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Wearable and mobile sensors connected to social media in human well-being applications

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ABSTRACT

Safety of children and marginalization of youth are increasing problems in our modern society. Developing technologies, however, offer more possibilities for building safety solutions for children and teenagers. This paper describes a new concept of using sensors to monitor human behavior in combination with data processing and information transfer via different communication channels as well as different types of support the concept makes available. The concept utilizes the web and social media to create services and new business centered around different applications designed to support child safety in challenging situations and to prevent the marginalization of young people. This conceptual work involves different sub-concepts in the areas of information flow and connections, potential services and business potential. Some application areas will be introduced and discussed as specific cases demonstrating the features of the developed concept.

1. Introduction

Human well-being includes several dimensions, including physical, mental and social well-being. Similarly, human ill-being can be divided into many categories. Although well-being and ill-being are not complete opposites, lack of well-being may very well lead to ill-being. In recent years, increasing attention has been paid to personalized health support systems (Free et al., 2013; Matthews et al., 2008; El-Gayar et al., 2013) and preventive measures to control such diseases as diabetes. In terms of overall well-being, it is important to support actions geared toward promoting health, well-being and motivation at the individual level (Kay et al., 2011).

Nowadays, individualism is gradually increasing, emphasizing individuals' right to satisfy their personal needs. At the same time, collectivism is being promoted and new solutions for effective communication are being developed but, in fact, interaction between people is becoming more superficial, to the point that personal peer relations may even be weaker than before (Oinas-Kukkonen and Oinas-Kukkonen, 2013). One reason for this development is ever-hardening competition between people, bred by the increasing inequality created by a business-minded lifestyle. This is particularly true of

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Asian cultures (Ogihara and Uchida, 2014). However, other studies show that individualism can in some cases also bring satisfaction to life (Veenhoven, 1999).

Children's growth environment strongly affects their well-being and their possibilities to grow into happy adults (Roysamb et al., 2003). Discarded children become tomorrow's marginalized youth and lost adults. How could this fatal course of development be stopped? How could signals of ill-being in children and young people at large be indicated and measured? How could these signals be used to break the spiral of exclusion? Could social media be harnessed to provide help, when sensors monitoring an individual's physiological and psychological signals indicate ill-being?

Wearable and mobile sensors enable monitoring human behavior in different conditions (Kay et al., 2011; Hao and Foster, 2008). Low power consumption and robust sensor design support consumer applications that could be applied to recognize challenging situations where children and youngsters need help (Czeskis et al., 2010). Human behavior can also be monitored and made more visible using portable devices containing a range of embedded sensors (Kay et al., 2011; ScienceDaily, 2014; Dey et al., 2014). Connecting sensors to social media systems is increasing rapidly, especially among fitness people. A number of activity buttons and wristbands (e.g., Fitbit Flex, Jawbone Up, Polar Loop, Withings Pulse) can be connected to different types of media to transmit performance data to friends. According to UNICEF, this offers a boost to developing technology for safety applications targeted at children (Mattila, 2011).

Supporting children to grow into happy adults benefits not only children and young people, it also increases the well-being of their families and friends, and saves the resources of society. It has been calculated that the societal cost of each marginalized youngster is at least one million euros. The most central and important objective, however, is that children should not fear being alone and young people should not be excluded from society. This paper introduces a concept based on monitoring human behavior using sensors with social media connectivity to distribute data and provide help to people in challenging situations.

2. Research methods

This study applies the following research methods: (1) literary studies from technical and scientific databases, company web pages and blogs, (2) queries to experts on the theme, (3) internal brain storming of the research group, (4) writing and analyzing the use of case stories, and (5) building and experimenting service concepts with practical, real-life pilots with potential end-users in a primary school and nursery environment.

3. Concept creation

A concept is needed to define what is measured and how, what is processed from the data and how to deliver feedback to users. In addition, it is important to consider the users' point of view: why would they need help, what would motivate them to seek help and what form should this help take.

3.1. What is measured, processed and how?

Technologies used to identify and measure relevant signals are:

(1) Sensors, microphones, cameras and processing capacity of smartphones.
(2) Wearable sensors, such as wristbands, necklaces, chest-belts, sensor clothing, etc.
(3) Ambient sensors, such as those available as smart home accessories.

Types of data measured and collected by sensors:

(1) Activity data.
(2) Location data.
(3) Voice data.
(4) Health-related data.
(5) Well-being data.

Technologies used to collect, process and share/display data are:

(1) Smartphone apps.
(2) Cloud computing services.
(3) Social media solutions, such as Facebook.
(4) Wearable safety devices (utilizing GPS and RFID technologies).

Phenomena to identify, measure and categorize are:

(1) Changes in stress level.
(2) Emotional state changes (fear, anger, sadness, etc.).