KTH ROYAL INSTITUTE OF TECHNOLOGY

CSC SCHOOL OF COMPUTER SCIENCE AND COMMUNICATION

# Bachelor's Thesis: Project Specification

Martin Pettersson (martinp4@kth.se)
Daniel Swensson (dsw@kth.se)

February 4, 2013

## 1 PROBLEM TITLE

Enhancing Computer Game Mechanics Using Electrodermal Activity

## 2 INTRODUCTION

Electrodermal Activity, abbreviated EDA, is a form of technology developed to measure sweat levels in human skin. "For most people, if one experiences emotional arousal, increased cognitive workload or physical exertion, the brain sends signals to the skin in order to increase the level of sweating."

This technology is interesting to use for measurement of cognitive activity during specific objectives or tasks, such as analyzing the difference between an experienced car driver and a subject who uses a car for the first time with no prior experience.

## 3 PROBLEM STATEMENT

In this project we whish to explore the possibilites of using EDA technology in order to provide enhanced computer game mechanics; starting simple by for instance implementing various stress mechanics in simple and classic games such as Tetris or Pacman. We will use a

slightly modified Q-Sensor from Affectiva in order to measure EDA.

From this point we have realised that EDA measurements using current software with the Q-Sensor seem to be somewhat unprecise. The cause of this may be inadequate calibration methods or unsufficient sensitivity of the sensor. It has also come to our knowledge that different subjects respond very differently in stressful situations; variations in cognition flow or sweat levels may require different forms of calibration.

## 4 Approach

At this moment we have a vague understanding of the hardware and its limitations; this is something we need to work on. Starting off, we will have to evaluate if it is possible to use existing software provided with the Q-Sensor. If this is not the case, the Bluetooth protocol needs to be read and processed by ourselves. Since we are not motivated to spend the bulk of this project on hardware issues, one possibility may be to solve these problems in collaboration with the two other assigned project groups.

The latter and most interesting part of the project will be to implement stress game mechanics into a simple computer game (such as Tetris and possible other game types), and by utilizing user testing evaluate if this actually is a rewarding feature in a game and how it would fit best. Examples of interesting test cases would be to determine how fast the EDA sensor responds to a certain element of surprise to the subject, or how long it takes for measurement data to stabilize after the subject has calmed down.

## 5 References

Electrodermal Activity of Novice Drivers During Driving Simulator Training - An Explorative Study:
http://essay.utwente.nl/61873/1/Schnittker

Resources: Understanding EDA:
http://www.affectiva.com/q-sensor/resources/understanding-eda/how-is-it-measured/