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Demo:Drumming Application Using Commodity Wearable Devices *

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ABSTRACT

We aim to develop a drumming application in which individual can play drums using multiple wearable and mobile devices. Our vision is to tap out different rythms in the air using smart watches as a virtual drum stick and smart phone would act as a drum kit. Same user interface can be visualized in smart glasses. Here, our prime target is to use multiple commodity wearable devices (non-commodity i.e. Myo arm band) and smart phones for recognizing new (or same type of here) types of multi limb gestural context and building an adaptive application interface and allow such gesture recognition and interface to be easily integrated into a new multi device applications. We describe our initial exploration of our aim in multi wrist gesture recognition. We have designed and modified the traditional HMM [2] and discussed the problems faced in multi device interaction. We explore how same type of tapping gestures in drumming context gives the technical challenges and discuss the problems of developing the application and our research direction. The combined multi device ecosystem as a whole can enable not just a variety of new applications but also radically foster new forms of user interaction.

Keywords

SmartPhone, smart watch, Hidden Markov Model(HMM)

1. INTRODUCTION

In this demonstration, we propose a virtual drumming application towards our vision, enabled by distributed gestural inputs from smart watches. The user can enjoy playing the drum kit with a combination of Bass, Snare, Tom, Hihat, cymbals, etc, by just wearing two smart watches and playing the drums in the air. The application system in the background continuously and accurately tracks the player's hand gestures and movements to play back the right sounds in a real time.

Realizing this application raises a few unique challenges. First of all, it needs to accurate 1) track hand trajectory to identify which drum the player hits and 2) recognize various hitting gestures to capture the hitting moments. Secondly, tracking needs to be performed in real-time to provide realistic drumming experiences. According to our experiences, even the processing delay of more than 5 ms could cause serious lags in the application. Also, the distributed nature of processing and feedback pipeline makes it more challenging to achieve low latency. All the processing are likely to be executed on wearables or smartphones to prevent high network latency to offload the computation. We address these challenges by devising two techniques: (1) 3D based hand-trajectory tracking, and (2) low-latency HMM-based gesture recognizer. 3D trajectory would be helpful to system to find out the drum location and low latency HMM-based recognizer is needful because drumming is an activity in which user changes and repeats the gesture very frequently and fast.

2. DEMONSTRATION

We will demonstrate our Android application using Samsung tablet as drum kit and two LG Urbane smart watch (one on each hand) as a drum stick. A participant can involve himself wearing smart watch in his both hands and play a drum. We developed two techniques to meet the accuracy, latency for the drumming applications. Based on the professional drummers data collected in the university campus, we showed that our techniques achieve 93% and 92% of accuracy for wrist and hihat gestures and 0.2ms of latency.

3. REFERENCES

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