Gen Al Interactive Learning Games

Intel Unnati Industrial Training Program 2025



Outline

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Project Overview

The primary objective of this project is to:

• Develop an educational game platform that uses Generative AI to create dynamic content, challenges, and scenarios.

Key Features

Dynamic Content Personalized Natural Language Game Mechanics Generation Interaction Learning Paths Design interactive Use a GenAl model to Players can interact Implement a elements (e.g., leveling up, with the game using generate questions, recommendation badges, leaderboards) that mini-stories, or puzzles natural language, system that chooses reward mastery of dynamically. asking questions, subsequent game concepts. levels or educational providing answers, or content based on user Adjust difficulty and even directing the Integrate real-time topics based on learner narrative flow, making inputs and feedback loops for player the experience feel performance. progress. performance. more natural and intuitive.

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Platform Architecture

User Interface & Experience

- Dashboard: personaliz ed dashboard for each user
- Game Environment: An interactive and visually appealing game environment that adapts to different educational themes and subjects.
- Feedback System:
 Real-time feedback
 and hints to guide
 users through
 challenges.

Generative Al Engine

- Content Generation: Use Al models to generate quizzes, puzzles, and scenarios based on curriculum standards and user preferences.
- Adaptive Learning:
 Implement algorithms that adjust the difficulty and type of content based on the user's performance and learning style.
- Interest Mapping: Analyze user interactions to identify interests and tailor content accordingly.

Data Analytics

- Performance Tracking:
 Collect and analyze
 data on user
 performance to provide
 insights and improve
 content generation.
- Engagement Metrics:
 Monitor engagement
 levels to identify which
 types of content are
 most effective.

Backend Infrastructure

- Scalable Cloud
 Services: Use cloud
 computing to handle
 data storage,
 processing, and Al
 model training.
- Security and Privacy:
 Ensure robust security
 measures to protect
 user data and comply
 with privacy
 regulations.

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Key Components

User Interface	
& Experience	زد

Generative Al Engine

API

Data Analytics

Analytics Platforms:

Backend Infrastructure

Dashboard:

- Frontend Frameworks:
 React.js, Angular, or Vue.js
 for building dynamic and
 responsive user interfaces.
- Charting Libraries: D3.js or Chart.js for visualizing progress and achievements.

Game Environment:

Game Engines: pyGame, Amethyst, Three.js, Phaser, godot etc for creating interactive and visually appealing game environments.

Real-time Communication:

Socket.io or any other system for real-time feedback and hints.

Al Frameworks: TensorFlow, PyTorch, or Hugging Face Transformers for developing Al models that generate quizzes and scenarios.

Google Analytics or Open Web Analytics or Plausible for tracking user

DO Not Use any commercially available tools or its

performance and

Use Open-Source tools, models and frameworks as much as possible

Reinforcement Learning: Use libraries like Stable Baselines for creating adaptive learning paths. Use collaborative filtering or content-based filtering algorithms.

etc for creating custom analytics dashboards.

Scalable Cloud Services:

Explore OpenStack or Kubernetes

Serverless Computing:

Explore open FaaS, Kubeless

Database Management: Use relational databases like PostgreSQL or NoSQL databases like MongoDB for storing user data and game content.

Version Control: Git and GitHub for source code management and collaboration.

Scoping and Considerations

Ensure not scoping everything listed in slide 4

You can choose to create learning paths, quizzes, puzzles etc while not doing everything

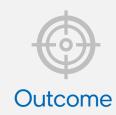
Consider a focus area or stream or subject and build

Consider making reusable components

Create minimum viable product as prototype for 1 use case which demonstrate end to end capability

Example: Implement a basic game environment with a few static quizzes or puzzles and use prompts or analytics to create recommendations

Expected Project Outcome / Deliverables





Functional Outcomes

- User Interface Prototype: A basic, functional user interface that allows users to interact with the platform. Includes a simple dashboard displaying user progress and achievements.
- Game Environment: An initial game environment with a few static quizzes or puzzles to demonstrate the concept. Basic interactive elements that engage users in the learning process.
- Generative Al Integration: A foundational Al model capable of generating simple quizzes or puzzles based on predefined criteria. Basic adaptive learning algorithms that adjust content difficulty based on user performance.

- Project Documentation: Architectural diagrams and design documents detailing the system's components, data flow, and integration points.
- Data Pipeline: Data Collection Scripts,
 Preprocessing Modules and Data Storage
 Solution
- Al Models
- Evaluation Metrics & Test Results
- Integration and Deployment: Deployment
 Scripts
- Source Code: All source code for the data pipeline, Al models, integration components, and user interfaces, organized in GitHub.

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Learning/Reference Material

https://ollama.com/ https://github.com/bobeff/open-source-engines?tab=readme-ov-file https://socket.io/docs/v4/ https://huggingface.co/models?pipeline_tag=text-generation https://huggingface.co/docs/transformers/index https://www.tensorflow.org/tutorials/generative/dcgan https://openreview.net/forum?id=Pd7IOswRUZ https://engineersplanet.com/wp-content/uploads/2024/01/Application-of-Variational-AutoEncoder-VAE-Model-and-Image-Processing-Approaches-in-Game-Designsensors-23-03457-v2.pdf https://www.geeksforgeeks.org/variational-autoencoders/ https://stable-baselines.readthedocs.io/en/master/modules/ppo2.html https://spinningup.openai.com/en/latest/algorithms/dqn.html https://huggingface.co/docs/transformers/model_doc/t5 https://huggingface.co/docs/transformers/model_doc/bert https://huggingface.co/openai-community/gpt2-medium

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