



# Final Project Report

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**Submission Date:** 2025/12/01

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# 1. Product Overview

## 1.1 TL;DR (≤65 words)

another.ai is an **Agent Reality Check Platform** that runs a reference browser agent across real SaaS websites and reveals *why* it fails. It captures full video recordings, traces, and logs for every run, and uses OpenAI to generate structured failure explanations. Teams use it to diagnose mis-clicks, loops, hallucinations, and blocked flows, before users encounter them in production.

## 1.2 Jobs To Be Done (JTBD)

### JTBD 1 — Diagnose Failures With Evidence

As an agent developer, I want **evidence-based diagnostics** (videos, traces, failure reasons) showing exactly why my agent fails specific workflows, so I can fix root-cause issues instead of guessing.

### JTBD 2 — Validate Production Readiness With Measurable Signals

As a technical lead preparing a launch, I want **quantitative success rates** and **per-site pass/fail results**, so I can evaluate whether the agent is stable enough for real users.

### JTBD 3 — Reproduce User-Reported Bugs Reliably

As an engineer debugging issues, I want **reproducible test runs with consistent recordings and logs**, so I can pinpoint the exact step where the agent breaks.

### JTBD 4 — Communicate Failures Clearly to My Team

As a PM or team lead, I want **human-readable reports summarizing failures**, so I can coordinate fixes without replaying videos manually.

## 1.3 Core User Journeys (CUJs)

### CUJ 1 — Run an Agent Reality Check Across SaaS Sites (Primary)

**Statement:**
The user selects a predefined goal (e.g., “Find Pricing”) and runs the built-in browser agent across **10 curated SaaS websites**.

**System Behavior:**
The system launches 10 Playwright sessions in parallel, records full-session videos, logs

actions, captures DOM snapshots, and sends session metadata to OpenAI for pass/fail judgment and failure categorization.

**Value:**
Provides a reproducible benchmark of how well the agent handles real SaaS workflows.

**CUJ 2 — Inspect Agent Behavior With Full Observability**

**Statement:**
The user reviews exactly what the agent did on any given site.

**System Behavior:**
The dashboard presents an HTML5 video (from S3), step-by-step trace logs, reasoning text, and DOM snapshots. Users can scrub the video, follow each click, and compare the agent's interpretation to the page structure.

**Value:**
Makes mis-clicks, loops, and navigation errors **directly visible**, eliminating guesswork.

**CUJ 3 — Understand Failure Reasons (AI-Generated Report)**

**Statement:**
The user reads a structured explanation of why the agent failed or succeeded.

**System Behavior:**
Structured metadata (actions, timestamps, logs, DOM snapshots) is sent to OpenAI, which returns:

- primary failure reason
- failure classification (loop, hallucination, missing element, tool error)
- a summarized chain of actions leading to failure

Reports are rendered cleanly in Markdown.

**Value:**
Transforms raw logs into **actionable insights** teams can immediately act on.

**CUJ 4 — Compare Historical Runs to Track Progress**

**Statement:**
The user reviews previous test runs to determine if the agent improved after changes.

**System Behavior:**
The History view shows past runs (using localStorage and backend metadata), including:

- overall success rates
- per-site trends
- changes in failure categories over time

**Value:**
Allows teams to confirm whether fixes actually improved reliability.

# 2. MVP Development Justification

## 2.1 Initial Hypothesis

Our original hypothesis was that **early-stage product, marketing, and founding teams need faster, trustworthy customer insight before launch**, but traditional research (surveys, panels, interviews) is too slow and expensive.

We framed this with three primary **Jobs To Be Done**:

- **Feature Confidence** – As a product manager, I want to quickly understand which feature customers value most, so I can prioritize the roadmap and avoid building the wrong thing.

- **Pricing Confidence** – As a marketing manager, I want to know how much customers are willing to pay at different price points, so I can pick a launch price without guessing.

- **Trust in Insights** – As a founder, I want confidence that my early customer insights are defensible, so I can speak to investors and partners with evidence, not gut feel.

The original product vision for **another.ai** was a **synthetic survey platform** that used LLM-based personas to approximate early customer research:

- Users create an account and set up projects.

- They input a product description and **feature variants** (e.g., A vs B) and pick personas (Luxury Buyer, Value Seeker, Eco-Conscious Shopper).

- The system orchestrates **20–30 synthetic responses per persona per variant**, with consistent persona conditioning.

- It aggregates:

    - % preference per persona,

    - confidence intervals / variance,

    - rationale clusters (grouped “why” snippets).

We defined three **Core User Journeys (CUJs)**:

1. **Run a Synthetic Feature Survey**
   Upload two feature variants, select 2–3 personas, run the survey → dashboard shows

preference splits, rationale clusters, and confidence intervals.

2. **Estimate Willingness To Pay (WTP)**
   Enter a baseline product and several price points → synthetic personas respond buy/no-buy → system builds demand curves and suggests an optimal price band.

3. **Validate Against a Human Micro-Panel**
   Export the survey to a human panel (e.g., Prolific), re-import results → system computes alignment scores between synthetic and human data and flags divergences.

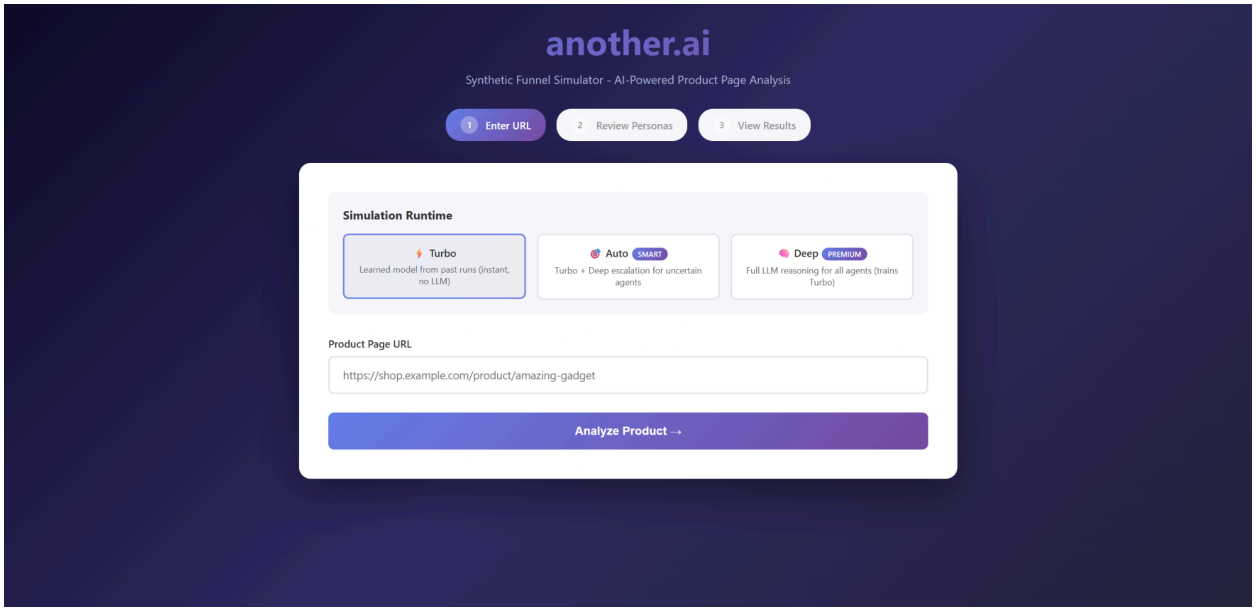
In short, our **initial MVP hypothesis** was:

> "We can give early teams fast, trustworthy product and pricing insights using synthetic respondents, with enough transparency and validation hooks that they will actually trust and use the results."

## 2.2 Key Learnings and Pivots

Over the semester, we realized that while the **research problem** was real, our **surface area** was too broad for the course timeline. As we tried to build and validate pieces of the synthetic survey engine, two major pivots emerged.

### Pivot 1 — From Synthetic Surveys to Synthetic Funnel Simulator




As we started implementing the orchestration and talking to peers, several issues surfaced:

- Running full synthetic surveys with validation, WTP ladders, and alignment scoring was **complex and expensive** to implement properly within one term.

- We personally became more interested in flows that look like **real user journeys on live sites**, not just survey answers.

This led to our **first pivot**: narrowing from “synthetic survey research platform” to an **e-commerce focused Synthetic Funnel Simulator**.

The new product (first build) evaluated **e-commerce product pages** by simulating **90 synthetic shoppers** across three personas (Value Seeker, Skeptical Researcher, Impulse Mobile), each moving through a four-stage funnel:

1. Hook – Does the page capture attention?
2. Proof – Are there enough reviews/trust signals?
3. Price – Is the price acceptable?
4. CTA – Can they find and click “Add to Cart”?

Key features included:

- Facts-first page extraction (title, price, reviews, images, benefits) with confidence scoring.
- Three runtime modes (Turbo, Deep, Auto) balancing speed and cost.
- Deterministic seeding and variance logging.
- A **Conversion Health Score (0–100)**, top blockers, persona-level performance, and reasoning snippets.

Learning from this pivot:

- Moving from abstract survey questions to **concrete funnels on real product pages** made the product easier to explain.
- However, the target remained **e-commerce growth teams**, which we still struggled to access directly for deep validation.
- At the same time, the broader AI ecosystem (including our own interests) was moving quickly toward **autonomous agents navigating real products**, not only modeling human shoppers.

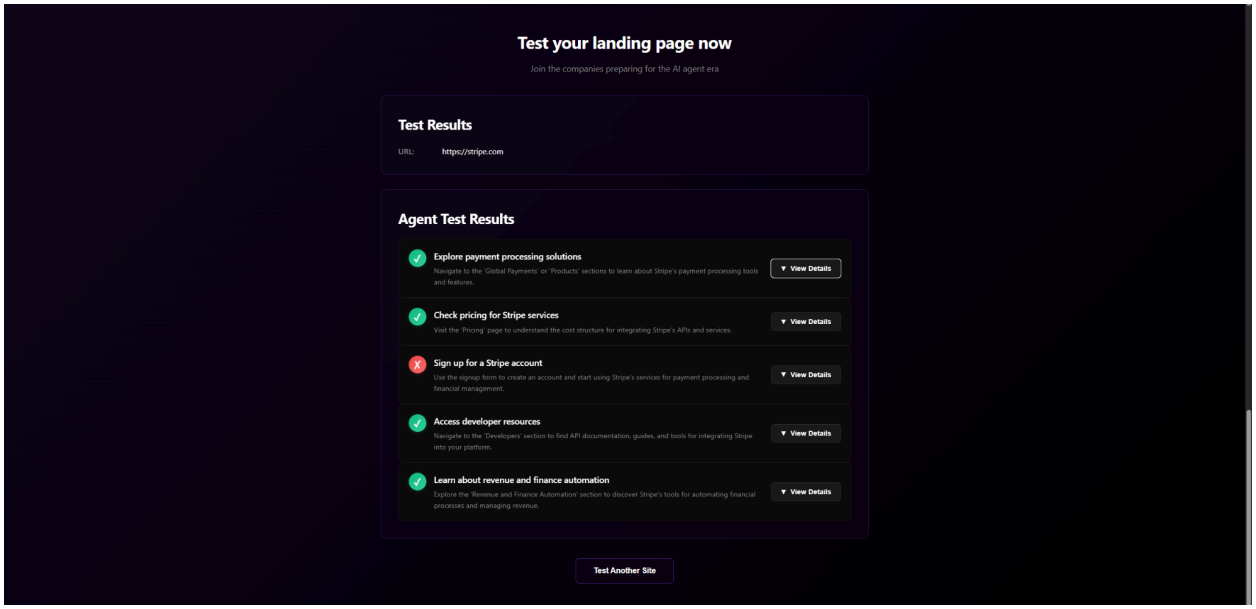
These realizations, plus early technical progress with browser automation, set us up for a second pivot.

**Pivot 2 — From Funnels to Agent Reality Check for Browser Agents**

After multiple concept interviews, prototype tests, and discussions with our professor, we made a second pivot toward what is now our final direction: **another.ai as an Agent Reality Check Platform**.

The new hypothesis:

> "Teams building browser agents don't just need more tests; they need **visibility** into why agents fail on real SaaS sites so they can fix them before production users suffer."




We validated this direction with:

- A **concept interview** with a B2B SaaS Product Manager ("Stephanie Lim"), where we pitched another.ai as "Paste a URL → another.ai analyzes the page → identifies 5 flows → runs AI agents → reports where they pass/fail."
    - She saw **agent-readiness** as early but inevitable, especially for startups integrating AI into onboarding/support.
    - She stressed that she would only trust such a system with:
        - full traces,

        - clear failure reasons,
        - transparency about whether the problem is the site or the agent/scraper.
- A **live prototype test** with a classmate:
    - They understood the product in ~15 seconds: “You’re basically checking if future AI agents can actually use my website without getting stuck.”
    - They loved the step-by-step traces and were excited by the idea of video recordings.
    - They found the default task suggestions a bit generic and wanted custom control.

Combining this feedback with instructor guidance, we decided to **narrow scope hard** again and focus on a specific, technically deep problem we could fully deliver: **testing a reference browser agent against a curated set of SaaS sites with rich observability**.

This became our current build:

- **Built-in reference agent** (Playwright + OpenAI) — no GitHub integration required.
- **10 curated SaaS websites** and **5 predefined goals** (pricing, talk to sales, sign up, help docs, reviews).
- **Full observability:** Playwright videos, traces, DOM snapshots, logs.
- **OpenAI-based evaluation:** success/failure judgments and human-readable reports explaining what went wrong (loops, hallucinations, tool errors, etc. forming part of the roadmap).

## 2.3 Justification of Final MVP

Given the time, complexity, and access constraints of the course, the final MVP represents the **smallest coherent product** that:

- **Solves a real, validated pain** for a concrete user (agent teams who see a gap between perfect demo runs and messy production behavior).
- **Leverages our existing technical work** (scraping, LLM orchestration, Playwright, cloud deployment).

We intentionally chose to **de-scope** several original ambitions:

- Synthetic survey UI with multiple CUJs and WTP ladders.
- Human validation micro-panel flows and alignment scoring in-product.
- Arbitrary user agents, any URL, and fully custom goals.

Instead, the final MVP focuses on:

- **One reference agent**, so we can control behavior and debugging.
- **A fixed, realistic testbed** (10 SaaS sites, 5 common goals).
- **Deep observability** (videos, traces, reports) rather than wide configurability.

In other words, we started with a broad **"synthetic survey research"** hypothesis, pivoted to a concrete **"synthetic funnel simulator"**, and ultimately converged on a focused, shippable **"Agent Reality Check Platform"** that we could fully implement, deploy, and demo, while still preserving a believable path back to the larger vision in future work.

# 3. Functional and Dynamic MVP

## 3.1 Core Functionality Delivered

Our final MVP implements a fully functional **Agent Reality Check Platform** capable of running a reference browser agent across real SaaS websites, recording each session, and providing structured AI-generated explanations of success or failure. The core functionality includes:

### 1. Reference Browser Agent (Playwright + OpenAI)

- A built-in, deterministic browser agent attempts predefined goals on curated SaaS sites.
- Each run captures:
    - Full session **video recordings**
    - Playwright **trace files**
    - Step-by-step **action logs**
    - DOM snapshots and extracted page content

### 2. Parallel Test Execution

- The system runs **10 real SaaS sites in parallel** using asyncio + Playwright.
- Each session executes a consistent workflow based on the user-selected goal.

### 3. AI-Powered Success/Failure Evaluation

- OpenAI GPT-4o-mini evaluates:
    - Whether the goal was achieved
    - Why the agent succeeded or failed
    - What type of failure occurred (loop, hallucination, missing element, tool error)

### 4. Video Playback + Trace Viewer

- The frontend includes a modal-based video player with:
    - Dynamic load from S3/CloudFront
    - Trace logs displayed side-by-side
    - A markdown-rendered AI report

### 5. Background Job System

- Users can run a test and return later; the frontend polls job status every few seconds.
- Completed runs persist locally and can be revisited.

### 6. Run History

- The dashboard stores past runs in localStorage and retrieves them on load.
- Users can revisit results, compare runs, and replay videos.

### 7. Fully Functional Dashboard (Next.js + Tailwind + shadcn/ui)

- A production-quality UI enabling:
    - Triggering test runs
    - Viewing run progress
    - Opening test results
    - Inspecting pass/fail outcomes
    - Reading AI-generated failure analyses

All core CUJs (running tests, inspecting agent behavior, reading failure reports, comparing runs) are fully functional and dynamic.

## 3.2 Dynamic vs. Static Components

This section clearly identifies which parts of the MVP are **dynamic** (executed live at runtime) and which parts are **static** (fixed, pre-configured, or placeholder).

## Dynamic Components (Real Data, Real Execution)

### 1. Agent Execution (Dynamic)

- Playwright launches real browser sessions.
- Agent actions are generated live via OpenAI (GPT-4o-mini).
- Navigation, clicks, forms, DOM extraction → all done dynamically on real sites.

### 2. Video & Trace Recording (Dynamic)

- Videos are created per session at runtime.
- Traces and logs are generated live and uploaded to S3.

### 3. AI Evaluation (Dynamic)

- OpenAI analyzes each session's metadata live:
    - Determines success/failure
    - Classifies error types
    - Generates a markdown report
- This step is fully dynamic and varies per site/run.

### 4. Dashboard Output (Dynamic)

- Pass/fail states update as background jobs finish.
- Video modals load content directly from S3.
- Trace logs and AI reports are rendered in real time.

### 5. Run History (Dynamic Persistence)

- LocalStorage persists past runs.
- Re-openable even after refresh.

## Static Components (Purposeful Constraints for MVP Scope)

These are static **by design**, aligned with your MVP strategy and roadmap:

**1. Test Site List (Static)**

- The 10 SaaS websites are hardcoded.
- This avoids needing a scraping pipeline or user-defined URLs for MVP.

**2. Goal List (Static)**

- The 5 available goals (“Find pricing,” “Talk to sales,” “Sign up,” “Help docs,” “Reviews”) are predefined.
- Users cannot create new custom goals yet.

**3. Built-in Agent (Static Agent Implementation)**

- Only **one reference agent** is included in the MVP.
- No GitHub integrations or custom agent imports yet.

**4. UI Copy, Marketing Sections (Static)**

- Landing page content and illustrations are static.
- No CMS or dynamic text editing.

**5. Report Taxonomy (Static Categories)**

- Error categories (loop, hallucination, missing element, tool error) are static choices.

These static constraints were intentional and validated through user research + instructor guidance to avoid over-scoping and ensure delivery of a **deep, working** MVP.

### 3.3 CUJ Alignment

All **core CUJs** defined in Section 1 are implemented dynamically:

| CUJ | Status | Dynamic Behavior Demonstrated |
|---|---|---|
| **CUJ 1 — Run Reality Check** | Fully Dynamic | Playwright agent runs **real browser sessions** across real SaaS sites |
| **CUJ 2 — Inspect Agent Behavior** | Fully Dynamic | **Video playback** + **trace logs** loaded from S3 |
| **CUJ 3 — Understand Failures** | Fully Dynamic | OpenAI generates **live failure explanations** |
| **CUJ 4 — Compare Historical Runs** | Dynamic Persistence | **localStorage** and **backend metadata store** past runs |

Our MVP meets the requirement that **core CUJs must be dynamic**.

# 4. Test Coverage

Our project uses **GitHub Actions** for continuous integration. On every push to `main`, the pipeline runs:

- **Backend tests** (pytest) with coverage reporting
- **Frontend tests** (Jest + React Testing Library) with coverage reporting
- Automatic upload of HTML coverage artifacts for both services

## Coverage Results (Latest CI Run)

From the latest successful CI execution:

- **Backend (FastAPI / Python): 85% coverage**
    - Key modules such as `agent.py`, `llm.py`, `main.py`, and `runner.py` are all above 80%
- **Frontend (Next.js / React): 70% statements**, **83.8% branches**, **97.6% functions**

## CI Reporting

The GitHub Actions workflow automatically:

- Runs full test suites
- Generates combined backend + frontend coverage summaries
- Uploads HTML coverage reports as downloadable artifacts

## Submission Link

A sample successful CI run with full coverage reporting is available here:
**https://github.com/MBZ-0/LiveGap/actions/runs/19807464232**

# 5. Demo Recording & Testing Guide

## 5.1 Demo Video (3 minutes)

**YouTube Link:** *https://www.youtube.com/watch?v=XJ75tcr0Kq0*

## 5.2 Accompanying Write-Up (How to Test the App Yourself)

Use the live production deployment:

**URL:** https://d3lcgzvi9bu5xi.cloudfront.net/about/index.html
**Login:** Not required

**Steps to Reproduce the Demo:**

1. **Navigate to Dashboard**

2. **Start a new agent test**

    - Click **New**
    - Choose a pre-defined goal
    - Click **Run test on 10 SaaS sites**

3. **Wait (2-3 mins) Until all 10 websites are processed**

4. **Inspect agent behavior**

    - Click **Video** to watch recorded sessions

    - Click **Report** to open explanations

5. **Review past runs**
   The sidebar shows previous test runs.

# 6. Deployment Documentation

## 6.1 Production Web App

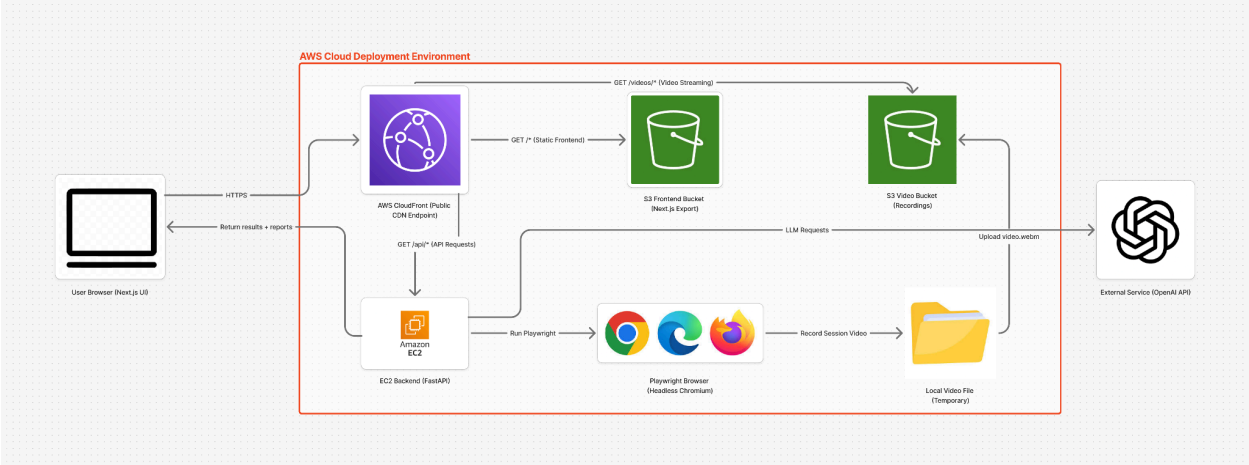
- **Public URL:** https://d3lcgzvi9bu5xi.cloudfront.net
- **Access:** No login or credentials required.

You can follow the full, step-by-step deployment guide in the main project README:

**Deployment & setup details:**
https://github.com/MBZ-0/LiveGap/blob/main/README.md

# 7. Updated Architecture Diagram

## 7.1 High-Level Architecture




## 7.2 architecture to code mapping table

| Architecture Component | Code / Docs Location | One-Sentence Integration Description |
|---|---|---|
| **User Browser (Next.js UI)** | livegap-mini/frontend/app/page.tsx | Renders the main dashboard UI and sends HTTPS requests to CloudFront for static assets and /api/* calls. |
| **AWS CloudFront (Public CDN Endpoint)** | README.md – *Architecture / Production Deployment* | Acts as the **single public entrypoint**, serving the static Next.js frontend from S3 and proxying /api/* requests to the EC2 backend. |

| | | |
|---|---|---|
| **S3 Frontend Bucket (Next.js Export)** | livegap-mini/frontend build output (out/) | **Hosts the exported static Next.js site** that CloudFront serves to users. |
| **EC2 Backend (FastAPI)** | livegap-mini/backend/app/main.py | Exposes the **REST API** (/api/run-reality-check, /api/run/{run_id}) and orchestrates agent runs for each request. |
| **Playwright Browser (Headless Chromium)** | livegap-mini/backend/app/agent.py & runner.py | Runs headless Chromium sessions on EC2 to **execute the reference browser agent** across the 10 SaaS sites. |
| **Local Video File (Temporary)** | livegap-mini/backend/app/videos/ (via agent.py) | **Stores raw session recordings on disk** before they are uploaded to the S3 video bucket. |
| **S3 Video Bucket (Recordings)** | livegap-mini/backend/app/s3_storage.py | **Receives uploaded .webm recordings** from the backend and serves them via CloudFront /videos/* URLs for playback in the UI. |
| **OpenAI API (LLM Requests)** | livegap-mini/backend/app/llm.py | Sends LLM requests from the EC2 backend to OpenAI to **power agent reasoning** and generate human-readable reports. |