

Case By Case

GENERATIVE AI AS A TOOL FOR DOCUMENTATION AND SPECULATION ACROSS MATERIAL PRACTICES

Mariah Gardner, Adam G. Emerson, Cesar Torres
Computer Science & Engineering, The University of Texas at Arlington, Arlington, Texas, USA



INTRODUCTION

Process documentation plays a central role in maker culture, where prototypes circulate through images, renders, and reproducible files that render making legible and transferable. Yet not all material practices lend themselves to clean, sequential representation. This paper introduces a hybrid documentation workflow that integrates AI-generated imagery with partial photographs, field notes, and first hand narrative accounts. We argue that AI-assisted reconstruction can extend the communicability of materially intensive practices while preserving their situated complexity.

CASE STUDY

We present a practice-based case study that uses AI-assisted documentation to annotate a material exploration. The study centers on ceramics, a medium that remains comparatively peripheral within HCI's digital fabrication discourse despite sustained engagement through extrusion-based systems [1], slab-oriented workflows [2,3], and slipcasting [4,5,6]. While recent studies [6] provide valuable insight into practical challenges, the literature continues to privilege finished artifacts, leaving process dynamics, failure modes, and tacit material knowledge under-articulated.

We examine these frictions through a materially grounded case study of the *Frankencase*, a slip-cast ceramic enclosure for an Arduino Uno. The microcontroller case is intentionally chosen. In makerspaces, printing a case often serves as a “hello world” exercise. Standard geometries circulate as downloadable STLs, and users frequently reproduce them with little modification, despite remix features on platforms such as Thingiverse [7]. The case thus operates as a canonical object within digital fabrication culture.

DISCUSSION

Provenance, Bias & Defamiliarization

- Models inherit biases from training data (favoring smooth, commercial ceramic forms)
- Struggle to merge “technology” and “craft” aesthetics

Semantic Gap: Material vs Model Understanding

- Models lack embodied material knowledge (e.g., “leather hard,” “bone dry”)
- Models respond better to sensory, visual descriptions than jargon

VISION



Fig. 1. A speculative ceramic prototyping workflow for microcontroller enclosures. A library of plaster molds accommodating common board form factors enables batch production across varying sizes (left). Slip-cast forms are modified after casting through subtractive carving, additive attachment, and surface deformation (top right). The resulting enclosure is finished with glaze and fired, yielding a durable, craft-inflected housing for embedded electronics (bottom right). (Midjourney v7)

SPECULATIVE DESIGN

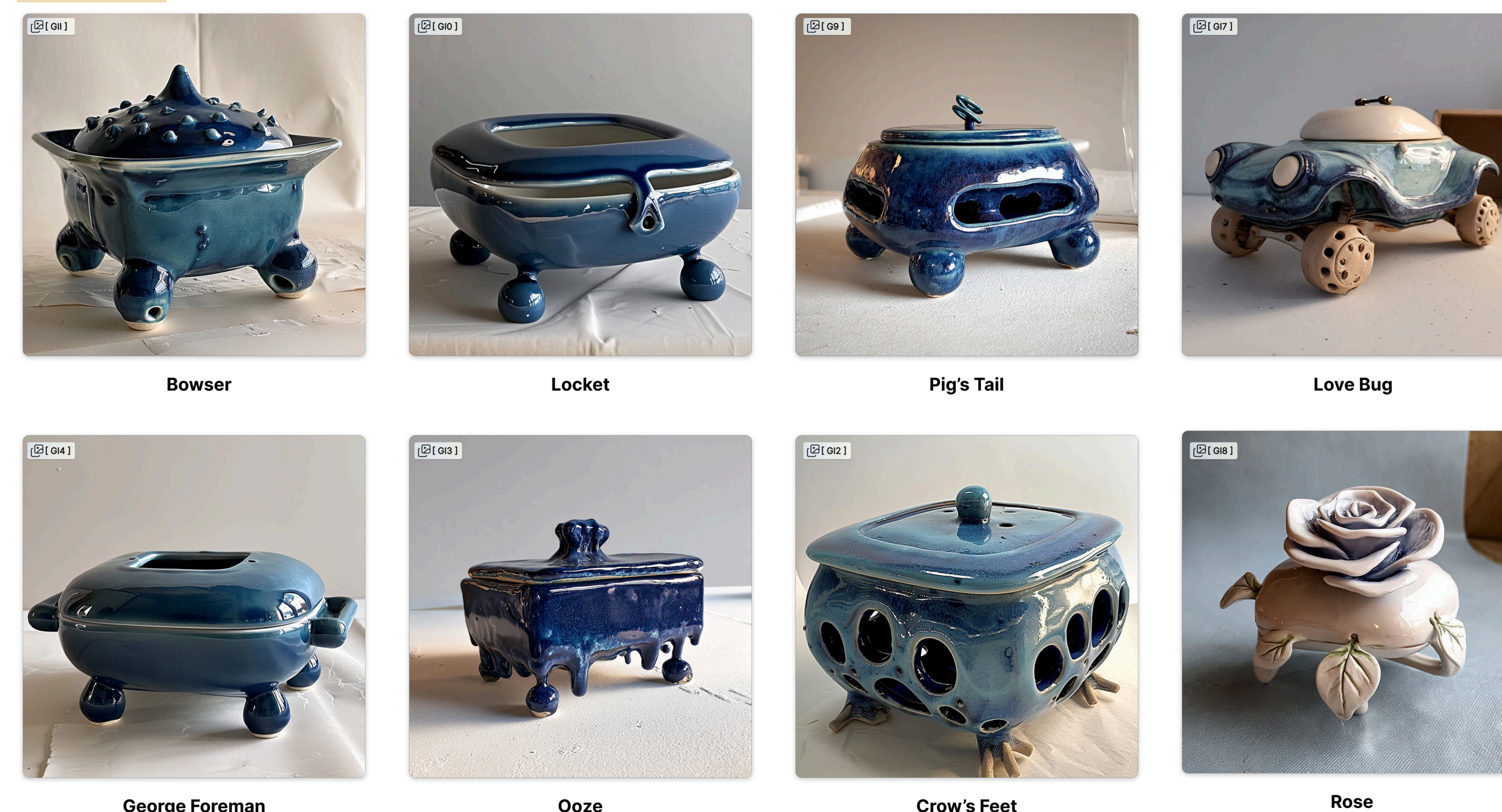


Fig. 2. AI-generated speculative designs exploring foot and handle variations for the Frankencase. Prompts drew on photographs of the finished enclosure alongside reference objects from Thingiverse, with a meta-model generating structured Midjourney prompts to encourage formal variety beyond what was physically attempted during fabrication. Outputs range from resolved craft-adjacent forms to unexpected hybrid geometries, and were treated as open design possibilities rather than evaluated against material constraints. Names were assigned by the authors to support discussion. (Midjourney v7)

PROCESS

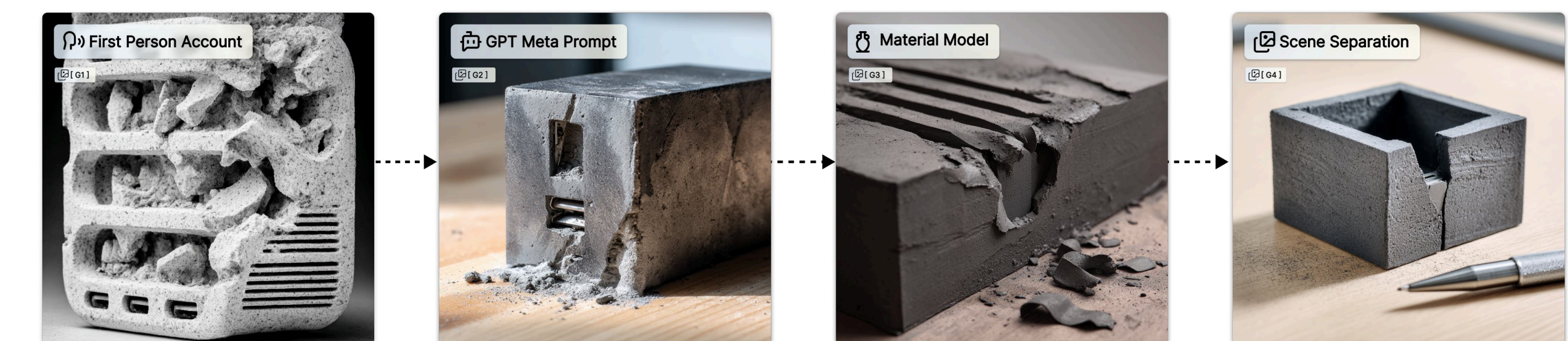
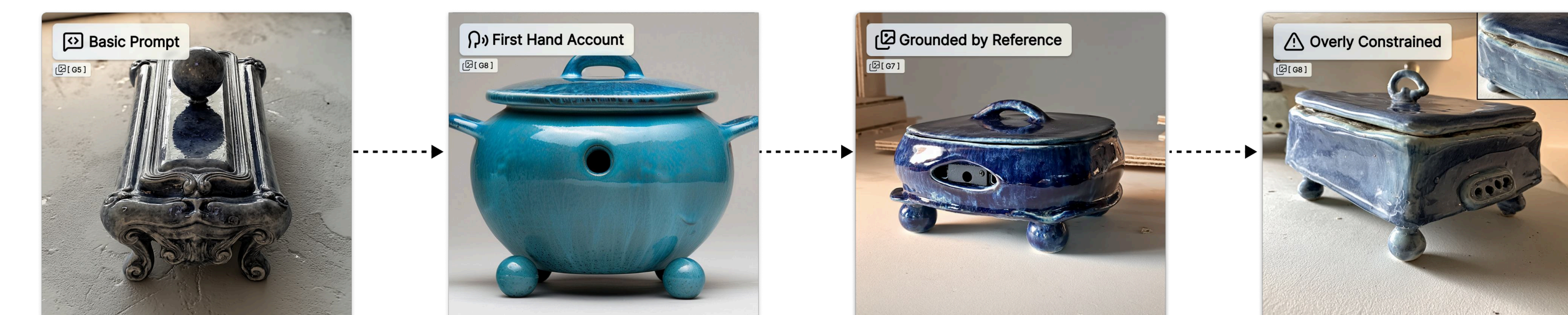


Fig. 3. Beginning with a direct first-person account as a prompt (First Person Account), the description was passed to GPT to generate a structured Midjourney prompt (GPT Meta Prompt). Material fidelity was then improved by incorporating ceramic state descriptors (Material Model). The first-person narrative was decomposed into discrete scenes to enable more targeted image generation (Scene Separation). Each stage produced progressively more specific and materially accurate visual outputs.

Speculative Meta Prompting



Speculation From Source

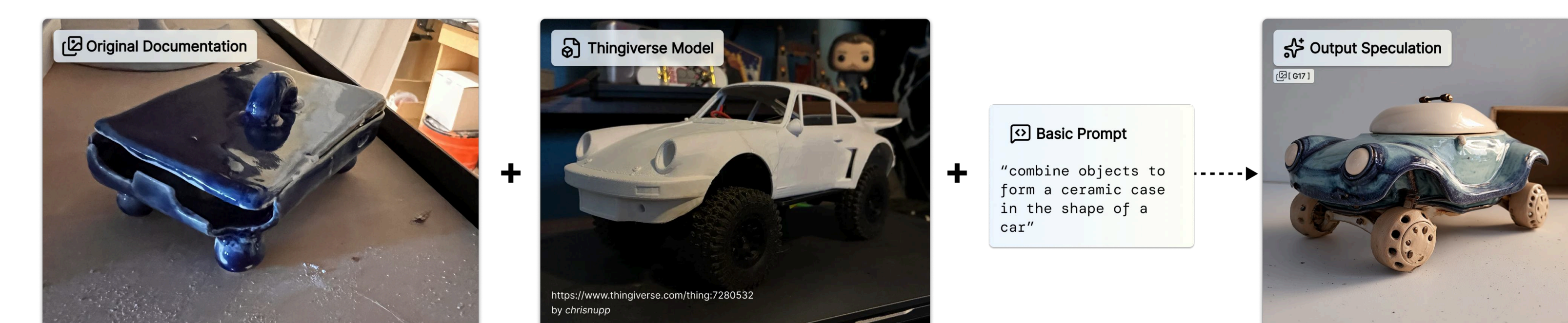


Fig. 4. An alternative speculation strategy combines original documentation of the Frankencase with a reference object sourced from Thingiverse and a brief natural language prompt, producing a speculative ceramic enclosure that merges the formal logic of both inputs.

CITATIONS

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