AI PET ROBOT FOR MENTAL HEALTH CARE AND PERSONAL ASSISTANT

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Keywords:

AI Pet Robot, Mental Health Care, Personal Assistant, Emotion Recognition, Natural Language Processing (NLP), Affective Computing, Socially Assistive Robotics.

Introduction:

Mental health issues like stress, anxiety, and loneliness are increasingly prevalent across all age groups. While traditional digital assistants exist, they are often task-oriented and lack the empathy required for effective social interaction. This project proposes an affordable AI-driven pet robot designed to detect, understand, and respond to human emotions in a natural manner. By integrating multimodal emotion recognition and personal assistance features, the system aims to provide a comforting, interactive solution to enhance overall mental well-being.

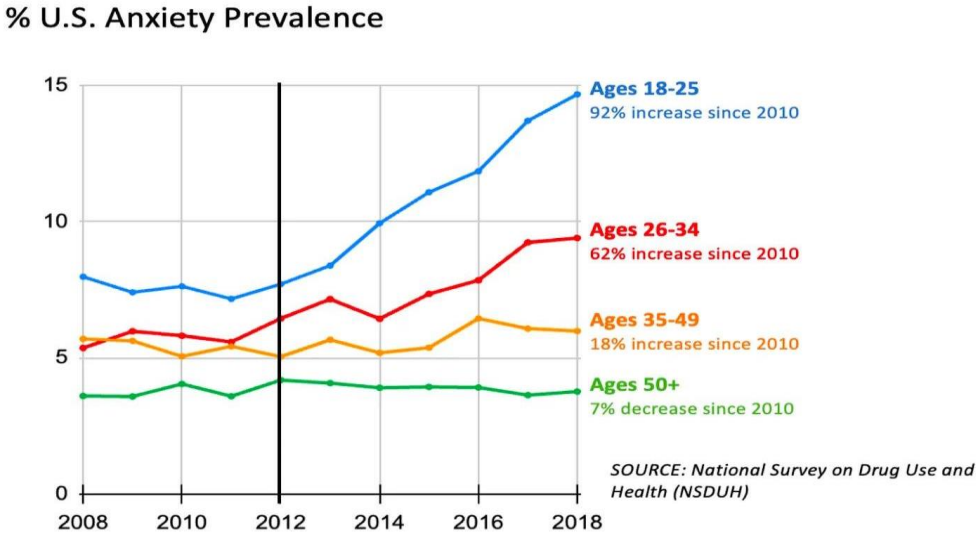

Figure 1: Mental Health rates over the years

Objectives:

1. Develop a system to recognize user emotions through facial expression analysis and voice-based detection.
2. Facilitate natural engagement using speech recognition and intelligent response generation.
3. Provide practical assistance features including reminders, task scheduling, and motivational prompt.
4. Design a physical robotic model that is safe, friendly, and expressive to ensure user comfort.

Methodology:

The project's methodology follows a systematic software and hardware development approach. An emotion recognition module uses deep learning to classify states based on facial expressions (using FACS) and voice signals. A conversational system built on Natural Language Processing (NLP) enables empathetic dialogue. To handle data uncertainty, Fuzzy Machine Learning (FML) is incorporated for adaptive decision-making. The hardware is assembled using a custom 3D-printed chassis, a Jetson Nano for processing, and sensors like the OV7670 camera and microphone for real-time perception.

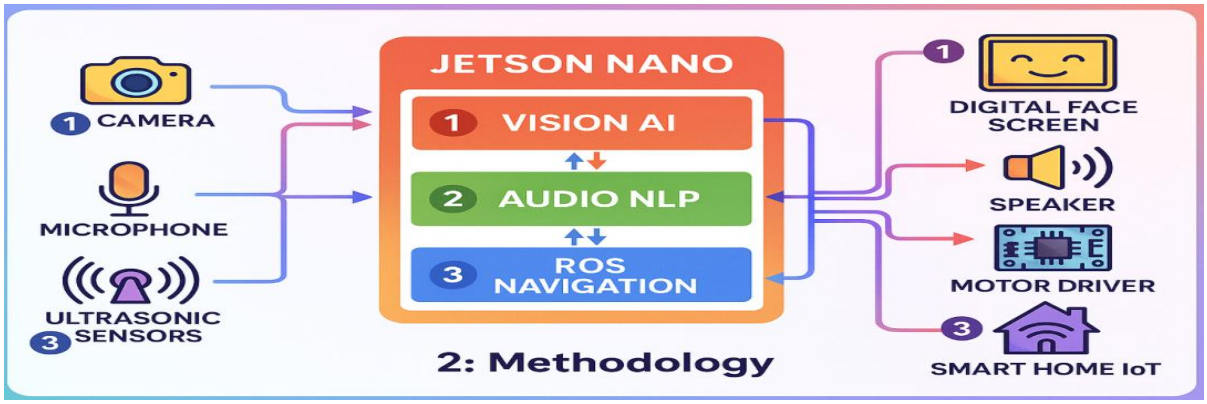

Figure 2: Methodology

Result and Conclusion:

Experimental testing demonstrates that the robot can accurately interpret user emotions and generate context-aware, empathetic responses through voice, screen animations, and gestures. The use of cost-effective hardware makes this a viable solution for home and care environments. In conclusion, the AI Pet Robot serves as an effective platform for mental health support, successfully bridging the gap between technology and human emotional needs.

References:

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[18]. Zhang and Chen (2024): Researched the development of a robot query system utilizing advanced natural language processing techniques.
[19]. Berrezueta-Guzman et al. (2022): Performed a literature review on the effectiveness and implementation of robotic technologies in ADHD care.

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Future Scope:

1. Integration of physiological signals such as heart rate and stress indicators for deeper emotional understanding.
2. Incorporation of larger, more context-aware language models with long-term memory for extended interactions.
3. Implementation of multilingual and regional language support to increase accessibility.
4. Upgrading hardware with LiDAR or depth cameras for autonomous movement and obstacle avoidance.