Emotional Interactive Storytelling Robots: An Interactive Design of an Upper Limb Motor Re-learning Method for Neurological Diseases

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Every year, over 600,000 people suffer from neurological injuries in the U.S. alone, and about 80% of acute stroke survivors lose motor skills of the upper limb. Research shows that methodical repetition of movements promotes recovery following a neurological injury. However, traditional physical therapy tasks may frustrate the patient due to their repetitive nature and may result in lack of motivation. Phase one of this project aimed to develop an accurate motor-relearning method with a therapy tool that includes task-specific exercises as a novel solution to these issues. Further research into motivation aspects shows that narratives are an effective way to absorb information as well as express emotions. This year's project goal is to create a positive emotional environment and decrease negative emotions or attitudes (such as lack of movement, loneliness) by creating a tangible robotic interactive storytelling scenario between the robot and the subjects. To accomplish this, the storytelling element was added as a psychological comfort. The robot will do an imitation of the task-specific exercises while mirroring the individual's emotion/mood using EEG (Electroencephalogram). Quantitative and qualitative data was collected, analyzed, and validated. Results shows a significant step recall and motivation over time. These findings indicate that the motor-relearning method significantly improved overall performance, motivation, and psychological status.

Awards Won: