Artificial intelligence model for continuous, in-home, posture and health monitoring including user feedback and predictions of clinical assessment.

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## Introduction

According to (Gill et al., 2023) in 2020 alone, musculoskeletal disorders (MSDs) had been ranked 2nd as the leading non-fatal disability which has been affecting more than a billion people worldwide. In Finland, MSD had taken the spotlight as being the leading cause of temporal disability within the nation, through which a lot of resources allocated towards the health services (Martimo, 2010). It might be misconceived that only the elderly are the only ones that suffer from this condition. However, a report by (US Bone and Joint Initiative, 2014) has concluded that quite a few individuals across different age groups are currently suffering from it. **(Schmidt et al., 2021)** reported that musculoskeletal disorders (MSDs) can often originate during childhood due to abnormal postures, which can further lead to chronic pain, discomfort, and physical limitations. Traditional examination and treatment procedures most often consist of regular clinical visits and are currently viewed as being inconvenient and costly. According to (Bevan, 2015), MSDs have cost the EU over 2% of its gross domestic product (GDP) which is estimated to be over €240bn each year. There is no doubt that this is a steadily growing concern that needs to be properly addressed.

Furthermore, with the rapid advancement in data sensor technology and Artificial Intelligence, there should be new and creative solutions for continuous posture and health monitoring, allowing for personalized medicine and improved quality of life for individuals suffering from MSDs. With this in mind various studies have implemented smart sensing equipped with sensors with the goal of accurately classifying one’s postures based on different sitting positions. Furthermore, this literature review aims to evaluate related studies and identify research gaps that can pave the way for further investigation. By exploring existing studies, it is possible to gain a better understanding of the current state on the implementation of a smart sensing chair for posture classification.

## Literature Review

### Existing Sitting Posture Monitoring Systems

The development of a sitting posture monitoring system is not an entirely new concept, rather it is an area that has been explored in the past. Currently, over 30 related papers have been published focusing on the of the use of unobtrusive means for the classification of different sitting positions. These papers have shed light on the common methods and techniques being used to be able to classify various sitting postures.

### Smart Wheelchair Systems

### User Feedback System

### Machine Learning Algorithm

### Sensor Technology

### Machine Learning

### Commercialization

### Research Gaps

### Future/Proposed Plans

### Conclusions

Bevan, S. (2015) ‘Economic impact of musculoskeletal disorders (MSDs) on work in Europe’. *Best Practice & Research Clinical Rheumatology* 29(3), pp. 356–373. doi: 10.1016/j.berh.2015.08.002.

Gill, T.K. et al. (2023) ‘Global, regional, and national burden of other musculoskeletal disorders, 1990–2020, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021’. *The Lancet Rheumatology* 5(11), pp. e670–e682. doi: 10.1016/S2665-9913(23)00232-1.

Martimo, K.-P. (2010) *Musculoskeletal disorders, disability, and work*. Helsinki, Finland: Finnish Institute of Occupational Health.