

UNIVERSITI TEKNOLOGI MARA

**DEVELOPMENT OF AN ASSISTIVE
SMART CLOTHING DESIGN
SYSTEM FOR THE AGING
POPULATION IN CHINA**

HONG WENJIN

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ABSTRACT

The main central of this study was to develop a smart clothing design system (SCDS) to meet the unique needs of older people for quality of life. It focused on the research objectives in meeting the needs of older people for smart clothing; the practical development of smart clothing products, and an exploration of a model for smart clothing design systems. Through experimental research, surveys were conducted to understand the needs and preferences of older people. While evaluating the needs and preferences of older people, a smart clothing prototype was developed in combination with survey analysis. Therefore, this paper presented smart undergarment for older adults as a practical design towards the development of smart clothing, by utilizing smart sensor technology to meet real-time monitoring needs while providing auxiliary support for their heart rate and blood pressure. In the design and development process of smart undergarment, the design for older people also fully considered the wearer's comfort, integrating the appropriate version and size to ensure it can adapt to various body shapes while maintaining the softness and comfort of the fabric. The detachable smart sensor component ensured that older people can easily change clothing, providing convenience for both wearing and removal. In addition, considering that the elderly are prone to health complications, smart undergarment also incorporated safety elements, such as anti-fall mechanisms and antibacterial fabrics, which help prevent infection. Finally, this paper conducted interviews and wear tests with older people, utilized NVivo software analysis, to clarify the relevant thematic elements for constructing a model of the smart clothing design system. The results of the study showed that smart undergarment met the initial functionality (4.88%), comfort (4.56%), and safety (4.72%) needs of older people and that smart clothing improved the mobility and independence of elderly users, as 78% of participants experienced greater convenience and ease of movement and improved their quality of life. In addition to the direct impact on elderly care, this research has broader applications. The construction of a smart clothing design system (SCDS) provided a conceptual model for the future innovation in smart clothing design and development. The study also developed guidelines for future smart clothing design and development. Future research is recommended to design specialized smart clothing for specific groups with unique needs, such as children and pregnant women that aid to their mobility and life quality.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Human production, life, and reproduction rely fundamentally on clothing, food, shelter, and transportation. These essential elements are necessities for survival and critical for expanding human life and culture. As humanity has evolved, individuals have developed diverse modes of dress that enable them to adapt to varying natural environments. The choice of clothing was influenced by many factors, including the era, geographical location, customs, and the societal context in which one exists. Clothing is a second skin, representing a unique language through which individuals express their spiritual and cultural identities. It also reflects the stages of development within the material culture of human society.

In ancient times, human beings led primitive lives in caves and relied solely on natural resources, such as leaves for cover. As society evolved, animal skins emerged, allowing more effective protection against the elements. This marked a significant turning point: clothing began to reflect human material civilization, encapsulating both the practical needs for warmth and safety and the deeper spiritual and cultural dimensions of identity.

With this historical context in mind, the first chapter of this study delves into the clothing preferences of the contemporary elderly population. As the global population ages, understanding the specific clothing needs of older people becomes increasingly important. This chapter not only presents a detailed overview of the aging population in China, highlighting the various safety hazards that contemporary older individuals face, but it also raises critical questions that inform the research. The exploration includes a comprehensive problem statement, preliminary data collected from relevant studies, and clearly defined research objectives.

Key to this investigation is the recognition of the limitations and definitions that guide the research process. These elements help frame the study within the broader discourse on age-appropriate clothing, considering not only functional aspects but also aesthetic and emotional significance. The significance of this research lies in its