Neuro Movie Theatre: A Real-Time Internet-Of-People based Mobile Application

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ABSTRACT
In this demo, Neuro Movie (nMovie), a brain mobile interface application, is demonstrated to show the usage of a community networking [1] framework called HumaNet. In nMovie, various combination of scenes can be played according to the viewer mental state. HumaNet can enable public exhibition of nMovie in a virtual theatre where each audience may experience a different version of the movie.

1. INTRODUCTION
HumaNet is a platform independent infrastructure to develop Internet of People (IoP) based mobile applications that utilize and share physiological and environmental data in a manner guaranteed to be secure, safe, and sustainable [2, 3]. Our idea is to enable applications that use collective information from a group of human servers and not information tied to a single human being. Neuro Movie, a brain mobile interface application, is developed to show how HumaNet can be used in a movie theater, where audiences are wearing Google cardboard based virtual reality systems. In nMovie, a human user not only watches the movie, but can also interact through the virtual reality device with his or her friends, which in turn may be either real or virtual. nMovie acquires electroencephalogram (EEG) signals from viewers, performs complex signal processing to determine psychological state and use them in an interactive movie to control the scenes [4]. For example, a person may get stressed while watching a gory scene in a horror movie alone, when nMovie will blur the images. However, in a group the person can go through the scene without any stress or anxiety in such cases nMovie can show the gory scenes.

2. THE STRUCTURE OF NMOVIE
nMovie is a novel media technology that provides real-time interaction between viewer and a movie by combining her/his brain waves with movie parts. In this technology, according to viewer's mental state, different scenarios can be shown in a movie screen. nMovie is a dynamic system that combine brain-computer interface systems and interactive videos. It is based on bidirectional connection between video frames and brainwaves of the audience. Interactive video is a technique of blending viewer behavior and dynamic video frames to make changes in a part or the story line of an act. In these videos, users' inputs are delivered occasionally during display to trigger an event in a digital environment. Dynamic characteristic of these kinds of videos distinguishes them from traditional linear films or videos. Interactive movies have lots of applications like marketing and advertisement, education, entertainment, and healthcare. On the other hand, thanks to the BCI technology, we can develop an interface between viewer's mind and media by translating brain signals to meaningful and perceivable inputs for an interactive video to develop nMovies.

3. INFRASTRUCTURE NEEDS
WiFi network, a table, and electrical outlet.

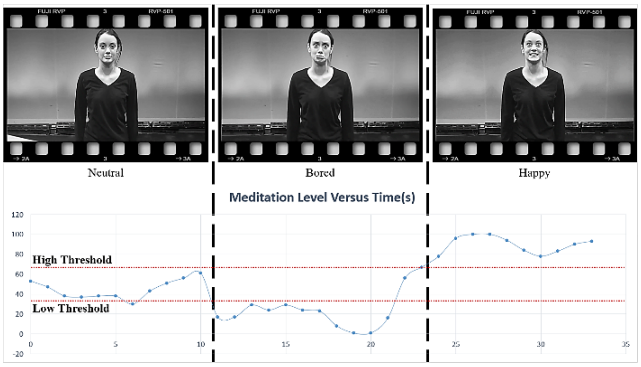

Figure 1: The mechanism of Neuro Movie application.

4. DEMO DESCRIPTION
In this demo, the nMovie is played on two smartphones (Nexus 5 and 7) and two Neurosky EEG headsets capture viewers' brain waves and send them to the phone via Bluetooth. Brain signals are processed on the phones and the mental states of the viewers are extracted accordingly. The playing video on the smartphones consists of three different layers (i.e. neutral, bored, and happy). The video receives inputs (meditation level) from the brain interface program. The inputs indicate which layers should be displayed at each run. In this case, the storyline of the interactive movie is synchronized and adopted to the viewer's mental state and each viewer watches different version of the video. As shown in Figure 1, the actress in the video changes her play according to the viewer mental state. Required time for the demo is at least ten minutes. During the demo, audiences can put on the EEG headset and watch the nMovie playing on the smartphone and see how the video changes according to their mental states (i.e. neutral, nervous, or relax).

5. REFERENCES
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