

NEST.ai – Project Requirement Document (PRD)

1. Project Overview

Project Name: NEST.ai

Category: AI-powered Education Platform

Type: Community-based, Open-source Learning System

NEST.ai is a two-way AI-powered education platform designed to support both teachers and students. It focuses on **visualization of teachers' concepts** and personalized learning through an **AI Co-Tutor**. The system transforms spoken explanations into visual learning content and automatically generates learning resources such as notes, summaries, and quizzes.

2. Problem Statement

- Many students struggle to understand abstract or complex concepts when learning is limited to verbal explanations.
 - Teachers spend excessive time creating learning materials instead of focusing on teaching.
 - Learning platforms lack personalization and real-time academic support.
 - Students often feel stressed, isolated, or hesitant to ask questions.
 - High-quality digital education tools are often expensive and inaccessible.
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3. Proposed Solution

NEST.ai addresses these challenges by:

- Visualizing teachers' spoken concepts using AI-generated videos and animations.
 - Providing an AI Co-Tutor that learns alongside students.
 - Automatically generating educational resources from lessons.
 - Creating a stress-free, community-driven learning environment.
 - Offering a free and open-source platform accessible to all.
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4. Goals & Objectives

- Simplify teaching through AI-powered automation.
 - Improve student comprehension using visualization.
 - Reduce academic stress through personalized AI support.
 - Enable collaborative and community-based learning.
 - Build an affordable, scalable, and open-source education platform.
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5. Target Users

Primary Users

- Teachers / Educators
- Students (school, college, self-learners)

Secondary Users

- Educational institutions
 - Community learning groups
 - EdTech developers
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6. Core Features & Requirements

6.1 Teacher-Focused Features

- Voice recording and upload interface
 - Speech-to-text transcription
 - Visualization of teachers' concepts through AI-generated videos
 - Automatic and manual video editing
 - Multi-language captions and translation
 - Simple and intuitive user interface
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6.2 Student-Focused Features

- AI Co-Tutor that learns with students
- Auto-generated summaries, notes, and PDFs
- Adaptive quizzes with difficulty adjustment
- Concept clarification and doubt resolution
- Less stressful, self-paced learning experience

6.3 Community & Collaboration

- Community-based learning spaces
 - Chat-enabled communication between students and teachers
 - AI-assisted moderation and guidance
 - Resource sharing within communities
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7. Functional Requirements

- Convert teacher audio into accurate text (Speech-to-Text)
 - Analyze transcripts to extract key concepts
 - Generate visual scenes based on explanations
 - Assemble visuals into educational videos
 - Generate learning resources from video content
 - Conduct adaptive quizzes and evaluate performance
 - Store and retrieve lessons and resources efficiently
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8. Non-Functional Requirements

- High system reliability and uptime
 - Fast processing and reasonable latency
 - Secure handling of user data
 - Scalability for increasing users
 - Cross-platform compatibility (Web & Mobile)
 - Privacy-first and consent-based data usage
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9. Technology Stack (Planned)

AI / ML

- Whisper (Speech-to-Text)
- Open-source LLMs (Llama / llama.cpp)
- Stable Diffusion / Text-to-Image
- Open-source Text-to-Video models

Backend

- Python (FastAPI)
- Redis / RQ (Background jobs)
- PostgreSQL / MongoDB
- MinIO / S3-compatible storage

Frontend

- React + Vite
- Tailwind CSS
- MediaRecorder API

DevOps

- Docker & Docker Compose
 - GitHub Actions (CI/CD)
 - WSL (Ubuntu)
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10. System Architecture (High-Level)

1. Teacher uploads or records audio
 2. Backend transcribes audio
 3. AI analyzes transcript and generates visual prompts
 4. Visual content is rendered into video
 5. AI Co-Tutor generates study resources
 6. Students interact with content and quizzes
 7. Community interactions enhance learning
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11. Constraints & Assumptions

- Initial prototype will use open-source and free tools
 - Full automation may be partial during MVP
 - GPU availability may affect video generation quality
 - Internet access required for some services
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12. Success Metrics

- Improved student comprehension and engagement
- Reduction in teacher content creation time
- Positive user feedback and adoption

- Quiz performance improvement over time
 - Community participation levels
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13. Future Scope

- AI model marketplace
 - Personalized learning paths
 - Mobile application
 - Institutional dashboards
 - Advanced analytics for educators
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14. Conclusion

NEST.ai aims to redefine digital education by combining AI-powered visualization, personalized learning, and community collaboration into a single, accessible platform. By focusing on simplicity, openness, and human-centered design, NEST.ai has the potential to make education more effective, inclusive, and stress-free.

Document Type: Project Requirement Document (PRD)

Status: Draft (Hackathon / Prototype Phase)