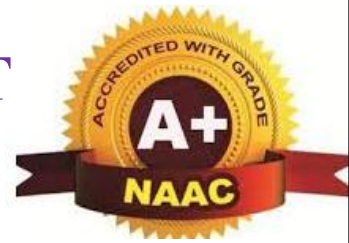




# BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT



(Recognized by Govt. of Karnataka, approved by AICTE, New Delhi)  
Autonomous Institute under Visvesvaraya Technological University, Belagavi)  
"Jnana Gangotri" Campus, No.873/2, Ballari-Hosapete Road, Allipura,  
Ballari-583 104 (Karnataka) (India)  
Ph: 08392 – 237100 / 237190, Fax: 08392 – 237197

## DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

### A Major Project Phase-II on “RGAC VIRTUAL UNIVERSITY”

Presented by

SUNKEERTH

3BR22AI160

Major Project Coordinator  
Mrs. P. Asha Jyothi  
Assistant Professor  
Dept. of AIML

Major Project Guide  
Mrs. Hosmani Manikeshwari  
Assistant Professor  
Dept. of AIML

Dr. B.M Vidyavathi  
Head of the Department  
Dept. of AIML

# 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

1. Introduction
2. Objectives
3. Problem Statement
4. Scope of the project
5. Literature Survey
6. Domain
7. Proposed System
  - 7.1 Block Diagram
  - 7.2 Architectural Diagram
  - 7.3 Modules And Their Fuctionality
8. Methodology
  - 8.1 Techniques
  - 8.2 Development Model
  - 8.3 Tools & Technologies
9. Requirements Specifications
  - 9.1 Functional Requirements
  - 9.2 Non-Functional Requirements
  - 9.3 Hardware Requirements
  - 9.4 Software Requirements

## 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

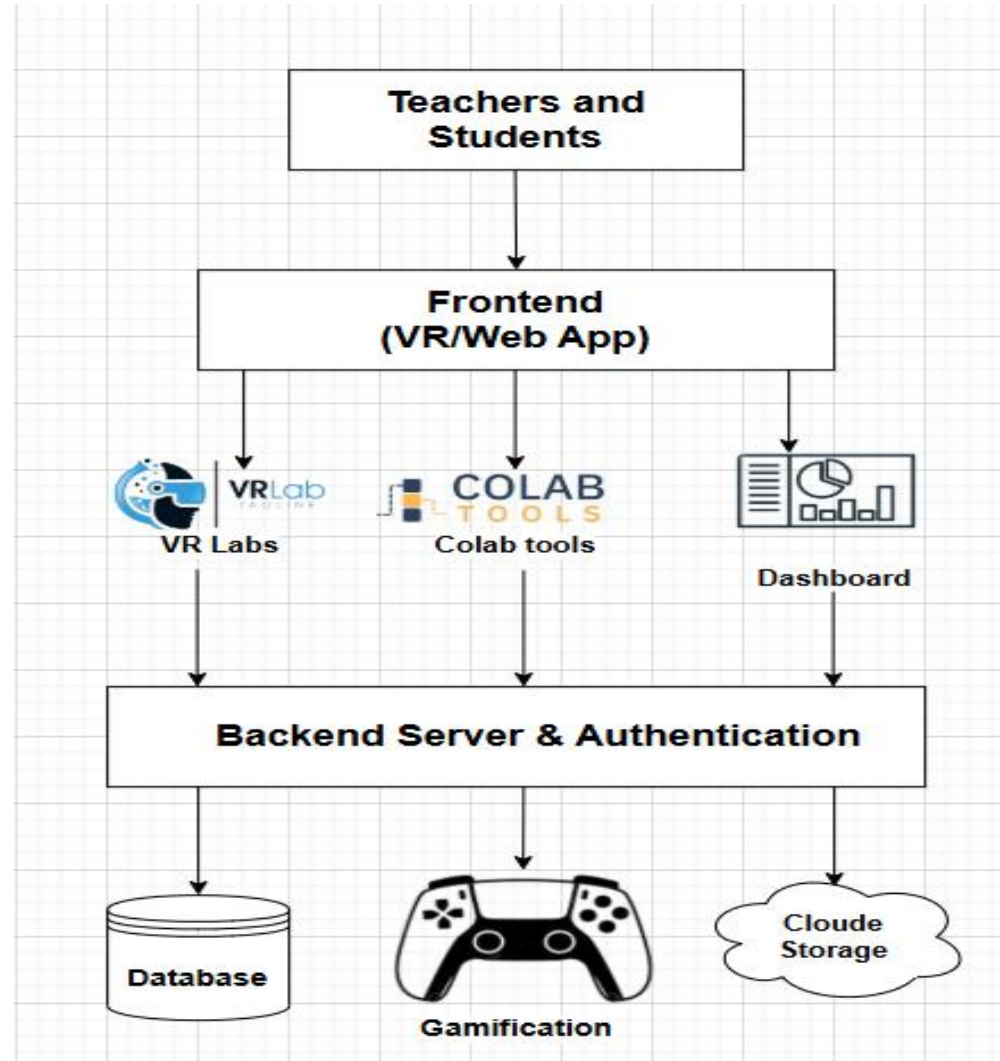
Title	Year	Summary	Gaps Addressed
“Metaverse in Education” By Leonard Zophan and Karin Northus	2018	Highlights the metaverse’s potential for immersive learning through avatars and 3D environments.	The app's reliance on internet and manual activation limits
“Virtual Labs” By Raghu Raman and Vinit Kumar 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

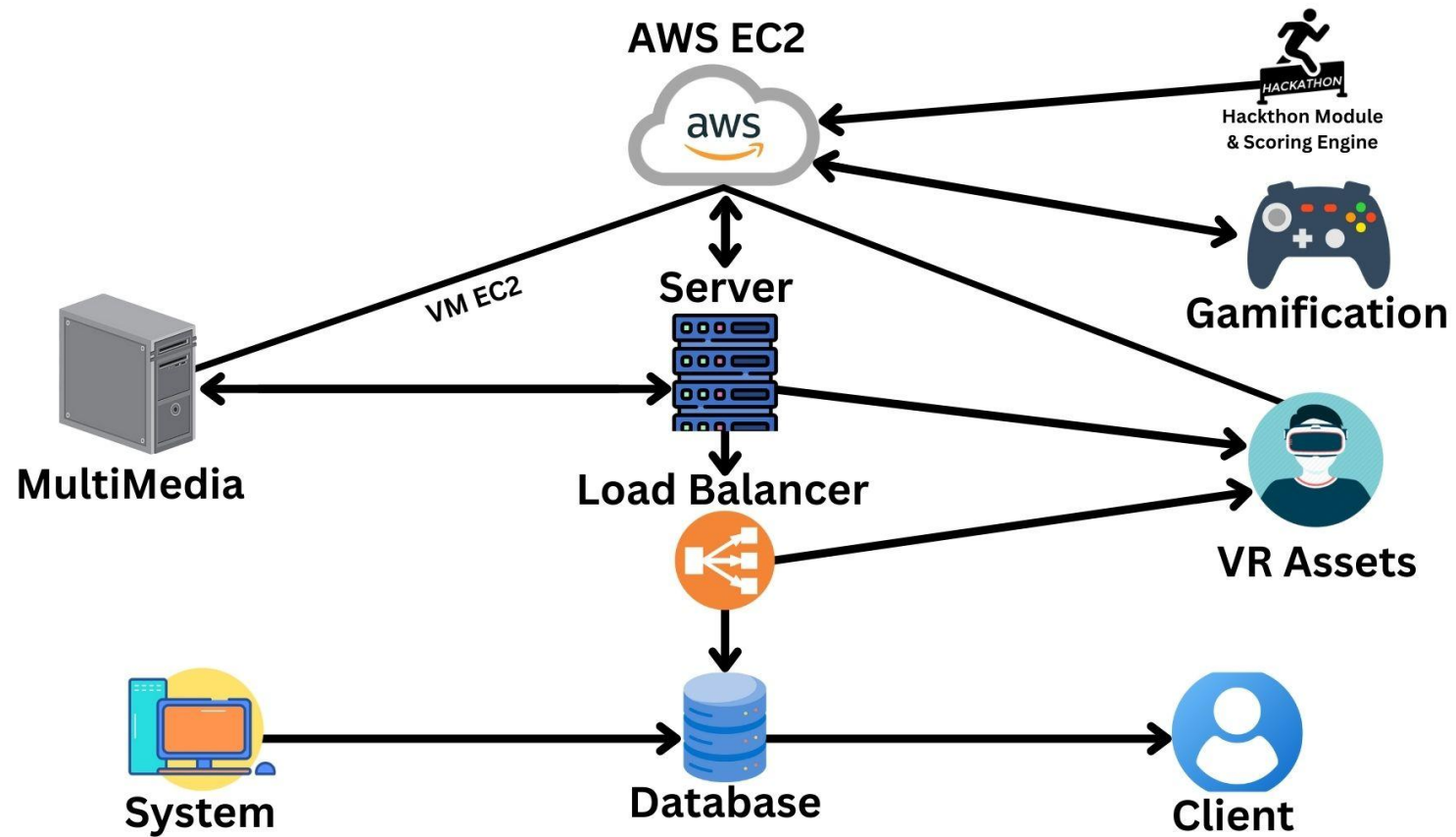
- **Core Domain (Technical focus):** Learning Management Systems (LMS), Artificial Intelligence (AI), Mobile Learning (m-Learning), Extended Reality (AR/VR).
- **Application Domain (Real-world Area):** Education (Focusing on educational content delivery and learn new skills through VR).

# 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

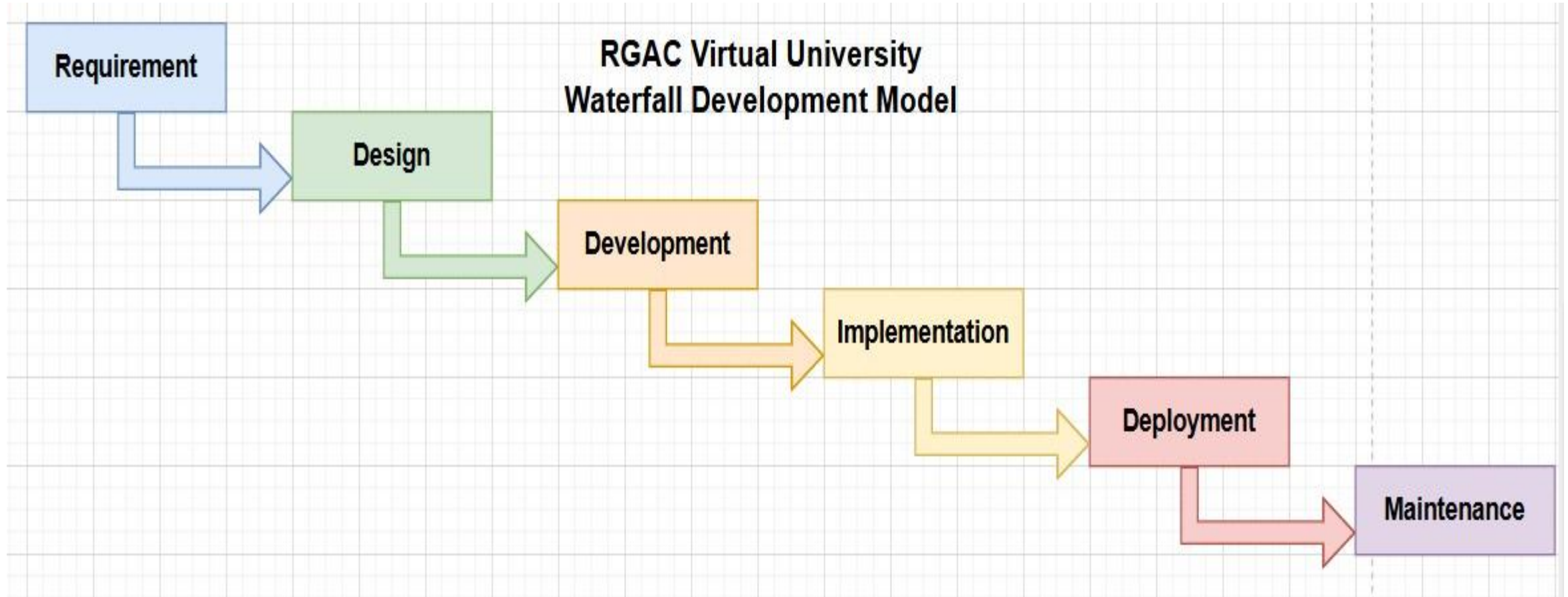
## 8.1 Techniques & Algorithms :

- **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:**

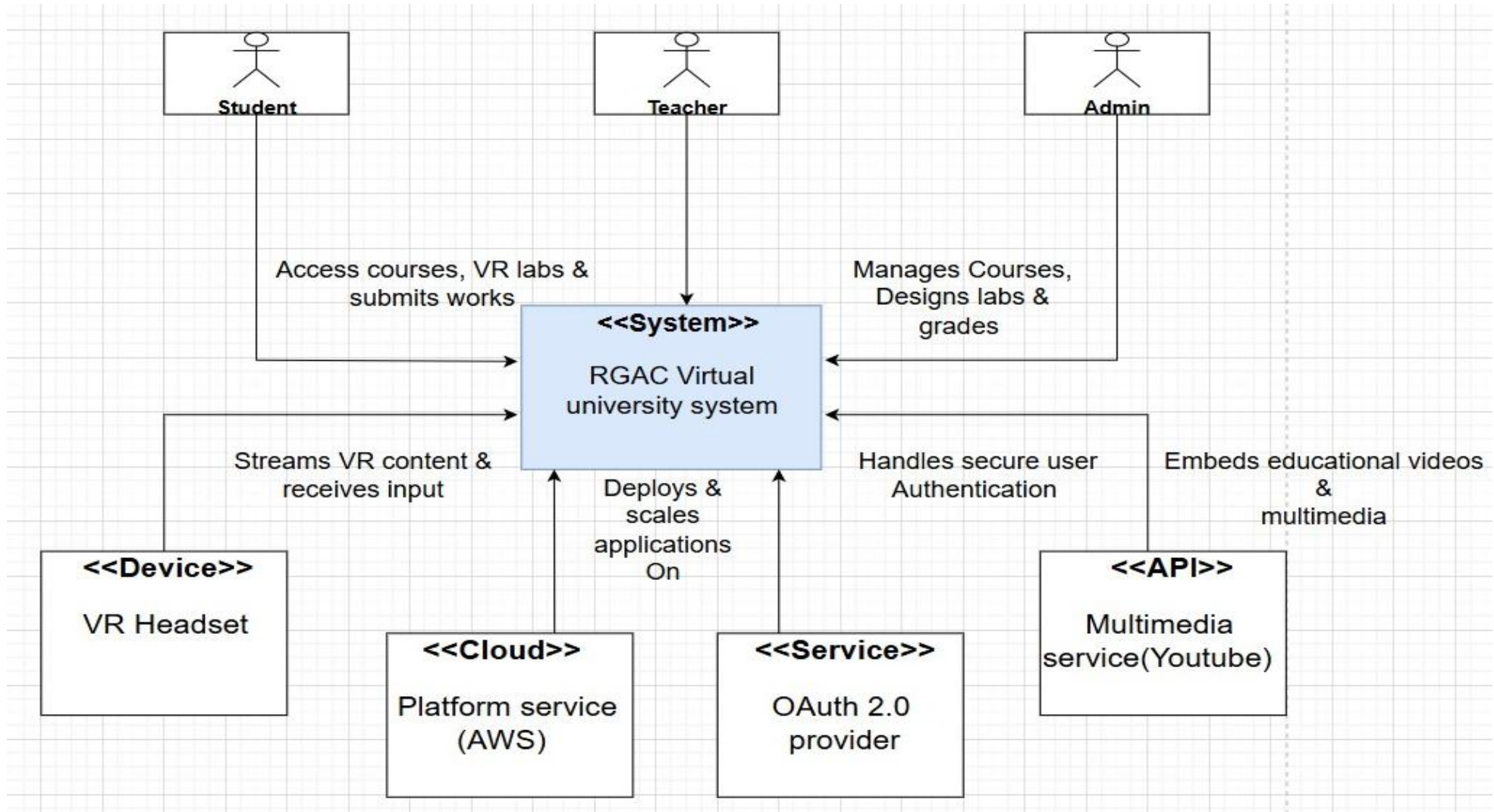
- **VR Headset** : Oculus Quest, Meta Quest.
- **Laptop** : Unity development, testing, coding.
- **Microphone**: Clear voice recording during lectures.
- **Webcam**: Record instructor face for overlays.
- **Green Screen Cloth**: Remove video background in OBS.

## 9.4 Software Requirements:

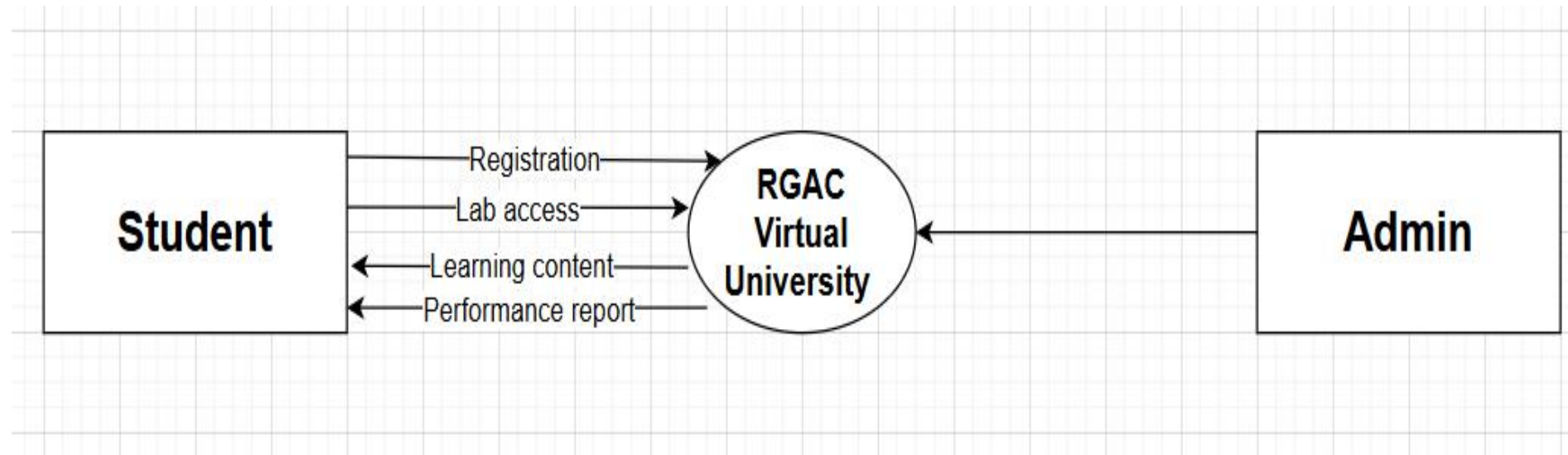
- **VR Development:** Unity 3D, Blender, Sketchfab.
- **Frontend:** React.js, Three.js.
- **Gamification:** Unity UI + Scoreboards.
- **Backend & Database :** Node.js ,Express.js , Reset API , MongoDB.
- **Content & Delivery :** YouTube API , WebXR .
- **Authentication & Security :** OAuth2 + JWT .

# 10.Design

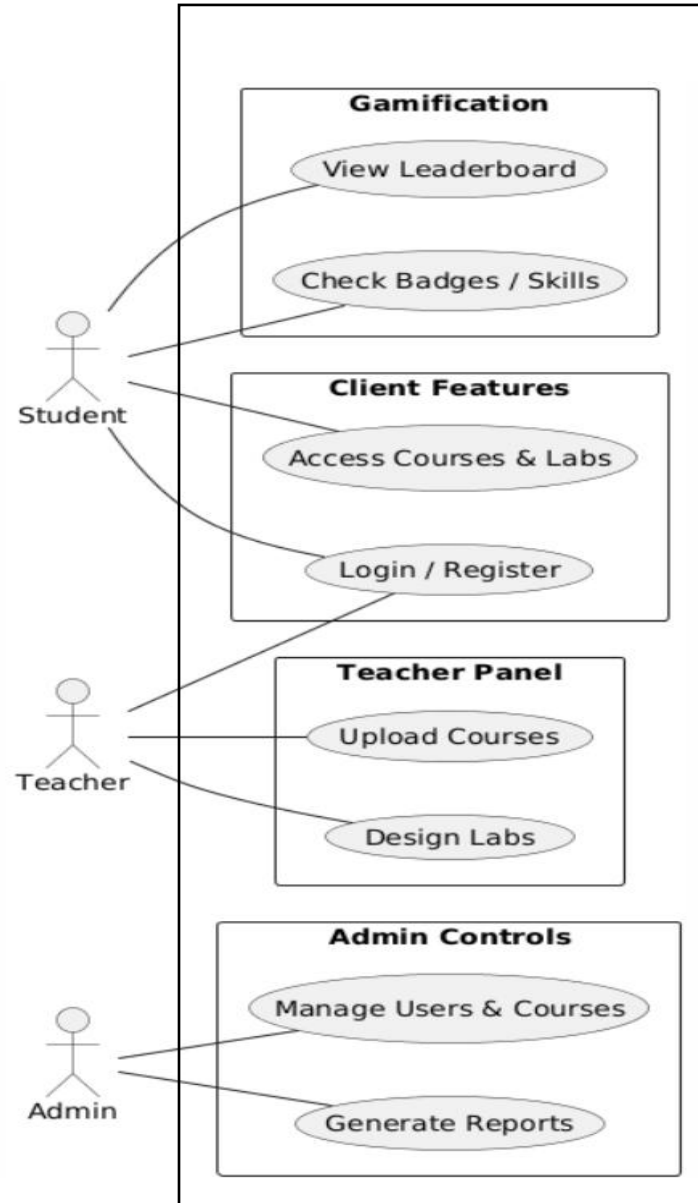
## 10.1 Context Diagram



## 10.2 Data Flow (Level 0) Diagram

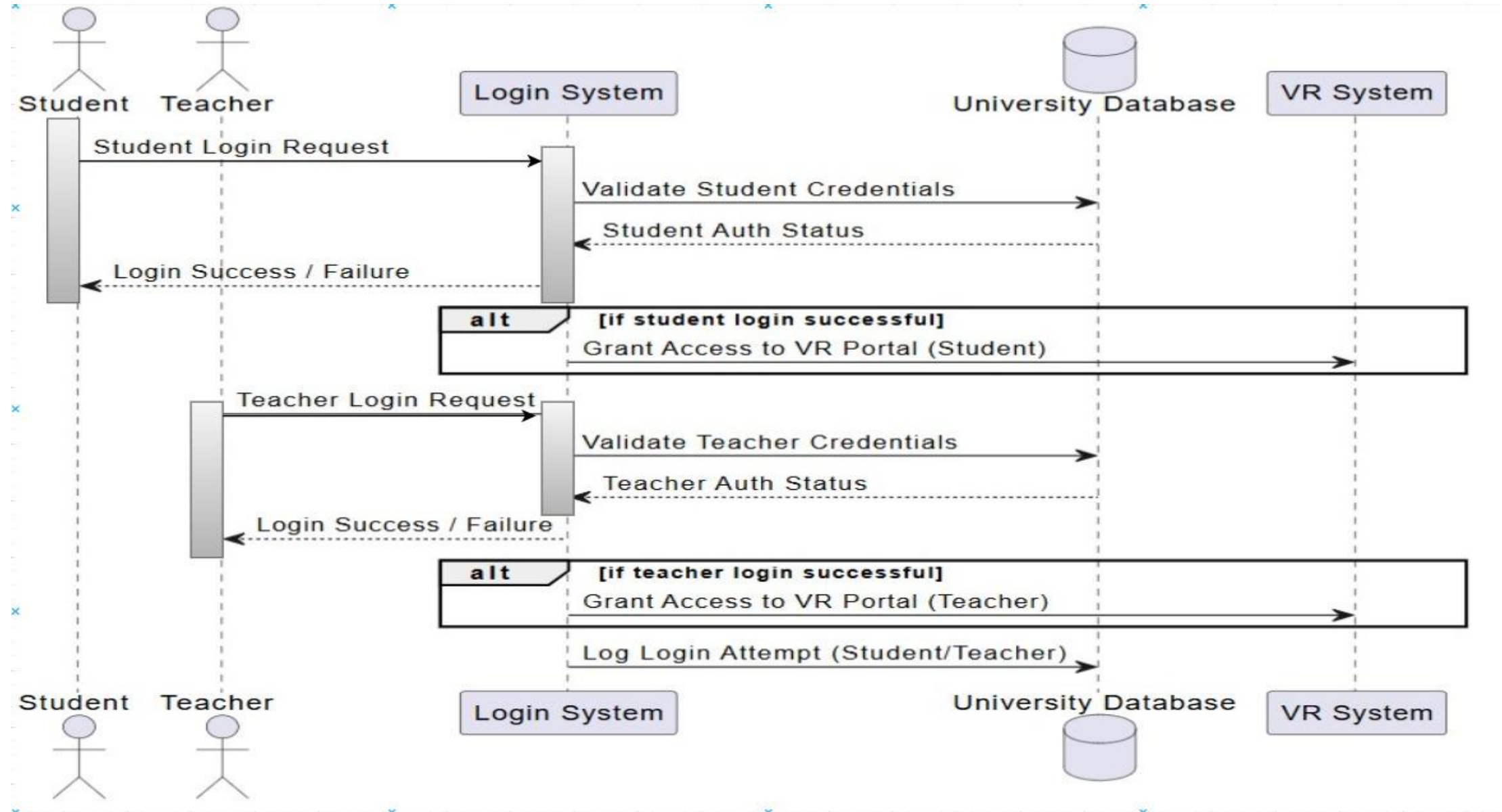


## 10.3 Use Case Diagram

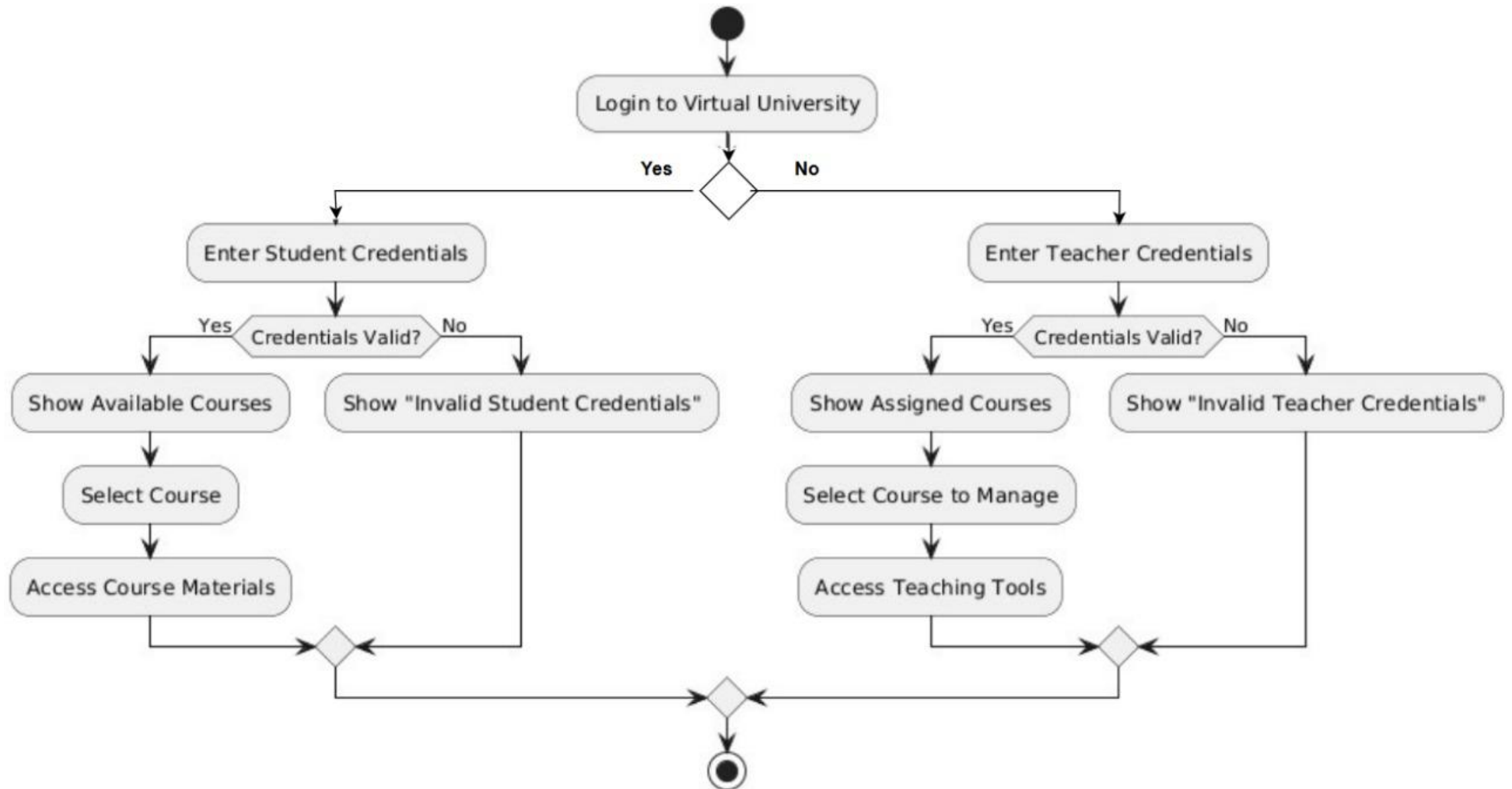




## 10.4 Sequence Diagram




## 10.5 Activity Diagram



# 11.Implementation

- User Register

**RGAC**

**Welcome to EduTube**  
The YouTube-inspired Learning Management System

[Login](#) [Register](#)

**Create an account**  
Fill in your details to sign up for EduTube


**Full Name**


**Email**

**Phone Number**

**Address**

**Role**

**Student**  
Learn with videos and VR

**Teacher**  
Create and share content

**Username**

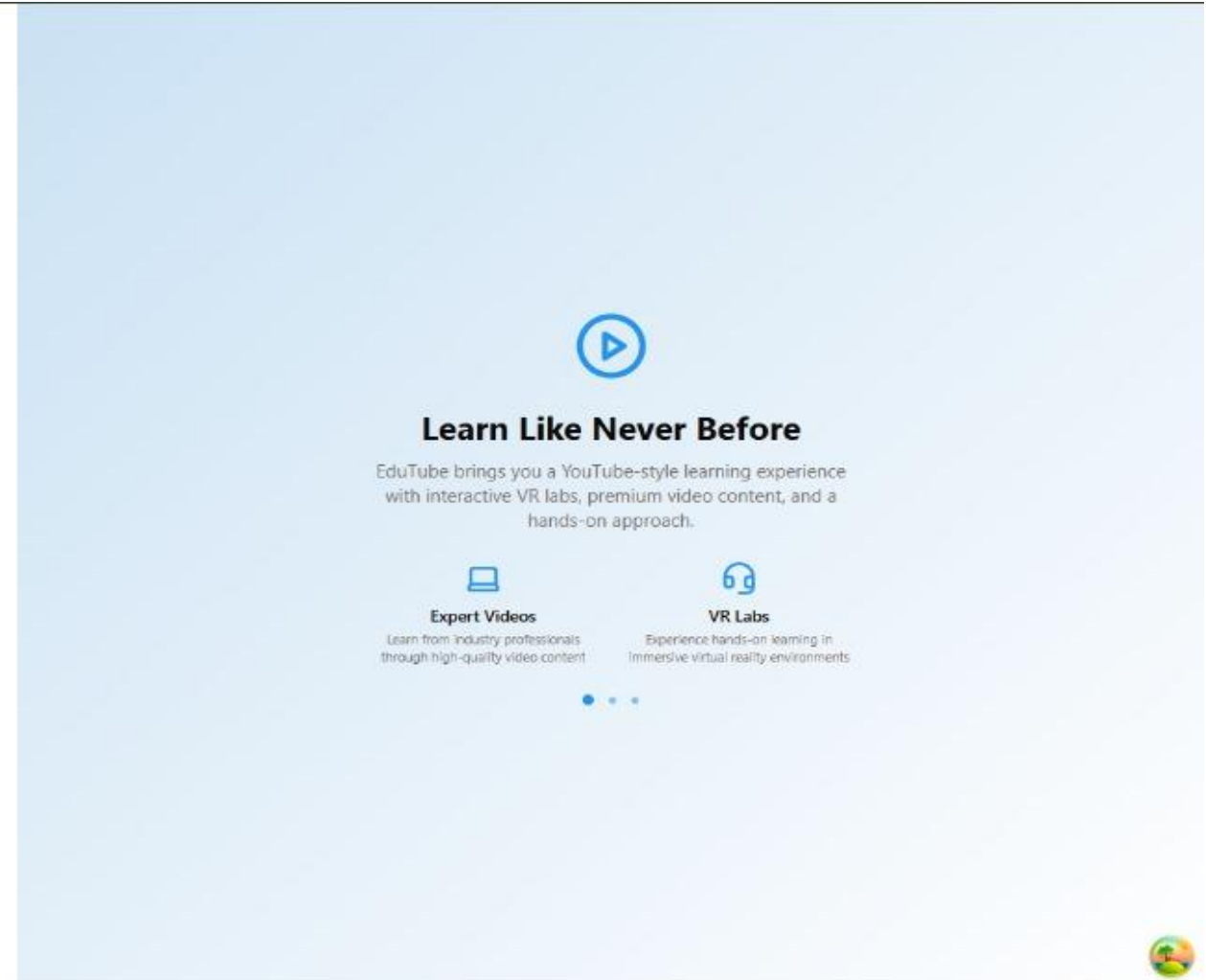
**Password**

**Confirm Password**


☐ I agree to the [Terms of Service](#) and [Privacy Policy](#)

[Create Account](#)

[Already have an account? Log in](#)



- 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

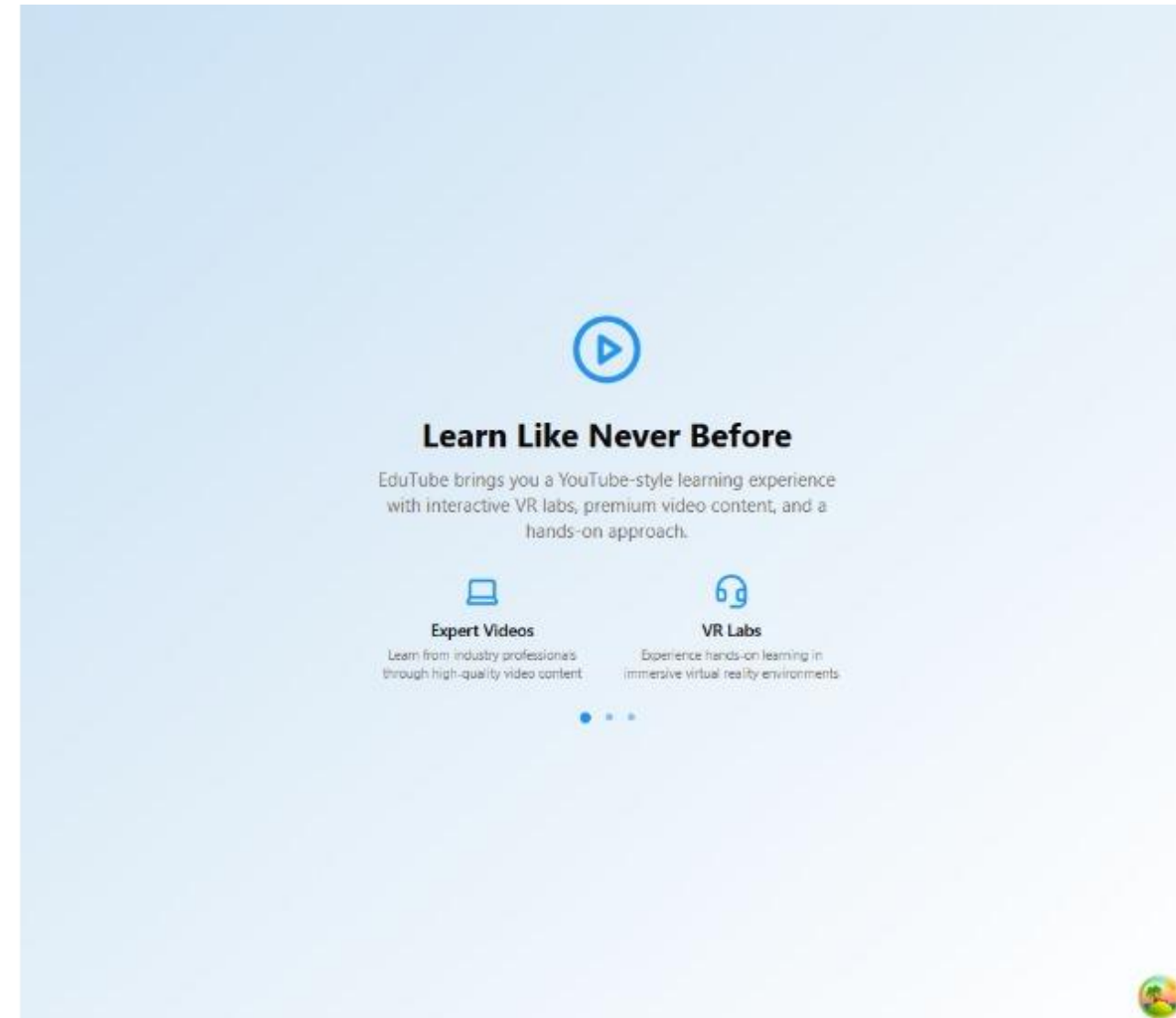
Email or Student ID

Password

☐ Remember me [Forgot password?](#)

**Log In**

[Don't have an account? Sign up](#)



• User as Teacher

RGAC

Search courses, branches, or videos

🔔

👤

Home

My Videos

Students

Leaderboard

Hackathon New

TEACHER TOOLS

Student Marks

Assignments

BRANCH ROAD MAP

Computer Science

Settings

Help

Send Feedback

© 2025 LMS  
Terms · Privacy · Policy & Safety

Welcome to RGAC Virtual University

Revolutionizing education through immersive VR technology and hands-on learning.  
Get started by uploading your documents to begin your journey.

Start Enrollment Now

Learn More

Immersive Learning

Experience virtual labs with realistic simulations and hands-on practice.

Expert Mentors

1-on-1 guidance from industry professionals and academic leaders.

Career Ready

Gain job-ready skills with our industry-aligned curriculum.

Virtual Lab Experience

Explore our cutting-edge virtual laboratories powered by latest technologies.

Lab Modules

- Electronics: Virtual circuits with Arduino & sensors
- Robotics: Program bots with motors & sensors
- CSE: Virtual IDEs for Python/ML programming
- IoT: Simulated device networks & protocols

Key Features

- Real equipment interaction in 3D space
- Instant visual feedback (LEDs, sensors)
- Multiplayer collaboration rooms
- AI-powered lab assistant

Learning Tools

- Drag & drop component interface
- In-VR code editors & compilers
- Multimedia whiteboards & annotations
- Voice chat & avatar system

Technologies

- Unity3D & WebXR for VR rendering
- Node.js + MongoDB backend
- AWS EC2 & S3 cloud hosting

Benefits

- 70% cost savings vs physical labs
- 24/7 access from any device
- Unlimited lab retries & experiments

Evaluation System

- No traditional exams
- Hackathon performance tracking
- Project-based assessments

santhosh  
Santhosh@gmail.com  
ID: STU-1B7A4UAD

My Profile

My Courses

Settings

Help

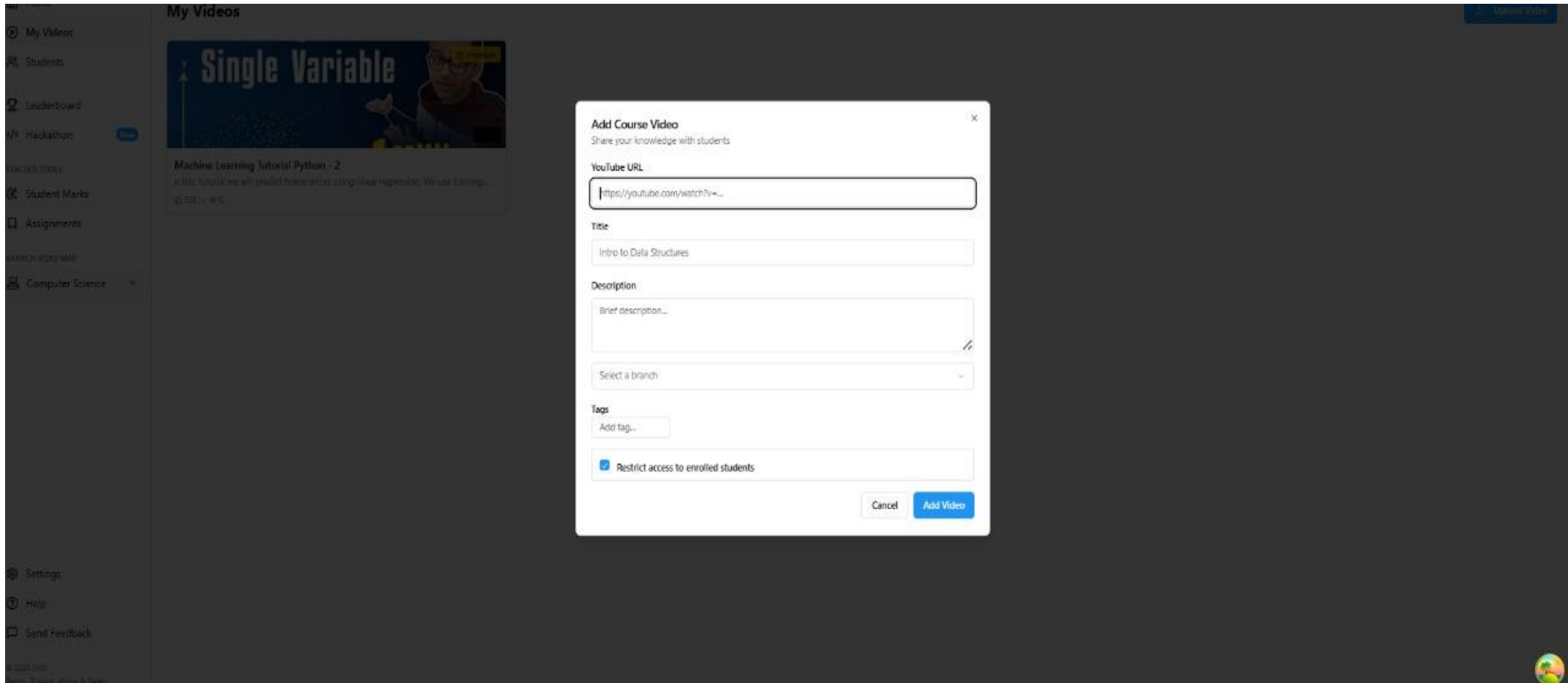
Sign out

10/25/2025

RGAC VIRTUAL UNIVERSITY

29

- Teacher Uploading Video Contents



- Uploaded Video

RGAC

Home

My Videos

Students

Leaderboard

Hackathon

TEACHER TOOLS

Student Marks

Assignments

BRANCH ROAD MAP

Computer Science

Settings

Help

Send Feedback

© 2025 UMS

Terms · Privacy · Policy & Safety

Search courses, branches, or videos

Q

Upload Video

My Videos

Single Variable

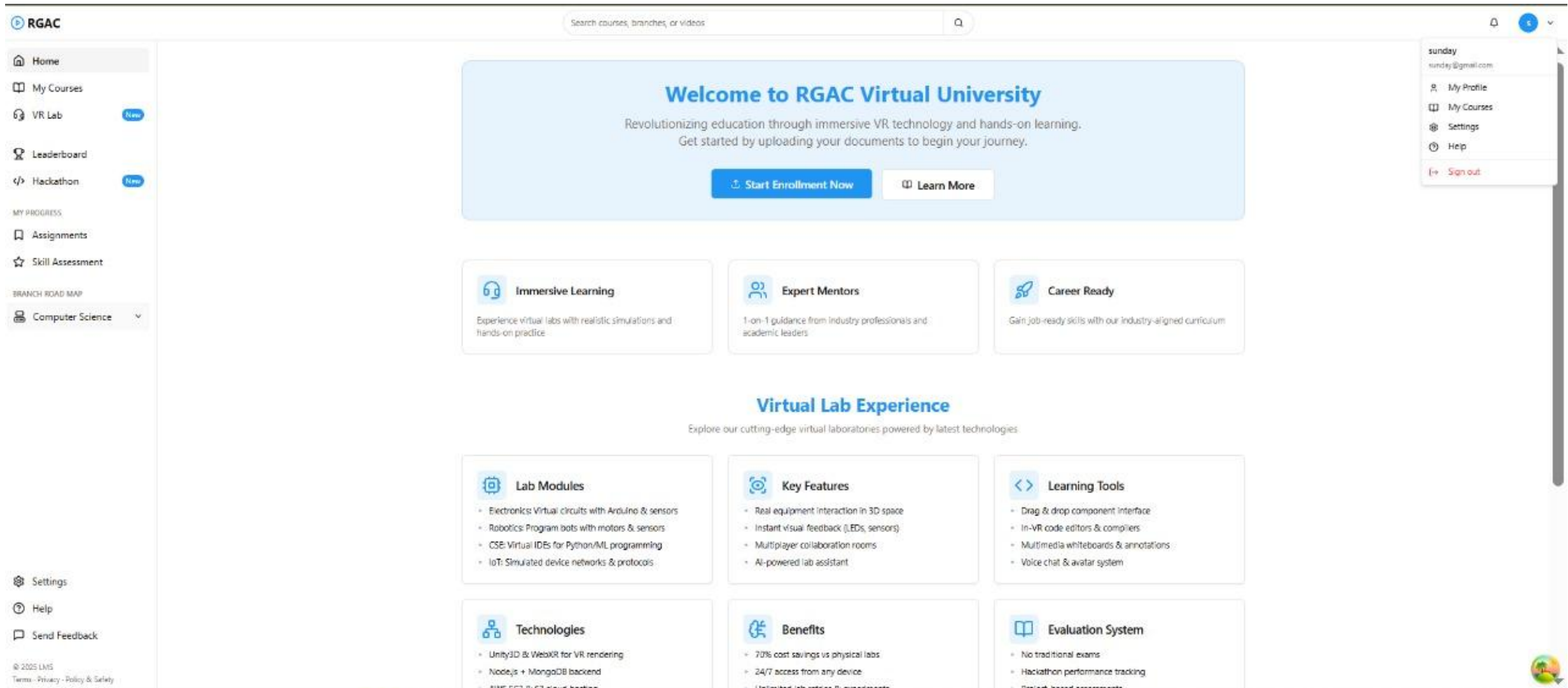
Machine Learning Tutorial Python - 2

n this tutorial we will predict home prices using linear regression. We use training...

101 · 0



- User as an Student





- Videos Contents Uploaded by Teachers on a Specific Brach

RGAC

Home

My Courses

VR Lab

Leaderboard

Hackathon

MY PROGRESS

Assignments

Skill Assessment

BRANCH ROAD MAP

Computer Science

Search courses, branches, or videos

Branch Videos

7 videos available

Search videos

Filter

LEARN VR IN 3 HOURS

Watch now

1

Learn VR Development in 3 Hours - Unity VR Tutorial Complete Course

Let's make a VR game from scratch in Unity. A 3 hours long lesson that will teach you everything you...

0

COMPLETE JAVASCRIPT COURSE

Watch now

2

Introduction to JavaScript | Complete JavaScript Crash Course | Tap...

Welcome to our Complete JavaScript Crash Course at Tap Academy! In this video, we will talk about...

0

COMPLETE JAVASCRIPT COURSE

Watch now

3

Programming Basics | HLL, MLL, ALL | Complete JavaScript Crash Course |...

Welcome to our Complete JavaScript Crash Course at Tap Academy! In this video, we will talk about...

0

this morning prayer changed

Watch now

4

god

god song

0

What is Machine Learning

Watch now

5

Machine Learning Tutorial Python - 1: What is Machine Learning?

What is Machine Learning? This is an introduction to machine learning to begin the python machine...

0

Linear Regression Single Variable

Watch now

6

Machine Learning Tutorial Python - 2

In this tutorial we will predict home prices using linear regression. We use training data that has home area...

0

Linear Regression Multiple Variables

Watch now

7

Machine Learning Tutorial Python - 3

In this tutorial we will predict home prices using linear regression. We use training data that has home area...

0

10/25/2025

RGAC VIRTUAL UNIVERSITY

33

## 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*

69STATUS.SRKH.IN