

TECHNICAL PROPOSAL & SCOPE DOCUMENT

# Persona AI

An AI-Powered Adaptive Social Skills Training Platform — Personalized Coaching Through Intelligent Voice Characters, Gamified Learning Pathways & Enterprise Team Development

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1.0 — Final

CLASSIFICATION

Confidential

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## Document Purpose

This document serves as the comprehensive technical proposal and scope definition for the design, development, and deployment of the Persona AI platform. It details the system architecture, AI/ML pipeline, feature specifications, development timelines, and commercial framework for building an enterprise-grade, AI-powered social skills training platform.

# 01

## Executive Summary

### THE OPPORTUNITY AT A GLANCE

**Persona AI** is a next-generation, AI-powered social skills training platform that delivers hyper-personalized coaching through adaptive voice-based AI characters. Users describe their real-world interpersonal challenges — managing up, public speaking, conflict resolution, networking — and the platform constructs a tailored learning pathway powered by conversational AI agents whose personalities, communication styles, and difficulty levels dynamically adapt to the learner's needs.

The platform combines **large language model orchestration**, **real-time text-to-speech synthesis**, **behavioral analytics**, and **gamification mechanics** into a unified experience that makes social skills training as engaging and measurable as fitness tracking.

\$38B

CORPORATE TRAINING MARKET (2026)

72%

EMPLOYERS CITE SOFT SKILLS GAPS

4.2x

ROI ON COMMUNICATION TRAINING

# 02

## Market Opportunity

### PROBLEM & DEMAND LANDSCAPE

#### The Problem

Traditional social skills training relies on expensive executive coaches (\$300-\$500/hr), generic e-learning modules with no interactivity, or roleplay workshops that are logistically difficult to scale. The result: 85% of professionals report receiving no structured social skills development despite it being the #1 predictor of career advancement.

#### Current Market Gaps

- **No personalization** — one-size-fits-all content ignores individual contexts
- **No practice environment** — learners read theory but never practice in realistic scenarios
- **No measurement** — no data-driven tracking of soft skill improvement
- **No scalability** — coaching is expensive and doesn't scale for enterprise teams

#### Persona AI's Differentiators

- **Adaptive AI Characters** — realistic practice partners that mirror real-world dynamics
- **Personality Tuning** — dial an AI character to match a tough manager or colleague
- **Voice-First Interaction** — natural spoken conversation, not text quizzes
- **Gamified Progression** — leaderboards, XP, streaks, and skill badges

## 03

# Platform Vision & Core Features

## WHAT WE'RE BUILDING

### User Journey Overview

A user signs up, completes a brief diagnostic assessment (5 min), describes their social skills challenge in natural language, and immediately receives a personalized learning pathway. They then engage in voice-based roleplay sessions with AI characters that adapt in real-time, receive post-session analytics, earn XP and badges, and track their progression on leaderboards.

#### 1. Onboarding & Diagnostic Engine

NLP-driven intake assessment analyzes user-described challenges. Maps to skill taxonomy (assertiveness, empathy, negotiation, etc.). Generates initial skill profile and recommends learning pathway.

#### 2. Personalized Learning Pathways

Adaptive curriculum engine powered by spaced repetition and mastery-based progression. Dynamically adjusts difficulty, session frequency, and content mix based on performance analytics.

#### 3. AI Character Interactions

Library of AI personas (supportive mentor, tough manager, demanding client, etc.). Users select or customize characters. Voice-first conversations with real-time personality modulation.

#### 4. Personality Tuning System

Slider-based interface to adjust AI character traits: aggression, empathy, formality, patience, directness. Users recreate challenging interpersonal dynamics for targeted practice.

#### 5. Gamification Engine

XP points, skill badges, daily streaks, weekly challenges, and global/team leaderboards. Achievement system tied to measurable skill milestones, not just completion.

#### 6. Post-Session Analytics

AI-generated session debrief: communication score, empathy rating, assertiveness index, areas of improvement, and comparison to previous sessions. Longitudinal progress tracking.

### **Key Innovation: Contextual Personality Tuning**

Unlike generic chatbot interactions, Persona AI allows users to describe a specific real-world person (e.g., "my manager who is passive-aggressive and avoids direct feedback") and the system constructs a behaviorally accurate AI character for targeted practice. This is achieved through a combination of personality trait vectorization, behavioral prompt engineering, and dynamic TTS voice modulation.

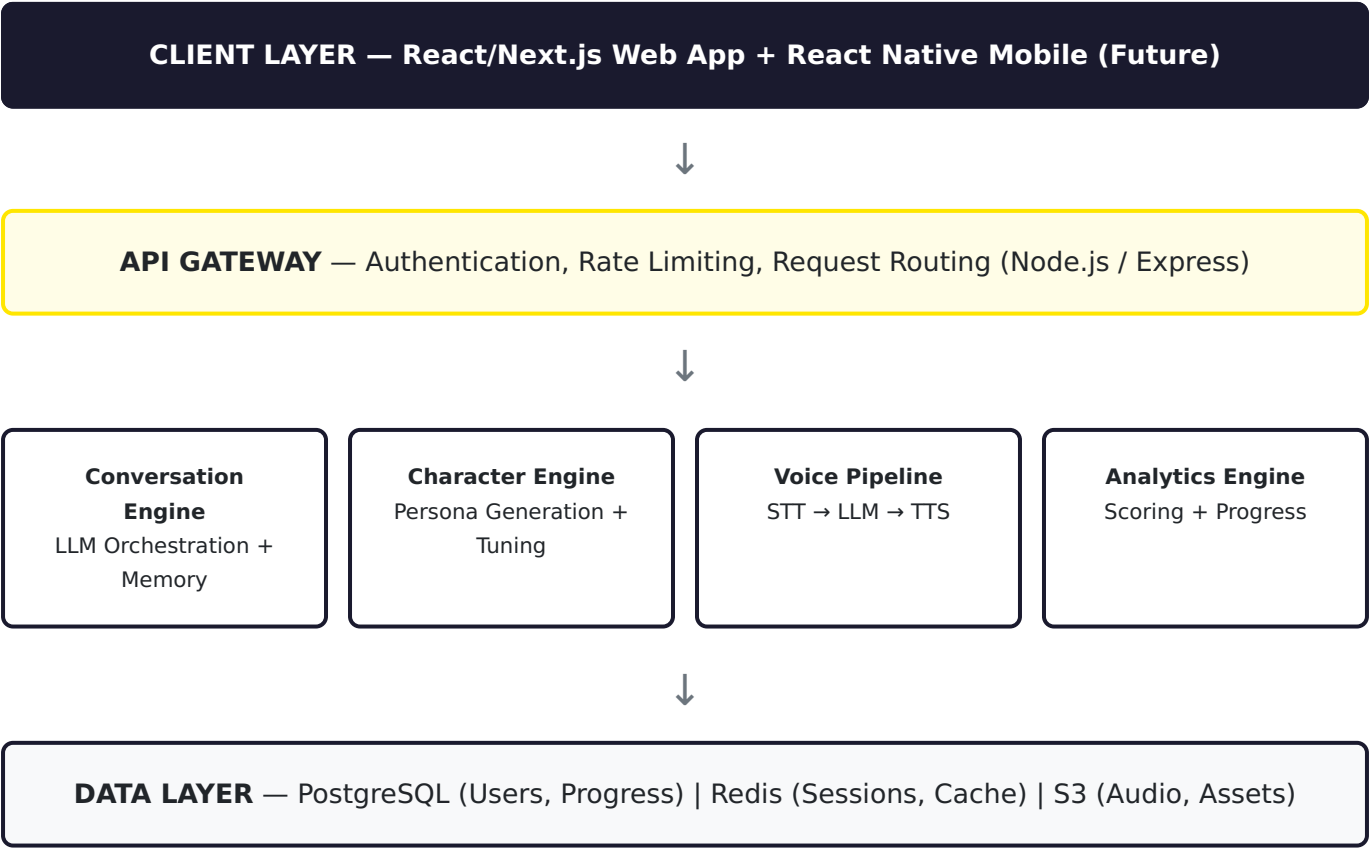
# 04

## Technical Architecture & AI/ML Pipeline

SYSTEM DESIGN DEEP DIVE

### High-Level Architecture

The platform follows a microservices-oriented architecture deployed on cloud infrastructure with the following layers:



# AI/ML Pipeline — Detailed

## 1. Natural Language Understanding (NLU)

User input is processed through a multi-stage pipeline: (a) speech-to-text transcription via Whisper (open-source), (b) intent classification and entity extraction, (c) emotional tone analysis using fine-tuned sentiment models, (d) context-aware response generation through LLM with personality-conditioned system prompts.

## 2. Personality Vectorization

Each AI character is defined by a 12-dimensional personality vector mapped to the Big Five personality model (OCEAN) plus domain-specific traits: directness, patience, formality, humor, assertiveness, empathy, volatility. This vector conditions the LLM's system prompt and modulates TTS voice parameters (pitch, speed, warmth).

## 3. Conversation Memory & State

Sessions maintain short-term memory (current conversation context) and long-term memory (user history, past sessions, skill progression). Implemented via a sliding window context with retrieval-augmented generation (RAG) for pulling relevant past session insights.

## 4. Skill Assessment Engine

Post-session, the conversation transcript is analyzed by a dedicated evaluation LLM call that scores across 8 dimensions: clarity, empathy, assertiveness, active listening, conflict resolution, persuasion, emotional regulation, and adaptability. Scores feed into the adaptive learning algorithm.

### Open-Source First Approach

We leverage open-source and cost-effective models to maximize the \$39K budget: **Whisper** (STT), **ElevenLabs / Coqui TTS** (voice synthesis), **Llama 3.x / Mistral** (conversation LLM — self-hosted or API), and **open embedding models** for RAG. This eliminates expensive per-API-call costs at scale while maintaining quality.



# 05

## AI Character Engine & Voice System

THE HEART OF THE EXPERIENCE

### Character Archetypes (MVP)

The platform ships with 6 pre-designed character archetypes, each with distinct personality vectors, voice profiles, and visual avatars:

CHARACTER	ARCHETYPE	KEY TRAITS	USE CASE
Alex	Supportive Mentor	High empathy, patient, warm	Building confidence, gentle feedback
Morgan	Tough Manager	Direct, demanding, low patience	Managing up, handling criticism
Jordan	Difficult Client	Volatile, high expectations	Client management, de-escalation
Sam	Peer Collaborator	Casual, opinionated, competitive	Team dynamics, negotiation
Dr. Reeves	Executive Coach	Analytical, strategic, Socratic	Leadership skills, strategic comms
Casey	Interview Panel	Formal, evaluative, structured	Interview prep, presentations

### Personality Tuning Interface

Users can modify any archetype or create custom characters using slider-based controls:

#### Tunable Parameters

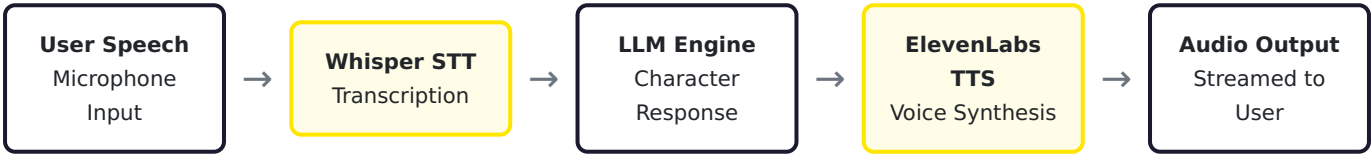
- **Directness** — Blunt ↔ Diplomatic
- **Patience** — Impatient ↔ Very patient
- **Warmth** — Cold/formal ↔ Friendly/warm
- **Assertiveness** — Passive ↔ Aggressive
- **Emotional Range** — Stoic ↔ Expressive
- **Formality** — Casual ↔ Corporate

#### Technical Implementation

Slider values (0-100) are normalized into a personality vector that dynamically generates the LLM system prompt using a template engine. The same vector modulates ElevenLabs TTS parameters:

- Voice **stability** maps to emotional range
- Voice **speed** maps to patience level
- Voice **style** maps to warmth/formality
- Voice **selection** maps to archetype gender/age

# Voice Pipeline Architecture



**Target latency:** <1.5s end-to-end using streaming TTS and LLM token streaming. WebSocket connection maintains persistent session state.

# 06

## Gamification & Adaptive Learning Engine

ENGAGEMENT-DRIVEN SKILL DEVELOPMENT

### Gamification Mechanics

The gamification system is grounded in self-determination theory (SDT) and flow theory — targeting intrinsic motivation through autonomy, competence, and relatedness. Every mechanic maps to a measurable learning outcome.

#### Core Mechanics

MECHANIC	IMPLEMENTATION
XP System	Points earned per session based on performance scores across 8 skill dimensions
Skill Badges	Unlocked at mastery thresholds (e.g., "Empathy Expert" at 80% empathy score avg over 10 sessions)
Daily Streaks	Consecutive day engagement with streak multipliers (1.5x at 7 days, 2x at 30 days)
Leaderboards	Global, weekly, team-based. Ranked by XP, skill scores, or streak length
Weekly Challenges	Themed scenarios (e.g., "Negotiation Week") with bonus XP rewards
Level Progression	Novice → Intermediate → Advanced → Expert → Master per skill domain

#### Adaptive Learning Algorithm

The pathway engine uses a modified **knowledge tracing** model (BKT variant) combined with spaced repetition scheduling:

- **Skill State Estimation** — Bayesian probability model tracks mastery per skill dimension
- **Difficulty Calibration** — AI character difficulty auto-adjusts based on estimated skill state
- **Session Scheduling** — Optimal review intervals calculated per skill to maximize retention
- **Content Recommendation** — Scenario selection weighted by weakest skills and user goals

#### Progression Formula

**XP = Base(50) × Performance(0.5-2.0) × Streak(1.0-2.0) × Difficulty(0.8-1.5)**

Where Performance = weighted average across 8 skill dimensions scored by evaluation LLM

### Learning Pathway Example

**User Goal:** "I want to get better at pushing back on my manager's unreasonable deadlines"

- WEEK 1-2 Assertiveness Foundations** — Practice with supportive "Alex" character at low difficulty. Learn assertion frameworks.
- WEEK 3-4 Escalating Difficulty** — Switch to "Morgan" (tough manager). Increase directness/impatience sliders. Practice pushback scenarios.
- WEEK 5-6 Custom Tuning** — User tunes character to match their actual manager's personality. Realistic rehearsal.
- WEEK 7-8 Mastery & Generalization** — Cross-context practice. Different scenarios. Assessment to confirm skill transfer.

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Monetization & Pricing Strategy

REVENUE MODEL

FEATURE	FREE TIER	PREMIUM (\$19/MO)	ENTERPRISE (CUSTOM)
Sessions / month	5 sessions	Unlimited	Unlimited
AI Characters	2 (Alex + Sam)	All 6 + Custom	All + Custom corporate personas
Personality Tuning	Basic (3 sliders)	Full (6 sliders)	Full + API-driven presets
Voice Interaction	Text only	Full voice (STT+TTS)	Full voice + custom voices
Analytics	Basic score	Full 8-dimension dashboard	Team analytics + manager reports
Gamification	XP + Streaks	Full (badges, leaderboards)	Team leaderboards + goals
Learning Pathways	Auto-generated	Custom + AI recommended	Manager-defined team pathways
Support	Community	Priority email	Dedicated CSM + SLA

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B2B Enterprise Module

TEAM DEVELOPMENT AT SCALE

The enterprise module enables companies to onboard teams, define skill development goals, and track progress through a dedicated admin dashboard.

## Admin Dashboard Features

- **Team Management** — Add/remove members, create teams (e.g., "Engineering", "Sales")
- **Goal Setting** — Define team-level skill goals (e.g., "Improve presentation skills by Q3")
- **Progress Tracking** — Aggregate skill scores, session completion rates, engagement metrics
- **Custom Scenarios** — Upload company-specific scenarios (e.g., handling customer complaints per brand guidelines)
- **Reporting** — Exportable PDF/CSV reports for HR and L&D teams

## Enterprise Integration Points

- **SSO** — SAML 2.0 / OAuth 2.0 integration
- **LMS Integration** — SCORM/xAPI compatibility for existing learning management systems
- **HRIS Sync** — Team structure auto-sync from HR systems
- **API Access** — REST API for custom integrations and automation
- **Data Residency** — Configurable data storage region for compliance

### Enterprise Example

"A 50-person engineering team at Company X wants to improve presentation skills before a major product launch. The L&D manager sets a team goal, assigns the 'Casey — Interview Panel' character with custom scenarios around technical presentations, and tracks weekly progress via the admin dashboard."

# 09

## Technology Stack & Infrastructure

ENGINEERING DECISIONS

## Frontend

Component	Technology
Framework	Next.js 15 (React 19)
State Management	Zustand
UI Library	Tailwind CSS + Shadcn/UI
Real-time Comms	WebSocket (Socket.io)
Audio Handling	Web Audio API + MediaRecorder
Charts/Analytics	Recharts
Authentication	NextAuth.js

## AI / ML Layer

Component	Technology
Core LLM	Llama 3.1 70B / Mistral Large (via Groq or Together AI)
Speech-to-Text	OpenAI Whisper (open-source, self-hosted)
Text-to-Speech	ElevenLabs API (production) / Coqui TTS (fallback)
Character Visuals	Ready Player Me / Custom SVG Avatars
Embeddings	BGE-base / Nomic-embed for RAG
Evaluation	Dedicated LLM scoring pipeline

## Backend

Component	Technology
Runtime	Node.js 22 (Express/Fastify)
Database	PostgreSQL 16 (Supabase)
Cache / Sessions	Redis (Upstash)
File Storage	AWS S3 / Cloudflare R2
Job Queue	BullMQ (Redis-backed)
API Docs	OpenAPI 3.0 / Swagger

## Infrastructure & DevOps

Component	Technology
Hosting	Vercel (Frontend) + Railway/Render (Backend)
CI/CD	GitHub Actions
Monitoring	Sentry + LogTail
Analytics	PostHog (open-source)
Email	Resend
Payments	Stripe

### Why This Stack?

Every choice optimizes for three constraints: **(1) cost efficiency** — leveraging free tiers (Vercel, Supabase, Upstash), open-source models, and usage-based pricing; **(2) speed to market** — battle-tested tools with rich ecosystems reduce development time; **(3) scalability** — all components are horizontally scalable when the platform grows past MVP.



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## Development Roadmap & Timelines

16-WEEK DELIVERY PLAN

- 1

**Phase 1 — Foundation & Core Architecture** **WEEKS 1-3**

Project setup, CI/CD pipeline, database schema design, authentication system (NextAuth + Supabase), base UI framework (Tailwind + Shadcn), API architecture, WebSocket infrastructure for real-time communication.

**Deliverables:** Authenticated app shell, API gateway, database schema, dev/staging environments.
- 2

**Phase 2 — AI Engine & Voice Pipeline** **WEEKS 4-7**

LLM integration (Llama/Mistral via Groq), character persona system with personality vectorization, prompt engineering for all 6 archetypes, Whisper STT integration, ElevenLabs TTS integration, streaming voice pipeline, personality tuning slider system.

**Deliverables:** Working voice conversation with AI characters, personality tuning interface, end-to-end voice pipeline.
- 3

**Phase 3 — Learning Pathways, Analytics & Gamification** **WEEKS 8-11**

Onboarding diagnostic assessment, NLP-driven skill mapping, adaptive learning pathway engine, session evaluation pipeline (8-dimension scoring), post-session analytics dashboard, XP system, badges, streaks, leaderboards, level progression, Stripe payment integration, free/premium tier gating.

**Deliverables:** Personalized pathways, session scoring, analytics dashboard, full gamification, payment flow.
- 4

**Phase 4 — B2B Enterprise Module** **WEEKS 12-14**

Enterprise admin dashboard, team management, goal setting, team leaderboards, aggregate reporting, SSO integration, custom corporate scenarios, exportable reports for HR and L&D teams.

**Deliverables:** Enterprise admin dashboard, team management, reporting suite.
- 5

**Phase 5 — QA, Optimization & Launch** **WEEKS 15-16**

End-to-end QA testing, performance optimization, voice latency tuning, security audit, staging → production deployment, launch readiness review, go-live.

**Deliverables:** Production deployment, launch-ready platform, documentation handoff.

<div>16</div> <div>WEEKS TOTAL</div>	<div>5</div> <div>DEVELOPMENT PHASES</div>	<div>Week 7</div> <div>FIRST USABLE DEMO</div>	<div>Week 16</div> <div>PRODUCTION LAUNCH</div>
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## Budget Breakdown

INVESTMENT ALLOCATION — \$39,000 USD

#	CATEGORY	SCOPE	AMOUNT	%
1	Frontend Development	Next.js app, responsive design, all user-facing screens, audio integration	\$8,000	20%
2	Backend & API Development	API architecture, database, auth, WebSocket, job queues, payment integration	\$6,000	15%
3	AI/ML Engine Development	LLM integration, character system, personality tuning, evaluation pipeline, RAG	\$7,500	19%
4	Voice Pipeline (STT + TTS)	Whisper integration, ElevenLabs integration, streaming audio, latency optimization	\$4,000	10%
5	Gamification System	XP, badges, leaderboards, streaks, progression engine, adaptive learning	\$3,000	8%
6	B2B Enterprise Module	Admin dashboard, team mgmt, goal setting, reporting, SSO	\$3,500	9%
7	UI/UX Design	Wireframes, high-fidelity mockups, design system, character avatars, interaction design	\$4,500	12%
8	QA, Testing & DevOps	Testing, CI/CD, monitoring setup, security review, deployment	\$1,500	4%
9	Third-Party Services (6 months)	ElevenLabs API, Groq/Together AI credits, Vercel, Supabase, hosting	\$1,000	3%
TOTAL			\$39,000	100%

### Budget Optimization Strategy

This budget is optimized through: **(1)** leveraging open-source models (Whisper, Llama/Mistral) to eliminate per-query LLM costs during development; **(2)** using free-tier infrastructure (Vercel, Supabase,

Upstash) for MVP; **(3)** a lean, senior-heavy team where every engineer covers multiple domains; **(4)** using pre-built UI components (Shadcn) to accelerate frontend development by ~40%.

Payment Schedule

Milestone	Trigger	Amount
Milestone 1	Project kickoff + Phase 1 completion (Week 3)	\$11,700 (30%)
Milestone 2	Phase 2-3 completion — Working AI voice demo (Week 11)	\$11,700 (30%)
Milestone 3	Phase 4-5 completion — Full platform launch (Week 16)	\$15,600 (40%)

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## Risk Mitigation & Quality Assurance

PROACTIVE RISK MANAGEMENT

RISK	SEVERITY	MITIGATION STRATEGY	CONTINGENCY
Voice latency > 2s	HIGH	Streaming TTS, LLM token streaming, WebSocket persistent connection, edge caching	Fallback to text-first mode with optional voice replay
LLM response quality	MEDIUM	Extensive prompt engineering, character-specific system prompts, evaluation guardrails	A/B test multiple LLM providers; upgrade to larger model if needed
ElevenLabs API costs at scale	MEDIUM	Free tier uses text-only; voice reserved for premium. Cache common phrases.	Migrate to open-source Coqui TTS for cost-heavy use cases
Scope creep	HIGH	Strict phase-gated delivery, weekly sprint reviews, documented change request process	Defer non-MVP features to v1.1 backlog
Data privacy / GDPR	MEDIUM	No voice data stored permanently; session transcripts encrypted at rest; user data deletion API	Engage compliance consultant pre-launch if targeting EU market

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## Why Idrak AI

YOUR ENGINEERING PARTNER

**Our Capabilities**

- **AI-Native Team** — Deep expertise in LLM integration, prompt engineering, and conversational AI systems
- **Full-Stack Delivery** — End-to-end product development from design to deployment
- **Voice AI Experience** — Prior work with real-time voice pipelines, STT/TTS integration
- **Rapid Prototyping** — Lean methodology, fast iteration, working demos within weeks

**Our Commitment**

- **Transparent Communication** — Weekly progress reports, demo sessions, open Slack channel
- **Quality First** — Code reviews, automated testing, staging environment for every release
- **Post-Launch Support** — 30-day post-launch support included in scope
- **Knowledge Transfer** — Full documentation, codebase walkthrough, and handoff support

**Ready to Build the Future of Social Skills Training**

**Idrak AI** — Building Intelligent Systems That Understand People

Contact: **hello@idrak.ai** | Let's build Persona AI together.