中文摘要

本研究以養老機構住民安全監控為出發點，因應全球人口高齡化，未來老年照護問題與護理照服人員短缺將使照護機構面臨照病比日益漸增，因此設計了各種應用服務協助有其需求的使用者。包含了即時性的室內定位、危險區域偵測警報與護理站、護理師與照服員的監視介面軟體，透過藍芽作為來源協助在機構內的人員可以掌控住民的位置與狀態，避免發生無人得知意外發生的憾事。本研究建置出(1)前端穿戴式無線傳輸裝置，(2)中端中繼器做穿戴式專制資訊匯集站，(3)後臺透過演算法歸納事件後，以圖形化的介面顯示，讓機構內使用者能完整且有系統的瞭解住民每日、每周與每月的健康安全狀況。

針對本研究所提出的方法與服務模式，為驗證其可靠性與準確度，本研究將系統架設於養老機構並提出七項照護指標，分別為(1)白天與夜間休息時間統計，(2)活動場域靜坐過久監控，(3)活動量，(4)進入警戒區，(5)夜間起床，(6)如廁過久，(7)服務鈴，透過實驗統計可以得知，白天與夜間休息時間統計男性白天平均休息時間長度 3.5 ± 0.7 小時，夜間平均休息時間長度 11.1±0.9 小時，女性白天平均休息時間長度 3.9±0.5 小時，夜間平均休息時間長度 10.7±0.9 小時；活動場域靜坐過久的部分，男性平均次數為 1.5±0.4 次，女性平均次數為 1.4 ± 0.7 次，平均發生時間為 2.9 小時，而最常發生時段為 11 點

至 13 點間；活動量的部分，男性平均活動步數為 167.4 ± 137.2 步，女性活動步數為 493.1 ± 1252.0 步；接近警戒區的部分，男性平均次數為 0.82 ± 1.37 次，女性平均次數為 2.27 ± 4.62 次；夜間起床的部分，男性平均次數為 0.32±0.38 次，女性平均次數為 0.69±0.68 次，而最常發生時段為 3 點至 4 點間；如廁過久的部分，男性平均次數為 0.23±0.29 次，女性平均次數為 0.27±0.66 次，而最常發生時段一樣為 3 點至 4 點間；服務鈴的部分，只要按下按鈕後，護理站即可在一秒後收到訊號並前往服務。

　　此系統主要利用智慧衣、低功耗藍牙裝置與室內定位演算法，在養老智慧照護系統中蒐集住民資料並分析數據來統計出以上指標，藉此提升照護的品質與住民的安全性。低功耗藍牙裝置的部分設有配戴偵測、低電量預警與失去訊號偵測，防止住民之穿戴式裝置有問題。

關鍵字－養老機構智慧照護系統、智慧衣、低功耗藍牙裝置、照護指標

Abstract

The rapid aging of the global population has become a topic valued by all countries. At the same time, it also makes the issue of elderly care increasingly important. We design many kind of application service, including wearable wireless transmission device in front-end, receiver as wearable information aggregation station in mid-range, calculates the event through the algorithm and displayed in a graphical interface.

This paper focuses on elderly care institutions and proposes seven care indicators. The seven indicators are rest time of day and night, sit for too long, steps, entering the warning area, getting up at night, long toilet time and service bell. It can be known through experimental statistics that the average rest time in men during the day is 3.5 ± 0.7 hours and in the night is 11.1 ± 0.9 hours. The average rest time in women during the day is 3.9 ± 0.5 hours, and the average rest time in the night is 10.7 ± 0.9 hours. The frequency of sitting too long in men is 1.5 ± 0.4 times and in women is 1.4 ± 0.7 times. The average time length of sitting too long is 2.9 hours and it usually happened at 11 am to 13 pm. The average activity steps in men is 167.4 ± 137.2 steps and in women is 493.1 ± 1252.0 steps. The frequency of entering the warning area in men is 0.82 ± 1.37 times and in women is 2.27 ± 4.62 times. The frequency of getting up at night in men is 0.32 ± 0.38 times and in women is 0.69 ± 0.68 times. It usually happened at 3 am and 4 am. The frequency of long toilet time is 0.23 ± 0.29 times and in women is 0.27 ± 0.66 times. It is also usually happened at 3 am and 4 am. Nursing station can receive the signal of service bell about one second after pressing the button.

This paper mainly uses smart clothes, BLE components and indoor positioning algorithm for smart elderly care system to collect the data from the residents in their daily life. After collecting the data, we will analyze the data to figure out the indicators we mention above. BLE components also have wearable detection, low power and signal loss warnings from preventing the device problem. Currently, this smart elderly care system is already imported to Taiwan's long-term care institutions.

Keywords—Smart elderly care system; Smart Clothes; BLE Device; Care Indicator