

# Forest-Robot-Stormin': Exploring Play for Eliciting More-than-Human (MtH) Forest-Robot Interactions

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## Abstract

This paper presents a speculative design workshop that represents an initial attempt to explore playful methods for envisioning more-than-human forest-robot interactions. Bringing together game designers, researchers, and technologists, the two-day workshop used creative games, such as a forest-themed fake news card game and AI-generated PowerPoint karaoke, to provoke imaginative thinking. Participants developed speculative concepts through bodystorming, storyboarding, and the creation of short videos, featuring a Boston Dynamics Spot robot. Our analysis, grounded in visual thematic analysis, highlights how play facilitated ideation, visualization, and the making of more-than-human forest-robot concepts. As a work-in-progress, we learned that some game elements proved to be too abstract; however, the iterative making and acting processes helped participants ground and refine their ideas. The outcomes of the workshop, in the form of forest-robot concepts, represent a wide array of more-than-human design considerations. We also discuss the

implications from the concepts through a critical more-than-human lens.

## CCS Concepts

• **Human-centered computing:** • Ubiquitous and mobile computing; • Ubiquitous and mobile computing design and evaluation methods;

## Keywords

More-than-human design, forest-robot interaction, playful creation, speculative design workshop

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## 1 Introduction

Play is a spontaneous, voluntary, and imaginative activity that is often characterized by exploration, experimentation, and joy [28, 33]. It is not bound by strict rules or outcomes, which makes it a powerful mode of thinking and doing, especially in creative fields like design [21]. Play enables individuals to step outside of

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conventional logic, embrace ambiguity, and engage with ideas in a more open-ended and embodied way [12, 22]. It also provides a flexible mode of engagement that invites imagination, improvisation, and collaboration, qualities that might be especially useful in the early stages of design [2, 24]. Within this context, the notion of play as a mode of creation has become particularly valuable, as it can provide support for nonlinear thinking, where ideas emerge not from a structured problem-solving approach but through storytelling, role-play, world-building, and embodied exploration [4, 26]. This understanding of play has been embraced in design and HCI research as both a mindset and method for early-stage ideation and speculative exploration. Playful approaches—such as ludic design and game-based co-design—support curiosity, ambiguity, and imagination, enabling designers to probe emerging technologies and futures in open-ended ways [6, 19, 27]. In this study, we speculatively employ play as a mode of eliciting more-than-human (MtH) [11] interaction design where robots and the forest, including its diverse ecosystem, are considered as MtH actors.

More-than-human thinking challenges dominant anthropocentric perspectives and calls for an understanding of the world that includes nonhuman beings, systems, and agencies [8, 17]. This approach foregrounds the entanglements between humans and a broader web of life, including animals, plants, environments, and technologies, urging designers to consider the needs, roles, and perspectives of these nonhuman actors [13]. More-than-human design thus seeks to create systems, experiences, and artifacts that acknowledge and respond to the interdependencies between humans and nonhumans [20, 38]. However, this mode of thinking is not always intuitive or straightforward, as it requires us to imagine relationships, values, and interactions that fall outside conventional human-centered frameworks. For example, designing urban infrastructures that account for animal mobility (e.g., wildlife crossings) [37], creating speculative artifacts that give voice to rivers or forests [10], or developing wearables that respond to environmental rhythms [1] are all attempts to shift perspective and design with nonhuman entities in mind. In this context, play, with its open-ended, improvisational, and imaginative qualities, offers a promising avenue for exploring more-than-human entanglements. By embracing ambiguity and allowing for nonlinear, embodied, and speculative engagement, play may help us step beyond habitual thinking and creatively envision alternative ways of relating to technologies, environments, and nonhuman others. In this study, we carefully selected the forest and robots as the MtH actors due to their influential presence in daily human lives. The forest is a whole ecosystem that humans once inhabited and still rely on not only for valuable resources but also for recreation, making it a natural and ever-present actor in many cultures and contexts that is other than humans. Robots, on the other hand, have been created by taking inspiration from nature (e.g., animals) as well as from how humans project different characteristics on them [9]. From the perspective of Actor-Network Theory, robots, though artificially constructed, are not merely passive tools but active participants within socio-technical networks [25]. They, like elements of the natural ecosystem, must be seen as actors that shape and are shaped by their relationships with humans, environments, and other entities. Making these two ends meet not only serves specific purposes in the forest (e.g., preservation, monitoring) [31],

but also raises questions about relationality, presence, ecology, and technology in the wild. For this study, through the exploration of creative play, we are interested in examining the concepts, roles, narratives, and interactions that emerge from the forest-robot perspective. Additionally, we want to analyze what inherent meanings these narratives might carry that can inform future designs for MtH forest-robot interactions.

We present an initial exploration and reflections on ideating through creative play, grounded in a two-day workshop, where participants engaged with a series of playful activities to imagine and sketch MtH forest-robot concepts and narratives. Through this framing, we begin to examine how play itself functions as a speculative design [3] method for eliciting MtH interactions. This work contributes and adds knowledge to a broader conversation around how playful and embodied methods can serve not only as tools for idea generation but also as frameworks for participatory reflection on the values and relationships we embed in our designs. We contribute knowledge through four designed concepts and critically analyze their stance in an MtH space.

## 2 Method

### 2.1 Participants

The workshop was arranged as part of the annual seminar of UNITE Flagship, a competence center which stands for “Forest-Human-Machine Interplay – Building Resilience, Redefining Value Networks and Enabling Meaningful Experiences” [16]. The workshop was advertised to the participants of this seminar, as it was attended by researchers from disciplines such as forestry, technology, design, and gamification. The group included five men and two women. Seven participants were recruited, aged between 28 and 42 years. All participants held advanced degrees, including Master’s or doctoral-level qualifications in fields such as mathematics, geography, physics, electrical engineering, computer science, game design, and biomedical imaging. All participants belonged to the academic community with a specific focus on different topics in forest technology. Hence, we can assume that they are well-informed about possible application areas in the forest, and it would be easier for them to imagine forest-robot interventions more intuitively. The familiarity and experience of working with robots varied significantly, as two participants reported having deeper prior experience with robotics, three participants reported an average level of understanding, while two other participants reported having a low level of knowledge and prior experience with robots.

### 2.2 Procedure

The two-day workshop began with introductions, an icebreaker activity, and an overview of the workshop’s goals and structure. Informed consent was obtained from participants at this stage. Participants were divided into two groups (three and four participants respectively) to play the Fake Forest News game, a creative card-based storytelling game. Over the course of four rounds per group, they generated 34 speculative narratives (Group one = 18, Group two = 16), each imagining a unique interaction between robots and forest environments. These narratives served as an idea pool to draw inspiration from for the next stage.

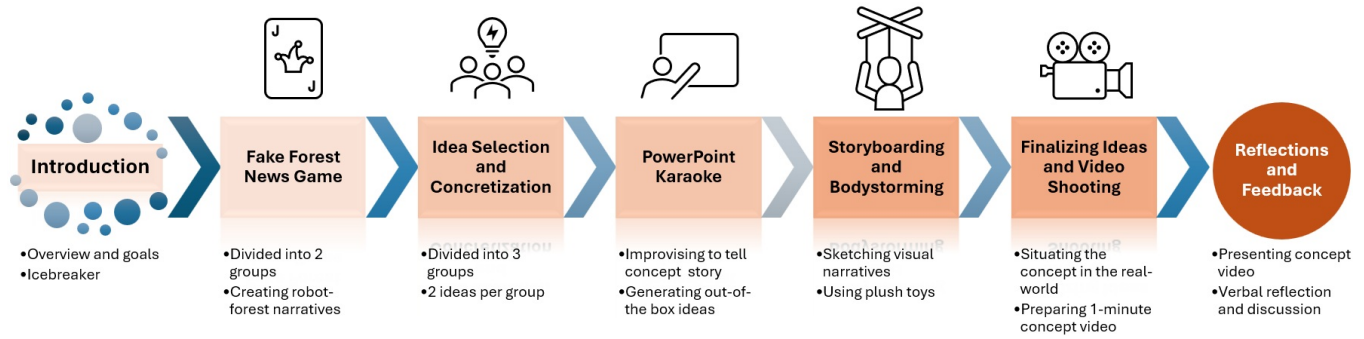


Figure 1: Overall workshop process.

After the game, participants were reorganized into three new groups (one group of three, two groups of two), each selecting two compelling ideas from the idea pool to develop further. These selected concepts were then developed further through a series of creative design activities. The first of these was PowerPoint Karaoke [34], where each group used an AI-powered tool [39] to generate a random slide deck on their chosen topic. Participants improvised short presentations based on these slides, practicing spontaneous storytelling and building confidence in pitching their ideas playfully. This was followed by storyboarding [35] and bodystorming [7] sessions, where participants began sketching visual narratives [30] and acted out use-case scenarios using simple plush toys, props, and wearable toys. Groups received specific instructions for recording the concept video: 1) the video should comprehensively present the concept, and 2) it should be kept under one minute. These methods allowed them to explore the physicality, relational aspects, and situational dynamics of their proposed forest-robot concepts. One group decided to work on two related concepts, while the others focused on one concept each. Day 1 ended with the participants finalizing their concepts and creating storyboard [35] sketches for Day two's video creation.

Day two began with a 30-minute group walk in a nearby forest, providing participants with an opportunity to ground their ideas in a real-world setting and reflect on its sensory and experiential qualities. Upon returning, groups filmed short concept videos using the Boston Dynamics Spot robot and the narrative structures developed on Day one. These videos served both as design artifacts and storytelling tools to convey the core of their ideas.

The workshop concluded with a screening session where all concept videos were presented to fellow participants and workshop facilitators. This led to rich discussions and reflections on the proposed concepts, methods used, and the overall experience. This presentation and discussion session were audio-recorded. Finally, participants completed a reflection form offering feedback on the creative process, tools, and the role of play in shaping their ideas. The step-by-step process of the workshop is demonstrated in Figure 1.

## 2.3 Materials of Play

**2.3.1 Game: Fake Forest News.** The Fake News Game is a creative storytelling activity designed to encourage improvisation and lateral thinking. It involves two types of cards: topic cards and image cards. Each player starts with three topic cards in hand. At the beginning of a round, four image cards are drawn and placed face up for everyone to see. Players then take turns crafting a short narrative, referred to as the "fake news," by combining one or more of their topic cards with one of the visible image cards. The goal is to invent an imaginative, absurd, or provocative story that links the chosen topic(s) and image together, encouraging playful thinking and reinterpretation of visual cues. In the context of this workshop, each narrative had to be in a forest-robot context.

**2.3.2 PowerPoint Karaoke.** After selecting their forest-robot interaction idea, groups used an AI-powered PowerPoint slides generator [39] to create a presentation, then improvised talks based on the generated visuals. This activity was chosen to loosen up communication styles and encourage imaginative, performative storytelling.

**2.3.3 Plush Toys.** Plush toys were provided to the participants to help them bodystorm their concepts and use the toys to film their concept videos when relevant. The toys added a layer of abstraction to the ideas, sometimes proving provocative for concept ideation.

**2.3.4 Spot Robot.** The Boston Dynamics Spot [15] robot was made available as a central artefact for exploration and interaction. Participants could engage with Spot during ideation, concept development, and video sketching. Its presence allowed for a tangible imagination process of human-robot interaction scenarios in outdoor contexts. Spot's animal-like movements, technical capabilities, and aesthetic form sparked curiosity and critical reflection, encouraging participants to imagine playful, speculative, or provocative roles beyond utility within forest settings.

## 2.4 Data Collection

Data collection during the workshop drew on multiple sources to capture a rich and layered understanding of the playful ideation process. Facilitators took observation notes throughout the sessions, focusing on aspects such as group dynamics, play styles, design discussions, and how participants interacted with the forest context. Participants played the Fake News game to create ideas, selected

their preferred ideas to go forward with, and created sketches and storyboards on paper. These were complemented by final concept videos, combining towards a visual annotated portfolio [18]. In addition, verbal reflections and informal feedback were gathered during the closing session. Participants also completed a reflection form to express their views on the creation process and overall workshop structure.

## 2.5 Data Analysis

The analysis of the workshop outcomes was primarily conducted by the first and second authors, who also facilitated the workshop and were deeply familiar with the nuances of the activities. A visual thematic analysis [32] in the form of a narrative analysis [14] was done on the four final concept videos and their accompanying storyboards. Each concept was coded for its unique design features, relational logics, and speculative functions using affinity diagramming. This process emphasizes an interpretive engagement with visual and narrative data. The other authors supported the analysis by reviewing and reflecting on the coded material, providing additional perspectives on the thematic structures. Additionally, we analyzed the recordings of the final discussion and presentation session to capture participants' reflections on the process and the ideas they generated.

## 3 Workshop Concepts

### 3.1 Justice for Mushrooms - 1

In this concept, a mobile robot acts as a vigilant guardian of mushrooms in the forest, stepping in to protect them from animals that attempt to eat or steal them. The mushrooms here are portrayed as a precious ecological resource, and the robot's intervention introduces a narrative of justice and preservation. This scenario playfully reimagines the forest as a space where technology enforces ecological boundaries. The robot's role as protector reflects a human desire to control and curate natural processes, even when the threat comes from within the ecosystem itself. Figure 2 visualizes the concept through snapshots taken from the concept video.

### 3.2 Justice for Mushrooms - 2

This concept builds on the earlier mushroom protection narrative but shifts the antagonist from animals to humans. Here, a robot confronts a person attempting to unlawfully harvest mushrooms, ultimately scaring them away to protect the forest's resources. The robot's assertive behavior introduces a provocative reversal of roles, reflecting growing concerns about environmental exploitation, and imagines a future where robots serve as autonomous agents for conservation. This scenario invites reflection on authority, accountability, and the potential for machines to embody and enforce moral values in natural spaces. Figure 3 visualizes the concept through snapshots taken from the concept video.

### 3.3 Mosquitonomous

A robot named Spot is deployed as a data-gathering explorer, sent into areas where humans might face greater exposure to environmental risks. Spot collects information on conditions such as mosquito activity and other bio-markers, while live-streaming its

findings to a broader audience. This concept positions the robot as both a scientific instrument and a social interface, enabling community engagement with ecological monitoring. It reflects a shift toward participatory environmental science while also pointing to the possibilities and the role of technology in mediating our understanding of nature. Figure 4 visualizes the concept through snapshots taken from the concept video.

## 3.4 Spotventure

Spotventure tells the story of a robot entering the forest as a stranger and gradually becoming part of the animal community. Initially perceived as an outsider, the robot interacts with various forest creatures, slowly gaining their trust and ultimately being accepted as one of their own. This concept explores themes of belonging, adaptation, and the potential for non-human agents to form meaningful relationships within natural ecosystems. Figure 5 visualizes the concept through snapshots taken from the concept video.

## 4 Discussion and Reflections

While each concept stands on its own, they serve as speculative design probes that reveal deeper cultural, ecological, and philosophical tensions in the evolving MtH relationship between technology and nature. They form a cohesive exploration of how robots might be imagined not merely as tools, but as agents, companions, and enforcers within ecological systems. The following discussion interprets the meanings, assumptions, and potentials embedded in the concepts, offering broader reflections on the whole process.

### 4.1 Robots as Guardians of Nature

The concepts Justice for Mushrooms-1 and Justice for Mushrooms-2 both present robots as protectors of forest resources, first defending mushrooms from animals, then from humans. These stories reflect a growing concern about environmental degradation and suggest that technology might be needed to help preserve nature. In these roles, the robots act as moral agents, enforcing a kind of ecological justice based on human-defined values. This also points to an implicit bias towards designing robots that carry the same morals and reservations as humans. However, this also raises important questions: Who decides what needs protection? And what are the consequences of giving robots the power to control natural behavior, whether it's from animals or people? These concepts highlight the tension between human-centric conservation goals and the autonomy of non-human actors [29, 36]. In positioning robots as enforcers, the designs risk reinforcing anthropocentric hierarchies, where nature is managed rather than co-inhabited.

### 4.2 Robots as Social Beings in the Ecosystem

Spotventure imagines a robot not as an enforcer but as a social newcomer seeking acceptance within a forest community. This concept explores themes of belonging, empathy, and interspecies coexistence, offering a more relational and less hierarchical vision of technology in nature. Additionally, the robot's journey from outsider to group member mirrors human experiences of migration, adaptation, and social integration. However, these narratives challenge the notion of artificial versus natural by suggesting that





Figure 2: Snapshots from concept: justice for mushrooms - 1.



Figure 3: Snapshots from concept: justice for mushrooms - 2.

technological entities can be made part of the wild, not just physically but socially. By imagining the robot as a participant in the forest's social fabric, the concept challenges the artificial-natural divide and opens up possibilities for post-human ecologies [5], where machines are not separate from but entangled with the lives of animals, plants, and landscapes. This aligns with growing work in HCI that envisions technologies not as tools but as symbiotic actors within more-than-human worlds [38]. Such views emphasize mutual interdependence, relational ethics, and the co-shaping of futures that include nonhuman actors—biological or artificial.

#### 4.3 Robots as Mediators of Knowledge and Community

Mosquitonomous introduces a robot as a data-gathering explorer, bridging the gap between remote environments and human observers. Its ability to live stream its findings and respond to user input positions it as a mediator of environmental knowledge, democratizing access to ecological data. This concept aligns with trends in citizen science and participatory sensing, where technology enables broader engagement with scientific inquiry. This concept raises questions about who benefits from the knowledge gathered and how that knowledge is framed. It also reinforces a view of nature as something to be observed, measured, and interpreted through human lenses [23]. This also poses an important question, "Is this knowledge also valuable to non-human entities?" Especially considering the roles of the Mth components of the

ecosystem, it might be beneficial to understand the possibilities and ways of leveraging this knowledge from their perspectives.

#### 4.4 Robots as Reflections of Human Values and Fears

Across all four concepts, robots are not neutral tools; they are embodiments of human values, ethics, and anxieties. Whether protecting mushrooms, integrating with animals, or collecting data, each robot reflects a particular worldview. For instance, Justice for Mushrooms-2 enforces a conservation ethic that criminalizes human behavior, while Mosquitonomous reflects a scientific rationalist approach to nature. This underscores a key insight from more-than-human design: technologies are never value-free. They carry assumptions about what matters, who matters, and how relationships should be structured. These concepts invite reflection on how design can move beyond projecting human fears and desires onto machines [33] toward creating technologies that are attuned to the needs and rhythms of more-than-human worlds [30].

#### 4.5 Forest as a Stage for Human-Machine Interplay

In all four concepts, the forest is more than just a backdrop, it becomes a symbolic stage where the relationship between nature and technology is actively explored and reimagined. In Justice for Mushrooms 2, the forest is a contested space where human and non-human actors struggle over access and control. In Spotventure, it transforms into a social ecosystem, a place where new forms of kinship and community between machines and animals can emerge. Meanwhile, Mosquitonomous presents the forest as a data landscape, where natural elements are observed, measured, and streamed for human interpretation. These varied portrayals suggest that the forest is not only a physical environment but also a cultural construct, shaped by how we design, narrate, and interact with it. It also means considering how technologies might support the forest's own ways of knowing, growing, and communicating, rather than simply serving human interests [35].

#### 4.6 Ethical Considerations of Robotic Presence in Forest Ecosystem

While the use of robots in forest environments offers exciting possibilities for conservation, research, and engagement, it also raises important ethical questions. The concept Mosquitonomous, for



Figure 4: Snapshots from concept: justice for mosquitonomous.



Figure 5: Snapshots from concept: justice for Spotventure.

example, introduces a robot that collects environmental data and streams its activities to a public audience. Although this promotes transparency and community involvement, it also brings concerns about surveillance and intrusion. Forests are complex, sensitive ecosystems, and the presence of machines, no matter how well-intentioned, can disrupt natural behaviors. Questions such as “How might their presence affect animal behaviors, plant growth, or microbial life?” need to be answered. Ethical design in this context means not only minimizing harm but also designing with care, humility, and responsiveness to non-human needs [14].

## 5 Limitations and Future Work

This workshop was designed as an initial exploration into the potential of play as a creative process for imagining MtH interactions between robots and forest environments. While the outcomes provided valuable insights and surfaced promising directions, several limitations emerged that will inform future iterations.

A central limitation concerned the Fake Forest News game. Although it aimed to stimulate playful, imaginative thinking, participants noted that the randomness and abstraction of the topic and image cards made it difficult to generate ideas grounded in the workshop’s thematic context. Many card prompts were too generalized, resulting in concepts that felt entertaining but lacked design relevance. To address this, future workshops will involve reworking or reshaping the game-based activities to better align with the thematic focus. One direction is to develop a customized version of the Fake News game, with carefully curated cards that are situated in forest and human-robot interaction contexts. This

would preserve the playful, improvisational nature of the game while ensuring that the content scaffolds meaningful and relevant ideation.

We have not finished analyzing the after-workshop reflections from participants, which might have a large impact on how we design more workshops going forward by understanding what worked and what did not. This workshop marks the beginning of a larger program of exploratory workshops. We plan to run a series of sessions that explore different game-based and playful activities to assess which formats most effectively support ideation, collaboration, and creative storytelling in speculative design contexts.

Finally, a larger number of participants would make the creation process and data richer, with more ideas and perspectives. However, this is a work-in-progress with the initial setup planned with a few participants, and we plan to conduct a series of workshops by improving the structures from the learnings of this one.

## 6 Conclusions

This study explored the potential of play for ideating MtH forest-robot interactions. Through a two-day workshop, we aimed to examine how playful processes can support ideation in speculative and embodied ways. Our findings indicate that while not all game elements were equally effective, the overall playful framing contributed positively to engagement, imagination, and collaboration. Activities like storyboarding and video filming helped participants ground their ideas and rethink their concepts through a more embodied and situated lens. The study suggests that play can support nonlinear, imaginative design ideation by encouraging participants



to think beyond practical constraints and engage with speculative MtH futures.

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