📘 AI Interior Agent System — Execution Specification (v7)

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Purpose: Design Execution Spec for AI-based Interior & Exterior Home Design Agents

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I. SYSTEM OVERVIEW

The **AI Home Design Agent System (v7)** is a fully realized multi-agent architecture that replicates how professional interior designers, contractors, and stylists collaborate across projects.

It operates across **interior and exterior domains**, integrating both **space-based domain experts** and **cross-space functional specialists**.

🔧 System Layers

1. **Planning Layer** — Intent detection, context gathering, image analysis

2. **Functional Layer** — Layout, Lighting, Styling, Material, Color Harmony

3. **Domain Layer** — Room and exterior specialists (Living, Kitchen, Backyard, etc.)

4. **Execution Layer** — Visualization (2D & 3D), Sourcing, Purchase

5. **Feedback Layer** — Multi-proposal presentation, user iteration, and re-execution

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II. ASCII ARCHITECTURE DIAGRAM

```
USER → Intent Classifier → Context Agent → Image Analyzer → Scope Resolver
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        ▼
 ┌──────────────────────────────┐
 │      SHARED USER CONTEXT     │
 │ (Profile, Goals, Budget, etc)│
 └──────────────────────────────┘
                │
                ▼
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```

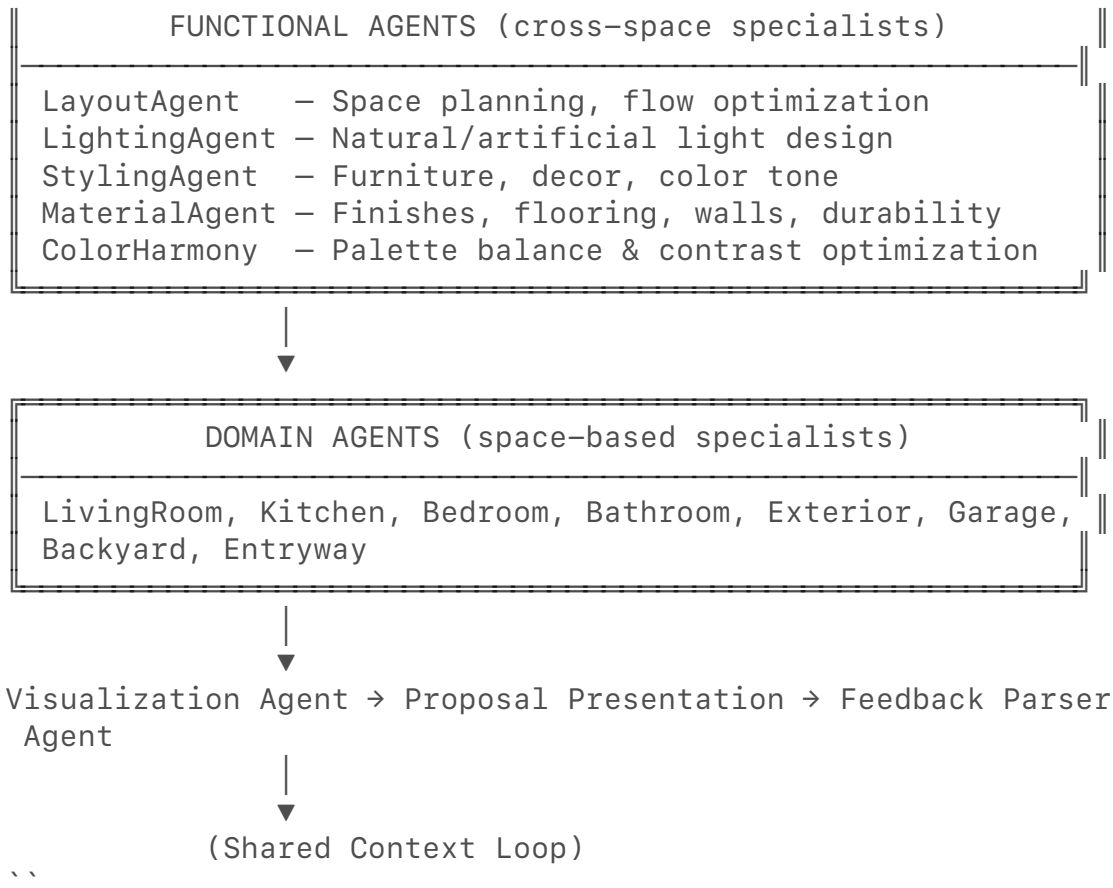

III. AGENT SPECIFICATIONS

Each agent includes:

Field	Description
🎯 **Role**	Core responsibility or decision scope
🧩 **Inputs**	Required data or context
⚙️ **Trigger**	Activation condition
✅ **Completion Criteria**	What defines success
🔁 **Outputs**	Structured result written to Shared Context

1\. IntentClassifier

* **Role:** Identify the user’s goal: full renovation, partial, refresh, or decor purchase.

* **Inputs:** Natural language prompt or photo metadata

* **Trigger:** User submits initial request

* **Completion:** Intent label assigned (e.g., full_reno, partial_reno, room_refresh, accessory_update)

* **Output:** { intent_label, scope_level, space_type }

2\. ContextAgent

* **Role:** Collect non-visual information — goals, constraints, budget, timeline, family/pet context.

* **Inputs:** Text answers or structured survey

* **Trigger:** After intent classification

* **Completion:** All core context fields filled

* **Output:** Context object saved to Shared Context

3\. ImageAnalyzer

* **Role:** Analyze room images for layout, lighting, size, and structure.

* **Trigger:** User uploads at least one valid image

* **Completion:** Spatial facts extracted (doors, windows, clutter, color, brightness)

* **Output:**

```
{ "room_type": "kitchen", "width": 4.2, "height": 2.8, "light_level": "medium" }
```

4\. ScopeResolver

* **Role:** Determine project size and domain assignment (single/multi-space).

* **Trigger:** After context and image analysis

* **Completion:** Correct domain agent(s) mapped

* **Output:** { "scope_level": "multi-space", "domains": \["kitchen", "bathroom"\] }

5\. Functional Agents

Agent	Role	Trigger	Completion	Output

LayoutAgent	Optimize furniture and space flow.	After ImageAnalyzer	≥2 layout variations	Layout JSON
LightingAgent	Design lighting balance & atmosphere.	After LayoutAgent	Light map ready	Lighting scheme
StylingAgent	Define visual mood, furniture type, and tone.	After LightingAgent	Style set complete	Style JSON
MaterialAgent	Choose materials by cost/durability.	After StylingAgent	3–4 combos	Material plan
ColorHarmonyAgent	Maintain color consistency.	After MaterialAgent	Harmonized palette	Palette JSON

6\. Domain Agents

Each domain agent acts as **project coordinator**—aggregating functional results for a specific space.

Agent	Core Focus	Example
LivingRoomAgent	Comfort, visibility, flow	Open layout with light oak palette
KitchenAgent	Ergonomics, ventilation, surfaces	Efficient L-shaped layout with marble
BathroomAgent	Safety, waterproofing, materials	Modern spa layout
BedroomAgent	Lighting, mood, rest	Cozy soft-tone room
ExteriorAgent	Outdoor harmony, facade, landscaping	Garden \+ garage integration

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7\. Visualization Agent

* **Role:** Convert proposals into visuals (2D \+ 3D).

* **Trigger:** Domain agent proposal ready

* **Completion:** 1–4 visual proposals generated

* **Output:** URLs for 2D plan \+ 3D render

8\. Proposal Presentation Agent

* **Role:** Deliver visual \+ textual proposals in carousel format.

* **Completion:** User receives 1–4 alternative proposals.

* **Output:** Display payload (images \+ descriptions \+ pricing).

9\. Feedback Parser Agent

* **Role:** Collect and interpret user reactions (likes/dislikes, comments).

* **Trigger:** After proposal delivery

* **Completion:** Structured feedback vector created

* **Output:** Updates Shared Context (feedback_history \+ preference vector)

10\. Execution Agent

* **Role:** Re-run only relevant Functional/Domain agents based on feedback.

* **Trigger:** When dissatisfaction threshold triggered

* **Completion:** Revised proposal (v2+) generated and logged.

11\. Sourcing & Purchase Agents

Agent	Role	Output
SourcingAgent	Match real products to proposals.	List of purchasable SKUs with price.
PurchaseAgent	Finalize checkout, produce BOM.	Bill of Materials document.

12\. Aftercare Agent (Optional)

* **Role:** Provide post-purchase care guide, warranty info, maintenance suggestions.

* **Output:** Aftercare manual.

IV. SHARED USER CONTEXT SCHEMA

```
{
  "intent_label": "partial_reno",
  "space_type": "kitchen",
  "budget": 4000,
  "goals": ["maximize storage", "modern feel"],
  "timeline": "6 weeks",
  "visual_context": {"lighting": "medium", "size": "4.2x3.8m"},
  "functional_outputs": {...},
  "domain_proposals": [...],
  "visualizations": {"2D": "url", "3D": "url"},
```

```
  "feedback_history": [],
  "revision_history": [],
  "selected_solution": null
}
```

V. MAIN SCENARIOS

🏠 Scenario 1 — Full Renovation

Flow: Intent → Context → Image → Functional Agents → Domain Agents → Visualization → Feedback → Execution

Completion: Full 3D model \+ BOM delivered.

🛁 Scenario 2 — Partial Renovation

Flow: Multi-domain (e.g., Kitchen \+ Bathroom).

Completion: 4 proposals merged; cross-space consistency guaranteed.

🪞 Scenario 3 — Room Refresh

Flow: Styling \+ Lighting \+ Visualization only.

Completion: Quick visual mockups (≤2 proposals).

🕯️ Scenario 4 — Accessory Styling / Product Purchase

Flow: Styling → Sourcing → Presentation.

Completion: One proposal \+ direct checkout path.

VI. FEEDBACK LOOP LOGIC

1. Present 1–4 proposals

2. User reacts (per element)

3. Feedback structured

4. Shared Context updated

5. Relevant agents re-triggered

6. New proposal (v2) delivered

7. Continue until satisfaction threshold met.

VII. COMPLETION MATRIX

Layer	Completion Condition
Planning	Intent \+ context \+ visual data collected
Functional	Each cross-space agent completed
Domain	Proposal set finalized
Visualization	2D \+ 3D renders ready
Feedback	Satisfaction ≥ threshold
Execution	Purchase flow complete

VIII. FUTURE EXPANSIONS

Area	Description
SustainabilityAgent	Eco-friendly material recommendations
Sensor Integration	Real light/furniture scan from IoT
Collaboration Mode	Multi-user co-edit design sessions
Localization	Regional style presets

이 버전이 현재 논의 내용을 완전하게 반영한 실행 사양서야.

원하면 이걸 바로 .md 파일로 만들어 다운로드 가능하게 해줄게 — 그렇게 진행할까?