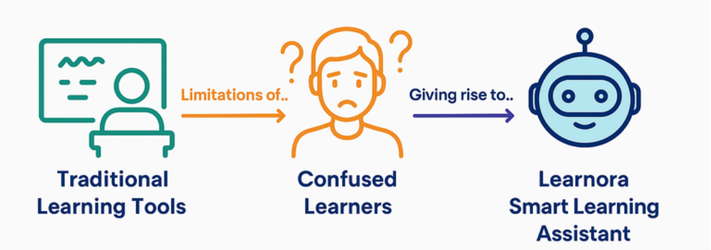
LEARNORA

SMART LEARNING ASSISTANT WITH EMOTION RECOGNITION AND AI CHATBOT

PROBLEM STATEMENT:



Despite the rise of online education platforms, a significant gap remains in delivering truly interactive and emotionally supportive learning experiences. Many learners struggle silently, often too shy or hesitant to ask questions during live or recorded sessions. The absence of real-time emotional understanding leads to passive learning, reduced comprehension, and disengagement. Traditional systems wait for the learner to reach out — but what if the system could recognize when the learner is confused and offer help proactively? Learnora is built to solve this exact problem by combining facial emotion recognition with AI-driven support tools.

⚠️ Key Issues in Traditional E-Learning:

- Learners hesitate to raise doubts in group or remote sessions.
- Emotions such as confusion, frustration, or boredom go unnoticed.
- Help and guidance are only provided when the student explicitly asks.
- Lack of personalization leads to reduced interest and high dropout rates.

Core Challenges

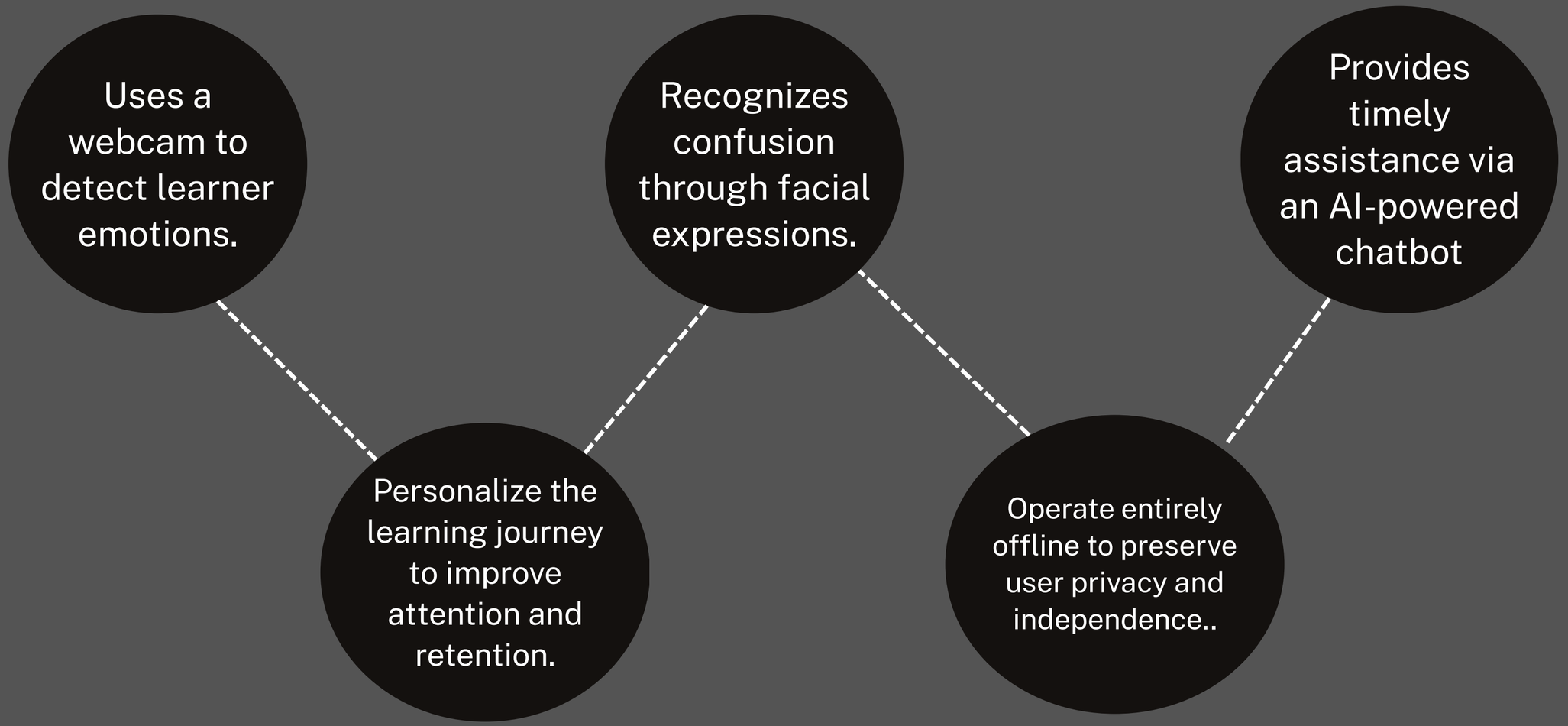
01 Detecting subtle emotional cues in real-time.

02 Ensuring high emotion detection accuracy across lighting & facial variations.

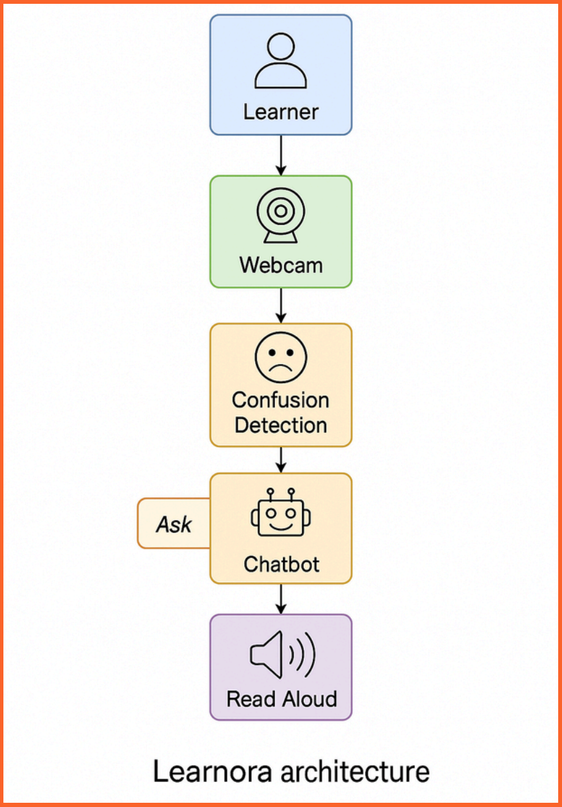
03 Seamlessly integrating voice and text interactions.

04 Operating smoothly on regular laptops without GPU.

Project Idea & Objective :



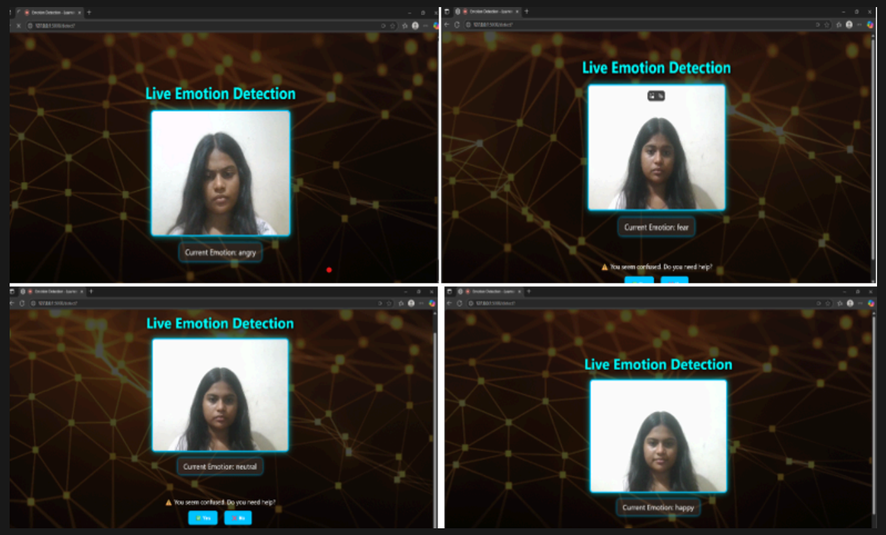
System Workflow – End-to-End Process



Learnora architecture

- Capture webcam frame every 5 seconds.
- Detect face using OpenVINO face-detection model.
- Analyze emotion with DeepFace.
- If confusion is detected → prompt for help.
- If confirmed → launch chatbot (voice/text input).
- Bot responds via text and speech output.

Key Feature
Emotion Recognition



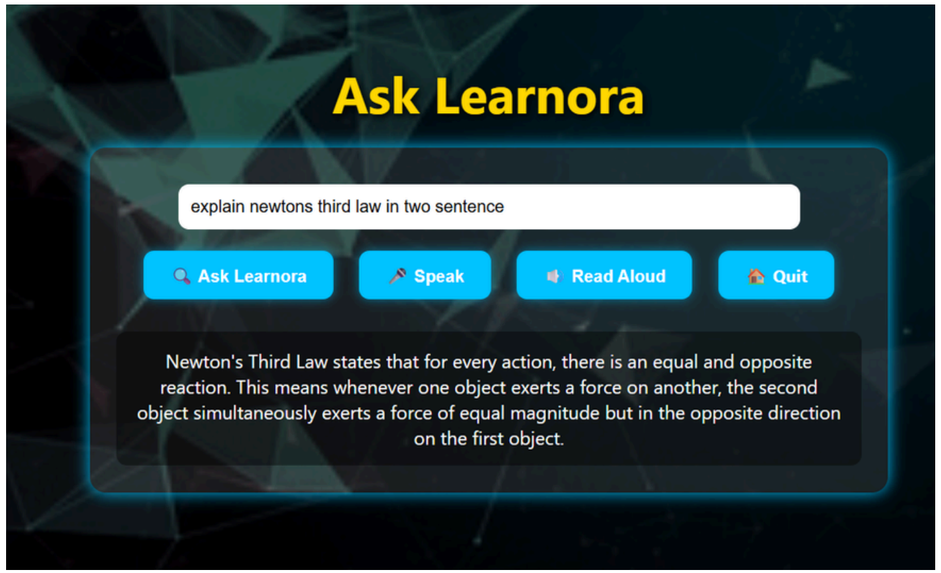
Detects emotional states like neutral, sad, fear.

Uses DeepFace pre-trained on large emotion datasets

Monitors in real-time to detect confusion or disengagement.

Automatically prompts: "You seem confused. Do you need help?"

Key Feature
AI Chatbot



01 Based on Microsoft’s Phi-3 Language Model.

02 Served locally using Ollama (offline LLM).

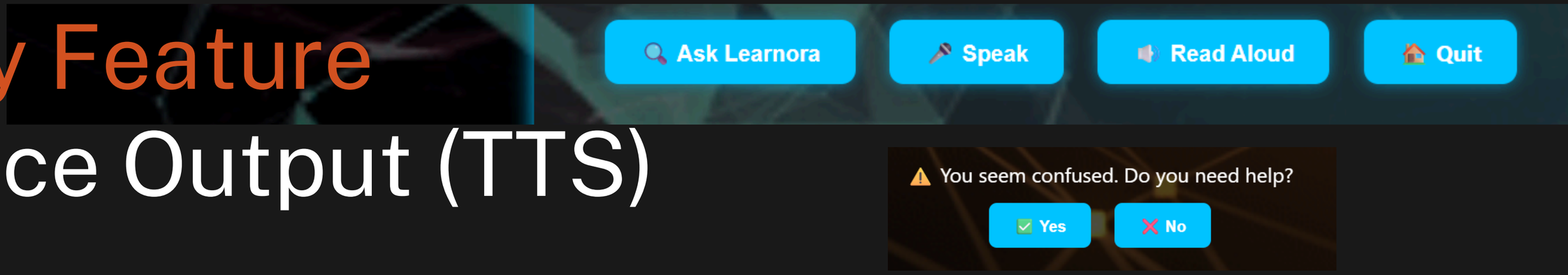
03 Accepts input via text or microphone.

04 Delivers high-quality, subject-relevant answers.

05 Accepts queries via voice or text, offering flexibility in interaction.

Key Feature

Voice Output (TTS)



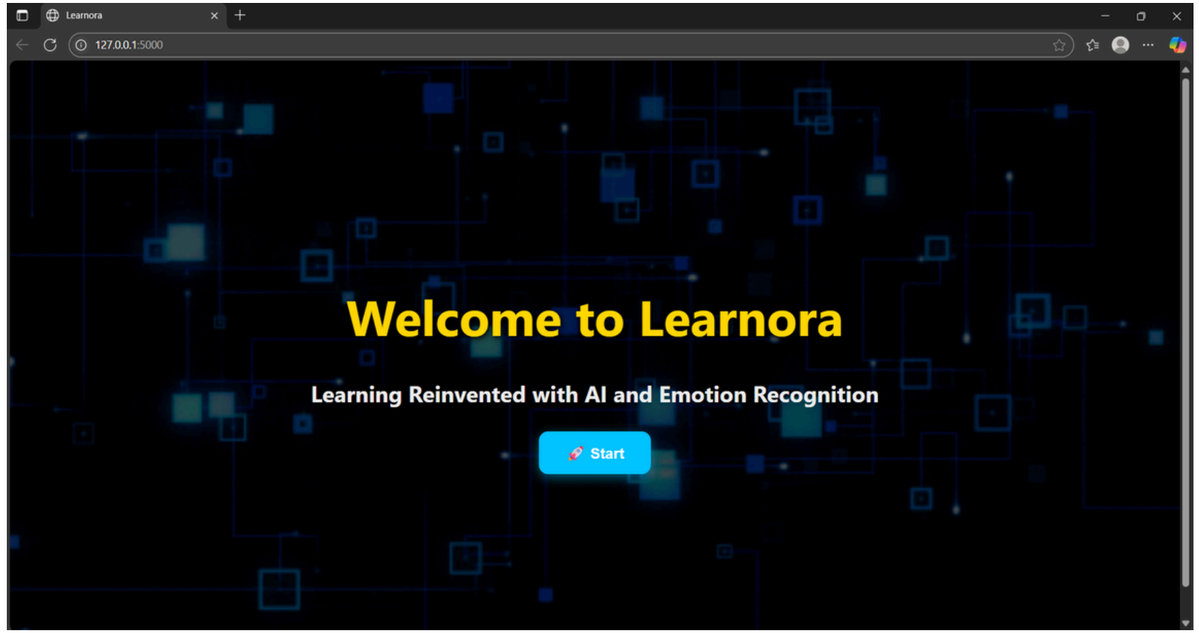
Uses gTTS and Web Speech API for speaking responses.

Improves accessibility for auditory learners.

Supports hands-free interaction..

Learners can read or listen to the chatbot’s response.

Key Feature
Privacy & Control



01 All data is processed locally (no cloud/API calls).

02 Webcam frames are discarded after processing

03 Voice data is not stored.

04 gTTS MP3s are deleted after playback

05 Learner can exit session anytime.

Emotion Detection Pipeline

Frame Capture: Webcam captures frames at intervals.

Face Detection: OpenVINO locates facial region.

Preprocessing: Face cropped, aligned, resized.

Emotion Classification: DeepFace returns probabilities for 7 emotions.

Decision: If emotion ∈ {sad, fear, neutral} → mark as confusion.

What is DeepFace?

Trained on:

- FER-2013 (35K images)
- AffectNet (1M+ images)

Deep learning-based facial analysis framework

DeepFace is a powerful AI model that can detect and analyze human facial features using deep convolutional neural networks. It recognizes patterns in expressions to determine emotions with high accuracy.

Developed by Facebook AI Research

Created by researchers at FAIR, DeepFace was among the first models to achieve near-human-level performance in face verification tasks. It has since become a standard in facial recognition technologies..

Used in Learnora for emotion classification

In the Learnora system, DeepFace helps identify learner emotions like sad, neutral, or fear, which are interpreted as signs of confusion. This enables the assistant to respond proactively to emotional cues

OpenVINO – RealTime Inference Engine

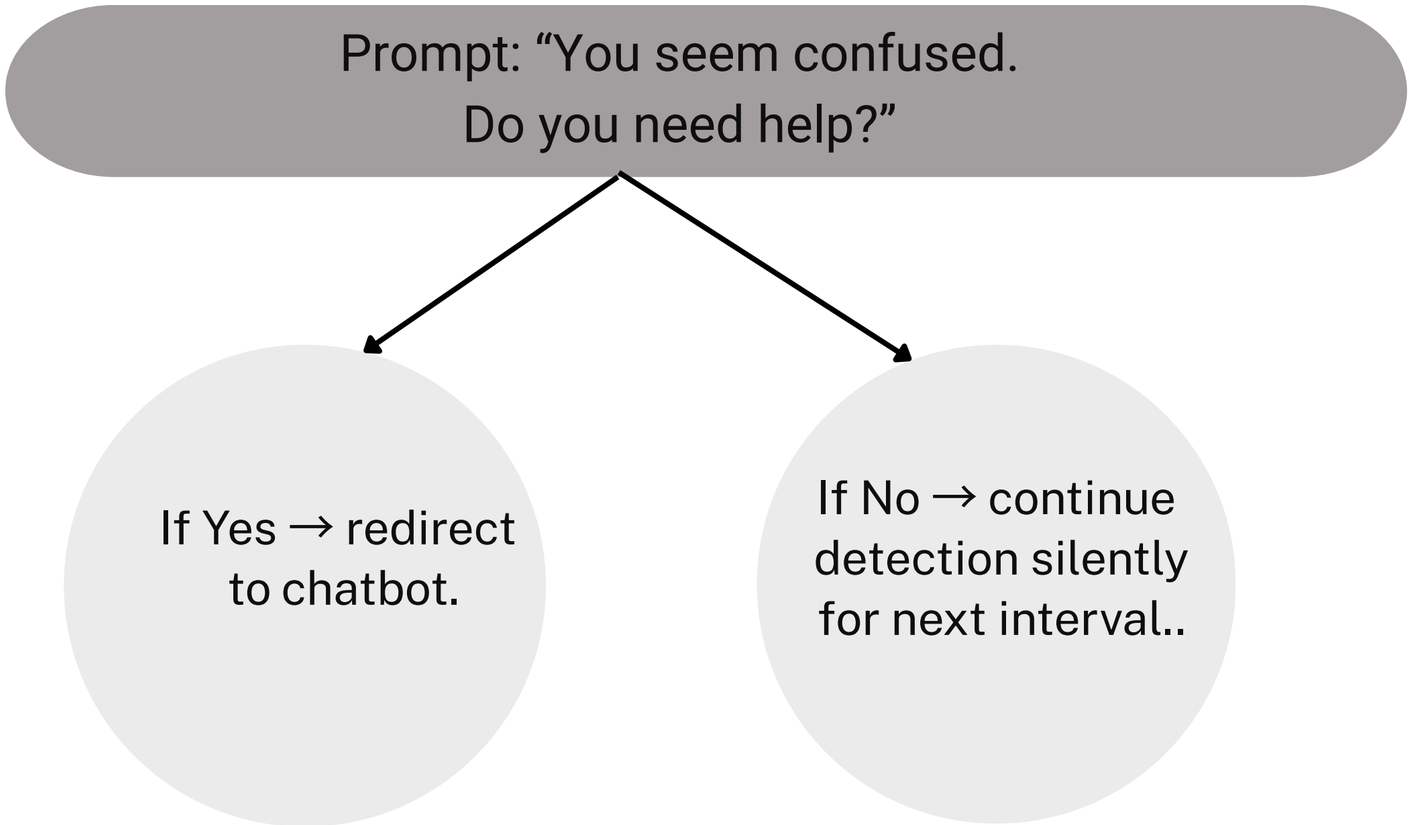
- Benefits:
  - Runs on CPU
  - Sub-100ms latency
  - 25–30 FPS processing
  - No GPU needed

Intel’s optimized toolkit for AI on edge devices.

Detects face using face-detection-adas-0001 model.

Confusion Detection Logic

IF EMOTION OUTPUT ∈ {NEUTRAL, SAD, FEAR} → LEARNER IS LIKELY CONFUSED.



What is Phi-3 Model?

- A compact LLM by Microsoft (3.8B parameters).
- Trained on textbook-quality data.
- Optimized for education, coding, and Q&A tasks.
- Lower memory (~4GB), faster than larger models.
- Hosted locally via Ollama.

Chatbot Interaction Flow

- Emotion detected → Prompt triggered.
- User accepts → chatbot interface opens.
- User submits query (text or voice).
- Flask sends query to Ollama’s Phi-3 API.
- Phi-3 returns response.
- Response displayed + read aloud via TTS.

Frontend UI Components

Built with HTML, CSS, JavaScript

Stylish layout with background animation and buttons

Home → Welcome screen

Detect → Webcam + emotion display

Chatbot → Input box + microphone + response

Flask Backend Architecture

Handles backend logic for:

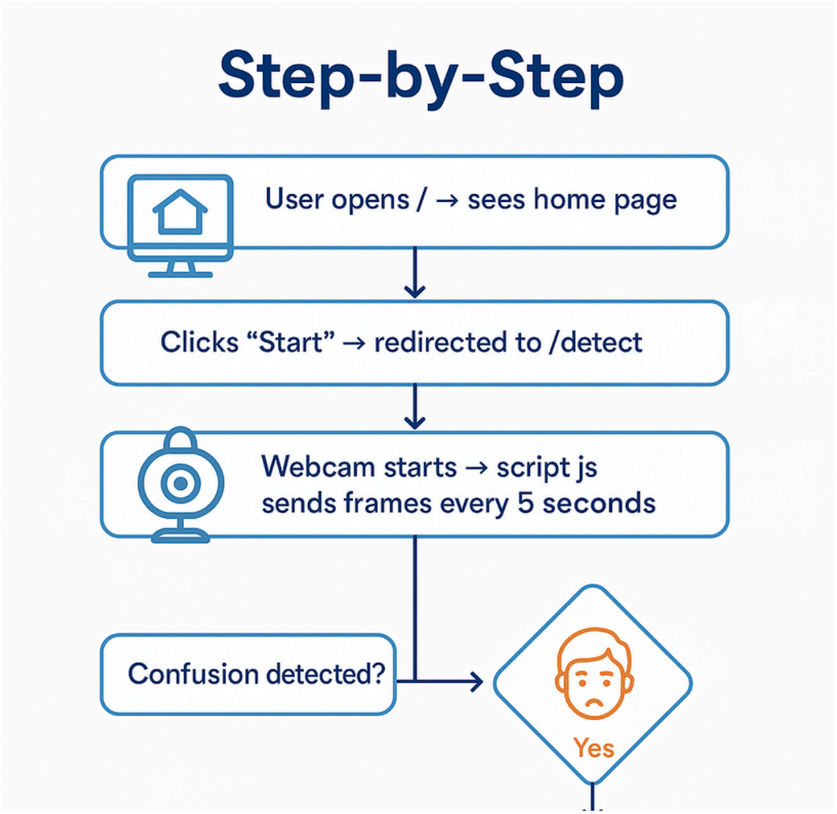
- /api/emotion → detects emotion
- /api/chat → sends to Phi-3 & gets response
- /api/speak → returns TTS mp3 file

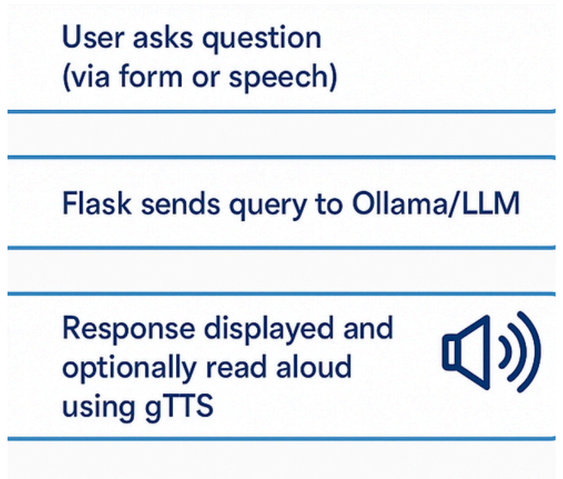
Lightweight and RESTful

Uses: DeepFace, OpenVINO, Ollama, gTTS

Technologies Used

- DeepFace – Emotion recognition
- OpenVINO – Optimized inference
- Ollama + Phi-3 – LLM chatbot
- Flask – Backend routing & APIs
- HTML/CSS/JS – Frontend UI





Performance Metrics

Module	Metric	Performance
Emotion Detection	Accuracy	~95%
Face Detection	Speed	25–30 FPS
Chatbot (Phi-3)	Response Time	~1.8 sec
TTS	Output Clarity	High
Voice Input	Accuracy	~90–95% (quiet)

Testing and Evaluation

- 10 Users tested emotion flow → All correctly prompted
- 50+ Educational Queries tested → 96% relevance
- Voice Input tested under noise → robust but sensitive to background
- TTS Playback → loud, clear, multi-platform support
- No crashes or lag reported in user sessions

Conclusion

Learnora successfully:

- Detects emotions to identify confusion
- Engages learners using voice + chatbot
- Works entirely offline
- Enhances personalized learning
- Makes EdTech more emotionally intelligent

Learnora doesn’t just respond — it understands.

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