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Neo Tandem Technologies

Design Documentation

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1 Introduction

1.1 Description of Document

This document aims to show the designs used to implemented the software that is being created known as eye tracking.The document is divided into three sections. Each section describes a certain aspect about the design of the software and how the structure and the interface is combined to create the final product. The purpose of this eye-tracking software is to allow the user to track eyes and the movement of eyes on different kinds of media and models. This is something that has not been done yet and will be a great contribution to the eye tracking. The eye tracking will be performed on 2D,3D and video models.

1.2 Section Overview

The three sections that are as follows:

- Data Design.
- Interface Design.
- Procedural Design.

These three sections each cover a very important part of design of a software application. Data design will talk mainly about the structures in place within the program and how all the data structures are linked and communicate. Interface design will describe the choices made for the look of the software while still incorporating the UX goals of the user to make the program easier to use.Procedural Design will focus on the producers that are carried out in the program.
You may note that Architectural Design is not included in this document. This is not necessary as the topics that would be covered by that section have been covered in great detail in the architectural requirements document.

2 Data Design

The data structures used throughout this program are C sharp classes and a external reference such as Aforge.Net and openTK will be used to process data and use them in our program.The data structures all interact with each other and there is no solitary class that is standalone. Communication between the Data Objects is crucial in this program as raw and process data is dealt throughout the program and Objects communication is important to start processes.The data from the models that are being tracked are handled by the c sharp classes we have created and this will then be shown to the user in a desirable format.

2.1 Models class

The models classes store all the information about the media that is being used and analysed.The models interact with the heat map class and the recording class.The models will initiate the recording.The data gathered from this will then be sent to the relevant heat map class so that it can create a heat map and then apply it to the media.The Model classes are separated into four child classes

- 3D Model
- 3D Model Fly Through
- 2D Model
- Video Model

2.2 Heat map

The heat map object allows the creation of a heat map for a specific media type.The heat map uses the information collected from the eye tracking and then generates a heat map that is based on the media type that it is linked to.The heat map can be in two forms:heat map and heat map overly.The difference between the two is the placement of the heat map.Heat map overlay is placed over the media showing exactly where the data is from the recording process relative to the media.

2.3 Statistics class

The statistics class uses the heat map data to create a statistical analysis on the heat map and gives the user the statistics that they need.This class also contains a reference to a specific heat map object so that it can directly access all the data that it needs.The transfer of data from raw to summarized changes the data structure so that it is easier to view by the user.

2.4 Recorder class

This class initiates the recording.This class is called in the Models classed and thus is part of it.This will open up the media to full screen to ensure there are no distractions.Then the data will be transferred from the camera to the program and then it can be used.

3 Interface Design

The interface design for this project is meant to be kept as simple as possible so that users could easily familiarize themselves with the program.The easy design will make the program more friendly and welcoming to the user.

3.1 Evolution of the design design

The previous design for the interface was a very primitive windows design.It was a basic and boring design.The forms would constantly open and close to new sections and was very user-friendly.The colours of the form were dull and lacking and appealing factor.The placement of elements were also not ideal for efficiency and clarity when using the program.

The new design improves greatly with a simple look interface and easy flowing from one form to the next.The placements of elements also uncluttered the interface to make it easier for the users to use the system.The colours have changed and made much better looking.

3.2 Flow of design

An important factor in the design of the interface design is the flow of the interfaces.The flow of interfaces can make a program easy to navigate or harder.We have tried to make it as easy as possible by flowing one form straight into the other in a logical order.The user will also be able to go back to previous forms.

3.3 Form element placement

The placements of all the elements are carefully placed so that the user is able to easily see how to do what actions.This is vital as this makes it easier to perform tasks and understand how to do these tasks.The elements are centred to the form so that it would be the first thing the user will see.The recording forms then have the buttons listed vertically on the right and a open space to the left that will be used to display the model that recording is happening on.

3.4 Interaction with functionality

The interfaces serve as a front end to the user and then functionality is added to the various elements of the form on the back end.This is how the Interfaces interact with the functionality.

4 Procedural Design

The program has a main procedure which outlines the entire process envolved in using the program an this procedure can be subdivided into many subprocedures

4.1 Main Procedure:Eye tracking

This will start from the moment the program is initiated.The first subsection is the selection of the method to start the entire process.This subprocedure is called project state.The following subprocedure is the setting up of the the recording project.This subprocedure is called recording setup.The final subprocedure called eye tracking recording is where the recording can be performed and then can be navigated to the setup subprocedure to start the process from that point.

4.2 Sub Procedure:Project Start

This procedure is comprised of an option to start a new recording session from the beginning or choosing to continue from a previous session.Both these options will navigate to the next subprocedure.The difference between the options is that creating a new session will create files and continuing a session will read from previously created files.

4.3 Sub Procedure:Recording Setup

The recording setup procedure allows the user to select the type of recording they wish to make and then also to choose a name for the recording.This sub procedure is the start point for the loop of activity when a recording has been completed.

4.4 Sub Procedure:Eye Tracking Recording

This procedure starts with the calibration of the camera to the user.Then the user will start the recording and then data will then be analysed.After the recording has taken place the user can then choose to create the heatmaps,create statistical analysis or to then start a new recording.When starting a new recording then the recording setup procedure will be executed until the user exits the application.

5 Usability testing

Usability testing of a program is crucial as people need to experience the project.These people need to be people that havent used the system at all or know anything about the system.

5.1 Date of testing

Usability testing of the program took place between 5th of October to the 9th of October.This was during the holdidays and we set up a space to perform the tests.

5.2 The participants

The participants used in the testing were largely students from different departments within the university. Each participant was asked to use the program to perform various types of recordings on all the types of models available. The feedback from each participant included their opinion on the following: accuracy of recordings, guided nature of the process, layout of the forms, preview window, size and style of font, size and style of buttons, loading times and calibration.

5.3 The feedback

The feedback taken from the users were gathered and then analysed.The following was the results of the feedback.

5.3.1 Calibration

The calibration was considered easy to perform and the window that displays the position of the eyes was helpful in positioning the user for optimal use of the program.

5.3.2 Accuracy of recordings

The heat-maps and gaze-plots have a high enough accuracy that most participants agreed with the results.There were a couple of inconsistencies between the gaze-plot and the heat map.

5.3.3 Layout of the forms

The forms were thought to be very simple and clean. Initially (with the first group of participants) the layouts were considered very cluttered.

5.3.4 Guided nature of the process

This helped most of those who were lost at first although the limitation was apparent on advanced users.

5.3.5 Preview window

This window was useful in verifying the right model was being used.

5.3.6 Size and style of font

The style was bland but the size was readable.

5.3.7 Size and style of buttons

The buttons were a little to small so participants had a hard time pressing them.

5.3.8 Loading times

Most of the participants agreed that the loading times were too long with any video processing and the 3D rendering.

5.3.9 Way forward

Since the usability testing concluded great effort has gone into improving upon the style of the font and buttons as well as the loading times of all the models.