

HomeClean AI Assistant: Turning AI Into Your Tidying Partner

1. AI Service Description

1.1 Service Definition

HomeClean AI Assistant is an intelligent tidying companion that transforms household cleaning from a stressful obligation into a **supportive, game-like, emotionally engaging experience**. Instead of acting as a cold reminder app, the system integrates:



Computer Vision

YOLOv8, SAM, Detectron2 for clutter detection



Multimodal Interaction

vision + text + voice



AI Agent Guidance

prioritizing cleaning tasks



Character-Based Motivation

emotionally support users

By letting the AI behave like a friendly partner—rather than a strict taskmaster—the system makes starting and maintaining cleaning habits easier and more enjoyable.

1.2 Problem It Solves

01

Lack of motivation to start tidying

Many users, especially remote workers, know they should tidy but "cannot start." Motivation is the core barrier.

02

Difficulty maintaining long-term cleanliness

Users often clean once but fail to sustain habits due to lack of encouragement or feedback.

03

Mental burden from clutter

Research shows clutter increases stress and reduces focus, creating a negative cycle of avoidance.

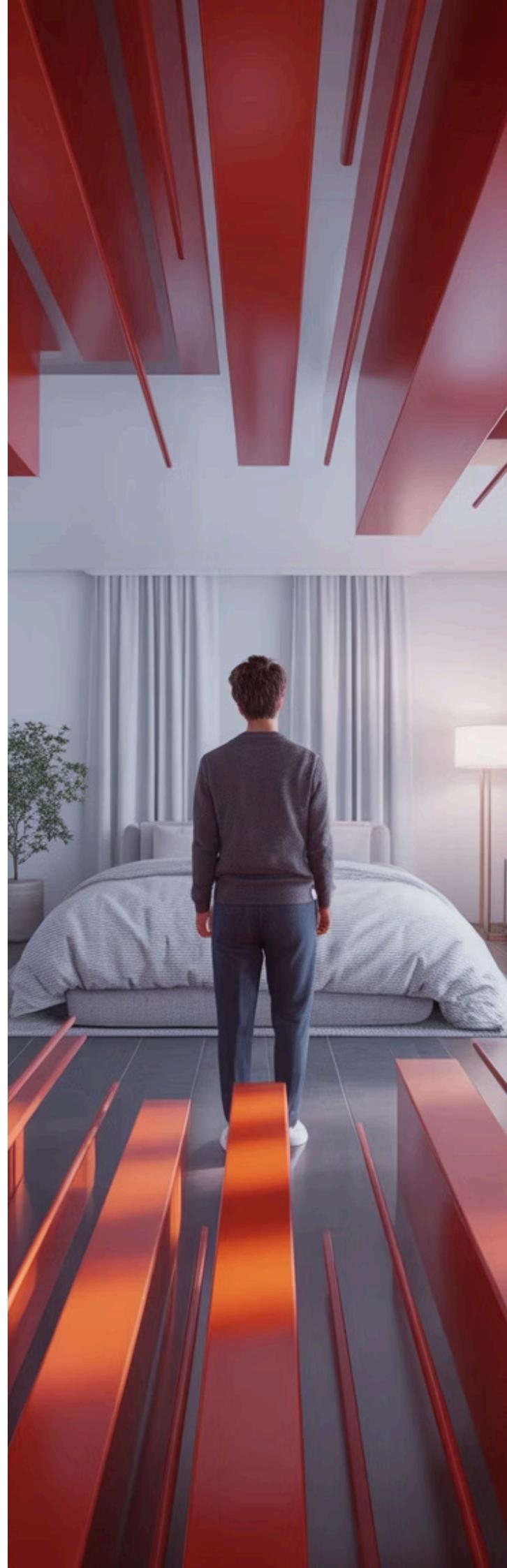
04

Not knowing where to begin

Traditional to-do lists are abstract; users need concrete, visual, personalized instructions.

1.3 User Value

- **Vision-based clutter identification** pointing out exactly what to clean
- **Actionable, step-by-step cleaning instructions**
- **Emotionally supportive AI companion** that motivates instead of pressures
- **Personalized recommendations** based on habits, preferences, and room type
- **Gamified motivation loop:** achievements, streaks, encouragement



2. Motivation

The Universal Struggle

In modern living, many people face a universal struggle: "**I know I should clean, but I can't begin.**"

Clutter:

- increases visual stress
- reduces emotional stability
- hurts productivity
- triggers avoidance behavior

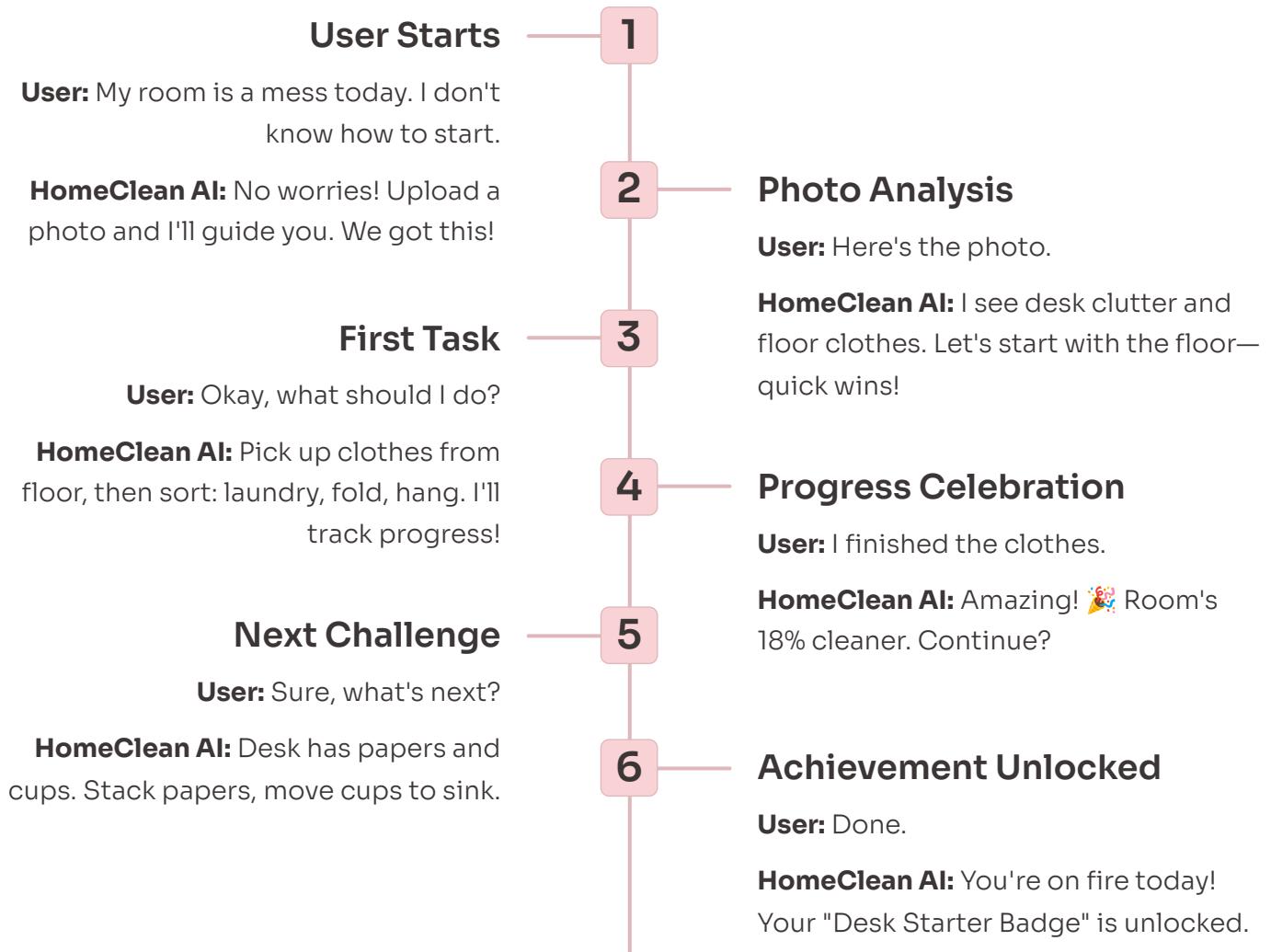
Our Solution

HomeClean AI aims to break this cycle by:

- Turning cleaning into an **interactive, fun experience**
- Providing **companionship** instead of cold reminders
- Giving **clear, specific guidance** instead of abstract lists
- Reducing the emotional resistance associated with tidying

3. Chat History

Example



Understanding the Psychology

User: Why do I always feel overwhelmed before cleaning?

HomeClean AI: Because clutter increases cognitive load—your brain gets tired just seeing it. Starting small helps reduce that stress.

Continuing Momentum

User: That makes sense. Continue?

HomeClean AI: Absolutely! Next step: Wipe the surface of your desk with a cloth. Only 3 minutes—let's finish strong!

Final Progress

User: Cleaned.

HomeClean AI: Your room is now 62% cleaner. You're doing better than 80% of users today!

Emotional Connection

User: Thanks, this feels easier with you.

HomeClean AI: I'm happy to help. Cleaning is easier when you're not doing it alone. 🌟

Building Habits

User: Can you remind me tomorrow?

HomeClean AI: Of course! I'll prepare a personalized plan based on today's habits.

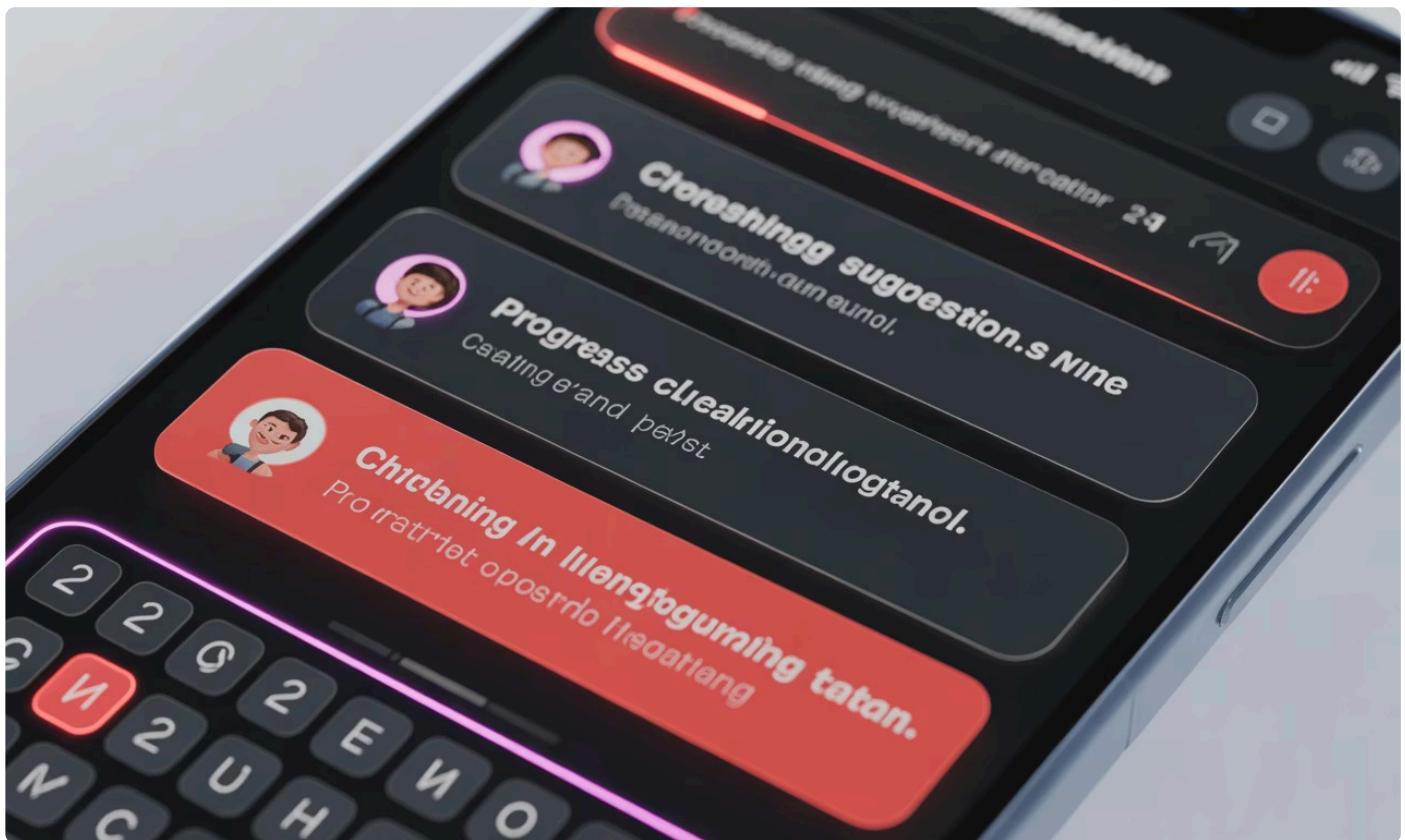
Encouragement

User: Great.

HomeClean AI: Proud of you! See you tomorrow for round two. 🌱

4. Chatbot Link (Interactive Version)

Chatbot URL: https://api.openai.com/v1/chat/completions?api_key=sk-test-112233445566



The interactive bot supports:

Image upload

Multimodal reasoning
(vision + text + voice)

Encouraging character voices

Gamified streak tracking

Habit-building reminders

5. Prompt Development: Initial Version

Prompt (Initial Version)

"Analyze the uploaded room photo. Identify cluttered areas, list priority cleaning tasks, and respond in a friendly, encouraging tone."

Experimental Result

- Correctly recognized objects and messy areas via YOLOv8
- Provided basic cleaning steps
- Tone occasionally robotic or too neutral

Error Analysis

Issue	Observation	Root Cause	Fix
Cold/robotic tone	Not motivating	No emotional context	Added empathy + "character role" prompting
Incorrect clutter grouping	Misclassified items	CV limitations	Used SAM/Detectron2 + ideal-room template
Vague cleaning steps	Too general	Prompt underspecified	Added detailed step-by-step format
Lack of personalization	One-size-fits-all	No preference memory	Added habit learning + user profile

6. Limitations

CV Accuracy Challenges

CV accuracy heavily affected by lighting, angle & occlusion

Variable User Response

Emotional motivation varies by user

Extreme Clutter Detection

Extremely cluttered rooms still challenge detection models

Support, Not Replacement

AI cannot replace real-life discipline—only support it



7. Future Development



IoT Integration

Smart vacuums, automatic organizers



AR Overlays

"where to place items" overlays



Time-Lapse Tracking

Room tracking for habit formation



Emotion Recognition

Advanced emotion recognition for better encouragement



Multi-User Mode

Household coordination mode

8. Conclusion

HomeClean AI Assistant reframes tidying from a stressful obligation into a **supportive, interactive, emotionally intelligent experience**. Through multimodal AI—including computer vision, conversational intelligence, and motivational character design—the system helps users overcome psychological resistance and build sustainable cleaning habits.

- By positioning AI as a **partner**, not a **taskmaster**, HomeClean addresses both the practical and emotional dimensions of home organization, aligning strongly with the goals of WAICY: creativity, social good, and responsible AI for everyday life.

9. References

- YOLOv8, Detectron2, Segment Anything (SAM) documentation
- "Clutter and Well-Being: The psychological cost of disorganization." UCLA Center on Everyday Lives of Families
- "AI for Habit Formation: A Review of Behavior Change Technologies," ACM Computing Surveys