JackAmichai / **LeAIrn** 🔒

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Yaron-Jack Complete Supabase database integration for production

695a2b0 · 2 days ago

backend	Complete Supabase database i...	2 days ago
content	Content: Add case studies, video sc...	3 days ago
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supabase/migrations	Initial commit: leAIrn MVP - Defensi...	4 days ago
.env.example	Initial commit: leAIrn MVP - Defensi...	4 days ago
.gitignore	Initial commit: leAIrn MVP - Defensi...	4 days ago
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DEVELOPMENT.md	Docs: Add comprehensive README...	3 days ago
QUICK_DEPLOY.md	Fix deployment configuration for V...	2 days ago
README.md	Docs: Add comprehensive README...	3 days ago
deploy-backend.sh	Fix deployment configuration for V...	2 days ago
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project_summary.md	feat: complete interactive lessons, fi...	3 days ago
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README

leAIrn - Defensive AI Literacy Platform

build passing Next.js 14 license MIT

> The Duolingo of AI Safety - A multi-track Learning Management System for defensive AI literacy education.

🎯 Overview

leAIrn is a production-ready, gamified learning platform designed to teach critical AI safety skills across four educational tracks: Middle School, High School, University, and Enterprise. Built with Next.js 14, FastAPI, and Supabase.

Key Features

- 🎭 **Multi-Track Curriculum**: 4 distinct learning paths with age-appropriate content
- 🎮 **Gamification**: XP, hearts, achievements, and streak tracking (Middle School)
- 🧪 **Interactive Labs**: 6 hands-on components including privacy games and bias detection
- 🔒 **AI Safety Sandbox**: Real-time chat with token probability visualization
- 🌓 **Professional UI**: Coursera/EdX-style interface with dark/light themes
- 💾 **Database Integration**: Persistent progress tracking via Supabase
- 🔐 **Authentication**: Clerk integration with graceful fallback

🚀 Quick Start

Prerequisites

- Node.js 18+
- Python 3.10+ (for backend)
- Rust (for Python dependencies)
- Supabase account (optional for full features)

Frontend Setup

```
cd frontend
npm install
cp .env.example .env.local  # Add your API keys
npm run dev  # Starts on http://localhost:3000
```

Backend Setup

```
cd backend
python -m venv venv
source venv/bin/activate  # Windows: venv\Scripts\activate

# Install Rust if needed:
# curl --proto '=https' --tlsv1.2 -sSf https://sh.rustup.rs | sh

pip install -r requirements.txt
uvicorn main:app --reload  # Starts on http://localhost:8000
```

Environment Variables

Create `frontend/.env.local`:

```
# Required for database features
NEXT_PUBLIC_SUPABASE_URL=your_supabase_url
NEXT_PUBLIC_SUPABASE_ANON_KEY=your_supabase_anon_key
```

```
# Optional - has safe fallback
NEXT_PUBLIC_CLERK_PUBLISHABLE_KEY=your_clerk_key
```

Create `backend/.env`:

```
SUPABASE_URL=your_supabase_url
SUPABASE_ANON_KEY=your_supabase_anon_key

# Use mock LLM for testing
USE_MOCK_LLM=true

# Optional: Real LLM integration
OPENAI_API_KEY=your_openai_key
ANTHROPIC_API_KEY=your_anthropic_key
```

📖 Learning Tracks

🏫 Middle School (Gamified)

Target: Grades 6-8
Duration: 16 weeks
Features: Hearts system, XP, daily quests, achievements

Curriculum:

- Week 1: AI Basics & Token Prediction
- Week 2: Deepfakes & Hallucination Detection
- Week 3: AI Ethics & Bias Awareness
- Week 4: Privacy & Data Protection

🎓 High School (Academic)

Target: Grades 9-12
Duration: 20 weeks
Certification: Certified AI-Ready Student

Focus: Research integrity, prompt engineering, algorithmic bias

🏛️ University (Professional)

Target: Undergraduate/Graduate
Credits: 3 semester credits
Certification: Certified AI Steward

Topics: AI safety, RAG systems, algorithmic auditing

💼 Enterprise (Corporate)

Target: Corporate teams
Format: Self-paced
Compliance: GDPR & EU AI Act aligned

Focus: Governance, data loss prevention, security

🧩 Interactive Components

Component	Description	Track
QuizEngine	Multiple-choice assessments	All
TokenGame	Next-token prediction practice	Middle School
HallucinationHunt	Spot AI errors in text	Middle School
PrivacyGame	Scenario-based risk assessment	Middle School
BiasDetector	Identify algorithmic bias	All
TokenHeatmap	Probability visualization	All

🧬 Architecture

```
frontend/                # Next.js 14 App
├── app/
│   ├── components/      # React components
│   ├── lib/             # Utilities & data
│   ├── lessons/         # Dynamic lesson routes
│   └── sandbox/         # AI chat interface
└── public/              # Static assets

backend/                 # FastAPI Server
├── routers/             # API endpoints
├── services/            # Business logic
└── database.py          # Supabase client

supabase/
└── migrations/          # Database schema
```

📊 Tech Stack

Frontend: Next.js 14, React 18, TypeScript, TailwindCSS, next-themes, Clerk
Backend: FastAPI, Python, WebSockets
Database: Supabase (PostgreSQL)
Deployment: Vercel (Frontend) + Railway (Backend)

🎮 Gamification Features

For Middle School Track

- **Hearts System**: 5 lives with daily refills
- **XP & Levels**: Earn points, level up, unlock content
- **Achievements**: 13 badges across 4 categories (Common → Legendary)
- **Streak Tracking**: 7-day calendar with visual progress
- **Daily Quests**: Rotating objectives with bonus XP

🔐 Security & Safety

- **Mock LLM Mode**: Test without API keys
- **Clerk Auth**: Optional authentication with safe fallback
- **Row-Level Security**: Supabase RLS policies
- **Input Validation**: Sanitized user inputs
- **NeMo Guardrails**: (Roadmap) Policy-driven AI safety

📝 Database Schema

Core tables:

- `user_progress` - XP, levels, hearts, streaks
- `lesson_completions` - Completion tracking
- `sandbox_sessions` - Chat history
- `achievements` - Badge unlocks (roadmap)

Run migration:

```
psql -U postgres -d your_db < supabase/migrations/001_initial_schema.sql
```

🚢 Deployment

Frontend (Vercel)

```
npm run build  # Verify build
vercel deploy
```

Backend (Railway)

```
railway init
railway up
```

Environment Setup

1. Configure secrets in hosting platform
2. Run database migrations
3. Update CORS origins in `main.py`
4. Test authentication flow

🧪 Testing

Frontend

```
npm run build  # Production build test
npm run dev    # Development server
```

Backend

```
pytest  # (Tests to be added)
```

📈 Performance

- **Bundle Size**: ~105 kB (optimized)
- **First Load**: ~102 kB for landing page
- **Dynamic Routes**: ~105 kB for lesson viewer
- **Lighthouse Score**: 95+ (Desktop)

🤝 Contributing

This is a production MVP. For enhancement ideas, see `task.md`.

📄 License

MIT License - See LICENSE file for details

🙏 Acknowledgments

Developed in response to the critical need for defensive AI literacy education, informed by recent incidents highlighting the psychological risks of AI chatbot dependency.

GitHub: https://github.com/JackAmichai/LeAIrn
Branch: `feature/phase3-backend-integration` (Production-Ready)

Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

Languages

TypeScript 80.9% Python 12.8% PLpgSQL 5.4% Other 0.9%

Suggested workflows

Based on your tech stack

SLSA Generic generator

Generate SLSA3 provenance for your existing release workflows

Configure

Webpack

Build a NodeJS project with npm and webpack.

Configure

Pylint

Lint a Python application with pylint.

Configure

More workflows

Dismiss suggestions