

Preface

In continuing our trend of providing high quality study support, we are proud to present this textbook to you. This text is meant to be used as a reference for the BTEC Higher National Diploma in Computing.

It has been prepared by our experienced panel of lecturers with reference to recommended study material and web resources taking in to consideration the content of the syllabus.

This study guide is provided for the purpose of knowledge sharing only and is strictly not for sale.

The panel of lecturers
HND Division
ESOFT Metro Campus

All Rights Reserved

© 2000 – 2018 ESOFT Metro Campus

Table of Content

| | |
|---|-------------------------------------|
| Table of Content..... | i |
| Introduction | iii |
| Learning Outcomes | iii |
| Assessment Criteria..... | iv |
| Recommended Resources..... | vi |
| 1. Introduction to User Interfaces and Experience Designing | Error! Bookmark not defined. |
| 1.1 History of the User interface and Experience | Error! Bookmark not defined. |
| 2. User Experience | Error! Bookmark not defined. |
| 2.1 Nature of User Experience | Error! Bookmark not defined. |
| 2.2 Why user experience matters..... | Error! Bookmark not defined. |
| 2.3 Defining a Good user experience..... | Error! Bookmark not defined. |
| 2.4 Different Forms of Experiences | Error! Bookmark not defined. |
| 3. User Interface..... | Error! Bookmark not defined. |
| 3.1 Nature of User Interfaces | Error! Bookmark not defined. |
| 3.2 Defining a good user interface..... | Error! Bookmark not defined. |
| 3.3 Different forms of User Interfaces | Error! Bookmark not defined. |
| 4. Tools for User Interface & User Experience development | Error! Bookmark not defined. |
| 4.1 Sketching..... | Error! Bookmark not defined. |
| 4.2 Wireframing | Error! Bookmark not defined. |
| 4.3 Prototyping | Error! Bookmark not defined. |
| 5. User Interface & User Interaction Testing | Error! Bookmark not defined. |
| 5.1 Planning User Experience Test..... | Error! Bookmark not defined. |
| 5.2 Methods of User Experience Testing. | Error! Bookmark not defined. |
| 6. Understanding the Human User | 7 |
| 6.1 Different Sensory Channels..... | 7 |
| 6.2 Human Cognition | Error! Bookmark not defined. |
| 6.3 Human Errors | Error! Bookmark not defined. |
| 6.4 Common issue related to interaction and Human | Error! Bookmark not defined. |
| 7. Personas in User Experience Design | Error! Bookmark not defined. |
| 7.1 The classification of Persona..... | Error! Bookmark not defined. |
| 7.2 Creating a Persona | Error! Bookmark not defined. |
| 7.3 Using personas throughout the design process | Error! Bookmark not defined. |
| 7.4 Mapping persona to interactions | Error! Bookmark not defined. |
| 8. User Interface / Interaction Development Methodologies | Error! Bookmark not defined. |
| 8.1 Logical User-Centred Design Methodology: LUCID | Error! Bookmark not defined. |

| | | |
|-----|---|-------------------------------------|
| 8.2 | Measuring Usability of Systems in Context (MUSiC) | Error! Bookmark not defined. |
| 8.3 | Participatory Design (PD) | Error! Bookmark not defined. |
| 8.4 | Other interaction development methodologies..... | Error! Bookmark not defined. |

Introduction

User Experience (UX) and User Interface (UI) Design is the process by which software applications and user interactions can be designed to be simple, accessible, effective and attractive for the end user. The objective of UX and UI Design is to create user interactions and software application experiences that are appropriate for specific platforms or devices and provide desirable end user outcomes utilizing insight and understanding about the practical, emotional and experiential motivations and values of the end user. UX and UI Design explores the motivations and desires of the end user and seeks to design user's interactions that best satisfy those motivations and desires in a concise manner.

This unit introduces students to the role, basic concepts and benefits of UX and UI Design in the development process of software applications. The aim of the unit is to enhance the student's understanding of the methodology, terminology and benefits of UX and UI Design in the development of software applications. Among the topics included in this unit are: classification and terminology of UX and UI Design techniques, the relationship between UX and UI Design, how UX and UI Design relates to the rest of the software development lifecycle, understand a user's emotions, desires and attitudes about using a particular feature, product, system, platform or software application, modes of interaction, human-computer interaction models, usability, accessibility, aesthetics, design thinking, value proposition design, user journey mapping and gathering meaningful insights from users feedback and research.

On successful completion of this unit students will be able to explain the basic concepts of UX and UI Design. Plan, build and measure the success of an appropriate UI Design. Design an interface and experience with a specific end user in mind. Conduct testing to gather meaningful feedback to evaluate the success or failure of a user interface. As a result, they will develop skills such as communication literacy, design thinking, team working, critical thinking, analysis, reasoning and interpretation, computer software literacy which are crucial for gaining employment and developing academic competence.

Learning Outcomes

By the end of this unit students will be able to:

- LO1. Research what aspects of User Experience and Interface Design are necessary and appropriate to satisfy end-user emotions, desires and attitudes when using a user interface concept.
- LO2. Plan an appropriate User Experience map and Interface Design for a User Interface concept with a specific target end user in mind and also outline the tests you mean to conduct.
- LO3. Build a User Interface concept and test it with users to see if it satisfies their emotions, desires and attitudes as planned.
- LO4. Evaluate user feedback, test results and insights gained from end users interacting with your User Interface concept to determine success or failure and steps to improve in future versions.

Assessment Criteria

| Pass | | Merit | Distinction |
|--|---|---|--|
| LO1 Research what aspects of User Experience and Interface Design are necessary and appropriate to satisfy end-user emotions, desires and attitudes when using a user interface concept | | | D1 Evaluate specific forms of User Experience and Interface Design and justify their use in a User Interface concept. |
| P1 Recognise specific forms of User Experience and Interface Design and end-user testing requirements. | P2 Assess standard tools available for use in User Experience and Interface Design. | M1 Evaluate the impact of common User Experience and Interface Design methodology in the software development lifecycle. M2 Review specific forms of User Experience and Interface Design and advantages and disadvantages of end-user testing requirements for appropriateness to different testing outcomes. | |
| LO2 Plan an appropriate User Experience map and Interface Design for a User Interface concept with a specific target end user in mind and also outline the tests you mean to conduct | | | D2 Make multiple iterations of your User Interface concept and modify each iteration with enhancements gathered from user feedback and experimentation. |
| P3 Review different end-user categorisations, classifications and behaviour modelling techniques. | P4 Appraise a specific end user and an appropriate User Experience and Interface Design methodology to test with this user type. | M3 Apply end user classification and behaviour modelling to select an appropriate Interface Design methodology. M4 Devise a plan to use appropriate User Interface Design methodology and tools to conduct end-user testing. | |

| Pass | Merit | Distinction |
|---|---|---|
| LO3 Build a User Interface concept and test it with users to see if it satisfies their emotions, desires and attitudes as planned | | |
| P5 Examine appropriate tools to develop a user interface. P6 Run end user experiments and examine feedback. | M5 Employ an appropriate set of tools to develop your plan into a user interface. M6 Reconcile and evaluate end-user feedback and build a new iteration of your user interface modified with the most important feedback and enhancements. | |
| LO4 Evaluate user feedback, test results and insights gained from end users interacting with your User Interface concept to determine success or failure and steps to improve in future versions | | D3 Critique the overall success of your User Interface concept and discusses your insight using prototyping. |
| P7 Evaluate end-user feedback from multiple iterations of your user interface. | M7 Undertake a critical review and compare your final user interface and your test results with the original plan. | |

Recommended Resources

Textbooks

Hanington, B. (2013) *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Rockport Publishers.

Kalbach, J. (2015) *Mapping Experiences: A Complete Guide to Creating Value through Journeys, Blueprints, and Diagrams* 1st Ed. O'Reilly Media

Lidwell, W. (2010) *Universal Principles of Design, Revised and Updated: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach through Design*. 2nd Ed. Rockport Publishers.

Tidwell, J. (2011) *Designing Interfaces*

Links

This unit links to the following related units:

Unit 10: Website Design & Development

Unit 28: Prototypin

1. Understanding the Human User

In information system development, to a certain extent, a human user can be considered as another system which interfaces with the system being built. Humans will input data through her sensory channels, process data, take decisions and act on them using her motor control effect.

Features of the interface between the human and the system dictate how efficient the information exchange between two parties and how pleasurable the overall experience to the human. As a developer, it is essential to understand the limits of the human user to create an interface which will not overwhelm her during the interaction.

1.1 Different Sensory Channels

Humans possess five major senses: Sight, hearing, Touch, Smell and Taste. In interaction designing, first three senses are the most important as presently the smell and taste are not made to be emulated by a machine as of yet.

1.1.1 Sight

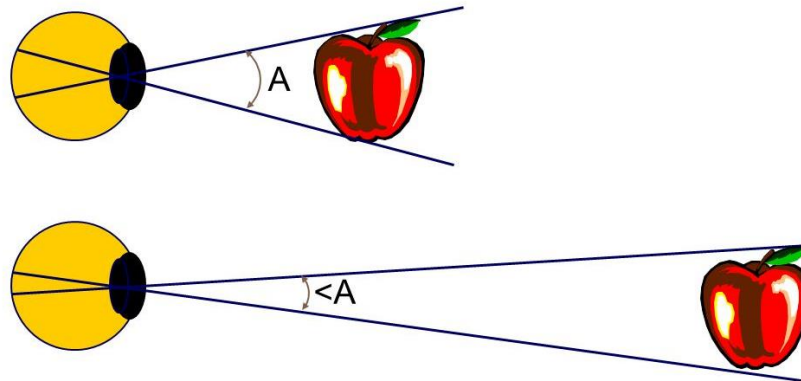
The most prominent way of interacting with a human being is using her sight. Almost all of the popular user interfaces such as command line interface, graphical user interface, menu-driven etc are based on human sight. Information receiving capability of the human eye is different from a human to another and on top of that, some humans may deviate significantly from the general crowd (colour blindness).

When interfacing with human sight, there are a few important factors to consider.

1.1.1.1 Size, Depth & Visual Angle

Humans have a stereoscopic sight. Which means, the human can approximate the size and the distance to an object to an object using her two eyes. In addition, the human eye can compensate for the changes of “visual angle”

Visual angle indicates how much of the visual field is occupied by the object it is seeing and it is based on the size and the distance to the particular object.



**The closer an object is, the larger it's visual angle, or
 The larger an object is (relative to smaller object) the larger the
 visual angle**

Figure 1.1 Visual angle of the human eye

Humans eye will perceive the apple as an apple regardless of how far or how close it is.

1.1.1.2 Visual Acuity

Visual acuity represents the human eye's ability to perceive details. Human eyes have a high but limited visual acuity allowing humans to perceive the significant amount of details of an object. Visual acuity is affected by the visual angle where high visual acuity is achieved when the visual angle is higher.

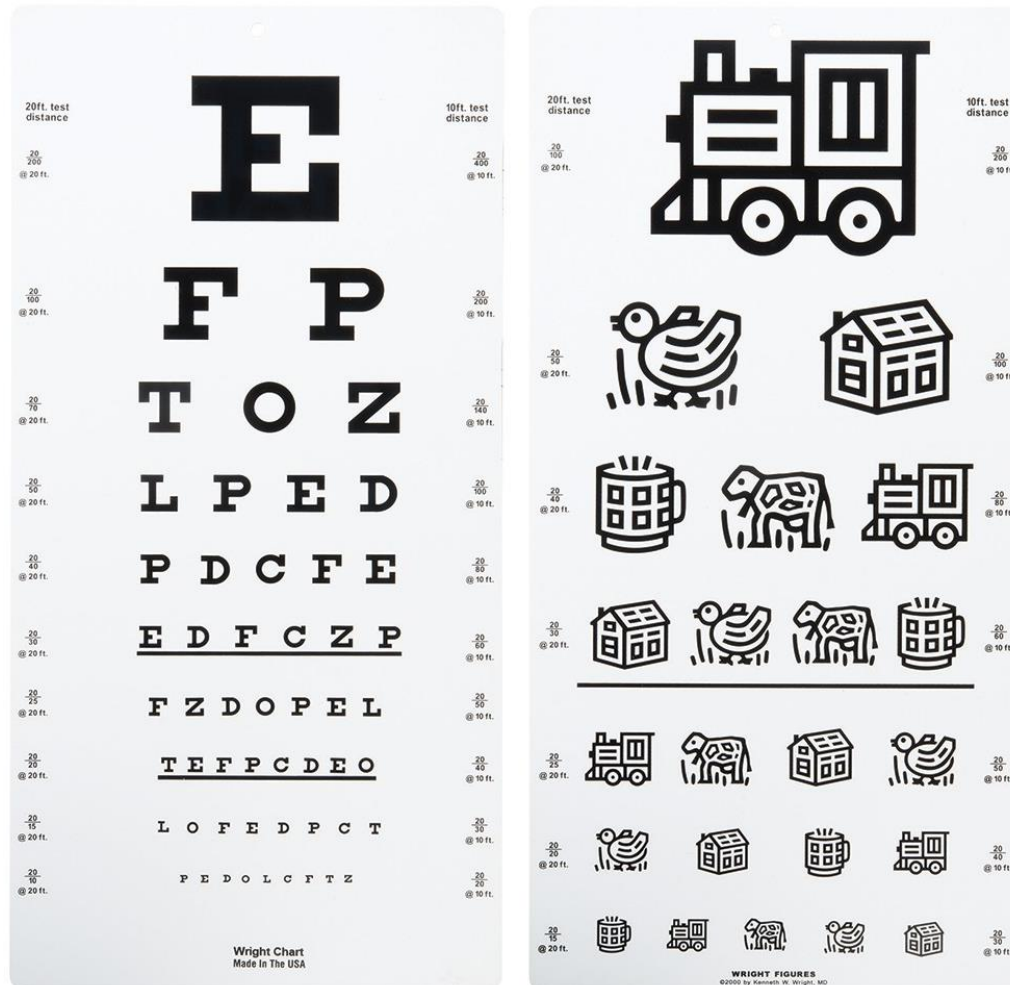


Figure 1.2 Visual Acuity Chart

This is the reason for you being able to see an object with more details when you go closer to the object.

1.1.1.3 Hue, Saturation and Brightness

Hue represents the colour. Each colour is actually how the human eye perceives a certain frequency of electromagnetic waves. The human eye has a specific range of electromagnetic frequencies which it is sensitive to. While human sight limited to the said range, there are animals who can perceive other frequencies, which are not observed by the human eye (Infrared light).

Saturation is the density of the colour in a given place. This can be understood as the density of the electromagnetic wave which is being observed. Low densities create darker colours while high densities create brighter colours.

The brightness of an object is based on the amount of light produced or reflected by it. Or, the intensity of the electromagnetic wave. The human eye has an upper and lower limit of brightness it can handle. That means humans will have a low acuity under very low brightness as well as very high brightness.

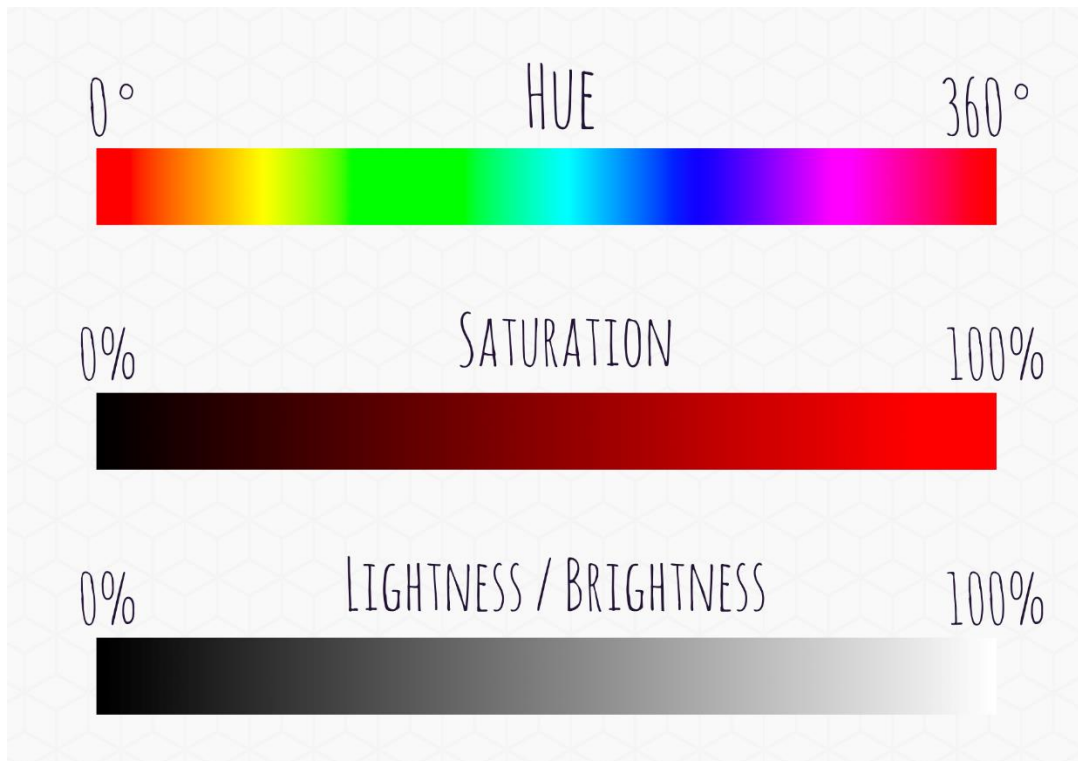


Figure 1.3 Properties of Colours

Different colours give rise to different emotions within humans. For interaction development, this can be used to console the user and grab attention as required.

| | | |
|---|---|--|
| BLACK sophistication power mystery formality evil death | GRAY stability security strength of character authority maturity | PURPLE royalty luxury dignity wisdom spirituality passion vision magic |
| YELLOW joy cheerfulness friendliness intellect energy warmth caution cowardice | WHITE freshness hope goodness light purity cleanliness simplicity coolness | PINK romance compassion faithfulness beauty love friendship sensitivity |
| RED danger passion daring romance style excitement urgency energetic | BLUE peace stability calmness confidence tranquility sincerity affection integrity | GREEN life growth environment healing money safety relaxation freshness |

Figure 1.4 Colour - Emotion Chart

Interaction designers need to focus on the size of the objects, their colours and brightness to make the interfaces look attractive, comfortable and productive. Too small, too dark or too bright elements, as well as certain colour combinations, reduce the visual acuity greatly, affecting the usability of the interface.

1.1.2 Hearing

Second most important human sense in interaction design is human hearing. Unlike human sight, hearing is omnidirectional. That means sounds can be heard even when the human is not turned towards it. Humans can sense three different qualities in sounds.

1.1.2.1 Pitch

Pitch is the frequency of the sound. A healthy human can hear sounds frequencies as low as 15Hz and up to 20KHz. In addition, some animals can hear even higher frequencies such as Dogs and Bats, meaning, humans would not hear all the “Sounds” in the environment.

It is important to note that sensitivity to the sound is not similar to a lower pitch to higher pitches. Humans often struggle to identify higher frequency sounds while they can figure out low frequencies easier.

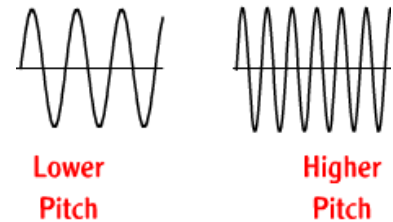


Figure 1.5 Pitch of a sound

1.1.2.2 Loudness

Loudness is a direct result of the amplitude of the sound wave. It will be hard for the human ear to identify the lower loudness while high loudness may overwhelm the human or even make temporary and permanent damages to the human ear.

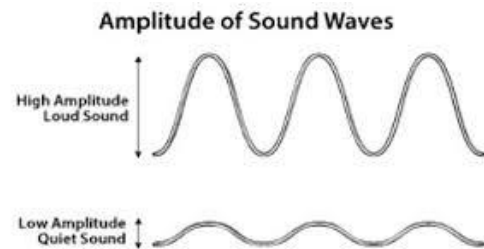


Figure 1.6 Amplitude of a sound

1.1.2.3 Timbre

Timbre is the type or the tone of the sound. Human hearing can distinguish between different timbre which allows her to filter out non-related timbre and focus onto a certain tone. This allows the human to attend to sounds over the background noise. The best example is, many people can easily recognize their phone’s ringtone over an overwhelming background chatter.

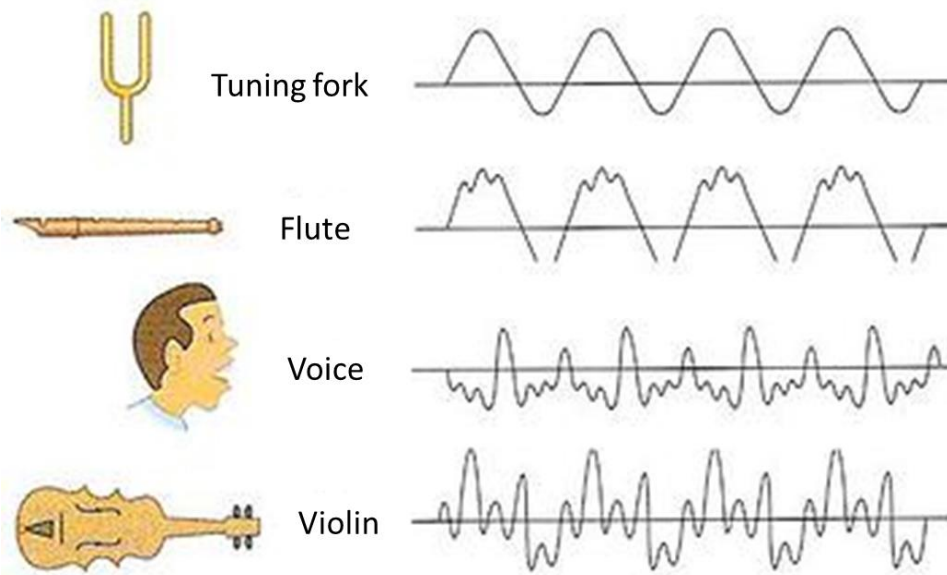


Figure 1.7 Timbre of a sound

In interaction design, sounds can be used to achieve multiple objectives such as gaining the attention of the user (Ring tone of a mobile phone), convey a status change (SMS alert), provide confirmation to a system event (Boot-up sound, screen touch “click”) and to indicate navigation options.

1.1.2.4 Touch

The sense of touch provides an instant update on the environmental change to the human user. Humans’ sensation of touch is provided by three type of receptors embedded into the skin. Although the entire human skin is a touch sensor, some parts of the body have higher sensitivity with regards to the other areas.

Touch can be used to communicate system state changes to the user effectively and unlike sounds, touch can be a non-invasive and private way of communication between the system and the user. Modern smartphones and wearable devices utilize haptic feedback devices (commonly called: vibrator) to communicate system status to the user privately.

Touch can be used to enhance the user experience greatly in some systems such as gaming. Most popular gaming platforms such as Microsoft Xbox uses vibration feedback within their game controllers to provide the sensation of gunfire, vehicle skid or building collapse greatly increasing the game’s “naturalistic feeling” and user experience.