中文摘要

近年來國內外皆掀起運動旋風，民眾不再視運動只是單純的為了減肥、塑身、鍛鍊肌肉，越來越多人將其視為生活的一種流行、一種生活態度,對自己身體健康的投資。完整的運動週期可由時間、頻率、強度、種類，以及進程組成，每次運動訓練的強度和時間達成率是最為重要的，因為沒有做到建議的量，那對於健康的助益是有限的。其中，運動強度最常使用最大心跳率（maximum heart rate, HRmax；HRmax = 220 - age）乘以百分比來評定。如何在有效的運動時間內，幫助使用者創造最大價值，正是本研究所關注的。

本研究利用無線感測技術建構出健身教練資訊系統，以此服務戶外健身、健身中心、心臟復健的使用者。為有效幫助使用者達成運動訓練目標，本研究建置出：(1) 運動強度知識庫：透過個案資料建立體能指標參考標準，以其服務不同年齡、體能族群的人；(2) 音樂節拍導引:建立音樂節拍導引機制,藉以調控使用者運動訓練時的心率；(3) 健身器材硬體設備之改良：改良舊有之健身器材，使其接受自動化控制。以此幫助使用者進行運動健康促進。

針對本研究所提出的方法與服務模式,為驗證其可行性、信效度、以及使用者對於此創新服務的滿意度，共設計了四項實驗：(1) 音樂

節拍訓練模式：共 29 為自願者，認為運動聽音樂能有效舒緩疲勞的佔 66%。每首音樂前 10 秒具有導引音的情況下，受試者對於音樂節拍掌握度達 6 成以上，甚至 8 成，是沒有導引音的 6 倍；(2) 運動強度知識庫之建立與誤差值預估：共蒐集 17 位自願者，其中不好的族群有 1 人，稍差 3 人、普通 3 人、尚好 3 人、很好 7 人。針對不同族群進行誤差值預估計算，結果顯示，族群平均預測的平均誤差約在 0.3% ~ 10.84%，而總體平均預測的平均誤差約為 3.56% ~ 19.1%（3）健身教練資訊系統滿意度調查：對（2）的自願者進行戶外健身的音樂節拍導引模式進行科技接受模型問卷調查，針對使用意願、認知有用性、認知易用性、產出品質，以及效果論證五大類問題，於 7 級評鑑之中都得到 5 級以上的分數，獲得良好等級；(4) 健身中心資訊系統訓練成效與滿意度調查：共蒐集 66 位自願者，執行為期三個月不等的運動處方箋訓練。結果顯示，受試者身體的各功能性指標皆有小幅度成長。對於健身中心服務的科技接受模型問卷調查，平均 5.97± 0.07 分，最高 6.09 分，最低 5.84 分。

由實驗結果證明本研究之方法信效度皆具備一定水準以上，滿意度調查也顯示使用者非常支持與肯定本研究的創新服務模式。

關鍵字－運動強度知識庫建立、無線感測技術、音樂節拍訓練

英文摘要

In recent years, sports are very popular at home and abroad, people think that exercise is not to lose weight, body sculpting, and build muscles, more and more people think that exercise is a popular, an attitude, on health investment. A complete exercise cycle could be makes up of time, frequency, intensity, type, and the process. In each exercise training, intensity and duration of the reaching rate of achievement is the most important, if not reaches the recommended amount of exercise, it is helpful to health is limited. Exercise intensity calculations, the most commonly used maximum heart rate (maximum heart rate, HRmax; HRmax = 220 – age) multiplied by the percentage assessed. This study is concerned with “How to help that user can achieve the target within the given time”.

This study was use wireless sensing technology to build fitness coach system. This system can service of outdoor fitness, fitness center, and cardiac rehabilitation. In order to help users reach exercise training objectives, The study can be summarized as three major: (1) Establish the standard of physical activities indicators, service every age and physical activities. (2) Create music beats guidance to adjust the rhythm of user during the exercise training. (3) Improved fitness equipment, to accept fitness center automation control.

We designed four experiments to test the overall reliability, validity, and survey the degree of user satisfaction: (1) Workouts with music beats. There were 29 subjects in this experiment and 66% believe that playing

music can help relieve fatigue during exercise. Each music beats has 60 percent or more to master in music mixed guide tempo. (2) Establishment of exercise intensity knowledge and error value estimates. There were 17 subjects in this experiment. The physical activities divided into five stage, total number of very poor is 1 people, poor is 3, average is 3, good is 3, excellent is 7. The results shown ethnic groups average forecast error is about 0.3% ~ 10.84%, overall average forecast error is about 3.56% ~ 19.1%. (3) Fitness coach system satisfaction survey experiment. The 17 cases of previous experiment also involved in the technology acceptance model (TAM). All the questions of TAM obtain more than 5 points in 7 points question. The results shown the subjects have a high degree of satisfaction and the subjects can accept the innovative concept of fitness coach system. (4) Fitness center system satisfaction survey, reliability, and validity experiments. There were 66 subjects in this experiment and implementation of the exercise prescription for three-months. The result shown each subjects, function of the body indicators is grown. For the TAM questionnaire, the average 5.97 ± 0.07 points, the maximum score is 6.09 points, minimum score is 5.84 points.

Keywords-Establishment of Exercise Intensity Knowledge; Wireless Sensor Technologies; Workouts with music beats