PUSL3122 HCI,
Computer Graphics, and Visualisation

Coursework 2023
Term: Term 2
Submission Deadline: 10th April 2024
Coursework Type: Group assignment
Element of Assessment: Coursework
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MODULE AIMS:

- To establish a systematic understanding of the concepts and techniques and good practice of information visualization in the context of HCI principles.
- To design and implement appropriate plans for evaluating the usability of software.
- To develop a systematic understanding of graphics and media applications
- To apply methods and algorithms in the context of computer animation and visualisation

LEARNING OUTCOMES:

1. Critically evaluate the usability of a small software system and document the user feedback gathered.
2. Design the front-end of a small software system in line with good practice in HCI.
3. Investigate the principles of graphics and media applications,
4. Apply standard APIs for the construction of UIs and display of standard media formats.
5. Systematically understand theories and techniques related to 2D and 3D rendering and implement a simple real-time renderer using a rasterization API.
6. Critically review algorithms for scalar and vector visualization.

This document contains all the necessary information pertaining to the assessment of *PULS3122 HCI, computer graphics and visualisation*. The module is assessed via 50% coursework and 50% exam. This document provides a specification of the coursework. The sections that follow will detail the assessment tasks that are to be undertaken. All assessments are to be submitted electronically via the respective DLE module pages before the stated deadlines.

All assessments will be introduced in class to provide further clarity over what is expected and how you can access support and formative feedback prior to submission. This coursework requires students to form teams of **five (5) to six (6) members** to carry out the following interactive software development exercise: Develop a project with suitable user interface (UI)/ user experience (UX) design for the given scenario available in appendix A.

The aim of this coursework is to apply the theoretical concepts learned throughout the course in a practical scenario. With this coursework, you will get an opportunity to exercise your user interface design abilities. You are required to design and implement a software solution for the scenario specified in Appendix A. You should follow an agile **software development life cycle.** You are encouraged to follow the Scrum methodology. appendix A. The source code should be pushed to the flowing group GitHub repo (https://classroom.github.com/a/J2GRTtYl). **Any other repositories will not be accepted.**

Based on the given scenario, you are required to implement a software solution and document the software development process used. That includes analysis, design, implementation and evaluation of your solution. To do this you must:
- Analyse the scenario to identify the context of use and the user(s) of the system.
- Gather your own requirements and add them to the requirements supplied to you in this brief. Use all of these requirements to develop your solution. Use the method(s) and technique(s) you were taught during the module.
- Develop user stories and personas to bring the requirements to life.
- Design the UIs of the system based on the requirements. Keep in mind the design/usability goals and principles you were taught during the module:
  - Produce a low-fidelity prototype and storyboard/s for the design of UIs. Use these to gather initial feedback on your initial designs.
  - Subsequently, produce a high-fidelity prototype which addresses the feedback you gathered during the initial evaluation. You are encouraged to use software such as Figma (see https://www.figma.com/prototyping/) for prototyping.
- Carry out both formative and summative user testing.
  - Invite at least two potential users to each study.
  - Set up a user study based on the knowledge you gained during the module using one type of 'user testing' that you were taught.
  - Consider how to incorporate the user feedback back into your software solution to enhance it.
- Implement the design of the UIs, produce these using the Java programming language using the swing APIs and the integrated library of computer graphics. Use of any other language will receive zero marks.

Report
As a group, submit a report describing your work. This must be a single PDF file uploaded to the DLE submission point for this module, no other submission type will be accepted**. Please NOTE that all your work should be described in the submitted PDF file, a link to a separate folder/**

file that holds your work will not be accepted and will result that the submission will not be marked and receives ZERO marks.

Your group report should include:
- The design of the UIs (sketches and/or screenshots)
- Details of the usability evaluation carried out. Include all the details of each study such as test plan, methods/techniques used, and participants' demographics. **NOTE: Children should not be involved in this study, and participants' identity should never be disclosed.**
- A link to the GitHub repository for your project. **It is your responsibility to make sure the link to the GitHub repo holds all of your code and that it is accessible.**
  - I recommend you ask each group member to check this as it is very important.
- A link to the YouTube video presentation of your application, highlighting the main requirements and explaining related blocks of your Java coding (submit as group).
  - In the video, the group should demonstrate the software developed running with data.
  - Each member of the group must appear clearly in the video to highlight **their** part of the development.
  - The video should be in the normal speed.
  - It is your responsibility to make sure the link to the video is publicly accessible.

More details about the report:
This should be a single PDF document describing your work. **NOTE: all your work should be described in the submitted PDF file, a link to a separate folder/ file that holds your work will NOT be accepted and will result that the submission will NOT be marked and receives ZERO marks.**

The PDF file should document all the details of the design, implementation and evaluation studies that were carried out. That includes:
- UIs design (low and high- fidelity prototyping)
- Details of the implementation phase providing a justification for your choice of design solution.
- Information about the user studies, participants who took part in the study, how they were invited and the consent form.
- How the user testing studies were set and conducted, details on the methods/techniques that were adopted, evidence of the study setting (you may use photographs), and full details of the user testing plan.
- An explanation of how the user feedback help enhance the software solution (i.e. recommendations).

More details about the video:
Video rundown of your application:
- Demonstrate the functionality of your project in a short **YouTube** video (this should be a group submission). A link to the **YouTube** video should be included in the main document. No other submission type will be accepted.
- **NOTE: It is the responsibility of each group member to test the link ensuring the video is accessible.** No other video type/submission method will be accepted.
- The video should be between 7-12 minutes long. Please note the marker will stop the video after twelve minutes, so anything after that will **not** be marked.
- Please make sure you do the following:
  - Explain any design solution.
  - Go through the code and explain your implementation briefly.
  - Demonstrate the program running with data.
- You may be invited to an online video call for further discussion at a later date

4

Video settings

File-Type:	MP4
Resolution:	720p or 1080p
Framerate:	30
Video Bitrate:	16 MBS
Audio Bitrate:	Mono:128 kpbs, Stereo:384 kpbs
Compression:	H.264

GIT Repository

An online repository of your project code using the GIT service. You will be graded on the following criteria:

- The contents of the readme file. It should include all additional resources (art, sound FX etc.) and they should be fully credited.
- No previous versions of the project should be present in the repository in a .zip or other compressed format.
- Commits to the repository are appropriately commented.
- Commits are made in a consistent and timely manner, at least once every week.

You must present the work carried out in a report submitted in a single document in PDF format. **No other format is acceptable.** Your report must be approximately 2000 words (**Please note the marker will stop reading after 2000 words**), please use screenshots and links to code files to illustrate functionality where appropriate, and low and high-fidelity prototypes to illustrate the design of the UIs.

The report must contain the following sections and should be clearly labelled:

1. Introduction (approximately 2 paragraphs). Introduce the document and signpost the reader to what they will find in it. Provide links to your GitHub repository that holds your source code and the YouTube video rundown your application. **It's students responsibility to make sure the links are accessible.**
2. Background. Explain here the scenario, what information your application provides, who are the potential users.
4. Gathering data: explain in detail how further requirements were gathered for this product (methods/ techniques used, how the data was analysed, etc.)
5. Design. Present here the design of the app (documentation of the requirements, personas/ user stories, storyboard, low-fidelity and the high- fidelity prototypes) with a discussion from the usability perspective.
6. Implementation. Illustrate with screenshots and hyperlinks to your source code in your GitHub repo how you implemented your design. Provide a suitable narrative to help your reader understand your screenshots and diagrams.
7. Evaluation. Present the full details of user studies you carried out for evaluating the app with details of participants and methods used with justification why you used any particular method/ technique. Show how you conducted the evaluation study clearly indicating areas for further work and improvement. Participants' identity should not be disclosed.
8. Summary. Summarize your work briefly and highlight the main points in each section.
9. References. State here all references you used.

The Rubric below will be used to assess and provide feedback on the submissions.

Table 1: Marking scheme for coursework assessment

| Category and marks weighting: | **Level descriptors.** Note that these definitions are indicative of expected standards at each level, and may not be precise descriptors of the project submitted. | | | | | | |
	<30%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
Application (40%) Implementation of interface design is appropriate. Implementation of computer graphics algorithms is appropriate. Implementation of code demonstrates good quality coding approaches. Application is shown running in the video. Implementation of code uses appropriate design solutions. Clear indication of innovative and proactive thought going beyond materials provided. GitHub commits are appropriate and not left to just before deadline.	Little or no evidence of coding skills in project implementation.	Poor skills in implementing code - incorrect &/or very confused.	Some skill in implementing the software, but with errors &/or confusion. Application provides more functionality than log in and registration.	Skill in most areas of software implementation - some issues/errors. Implementation of moderate complexity with suitable functionality demonstrated.	Competent implementation of software with minor issues/errors. Application is of suitable complexity, has appropriate architecture which is not monolithic but demonstrates interactions between levels and/or layers of	Highly skilled implementation of software (far beyond the level of taught modules). Application has good complexity and shows good quality software engineering.	Expert level of skill in all relevant areas clearly evident throughout. Software is of commercial quality and could be implemented in real world situation with very little modification.
	Little or no indication of user requirements having been implement ed	User Requirements shown as implemented inconsequential	User Requirements shown as implemented but illustration not clear and lacks clarity	Requirements matched to implementation ok, some errors and omissions	Requirements matched to implementation are appropriate. Meaningful choice of requirements	Requirements matched to implementation are clearly indicative of minimum viable	Requirements matched to implementation are of professional standard.
	Little to no indication of any attempt to go beyond the coursework teaching/brief.	Inadequate and poorly defined plan	Plan for innovation vague and/or largely unjustified	Relevant features considered. Accuracy, evidence &/or clarity could improve	Logical consideration given to innovative features, predominantly evidence-based and clearly	Appropriate, well presented and well justified innovations	Clear, concise and fully justified innovation plan. Shows original thinking and proactive development

Design and Testing (40%) Appropriate use of UI components to provide a suitable HCI experience Interface design illustrates clear application of robust usability testing and HCI principles. Application architecture demonstrates suitable use of computer graphics algorithms. Tests have been designed to evaluate application appropriately	Project is devoid of appropriate testing plan	Poor skills in applying testing, incorrect &/or very confused	Some relevant testing applied. V&V superficial, sparse &/or often flawed	Appropriate testing in place but with some omissions, issues &/or errors	Competent testing plan in place. Appropriate Validation and Verification approach in place.	Highly competent testing regime in place both in plan and implementation. Shows a deep understanding of testing above and beyond taught modules.	Expert testing plans and implementations in place, could be appropriate for commercial application with very little modification.
	Little or no indication of requirements	Requirements present but vague and poorly defined. Diagrams not provided.	Requirements present but need more thought and development. Few diagrams present but lack of understanding demonstrated.	Requirements presented ok with appropriate diagrams. Some questionable logic demonstrated. Some errors	Requirements clear and sensibly defined. Requirements appropriate for complexity of project. Coverage of application is appropriate.	Requirements have good depth of coverage for application. Diagrams are clearly derived from requirements.	Requirements excellent with little further to add. Diagrams match with requirements and could be used in professional setting.
	Images/graphs/figs sparse, illegible &/or irrelevant.	Images/graphs/figs do not convey required information.	Most images/graphs/figs convey req'd info but may lack clarity &/or contain errors.	Mainly appropriate images/ graphs/figs - aesthetics &/or labelling could improve.	Most images/graphs/figs of high standard; occasional minor errors/issues.	Images/graphs/figs of high standard, clearly conveying all required information.	Creative images/graphs/figs; peer reviewed journal standard.

Approach (20%) Illustration provided for how HCI and computer graphics aspects applied Coding approach outlined How application meets needs for scenario demonstrated. Reflection at an appropriate depth and understanding demonstrated of design solutions and their application.	Writing incomprehensible.	Inappropriate written work	Poor literacy	Mainly appropriate style of writing and presentation - could improve	Clear style of writing and presentation.	Lucid style of writing. Clear, unambiguous presentation.	Literacy presentation: peer reviewed journal standard.
	Little to no indication of any attempt to go beyond the coursework teaching/brief.	Inadequate and poorly defined plan	Plan for innovation vague and/or largely unjustified	Relevant features considered. Accuracy, evidence &/or clarity could improve	Logical consideration given to innovative features, predominantly evidence-based and clearly	Appropriate, well presented and well justified innovations	Clear, concise and fully justified innovation plan. Shows original thinking and proactive development

General Guidance

Extenuating Circumstances

There may be a time during this module where you experience a serious situation which has a significant impact on your ability to complete the assessments. The definition of these can be found in the University Policy on Extenuating Circumstances here: https://www.plymouth.ac.uk/uploads/production/document/path/22/22876/Extenuating_Circumstances_Policy_and_Procedures.pdf

Plagiarism

All of your work must be of your own words. You must use references for your sources, however you acquire them. Where you wish to use quotations, these must be a very minor part of your overall work.

To copy another person's work is viewed as plagiarism and is not allowed. Any issues of plagiarism and any form of academic dishonesty are treated very seriously. All your work must be your own and other sources must be identified as being theirs, not yours. The copying of another persons' work could result in a penalty being invoked.

Further information on plagiarism policy can be found here:

Plagiarism: https://www.plymouth.ac.uk/student-life/your-studies/essential-information/regulations/plagiarism

Examination Offences: https://www.plymouth.ac.uk/student-life/your-studies/essential-information/exams/exam-rules-and-regulations/examination-offences

Turnitin (http://www.turnitinuk.com/) is an Internet-based 'originality checking tool' which allows documents to be compared with content on the Internet, in journals and in an archive of previously submitted works. It can help to detect unintentional or deliberate plagiarism.

It is a formative tool that makes it easy for students to review their citations and referencing as an aid to learning good academic practice. Turnitin produces an 'originality report' to help guide you. To learn more about Turnitin go to: https://www.plymouth.ac.uk/about-us/teaching-and-learning/digital-education/turnitin-for-students

Referencing
The University of Plymouth Library has produced an online support referencing guide which is available here: http://plymouth.libguides.com/referencing.

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Another recommended referencing resource is https://www.citethemrightonline.com/ this provides you with specific guidance about how to reference lots of different types of materials.

Checking your assignments' references: https://aldinhe.ac.uk/product/learnhigher-resources/checking-your-assignments-references/

Appendix A

Product Vision
- A designing furniture company wants to develop a desktop application for their customers in order to enable them to view the furniture that the customers interested to buy in order to design it for their rooms, and based on the size, colour schemes and the shape of the rooms, which would enable them check sizes and colours if they do fit in the rooms. The furniture they sell are chairs, tables (dining, sides, etc.). The required app is to be used by the designers in the store when customers come to visit to show them final expected look of the designs of the furniture. Designers should be able to login into their account. The design involves putting 2D shapes together and view it in a 3D format. **NOTE: the design could be viewed individually and not necessarily inside the room, and the room's walls are optional to be implemented,** .

Functional Requirements of the admin side (designers):
- I wish to provide the size, shape and colour scheme for the room.
- I wish to create a new design. Based on the room size, shape and colour scheme
- I wish to visualise the design in 2D.
- I wish to visualise the design in 3D.
- I wish to scale the design to best fit the room based on the size.
- I wish to add shade to the design as a whole or selected parts.
- I wish to change the colour of the design as a whole or selected parts.
- I wish to save the design.
- I wish to edit/ delete the design.