

# NEST.ai – Project Requirement Document (PRD)

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## 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.

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## 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

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## 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.

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**Document Type:** Project Requirement Document (PRD)

**Status:** Draft (Hackathon / Prototype Phase)