Emotion Recognition in VR

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We built a dataset of "emotion data" consisting of recordings of facial expressions and weights labeled by emotion. We did this by recruiting participants for an IRB approved study in which participants watched emotion eliciting videos while wearing a VR headset with face tracking capabilities. We developed a custom app using Unity to record the participants' avatar's face expressions throughout the duration of them watching the video. The collected data was labelled according to the participants' answers to questions they were asked following each video. In addition to genuine emotion data, we collected "fake" emotion data from participants by asking them to act out each of seven emotions whilst having their avatar recorded in VR. This data was compared to the "genuine" emotion data to reveal the qualities that made them distinct from each other. The figure below shows the combination of action units activated genuinely that correspond to each of seven basic emotions according to the data collected from our study. Using this collected data and analysis, we trained an AI model with the dataset to recognize a user's emotions in VR. Additionally, it is trained to detect what is most likely a fake emotional reaction versus a genuine one.

Keywords: VR, emotions, AI.

Key Action Unit Combinations by Emotion

Emotion	Key Action Unit Combinations
Neutral	AU5+7, AU10+25, AU5+7+10, AU4+7, AU5+26
Disgust	AU10+7, AU6+10, AU4+10, AU9+10, AU7+14, AU4+7+9+10
Anger	AU4+5+7+10+26, AU4+5+7+10+16+26, AU4+5+7+23, AU4+7+24, AU4+17+24
Happiness	AU6+12+7, AU6+12, AU6+12+26, AU1+2+6+12, AU5+6+12
Fear	AU4+5+7+20, AU1+2+5+26, AU1+2+4+5, AU1+2+5+20+26, AU5+7+10
Surprise	AU7+10, AU6+7+10, AU5+7+10, AU6+10+12, AU4+7+10
Sadness	AU7+4, AU7+4+6, AU4+15, AU1+4, AU7+10+15

Based on facial expression analysis from participants within VCU