




# ScienceTutor

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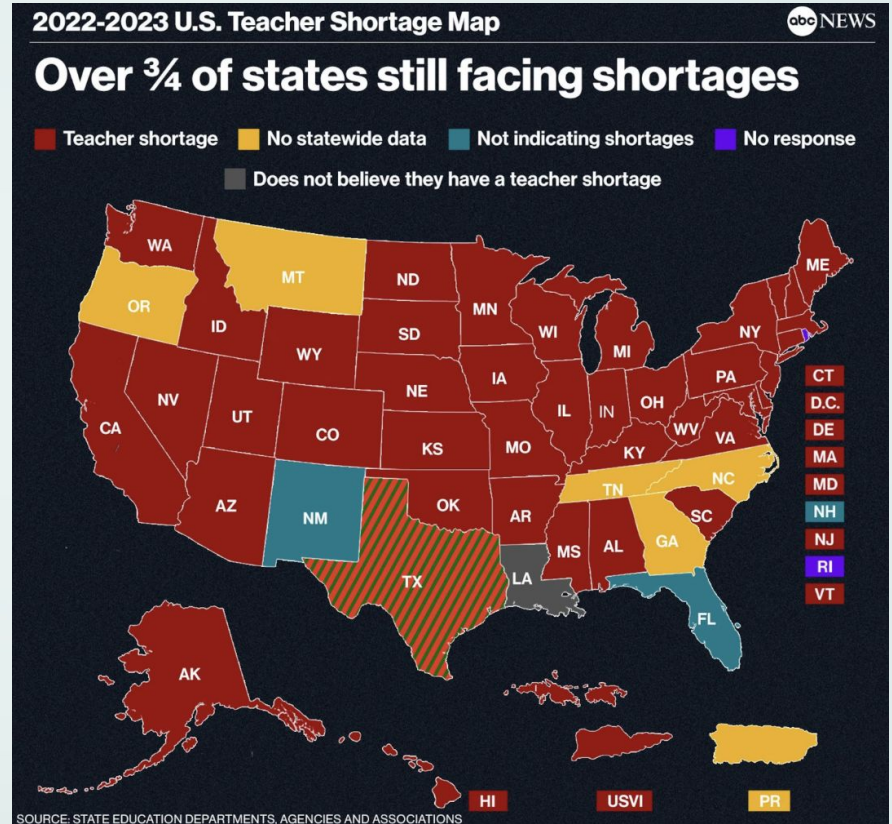


01

# Project Motivation

# Challenges in Current Education

## 1. Teacher vacancy



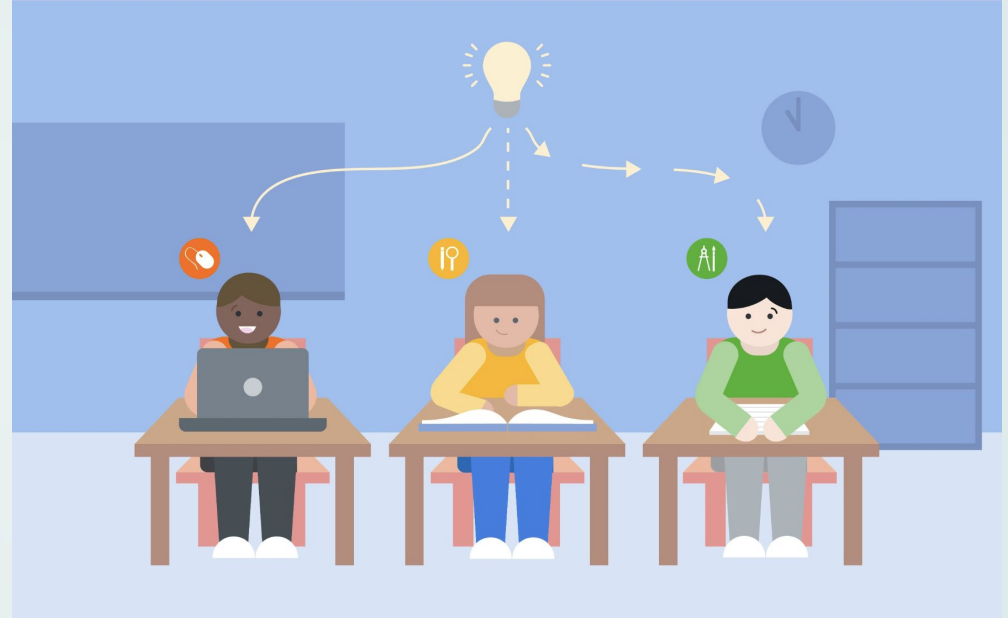
# Challenges in Current Education

1. Teacher vacancy
2. Student Frustration



# Challenges in Current Education

1. Teacher vacancy
2. Student Frustration
3. Demand for personalized experience



**What is special about ScienceTutor?**

# What is special about ScienceTutor?



- ✗ Primarily text-based
- ✗ Results vary in quality, depth, relevance
- ✗ Lacks interactive chatbot capabilities
- ✗ Not designed for children
- ✗ Many distractions

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Traditional Search Engine

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ChatGPT

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ScienceTutor

- ✓ **Tailored** to provide expert-level responses to **science** questions
- ✓ Support **multimodalities**
- ✓ Easy to incorporate **child-centric** design and **education-purpose** function, such as age-appropriate language and quiz function
- ✓ Aims for **worldwide accessibility**, promoting science education

# User Case Scenario

02

An abstract graphic design featuring organic, flowing shapes in orange, olive green, and dark grey. A central orange shape contains a white circle with the number '02' inside. Surrounding this are several small dots in teal, dark grey, and black, and a white teardrop shape pointing towards the bottom right.

# Use Case: Interact with Chatbot

The application allows users to send text and/or image and get instant response from the chatbot.

## Primary Actor

User: young children interested in science

## Trigger

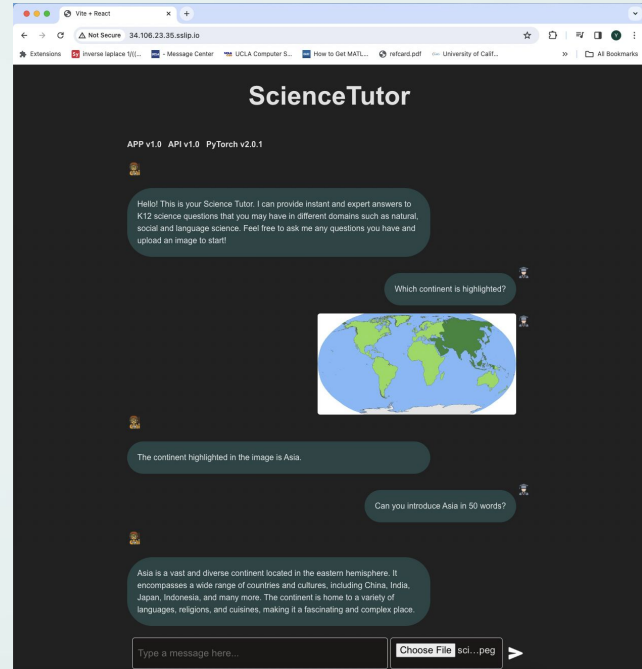
User sends a prompt (text) and/or an image

## Major Inputs

- Question (Free-Text)
- Image (Optional)
- New Question Asked

## Major Outputs

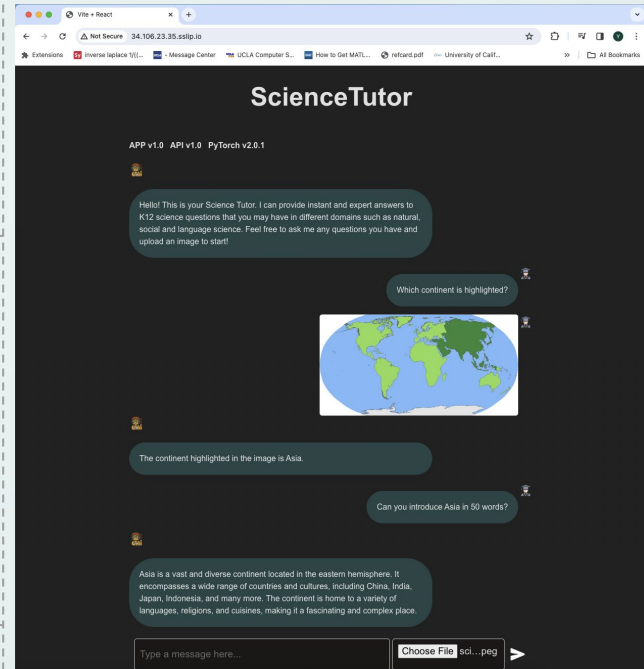
- Answer (Free-Text)
- New Answer



# Use Case: Interact with Chatbot

The application allows users to send text and/or image and get instant response from the chatbot.

Majors Steps	Information Required
1. User enters question to ask. ↓ Text   ↓ Image	← Question (Free-Text Prompt)  ← Image (Optional)
2. Application receives input (text &/or image) from user and sends response to user.	→ Answer (Free-Text Response)
3. User enters new question to ask.	← New Question Asked  → New Answer Provided



# Other Potential Use Cases



- Generates a quiz (5 random multiple-choice questions)
- User clicks on "Quiz Me!"

## Quiz on Science Questions



- Reads the chat conversation out loud
- User clicks on horn icon

## Read the Chat

- Translates conversation from English to a target language
- User clicks on "Translate"

## Translate the Chat Page



- Recommends educational blog posts and online courses
- User clicks on "Recommend"

## Recommend Resources

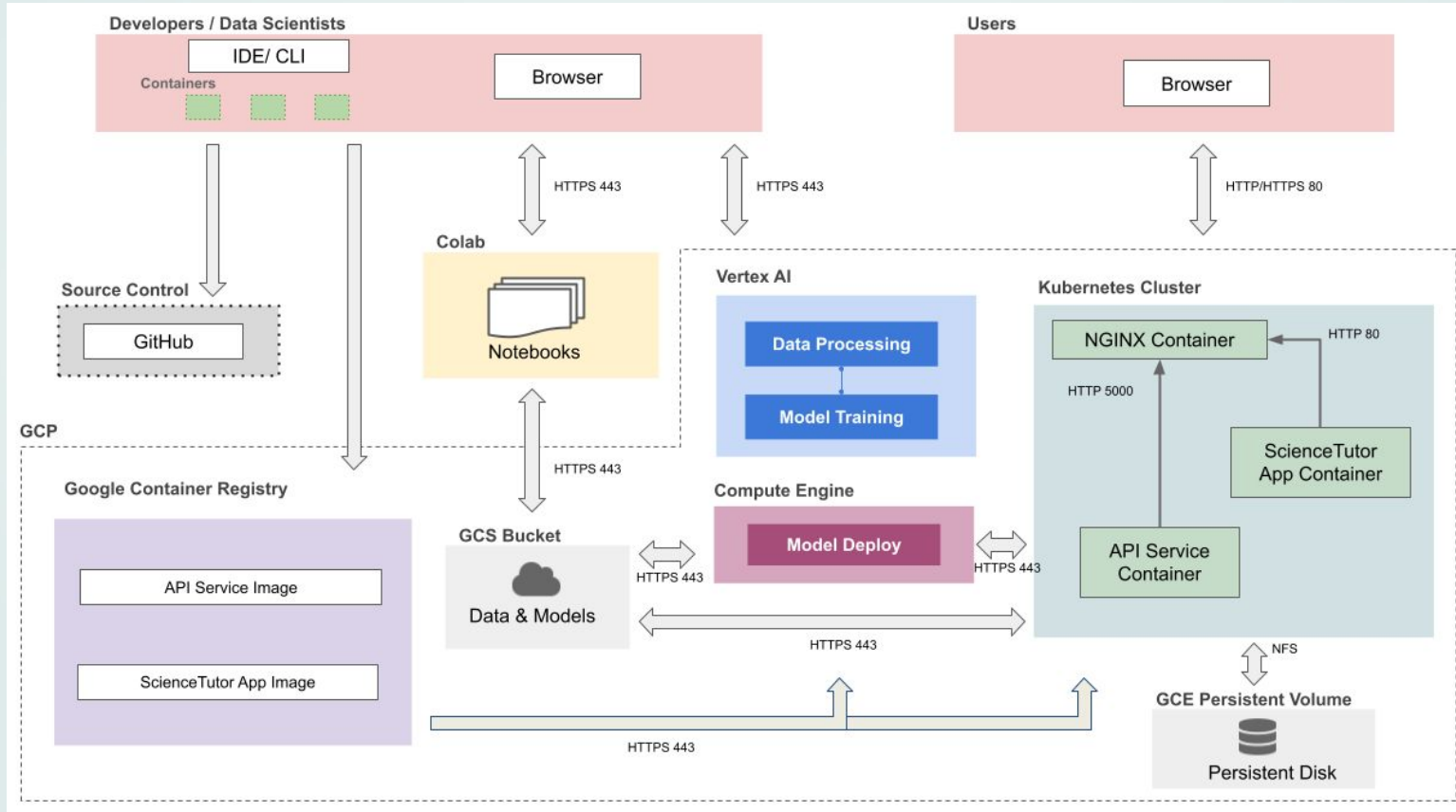


# Technical Aspects

03

An abstract graphic design featuring organic, flowing shapes in shades of olive green, mustard yellow, and teal. A central green shape contains a dark teal circle with the number '03' in white. Other shapes include a yellow teardrop with a teal circle, a white teardrop with a green circle, and various smaller circles in teal, black, and white scattered throughout the composition.

# Technical Architecture



# Challenges

01

## Optimization

LLaVA-7B's computational demands may hinder real-time interactions, especially in resource-constrained environments.

02

## Scalability

High concurrent user loads may strain the system, leading to delays in processing requests, slower loading times, or even system errors.

03

## User Friendly

ScienceTutor should allow users to ask follow-up questions based on submitted image and previous conversations.



# Innovative Approaches

01

## Optimization

Utilize the 4 bit-quantization technique to reduce model size and response time while maintaining acceptable accuracy.

02

## Scalability

Containerized deployment using Kubernetes Cluster and automation with Ansible and GitHub Actions, enhancing robustness and scalability.

03

## User Friendly

The frontend sends chat history to the backend to incorporate history during model inference, ensuring smooth interactions.

An abstract graphic design on a light blue background. It features several organic, teardrop-like shapes in orange, olive green, and dark grey. A central dark grey shape contains a white circle with the number '04' in white. Other shapes include an orange one with a green circle, a green one with a dark grey circle, and a white one with a green circle. There are also small solid circles in orange, green, and dark grey scattered around.

04

App Demo


Vite + React

Not Secure 34.106.23.35.sslip.io

Extensions reverse laplace 1/f(t)... Message Center UCLA Computer S... How to Get MATL... refcard.pdf University of Calif... All Bookmarks

# ScienceTutor

APP v1.0 API v1.0 PyTorch v2.0.1



Hello! This is your Science Tutor. I can provide instant and expert answers to K12 science questions that you may have in different domains such as natural, social and language science. Feel free to ask me any questions you have and upload an image to start!

Choose File No...sen



# Thank You!

Do you have any questions?