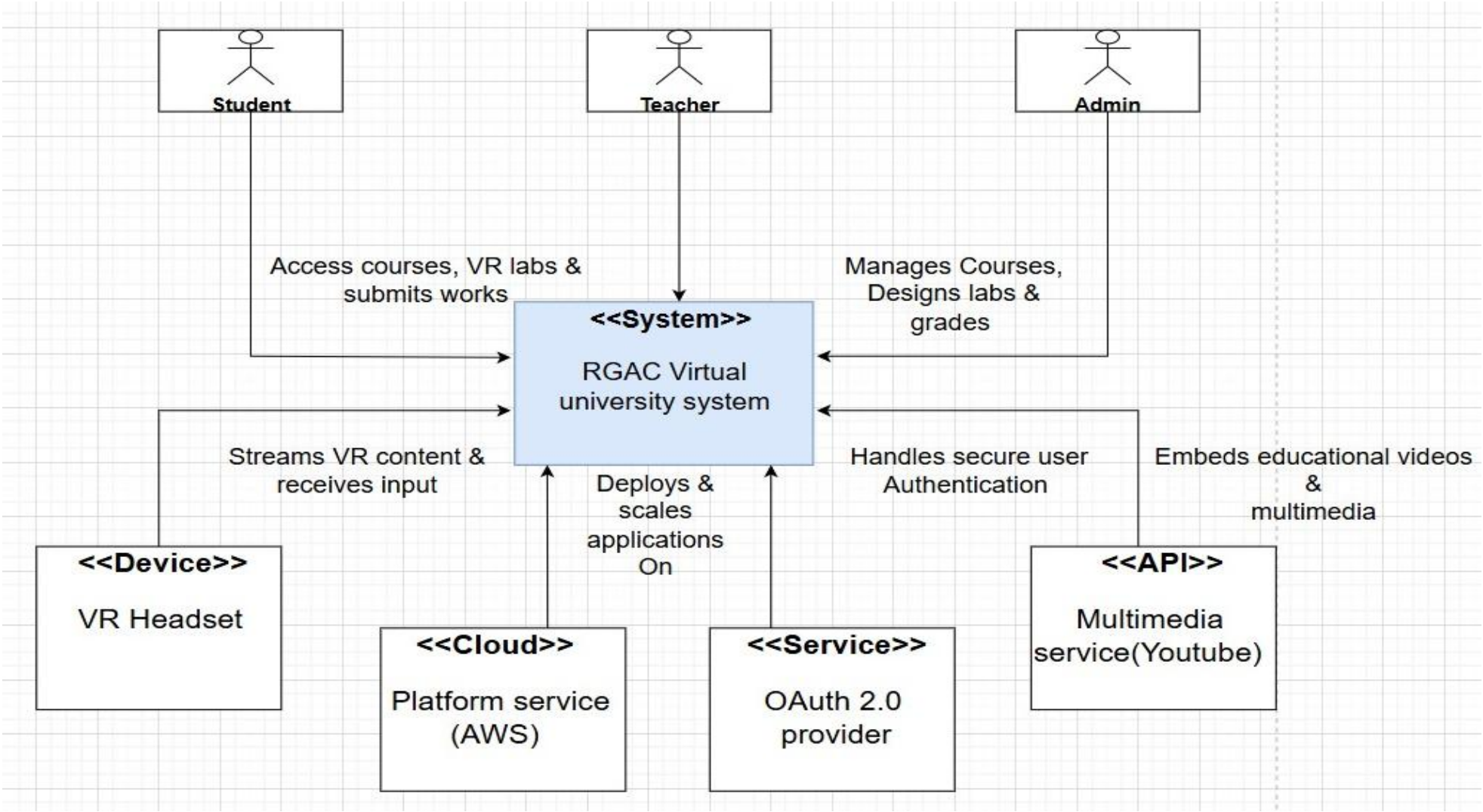
- **VR Headset :** Oculus Quest, Meta Quest.
- **Laptop :** Unity development, testing, coding.
- **Microphone:** Clear voice recording during lectures.
- **Webcam**: Record instructor face for overlays.
- **Green Screen Cloth:** Remove video background in OBS.

9.4 Software Requirements:

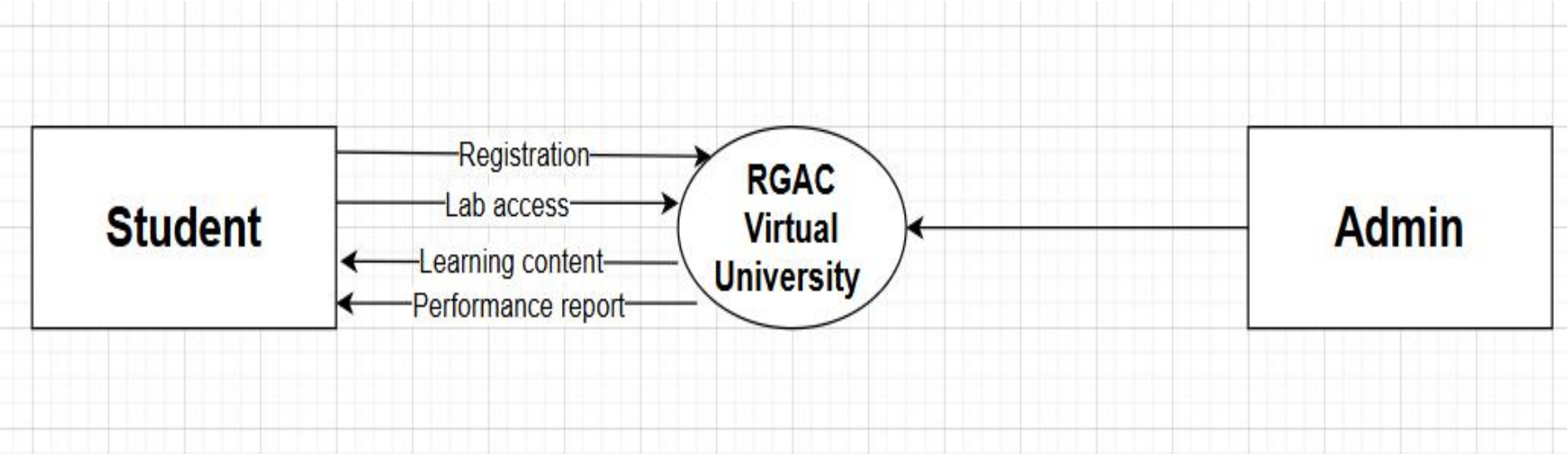
- **VR Development**: Unity 3D, Blender, Sketchfab.
- **Frontend:** React.js, Three.js.
- **Gamification:** Unity UI + Scoreboards.
- **Backend & Database :** Node.js ,Express.js , Reset API , MongoDB.
- **Content & Delivery :** YouTube API , WebXR .
- **Authentication & Security :** OAuth2 + JWT **.**

10.Design

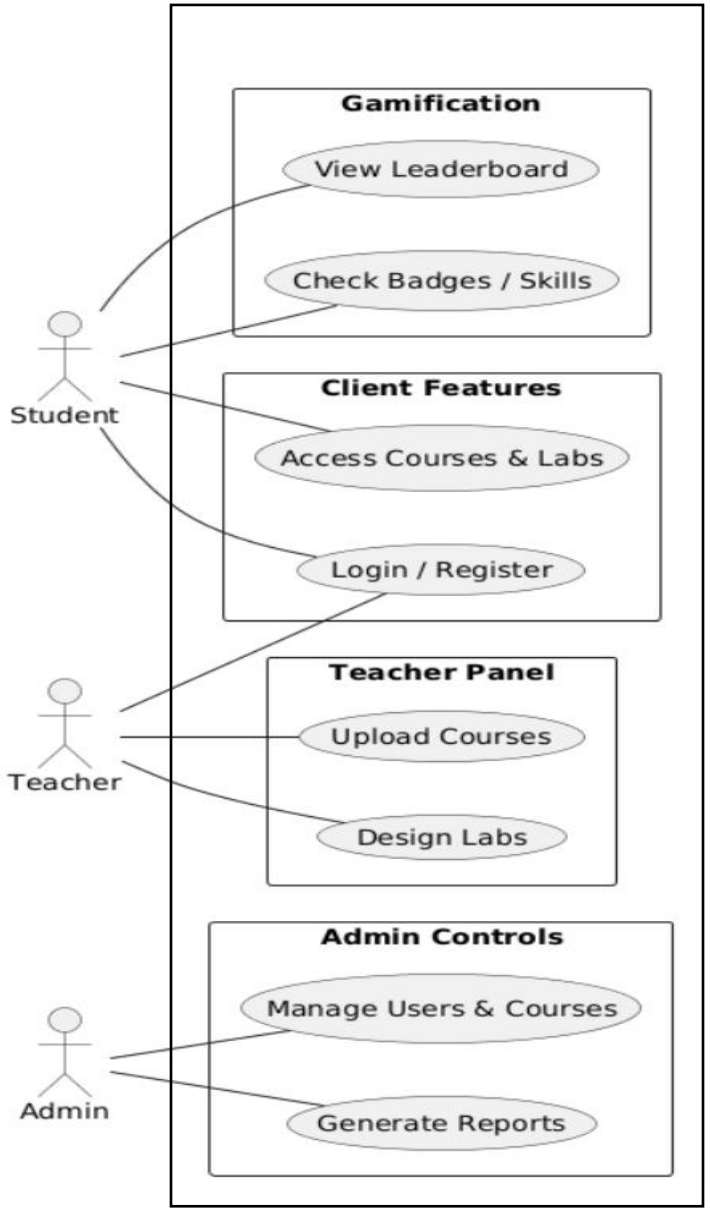
10.1 Context Diagram



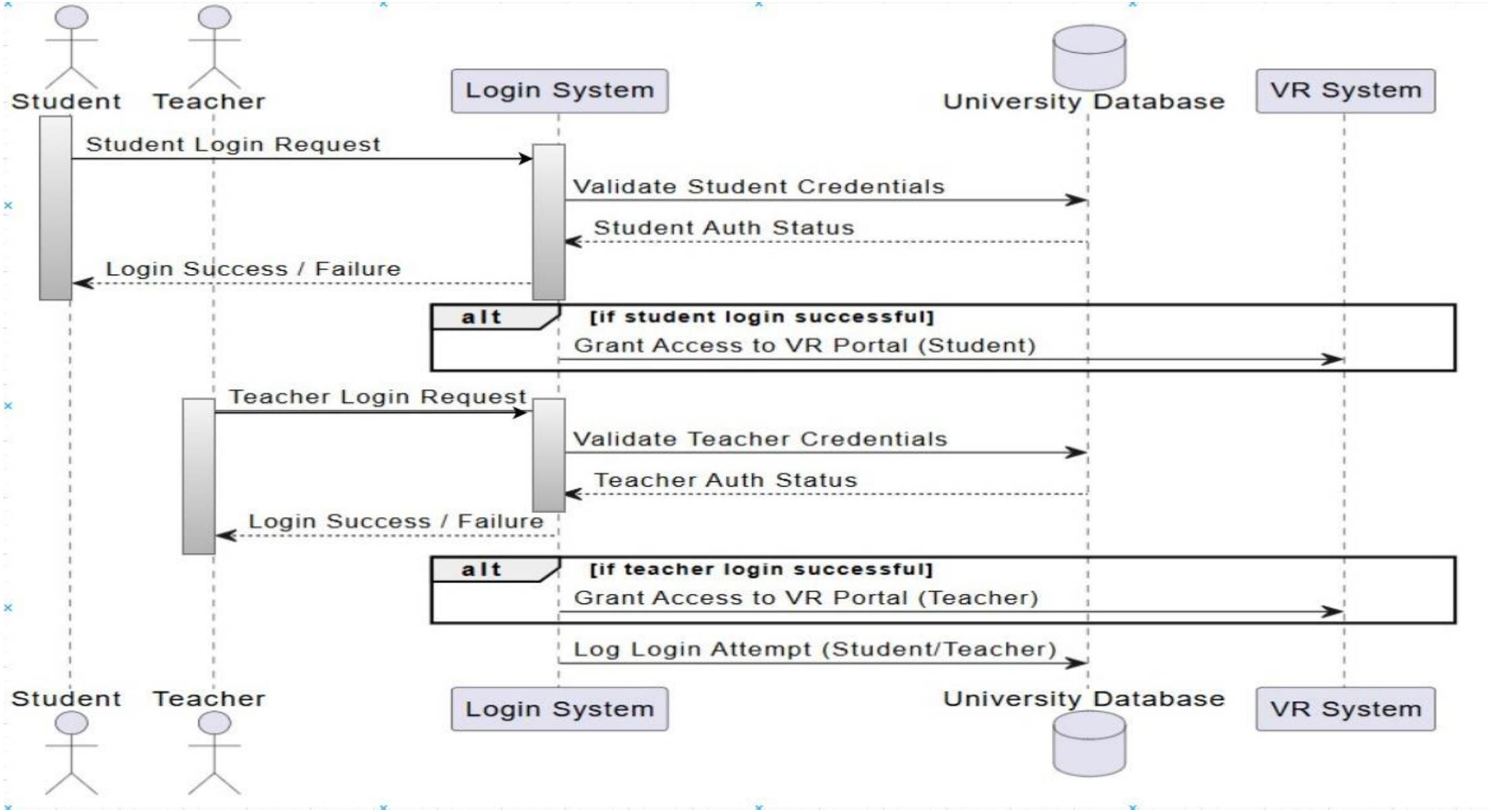
10.2 Data Flow (Level 0) Diagram



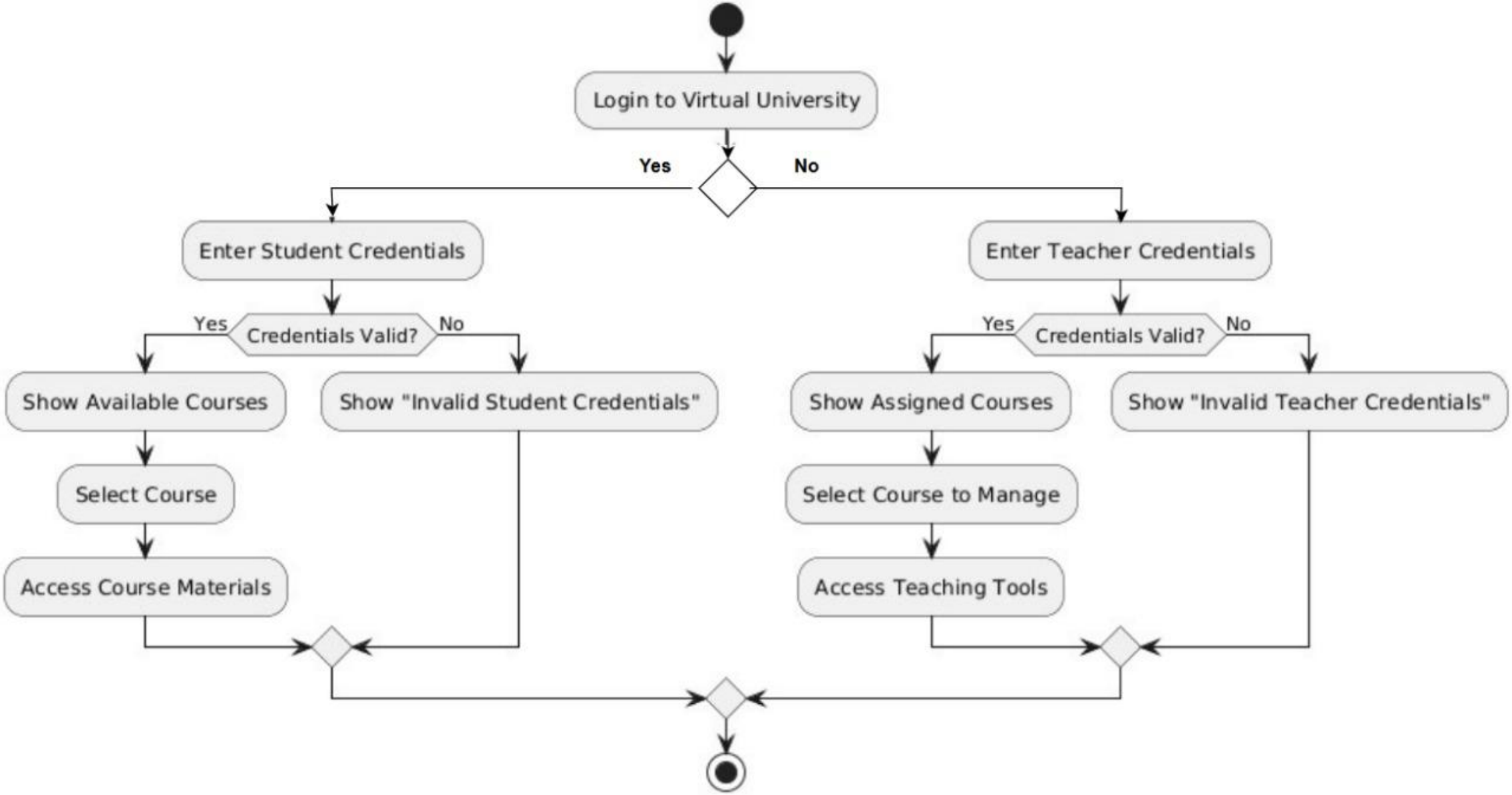
10.3 Use Case Diagram



10.4 Sequence Diagram

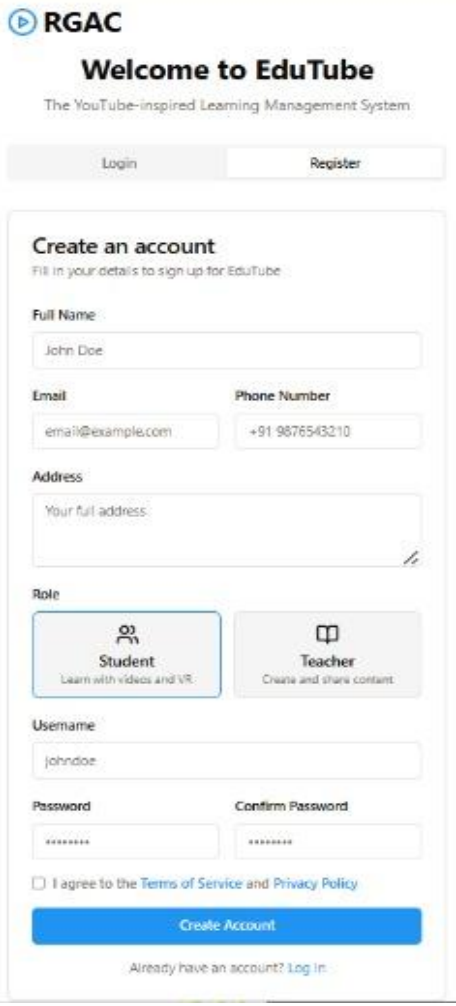


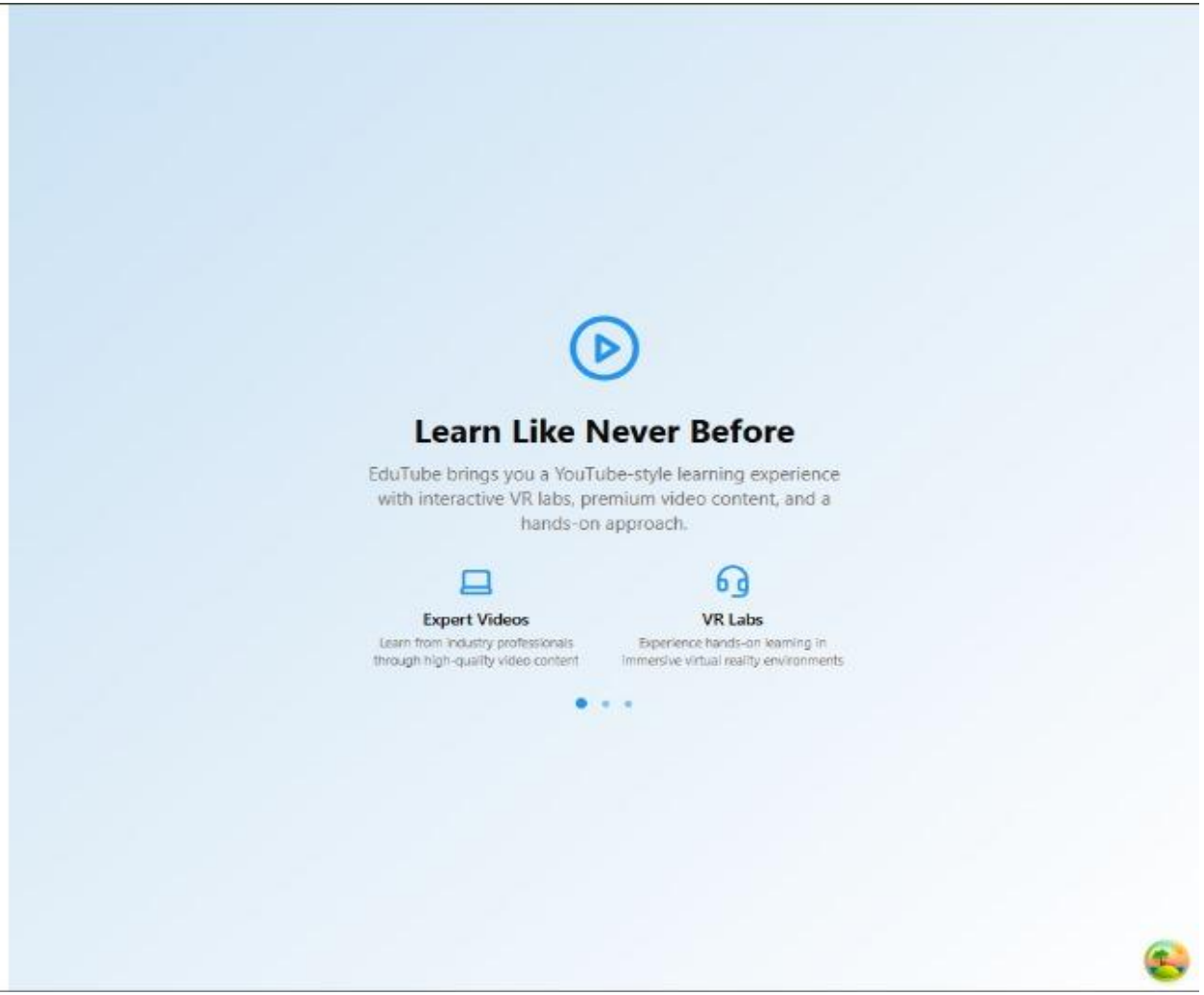
10.5 Activity Diagram



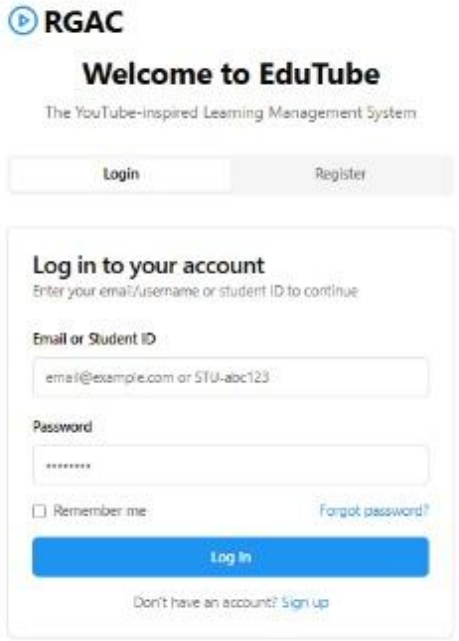
11.Implementation

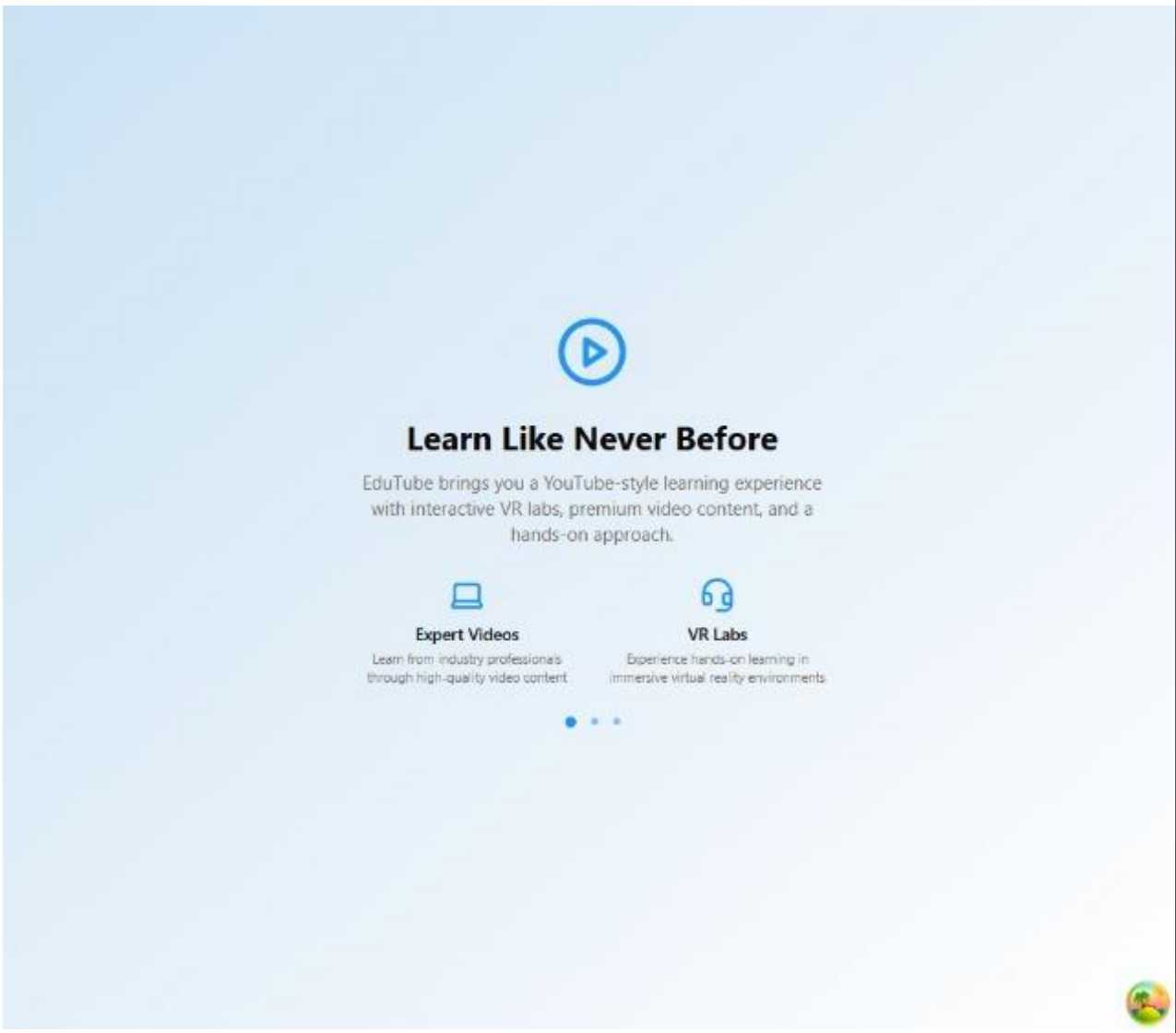
- **User Register**



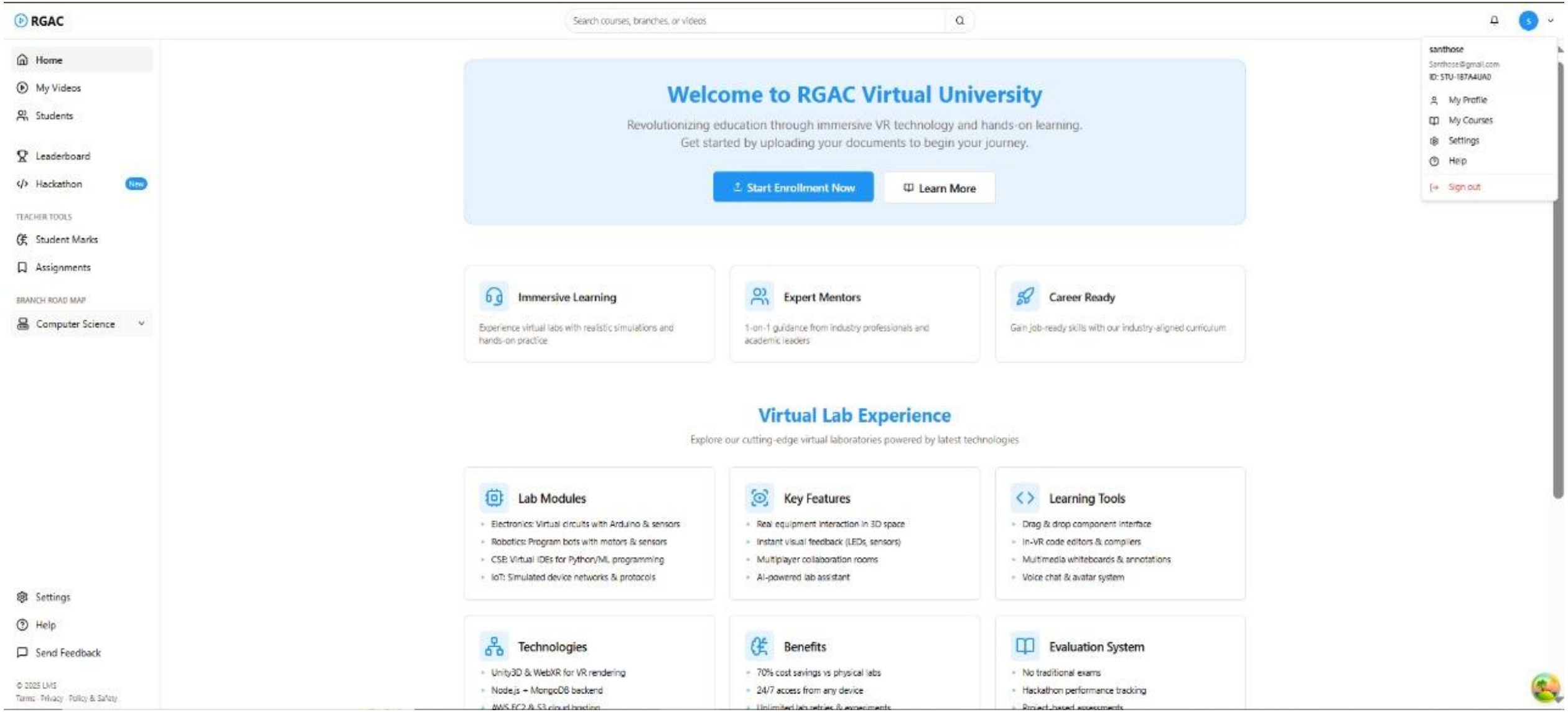


- **User Login**

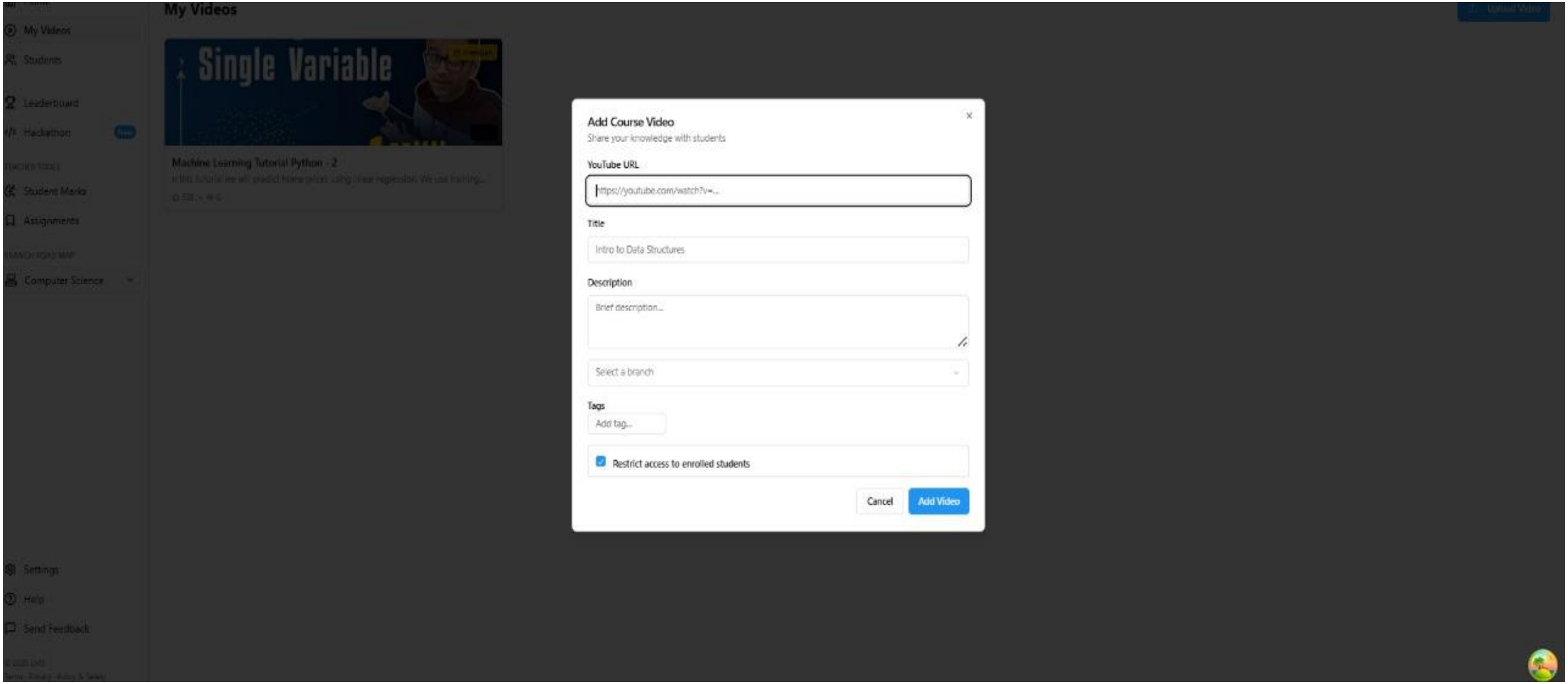

RGAC
Welcome to EduTube
The YouTube-inspired Learning Management System
Login
Register
Log in to your account
Enter your email/username or student ID to continue
Email or Student ID
email@example.com or STU-abc123
Password
Remember me
Forgot password?
Log In
Don't have an account? Sign up


Learn Like Never Before
EduTube brings you a YouTube-style learning experience with interactive VR labs, premium video content, and a hands-on approach.
Expert Videos
Learn from industry professionals through high-quality video content
VR Labs
Experience hands-on learning in immersive virtual reality environments

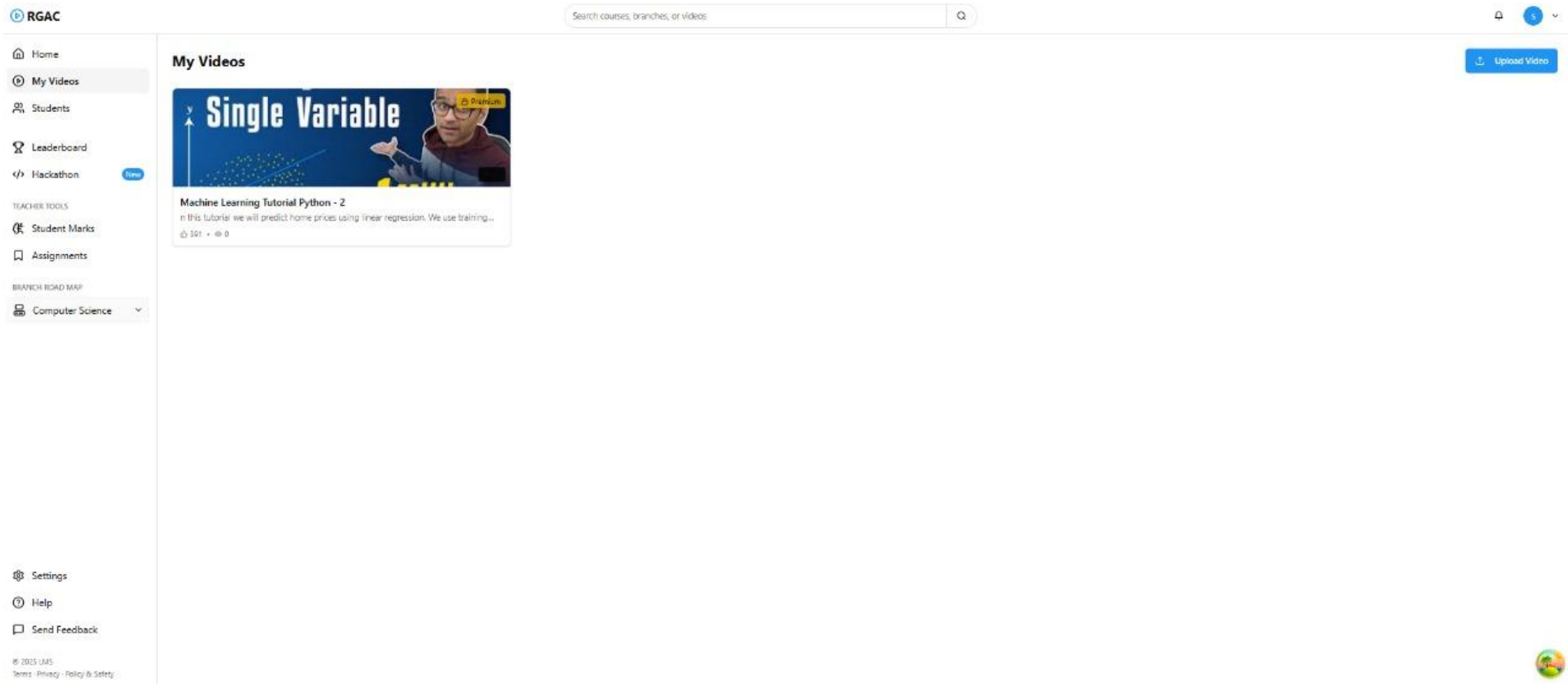
- **User as Teacher**



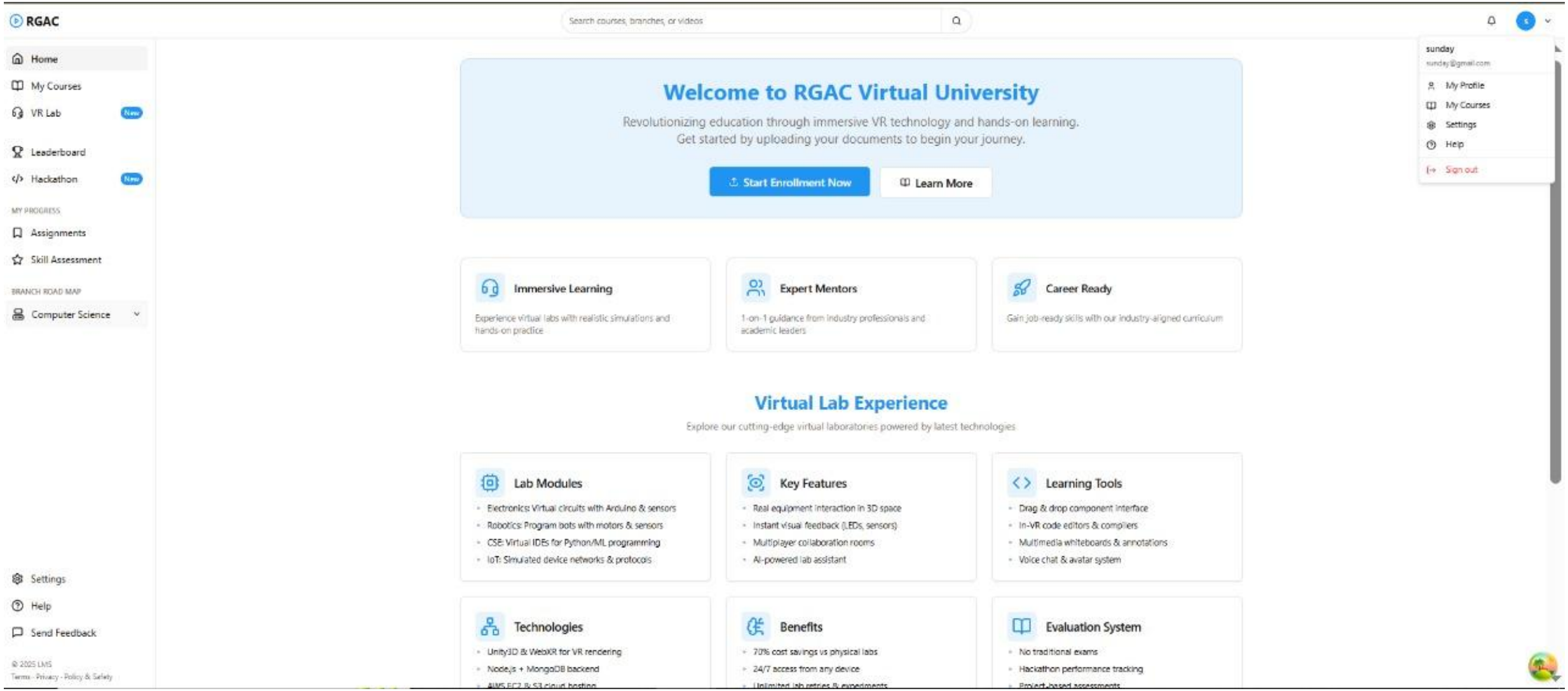
- **Teacher Uploading Video Contents**



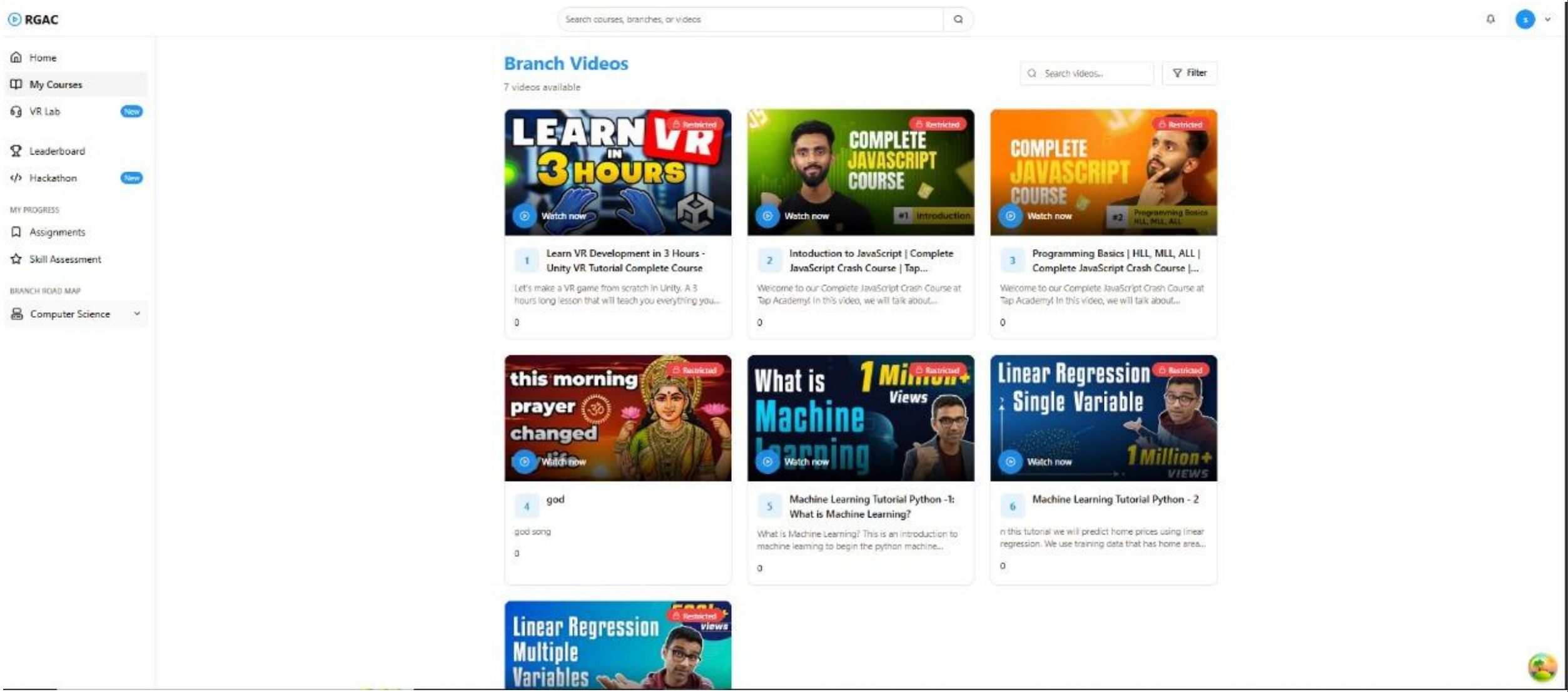
- **Uploaded Video**



- **User as an Student**



- **Videos Contents Uploaded by Teachers on a Specific Brach**



12.Expected Outcome

- A scalable Virtual University model.
- Students with enhanced employability skills.
- A decline in the urban-rural education gap.
- Financially inclusive access to quality education.
- Stronger industry-academia collaboration.

13.Applications

- Global Higher Education.
- AI-Powered Personalized Tutoring.
- Virtual Science and Engineering Labs.
- Global Expansion.

14.Timeline

Phase	Description	Duration
1	Synopsis + Literature Survey + Problem Statement	5 weeks
2	Requirements + Design	4 weeks
3	Module Development	4 weeks
4	Integration + Testing + Final Report	4 weeks

15.Conclusion

To conclude, the Virtual University is a groundbreaking solution to the limitations of traditional education systems. By combining affordability, flexibility, and industry-aligned learning, it empowers students with practical skills needed for real-world success.

References

[1] X. Zhang, Y. Chen, L. Hu, and Y. Wang, “The metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics,” Frontiers in Psychology, vol. 13, 2022.

[2] G.-A. Bodea and V. I. Bacu, “VRduino Learning: Introduction in Arduino with Virtual Reality,” in Proc. International Conference on Ubiquitous and Smart Technologies for Health and Education (ICUSI), Chisinau, 2023.

[3] F. Shadbad, G. Bahr, A. Luse, and B. Hammer, “Best of Both Worlds: The Inclusion of Gamification in Virtual Lab Environments to Increase Educational Value,” in Proc. 56th Hawaii Int. Conf. Syst. Sci. (HICSS), 2024.

Thank you all