

## **Adapting Assistive Robot Design and Behaviour Using Intelligent Data Analysis of User Activity Patterns to Support Pain Management**

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## Creating better lives for older people, through homes they want, lifestyles they can enjoy and care if needed.

ExtraCare Charitable trust provides affordable homes for older people, within their local communities. They aim to ensure their retirement villages are safe and comfortable, and that residents are supported by collaborative and flexible care, quality leisure and lifestyle activities and participation in community life.

Up to 62% of people over the age of 75 in the UK are living with some form of chronic pain, which lasts longer than 12 weeks and Includes conditions such as osteo and rheumatoid arthritis, fibromyalgia and complex regional pain syndrome. Chronic pain may exist as a condition in itself, or alongside other conditions common in aging.



of pain management,

Recently updated guidelines on managing chronic pain include collaborative pain management plans, reduced use of pharmaceutical interventions, and use of complimentary therapies.

The causes and effects of chronic pain can be cyclical, with increased pain leading to increased anxiety around movement, which in turn leads to reduced exercise and fitness, potentially creating more pain. Pain management plans seek to intervene in this cycle and reduce the negative effects of pain. This cycle is further influenced by other factors which are biological, psychological, and social.

Early research into robotic technologies for pain management has shown promise, often using pain distraction techniques to entertain or relax an individual. However so far intervention development has been technology led, as opposed to person led.

Human-centred design puts people at the heart of the design process. Through approaching a topic in this way new insights can be gained through lived experience. Additionally, stakeholders are more involved in the technology



development process, which can lead to greater acceptance of future outcomes.

By gathering data from potential end-users, regarding their pain experience and activities of daily living, interventions can be cocreated using adaptive robotic technologies. This data may also help to predict or understand changing needs of people living with pain, both day-to-day and in the long term. Adaptability allows the intervention to be altered to suit the user, and their changing needs, helping to break to cycle of chronic pain.

This project aims to bring together robotics technologies, people living with chronic pain, and pain psychologists to understand how technology could be used as a complimentary therapy for chronic pain. As well as how this technology could be adapted to the individual and their healthcare needs.

> This research will contribute to future healthcare ecosystems, as part of facilitating healthy aging and improved quality of life for older people. Additionally, it may expand understanding of the psychology relating to physical human-robot interaction, especially within healthcare and medical contexts.







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