Demo: Towards Immersive and Interactive Gym Exercises

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ABSTRACT

We demonstrate *JARVIS*, a novel virtual coaching system based on virtual reality (VR) and Internet of Things (IoT) technologies. It creates a truly immersive gym exercising experience for machine-based strength training and guides users in a highly interactive manner. With these unique advantages, we believe that JARVIS has a potential to revolutionize personal fitness experiences.

1. INTRODUCTION

Today, gym workouts have become an important part of people's modern lifestyle. However, working out on the stationary exercise machines in a gym easily makes exercisers bored. Moreover, novice exercisers do not have an ability to judge if they are using the right set of muscles or their exercise speedis adequate without the help from professional trainers. These factors prevent exercisers from making steady progresses, as well as make exercisers lose motivation and interests.

The advent of head mounted displays (HMDs) such as Oculus Rift, Samsung Gear VR, and Microsoft HoloLens is turning immersive virtual reality (VR) into reality. As one of its most compelling applications, we envision that VR will revolutionize personal fitness experiences. Towards this vision, we present *JARVIS*, a virtual gym exercise assistant that enables truly immersive and interactive gym exercising experiences. Specifically, JARVIS is developed based on the synergistic adoption of two emerging technologies: Internet of Things (IoT) and immersive VR HMD. It shows a user a virtual coaching scene with the user's virtual body, illustrating the correct way of exercising along with real-time exercise progress and quality information through the VR HMD (see Figure 1). In this way, JARVIS guides users through workout and makes the workout session more enjoyable.
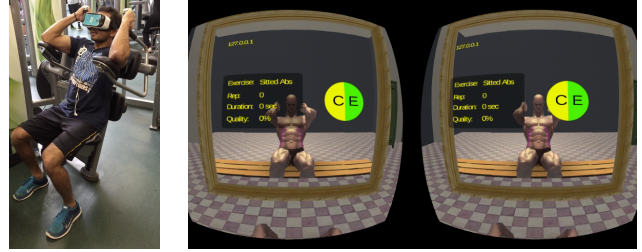
Figure 1: (a) A user trying JARVIS. (b) A stereoscopic immersive VR screen of the virtual coach.

2. ARCHITECTURE OVERVIEW

JARVIS has two core components: 1) *Real-time Exercise Analytics Engine* and 2) *VR Synthesis Engine* running inside a VR HMD at the back-end and the front-end respectively.

Real-time Exercise Analytics Engine detects the boundary of each exercise repetition, recognizes the type of the exercise, tracks the exercise progress, and assesses the quality of the exercise within each repetition, all in real time.

VR Synthesis Engine synthesizes an immersive gym exercise environment with a virtual body of an exerciser. It provides real-time coaching based on the exercise information obtained from the back-end exercise analytics engine. Furthermore, it makes the virtual body to move by following the body movement of the exerciser and highlights a set of suggested muscle groups according to the current exercise type to increase Muscle Mind Connection (MMC) [1].

3. DEMONSTRATION SETUP

We built a prototype of JARVIS on Samsung Gear mobile VR HMD combined with a Samsung Galaxy S6 smartphone, and used CC2650 SensorTag from Texas Instrument as an IoT sensing device. For demonstration, we plan to employ a seated abs machine, which is subject to change depending on the availability. Users will wear the mobile HMD and try JARVIS while performing a strength training exercise using the machine on site.

4. REFERENCES

[1] B. J. Schoenfeld and B. Contreras. Attentional focus for maximizing muscle development: The mind-muscle connection. *Strength & Conditioning Journal*, 2016.