Research Proposal

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1   What Is Your Research Question?

In this research, I will investigate and analyze common features of robotic pets. The research question will be: **What features of robotic pets are most frequently requested by users?**

2   Why Do You Think This Question Is Important?

As the population of care recipients grows and the number of qualified caregivers declines, robotic systems are increasingly viewed as potential technological solutions to support care services amid demographic shifts and mounting pressure on healthcare systems. Robotic pets are becoming increasingly popular, serving as companions for individuals who may be unable to care for live pets, such as the elderly or those with disabilities. Understanding user preferences can help manufacturers design better products that meet the needs of their target audience. This research can also contribute to advancements in human-robot interaction, improve accessibility, and inform the development of emotionally aligned social robots for various populations, including children with anxiety and individuals with dementia. By identifying the most requested features, manufacturers can prioritize their development efforts, leading to increased customer satisfaction and better product-market fit.

3   What Does Previous Research Tell You About Your Question?

Previous research highlights several key features users value in robotic pets:

- **Companionship and emotional support:** Users prioritize features that provide comfort, companionship, and emotional alignment, especially for vulnerable populations such as older adults and children with anxiety [1, 2, 4].
- **Interactivity and intelligence:** Features like emotion detection, realistic behavior, and the ability to respond to user actions are highly valued [2].
- **Ease of use:** Simple interfaces, minimal maintenance, and intuitive operation are critical for accessibility [6].
- **Customization:** Users appreciate the ability to personalize the pet's personality and responses [3].
- **Physical design:** Soft textures, expressive eyes, and realistic movements enhance user experience [3, 6].

Norina et al. [4] found that interventions of robotic pets can help mitigate loneliness by acting as social companions, increasing social interaction, facilitating remote communication and upcoming social activities reminder. Some social robots can improve health of children experiencing anxiety by giving social alignment between the robot and kids [3]. Socially assistive robots (SARs) can also help older adults with dementia by providing companionship and offering social interaction [2].

Xie and Luh [8] states current existing non-humanoid robots are mainly task-oriented, but they can also display visible emotional content when influenced by the vertical or horizontal movements, effects of simulation, vertical repetition, and movement direction.

The use of robot in education ensures consistent availability and authentic interactions, enhancing educational outcomes [5]. Paluch and Müller [6] says nursing home residents feel relaxed when interacting with robotic pets, and the exterior of the dog or cat is appropriate to be integrated into the daily care routine. Dogs behavior give valuable insights (e.g. communication, consistency and predictability, physical affection, positivity and enthusiasm etc.) for implementing dog behaviors into animal-like robots designed for social roles [7].

A parrot-inspired robot, KiliRo, is designed by Bharatharaj et al. [1] to classify and recognize the terrain based on images captured by its cameras and to notify the walker of incoming dangers.

These findings suggest that robotic pets should balance emotional, functional, and aesthetic features to meet user expectations.

4   What Data Will You Need To Answer The Question?

To answer this question, I will collect data from the following sources:

- **User feedback:** Surveys and interviews with robotic pet users to understand their preferences and priorities.
- **Online reviews and forums:** Analysis of platforms like Amazon, Reddit, and YouTube to identify common themes in user discussions.
- **Market trends:** Data on existing robotic pet features and emerging trends in the industry.
- **Demographics:** Information on user groups (e.g., age, gender, and needs) to identify variations in preferences.

This data will provide a comprehensive understanding of user needs and expectations.

5   How Are You Going To Analyse This Data?

I will use a mixed-methods approach to analyze the data:

- **Qualitative analysis:** Thematic analysis of survey and interview responses to identify recurring themes and patterns in user preferences.
- **Quantitative analysis:** Sentiment analysis of online reviews and forums to measure user sentiment toward specific features.
- **Statistical analysis:** Comparison of feature preferences across different demographics to identify trends and variations.

- **Natural Language Processing (NLP):** Techniques like Latent Dirichlet Allocation (LDA) and word frequency analysis to extract insights from textual data.

This approach will help identify the most frequently requested features and their importance to different user groups.

6 How Does This Relate To The Course Material?

This research proposal aligns with the course material in several ways:

- **Mixed methods research:** The use of both qualitative and quantitative methods reflects the course's emphasis on combining approaches for comprehensive analysis.
- **Ethical considerations:** Ensuring informed consent, protecting participant privacy, and addressing potential biases are key aspects of the research design.
- **Data collection and analysis:** The proposal applies techniques such as thematic analysis, sentiment analysis, and NLP, which are covered in the course.
- **Research design:** The study's focus on user preferences and its implications for product design and human-robot interaction demonstrate the importance of well-structured research.

By applying these concepts, this research will contribute to the growing body of knowledge on human-robot interaction and inform the development of robotic pets that better meet user needs.

This research aims to identify the most frequently requested features of robotic pets by analyzing user preferences through surveys, interviews, and online data. The findings will provide valuable insights for manufacturers, researchers, and designers, enabling them to create robotic pets that are more accessible, emotionally aligned, and user-friendly. Ultimately, this research will contribute to advancements in the field of robotics and improve the quality of life for users of robotic pets.

References

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