Exploring the Uncanny Valley

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Abstract

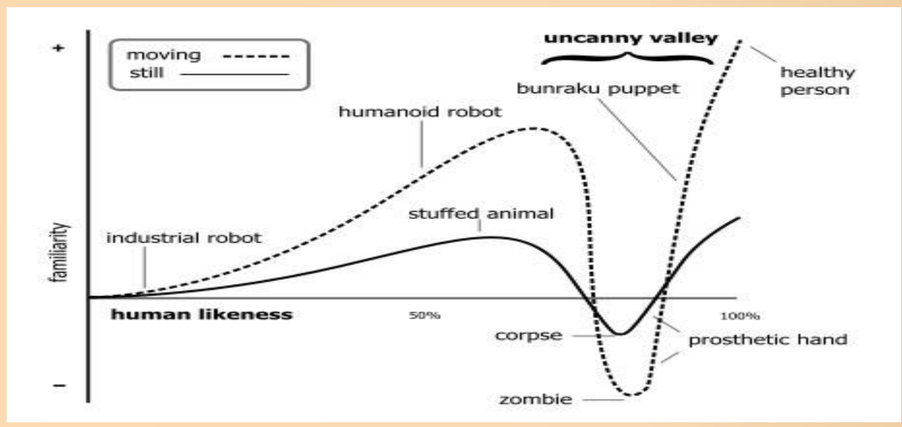
The Uncanny Valley is a hypothesis involving the field of robotics. The Theory states that as an android becomes more human like, a positive reaction will occur until a certain point where there is a rejection response to the movement and appearance of the android due to unknown aspects of the human mind.. This reaction limits the boundaries of androids dealing with humans. The ultimate goal is to overcome this theoretical valley by understanding the basic properties of the human mind that lead to uncanny reactions from a human being. By testing these properties, the field of androids can progress into society and be considered 'acceptable".

Introduction

The goal of our study is to gain a larger understanding of the Uncanny valley by using new procedures that are less costly and more efficient. With technology becoming part of everyday life, it is important to incorporate newly developed machines into current society. This gives us the task of truly understanding ourselves and what humans consider "Acceptable". One of our tasks was to find physiological monitors that obtain and store raw data along with creating a questionnaire that will allow us to understand the reactions of our current subjects. This task will help avoid the use of highly expensive and limited fMRI procedures that are typically used when studying the Uncanny Valley.

Research

I was assigned to research certain physiological responses such as: Galvanic Skin Response (GSR), Heart Rate (HR), Heart Rate Variability (HRV), Skin Conductance Response (SCR), Blood Pressure (BP) Temperature, etc. The main human responses I focused on were GSR and HR which seemed to be the easiest to monitor. GSR represents a change in the electrical properties of a person's skin either by environmental events or a person's psychological state. Monitors are worn on the fingers which record raw data in microSiemens (µS). GSR is measured in Tonic and Phasic skin conductance measure differentiating in that Tonic is a person's normal conductance rate, while Phasic measures conductance rate of the subject with an outside stimulus. GSR is fairly accurate and part of the autonomic nervous system. GSR seems to be effective procedure to monitor human psychological responses. The other response chosen was Heart Rate and HRV which tend to be fairly accurate and part of the autonomic nervous system. Heart Rate variability is simply the difference in time between heart beats. This response changes as the subject's changes emotions and possibly even thoughts. The same goes for heart rate, changing throughout the day due to physical exercise and emotions. These responses are easily measured in milliseconds using the Standart Deviation of the N-to-N interval (SDNN). All of these responses will clearly show how a subject feels about an Uncanny android.



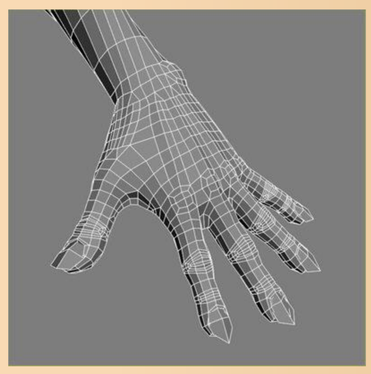
The Uncanny Valley

GSR Monitor

Maya 8.5

Throughout my research experience, I was able to use the program Maya 8.5 to create realistic 3d objects. The ultimate goal was to be able to create and manipulate objects to be used in our trials. I was able to master the animation and modeling tools of Maya by animating a goblin to move and fix the skin bound to the skeleton I created. I created realistic motions to appear as if it were a human walking. Maya proved to be a challenge to master, but with enough skills, is a great program for our trials.

Lifted Arms



Skin Modified

Conclusion

In conclusion the Uncanny Valley can be studied by measuring other properties of the bodies autonomic nervous system other than using fMRI. Properties such as GSR, HRV, and HR are some of the easiest to measure and obtain raw data from. With these properties being measured, Maya 8.5 can be used to create 3d objects which will create a stimulation.

Acknowledgments

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