Chapter 2

Estimating and Conveying User Activity Levels in a Multi-User Computer Assisted Exercise Motivation System

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ABSTRACT

The Electronic Multi-User Randomized Circuit Training (EMURCT, pronounced “emmersed”) system has been developed to utilize pervasive computing and communication technology to address the lack of motivation that individuals have for exercising regularly. EMURCT is capable of producing a totally different workout sessions with every use, for up to 7 trainees simultaneously using a common workout circuit, in an effort to reduce boredom. EMURCT is composed of three different components, a client application, an administrator application and a web service. This project also uses Wi-Fi signal strength to estimate the activity level of individuals using the system. Based on the activity level being read from each smart device, the event scheduler has the option of releasing any trainee from his/her assigned station if it feels that he/she is not working out, and someone else’s smart device is requesting that station. Initial experiments indicate that the best signal strength reading comes from preset, dedicated access points.

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INTRODUCTION

Today a strong emphasis is placed on physical fitness and maintaining personal health because of the various health-related issues that exist. Regular exercise takes many forms and is recommended to help decrease the risks of being diagnosed with health issues. Circuit training is a single or multi-user exercise method, whereby participants are required to rotate amongst various workout stations spending a designated amount of time at each station, consisting of a range of aerobic and strength exercises. Even though several methods of exercise exist, some people feel that they cannot incorporate exercise into their lifestyle and therefore avoid it. Many people are simply not motivated to undertake a regular exercise regimen; others quickly tire of a regimen. To find that extra motivation, some people turn to friends and form exercise groups. In this way they have someone to progress with and gain encouragement from. Others may choose to invest in a personal trainer who dictates every move that the individual makes during his/her session. The trainer might tell the individual what exercise station to go to, for how long to be at each station and how long to break between rotations during a circuit training workout.

This research seeks to use advances in the field of pervasive computing to design a system that motivates individuals to obtain more out of circuit training workouts, without the need for a personal trainer for motivation. The proposed system utilizes pervasive computing and communication technology to attempt to address the problem of boredom experienced by trainees who adhere to a given workout routine over an extended period of time. This system consists of several main parts. The first is an application that runs on a MS Windows mobile device and allows each individual to enter in different preferences at the start of each workout session, so that each session is fully customized to that individual. There is an administrative application which monitors the workout session, showing each event and which user is occupying each event. It also gives the administrator the ability to lock any event on the system, prohibiting access to it. The last part is the web service which is accessible by the previous two applications through the internet, and allows them to access the database, which is on a remote server and contains the various data that defines the system state.

BACKGROUND

Circuit Training

Circuit training is a mix of strength training and endurance training. In a circuit-training workout one does a group, or circuit, of exercises with little or no rest in between exercises. Usually, one circuit consists of 6 to 10 exercises. Each exercise is performed for a set number of repetitions or period of time before moving to the next exercise. For example, a person might do squats for 3 minutes, rest 30 seconds, and then do bench presses for another 3 minutes followed by other exercises. Depending on a person’s fitness level, he or she might do one circuit or several circuits during each workout (Henry, Ashnel, & Michael, 2006).

Some of the benefits of circuit training include being able to exercise different muscle groups to achieve a total-body workout, building strength and endurance and being able to do circuit training at home or at a gym. Persons are also less likely to become bored with a workout routine since there are a variety of exercises to be performed and the workout can be made as hard or as easy as liked by changing the amount of effort and the length of the rest interval (Henry, Ashnel, & Michael, 2006).