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Resumen:

This paper envisions a futuristic scenario with smart clothing for disabled and older adults using spray fabric combined with nanosensors. First we show the importance of assisting older adults and disabled people with the task of dressing themselves. Then, we briefly survey some technologies already developed which can be applied in our proposal. Smart clothes can be a great aid in dressing up, but can also be used to automatically collect information about the well-being and behavior of their users. We also present other possible scenarios that could benefit from our proposal.

Smart Spray-on Clothing for Disabled and Older Adults in AAL Settings

Jessica Beltrán
ITSON
Ciudad Obregón, Mexico
jessica.beltran@itson.edu.mx

J. Antonio García-Macías
CICESE
Ensenada, Mexico
jagm@cicese.mx

Valeria Soto-Mendoza
CICESE
Ensenada, Mexico
vsoto@cicese.edu.mx

Karina Caro
CICESE
Ensenada, México
karicaro@cicese.edu.mx

ABSTRACT

This paper envisions a futuristic scenario with smart clothing for disabled and older adults using spray fabric combined with nanosensors. First we show the importance of assisting older adults and disabled people with the task of dressing themselves. Then, we briefly survey some technologies already developed which can be applied in our proposal. Smart clothes can be a great aid in dressing up, but can also be used to automatically collect information about the well-being and behavior of their users. We also present other possible scenarios that could benefit from our proposal.

CCS Concepts

•Human-centered computing → Ubiquitous and mobile computing systems and tools;

Keywords

Dressing assistance; people with disabilities, spray-on clothes; ad-hoc nanonetworks

1. INTRODUCTION

Technical advances reinforce the optimism from researchers to envision a future where older adults, people with disabilities and/or with cognitive decline can perform their daily living activities independently. Currently, the efforts in Ambient Assisted Living (AAL) strive toward solutions for assisting a person's daily living and working environment to enable them to stay active longer, remain socially connected, and live independently into old age. The developments of this area provide support to older adults by using intelligent and pervasive computing, for example by designing systems capable of monitoring and notifying about risky scenarios,

like fall detection systems, or to provide assistance to complete daily activities [24].

The most common daily activities requiring assistance are bathing (showering) and dressing [18]. According to the U.S. National Science Foundation (NSF), "Physical disabilities due to illness, injury, or aging can result in people having difficulty dressing themselves, and the healthcare community has found that dressing is an important task for independent living". For that reason, the NSF has designated near to \$1.2 million USD to research on robots to dress the elderly [3].

The current market provides different options of assisting devices that leverage specific tasks when dressing, for example by helping to put on buttons, to lace shoes easily, using clips for pullup trouser and sticks to push/pull socks without having to stretch or bend over [1]. But these devices still need abilities that can be inappropriate for older adults, people with dementia or with injuries.

Work is being done on the design of robots for dressing assistance, but this is still an open field for robotics with different challenges, like handling different fabric materials and the varying posture from persons during assistance [15]. In this paper, we propose an scenario where people are dressed through fabric in spray, a technology already in development.

The Fabrican company [2] presented in 2010 the product ©Spray-on fabric which consists in liquefied fibers that allow textiles to be sprayed out of a can or spray gun. As the video in [4] shows, the fabric is sprayed straight onto a body, and when the solvent evaporates, the fibers will form a garment. This technology can be used in more applications besides fashion because of its properties, like its feature of being sterile allowing its use as bandage, and its feature to absorb oil that can be used for cleaning purposes.

Our proposed futuristic scenario is given by combining the liquefied fibers along with smart nanotextiles that will be used to assist in dressing, but additionally will monitor the users in others activities. Nanotextiles is a new technology that can be used to sense locally different aspects, for example health indicators like pulse, temperature and humidity. Also, these textiles can feel if and how they are being touched, so they can act as switches, antennas, etc.[30]. We propose to take advantage of the properties of nanotextiles to communicate with each other, so they act as motion capture technology in order to infer daily activities [29].