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POSTER

## Jetpacks, Dragons, and TARS: Speculative Design of Assistive Technologies Through Science Fiction Imaginaries

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# Jetpacks, Dragons, and TARS: Speculative Design of Assistive Technologies Through Science Fiction Imaginaries

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## Abstract

What if the future of assistive technology isn't built in labs, but by our memories of science fiction? Departing from traditional design fiction approaches that rely on curated prompts, we asked non-expert designers to prototype low-fidelity assistive systems for planetary settlements based on their own remembered cultural references. Across two workshops ( $n = 21$ ) and a group interview ( $n = 5$ ), participants prepared prototypes. Reflexive thematic analysis of their designs revealed five core themes: cultural templates as design scaffolds, speculative mobility logics, affective support, ethical concerns around system autonomy, and adaptive technologies responsive to alien conditions. These findings suggest that science fiction serves as aesthetic inspiration and an embedded framework. We argue that cultural memory can surface user expectations of assistive agents, informing the design of future human-agent interactions.

## CCS Concepts

• **Human-centered computing** → **Empirical studies in HCI**.

## Keywords

human-computer interaction, assistive systems, science fiction, speculative methods, design fiction

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## 1 Introduction

From jetpacks to robotic companions, our visions of space mobility are saturated with science fiction (SF). These cultural narratives shape our collective imagination and influence how we conceptualize mobility in extreme environments. Within Human-Computer Interaction (HCI) and Human-Robot Interaction (HRI), SF has become a productive speculative tool serving as both provocation and prototype for technologies yet to be realized [7, 8, 11].

In this study, we investigate how SF and pop culture inform the participatory design of assistive technologies (ATs) for planetary mobility. We ask: *How do internalized SF narratives and cultural references influence the design of ATs in speculative co-design contexts?* To answer this, we conducted a group interview and two workshops ( $n = 26$ ), where participants prototyped low-fidelity AT for extraterrestrial settings without being exposed to curated material.

Our goal is to examine how remembered narratives shape design decisions related to assistive agents, and how speculative co-design reveals overlooked emotional, ethical, and symbolic dimensions of AT. This reveals which cultural tropes shape imagined assistive systems and how user imagination, rooted in media experience, surfaces embedded values in future system design. This work contributes to Human-Agent Interaction by revealing how remembered pop culture narratives shape users' expectations of assistive agents – including their emotional roles, autonomy, and imagined interactions – in speculative design settings.

## 2 Related Work

SF was used in HCI to explore sociotechnical futures, surface ethical considerations, and identify user expectations [3, 8, 9]. Design fiction and scenario prototyping leverage SF narratives to provoke reflections about future technologies [6, 14, 15]. However, these approaches rely on researcher-curated stimuli, limiting speculative contributions.

**Pop Culture and User Perception.** Pop culture exerts an influence on user expectations, especially in interface aesthetics and emotion. Zhadan et al. suggest that interface trends like cyberpunk and retrofuturism evoke affective responses and cultural familiarity [18]. As Cheung and Antle observe, users project learned media

behaviors onto novel systems, especially in unfamiliar interaction contexts [5].

**Participatory Design and Speculative HRI.** Participatory design in HRI involves users in shaping technologies aligned with social and contextual needs [13, 16]. While speculative co-design has been used across fields like urban planning and healthcare [2, 12], its application to ATs for planetary exploration is limited. Existing methods often rely on researcher-curated prompts [10], potentially restricting participants' speculative creativity. Responding to recent calls for more speculative and adaptive design approaches in HRI [16], our study demonstrates how participant-driven cultural memory can serve as a flexible and generative design strategy tailored to unfamiliar use contexts, avoiding researcher-curated narratives and enabling spontaneous cultural associations.

### 3 Methodology

This study combined an exploratory group interview and two participatory design workshops. The study was conducted in-person between August and October 2024. The study followed institutional ethics guidelines and involved consenting adult students from non-vulnerable populations. A total of 26 participants, with a mean age of 24.4 years (SD = 4.2), where 5 (m=3, f=2) were in the initial group interview and 21 were (m=10, f=11) across two workshop sessions. Participants were HCI course students, as well as pop culture fans recruited at the SF convention. All participants reported familiarity with SF media, but none identified as professional designers.

**Group Interview** The group interview was held during a SF convention and involved open-ended discussions about fictional portrayals of mobility in extraterrestrial environments. Findings from this session were used to inform the subsequent workshops.

**Workshops.** The workshops lasted 100 minutes in a classroom setting. Each began with a moodboard presentation and a warm-up task where participants listed remembered or imagined ATs. The main task involved creating 2D/3D prototypes for mobility in a planetary settlement, using sketching materials and narrative elements. Each group presented briefly at the end.

**Analysis Procedure** The data collected during the interview and workshops included audio recordings of discussions and presentations, photographic documentation of all prototypes, scanned design materials, and moderator field notes. Audio data were transcribed and analyzed by two researchers using reflexive thematic analysis, with both researchers coding and discussing themes iteratively [4].

### 4 Results and Discussion

This section presents results (Fig. 1) of a reflexive thematic analysis of transcripts from user studies. The following themes reflect on how participants' lived experiences, media references, and speculative assumptions shaped the creation of ATs' prototypes.

#### Cultural Templates and Embodied Agent Tropes

SF emerged as a shared design vocabulary. Participants drew extensively on SF narratives, embedding recognizable motifs such as futuristic aesthetics and weaponry. Participant explained, *"It looks like a technologically advanced dragon—because dragons are able to fly and throw fire."* [P4]. Automatic inclusion of aggressive features highlighted deeply internalized cultural tropes. This echoes



**Figure 1: Low-fidelity prototypes from workshops: wearable interface, hoverboard, adaptive boots, exosuit, robot assistant, and jetpack.**

Michaud and Appio's observation that SF enables "envisioning innovation through culturally familiar yet speculative frames" [8]. However, as Wong et al. argue, this can also surface latent social biases [17], reinforcing problematic assumptions about space colonization, threat response, and power hierarchies.

#### Reimagining Mobility in Alien Contexts

Mobility was imagined through gravity-defying tech, with limitations: *"On the Moon, I wouldn't need an exoskeleton unless the suit is heavy... maybe a limiter, not an amplifier."* [P2]. Such reflections indicate awareness of practical constraints in planetary contexts. As in Stepanovic and Ferraro's critique, speculative design should not only imagine radical futures but account for situated embodiment and control trade-offs [14]. Prior findings also suggest that fictional media over-represents flying mobility option. environments [15].

#### Affective Interaction and Emotional Agents

Participants moved from mechanical to emotional support, e.g. a group described their TARS-inspired robot as a "helper that follows you, helps with directions, and keeps you calm if you're injured". This resonates with Noortman et al.'s concept of "empathetic design fiction probes" tech [10]. Participants also emphasized the need for entertainment systems, AI-based pets, and even robotic masseurs.

#### System Critique: Autonomy, Ownership, and Ethics

Participants anticipated ethical challenges surrounding system autonomy and surveillance. One stated, *"What if your AR map shows ads on your helmet while you try to survive?"* [P3]. Others expressed concerns about commercialization limiting user control, highlighting ethical tensions inherent in speculative AT design. Abosaleh and Vlachokyriakos' warn about how assistive and civic technologies can become sites of socio-political tension, especially when deployed in life-critical contexts [1]. Participants speculated about how tourists, might face limited autonomy or surveillance: *"If a rich tourist hits their head, the company will get sued, so they'll monitor every move."* [P17].

### 5 Conclusion and Future Work

This study explored how internalized science fiction and pop culture references shape the participatory design of ATs for planetary mobility. By asking participants to prototype devices based on remembered narratives, we revealed how sci-fi frames design decisions related to function, ethics, and emotion. Participants generated symbolic designs that reflect practical needs and imagined interactions, highlighting cultural memory as a speculative tool in

unfamiliar yet demographically limited contexts. Our study contributes to Human-Agent Interaction by revealing how participants intuitively envisioned assistive agents that support users cognitively, emotionally, and ethically.

Future work will turn selected concepts into prototypes and evaluate them in simulated space contexts, bridging speculative design with user-informed agent behavior in off-Earth environments..

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