

The Department of Computer Science

# CIS4517

# Research and Development Project

Level 7

Coursework 2 – Final Report

2023/2024

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| Coursework 2 |

**Weighting**: The Project Document– (80%) – coursework

**Hand in date**: 27th September 2024 (11:59am)

**Learning Outcomes Assessed**:

1. Identify, specify and critically analyse a system, issue, or problem of current interest within a relevant context.
2. Critically and systematically review relevant literature and alternative approaches and solutions.
3. Demonstrate and critically self-reflect on the significance of the outcomes of the project in a professional manner including aspects related to legal, social, and ethical implications.
4. Demonstrate systematic application of knowledge, together with a practical understanding of how current techniques of research and enquiry are used to identify, develop and evaluate practical solutions to a well-defined problem.
5. Deal with complex issues both systematically and creatively, make sound judgments in the absence of complete data, and communicate their conclusions clearly, relating theory to practice.

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| Introduction |

In accordance with the BCS projects at postgraduate level may be similar in scope to undergraduate projects but should reflect the ethos of advanced study and scholarship appropriate to a master’s degree.

Postgraduate projects must give students the opportunity to demonstrate:

* a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the specialist academic discipline
* a comprehensive understanding of techniques applicable to their own research or advanced scholarship
* originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in the discipline
* deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences
* demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level
* critical self-evaluation of the process

Projects must include the students undertaking practical work of some sort using computing/IT technology. This is most frequently achieved by the creation of an artefact as the focus for covering all or part of an implementation life-cycle. **Dissertations based solely on literature review activity and/or user/market surveys are not acceptable.**

A typical Report will be approximately 12,000 words, excluding tables, figures, project plan, references, artefact and appendices.

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| General Guidance |

The aim of the report layout should be to make it as easy as possible for somebody to read and understand your work - it is obviously in your own interests to ensure that this is the case.

**Format**

**Margins**: Standard margins are typically 1 inch on all sides. This helps ensure the text is well-framed on the page and looks tidy.

**Spacing**: Use 1.5 or double line spacing for the main text. This makes the report easier to read.

**Alignment**: Text should be left-aligned.

**Font**

**Type**: Choose a clear, professional font. Common choices include Times New Roman, Arial, and Calibri because of their readability.

**Size**: Typically, 12-point font is used for the main text, with larger sizes for headings and subheadings to distinguish them clearly from the main body.

**Consistency**: Keep the font consistent throughout the document, except in figures and tables if necessary for clarity.

The Report must be written in 3rd person and should contain:

* **Title Page**
* **Abstract**
* **Table of Contents Page** (List of Tables and List of Figures may be included if necessary)
* **Chapter 1 Introduction**
* **Chapter 2 Background Research / Literature Review**
* **Chapter 3 Methodology**
* **Chapter 4** **Implementation/Testing**
* **Chapter 5 Evaluation**
* **Chapter 6 Discussion**
* **Chapter 7 Conclusion**
* **References**
* **Appendices**

### The Report Structure

Title Page:

This is the coversheet for your report which contains project details. A separate template is on BB for you to use electronically. You should endeavour to keep its format and only change the details that concern your project, i.e.

* Your name
* Your student ID
* The programme that you are studying
* Your project title
* Your supervisor

Abstract:

A concise summary of the project, including its purpose, methodology, key findings, and conclusions. It should provide a snapshot of the entire report. (approx. 300 words)

Acknowledgements: This part acknowledges the individuals (e.g. the supervisor) who have provided substantial help. (Optional) (*approx. 100 words)*

Chapter 1, Introduction: This is the first chapter informing the reader of brief subject background, the problem domain, main aim and specific objectives, proposed methodologies and expected outcomes. *(approx. 1000 words)*

Chapter 2, Research / Literature Review:

The project background expands on what was said CW1 about the topic and clarifies the area of your project. Key to this section is a literature / organisation / product review of other people's work and an understanding of how technology already addresses (or fails to address) what you are proposing. *(approx. 2000 words)*

Chapter 3: Methodology:

This chapter lays out how you went go about examining the research problem. This should explain the methodology / design technique chosen (and justify why it is appropriate) from the various ones available. Where trade-offs exist between different designs, the chosen approach should be justified. Suitable diagram-techniques (e.g. UML, other drawings) should be used where appropriate. If a method is applied selectively, explain which parts were used and why. This is always written in past tense. *(approx. 1800-2000 words)*

Chapter 4: Implementation and Testing:

The implementation phase includes carrying out the practical part of the project according to the selected methodological approach and plan. Testing should follow some suitable model - e.g. category partition, state machine-based. Both functional testing and user-acceptance testing are appropriate. For experimental/investigative projects, techniques developed should be evaluated against a standard result set for calibration, as well as the "live" data set. *(approx.2500 words)*

Chapter 5: Evaluation:

This chapter contains your critical evaluation of your work as compared to your original objectives and requirements captured. To what extent have your original objectives been fulfilled? If they have changed, what is your rationale for this? What are the advantages, disadvantages of your approach compared with related work (literature chapter)? How does the scope of your work differ from related work? (*approx. 2000 words)*

Chapter 6: Discussion:

The main results of your work should be presented together with critical discussion. This chapter should cover three things:

* **Findings** - present all the results (products, experimental findings, theories, etc.) generated during the project. This may also include some off-topic findings that were not expected, or which were side-effects of other explorations
* **Goals achieved**- describes the degree to which the findings support the original objectives laid out for the project. The goals may be partially or fully achieved, or exceeded. An experimental project may prove, or disprove the original aim. A theoretical project may cover some or all of the example cases. Note that reporting of failures to achieve goals is important since a fundamental feature of the assessment procedures is that the processes (how you went about your project) are often as important as the products of the project.
* **Further work** – describes new areas of investigation prompted by developments in this project, as well as parts of the current work which were not completed due to time constraints and/or problems encountered. *(approx. 2000 words)*

Chapter 7: Conclusions:

This chapter brings together and summarises the findings and main points achieved, limitations of the solution and brief recommendations for further study/work. A self-reflection section is useful to present and explain attainment over the course of study. The conclusions should not be used to introduce new materials. *(approx. 1200-1500 words)*

References: This is a list of references cited in the main text in either alphabetical order by the first authors’ surname. Remember to use EHU Harvard referencing style.

Appendices: In general, appendices can be used to present detailed information of relevance that is not essential in the main text, helping to minimise ‘clutter’ in the main body of the project, making it more readable. Materials in appendices should be closely linked to the main document. For example, the project plan, source code listings, test data, rough work, questionnaire results (submission of actual completed questionnaires it subject to agreement with the supervisor) and so on may be included as appendices (as advised by the supervisor). Every appendix should be coded with a number (e.g. Appendix 1, Appendix 2, and so on, and should be titled), and begin on a fresh page. All appendices should be cited in the main text.

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| Tutor Details |

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| **Module Leader**: Prof Yonghuai Liu | |
| **Location:** Tech Hub **Office:** TH F-15  **Direct line:** 01695 65 7230 | **e-mail:** liuyo@edgehill.ac.uk |

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| What you should submit |

Your report should be submitted in ***electronic format*** through the university VLE. A Turnitin drop box will be set up near the deadline to allow you to submit. Name the submission file as per supervisor's initials (i.e. YL for Yonghuai Liu) followed by your `id number final' (i.e. YL0000000final.doc), so that it is easy to identify who you and your supervisor are.

Appendices should be kept as a separate document and will be uploaded to a standard drop box on the VLE.

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| Assessment Criteria |

| **Assessment Criteria** | | | | | | | | |
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| **Assessment Criteria** |  | **Mark**  **(0 – 29)** | **Mark**  **(30 – 39)** | **Mark**  **(40 – 49)** | **Mark**  **(50 – 59)** | **Mark**  **(60 – 69)** | **Mark  (70 -84)** | **Mark  (85 – 100)** |
|  | **Grade:**  **Fail** | **Grade:**  **Narrow fail** | **Grade:**  **Pass** | **Grade:**  **Good** | **Grade:**  **Very Good** | **Grade:**  **Excellent** | **Grade:**  **Outstanding** |
| **LO1: Identify, specify, and critically analyse a system, issue, or problem of current interest within a relevant context.** | Aim & Objectives;  Requirements analysis of software | Nothing submitted or an inadequate level of engagement with the coursework requirements to demonstrate appropriate knowledge or skills.  No or unclear aim and objectives. | Limited attempt to establish and define the rationale of a chosen system, issue, or problem of current interest. Demonstrates limited awareness of current trends, challenges, or developments related to the subject area.  Either a weak aim or weak objectives evident. | Establishes the rationale of the chosen system, issue, or problem of current interest. Shows some awareness of current trends, challenges, or developments related to the subject area.  Both the aim and objectives are indicated but are weakly defined. | Establishes the rationale of the chosen system, issue or problem of current interest to a satisfactory extent. Provides context that illustrates/describes the significance of the identified subject area.  A clear aim but weak objectives defined. | Clearly identifies and defines the chosen system, issue, or problem of current interest. Provides sufficient context to understand the significance of the identified subject area.  Clear aim and clear objectives but not SMART. | Demonstrates a deep understanding of the complexities and nuances of the chosen system, issue, or problem of current interest. Provides a thorough rationale grounded in the literature.  Clear and concise aim underpinned by SMART objectives. | Synthesises findings from research to provide a coherent and holistic rationale of the chosen system, issue, or problem of current interest. Evaluates the implications of actions in terms of outcomes or recommendations in the subject area. |
| **LO2: Critically and systematically review relevant literature and alternative approaches and solutions.** | Literature Review | Nothing submitted or fails to conduct a meaningful review of relevant literature. Does not summarise key concepts, theories, or findings from existing literature. Shows no understanding of different perspectives within the chosen subject area. Provides no evidence of engagement with alternative viewpoints or approaches. | Attempts to review relevant literature is evident but lacks depth or coherence. Summarises key concepts, theories, and findings from existing literature superficially. Shows minimal understanding of different perspectives within the chosen subject area, with limited engagement with alternative viewpoints | Conducts a review of relevant literature, but the scope may be limited or lacks depth.  Descriptive summary of key concepts, theories, and findings from existing literature, but may lack clarity or thoroughness. Demonstrates some understanding of different perspectives within the chosen subject area but may overlook important sources or alternative viewpoints.  Literature review has not, or has marginally developed from original version. | A thorough review of relevant literature related to the chosen topic is evident.  Identifies and summarises key concepts, theories, and findings from existing literature with some depth. Demonstrates an understanding of different perspectives and approaches within the subject area.  Literature review has developed from original version but is descriptive rather than critical. | Critically evaluates the strengths and weaknesses of the literature reviewed, demonstrating discernment and analytical thinking.  Synthesises information from various sources to provide a coherent and nuanced understanding of the subject area.  Literature review has developed from original version by exhibiting criticality of discussion with appropriate theoretical underpinning | Engages in critical analysis of the literature, demonstrating a high level of critical thinking and analytical skills.  Provides clear and insightful critiques of the literature, highlighting strengths and weaknesses.  The literature review has evolved from its original version by extensively integrating critical discussion supported by appropriate theoretical underpinning. | Identifies and evaluates the strengths, limitations, and implications of different approaches and solutions presented in the literature. Offers insightful interpretations and perspectives on the existing literature and demonstrates a nuanced understanding of alternative approaches and solutions, evaluating their relevance, feasibility and potential impact on the subject area.  The literature review has progressed from its initial iteration by deeply incorporating critical discourse backed by suitable theoretical foundations. |
| **LO3: Demonstrate and critically self-reflect on the significance of the outcomes of the project in a professional manner including aspects related to legal, social, and ethical implications.** | Legal, Social, Ethical & Critical Reflection | Nothing submitted or minimal evidence of self-reflection on the significance of the project outcomes, lacking depth or insight. Demonstrates minimal understanding of legal, social, or ethical implications related to the project outcomes. Shows little awareness of the professional implications of the project outcomes. | Limited evidence of self-reflection. Fails to identify or analyse legal, social, or ethical implications related to the project outcomes adequately. Demonstrates a lack of critical evaluation of the professional implications of the project outcomes. Communication may lack clarity or coherence, hindering the effectiveness of self-reflection and analysis | Provides some self-reflection on the significance of the project outcomes, but the depth of reflection may be limited.  Identifies some legal, social, or ethical implications related to the project outcomes.  Demonstrates a basic understanding of the professional implications of the project outcomes. | Provides thoughtful analysis of legal, social, or ethical implications related to the project outcomes.  Evaluates the professional implications of the project outcomes, considering potential impacts and consequences.  Communicates insights in a clear, coherent, and organised manner, demonstrating a professional approach to self-reflection and analysis. | Provides comprehensive self-reflection on the significance of the project outcomes, demonstrating depth and insight.  Identifies and analyses legal, social, or ethical implications related to the project outcomes with clarity and coherence.  Shows a strong understanding of the professional implications of the project outcomes, considering potential impacts and consequences. | Demonstrates professionalism in presenting self-reflections on the project outcomes, with clear organisation and coherence.  Provides a through and insightful analysis of legal, social, or ethical implications related to the project outcomes, offering nuanced perspectives.  Critically evaluates the professional implications of the project outcomes, demonstrating a thorough understanding of relevant issues. | Provides exceptional and profound self-reflection on the significance of the project outcomes, showcasing exceptional depth and insight. Identifies and analyses legal, social, or ethical implications related to the project outcomes with exceptional clarity, depth, and sophistication.  Demonstrates an exceptional understanding of the professional implications of the project outcomes, considering a wide range of potential impacts and consequences with exceptional insight. |
| **LO4: Demonstrate systematic application of knowledge, together with a practical understanding of how current techniques of research and enquiry are used to identify, develop, and evaluate practical solutions to a well-defined problem.** | Methodologies | Nothing submitted or demonstrates minimal understanding of relevant concepts, theories, and principles related to the problem domain.  Shows little to no understanding of current methodologies (research and development) and techniques applicable to the problem domain.  Limited identification of appropriate sources of information or data to inform problem-solving processes. | Displays partial understanding of methodologies (research and development) and techniques applicable to the problem domain, but inconsistency in application is evident.  Attempts to gather information or data is indicated but weaknesses are evident due to the absence of important sources or a failure to critically evaluate their relevance | Demonstrates a basic understanding of relevant concepts, theories, and principles related to the problem domain.  Applies selected methodologies (research and development) and techniques applicable to the problem domain, with some degree of effectiveness but may lack consistency or thoroughness. | Appropriate methodologies (research and development) and techniques applied to the problem domain effectively. Gathers and evaluates information or data relevant to the problem.  Demonstrates proficiency in critically analysing and synthesising research findings to inform problem-solving processes. | Applies key concepts effectively to the problem, demonstrating coherence and consistency in their application, with practical considerations that inform the problem-solving processes.  Demonstrates a systematic approach to selecting and employing appropriate methodologies (research and development), to the problem domain, ensuring thoroughness and accuracy relevant to the problem | Applies methodologies (research and development) and techniques to the problem domain with proficiency. Gathers, evaluates, and synthesise information or data relevant to the problem.  Integrates theoretical insights with practical considerations in a coherent and insightful manner to inform problem-solving processes. | Selects and applies methodologies (research and development) and techniques to the problem domain with exceptional prowess to gather, evaluate, and synthesise information or data relevant to the problem.  Exhibits unparalleled critical thinking, creativity, and originality in analysing and synthesising research findings to inform problem-solving processes with depth and sophistication. |
| Artefact – design, development, evaluation | Does not develop / generate any practical technological solutions or approaches to address the defined problem. Or offers solutions that are impractical, unrealistic, or not supported by evidence or reasoning.  Does not demonstrate any attempt to evaluate the effectiveness or feasibility of proposed solution | Proposes potential technological solutions to address the problem but lacks depth or coherence in their development.  Artefact demonstrates some attempt to apply relevant knowledge and understanding to formulate the problem solution but requires further refinement.  Attempts to evaluate the feasibility or effectiveness of proposed solution but lacks thoroughness or depth in analysis. | Proposes technological solution to address the problem with some degree of coherence and relevance.  The artefact demonstrates a basic understanding of relevant concepts and considerations.  Attempts to evaluate the feasibility and effectiveness of proposed solution but may exhibit limitations in analysis or depth of consideration. | Proposed technological solution addresses the problem effectively, demonstrating a logical and systematic approach.  Artefact demonstrates consistent and systematic engagement with the problem-solving process and a capacity to integrate theoretical knowledge with practical considerations.  Identifies potential risks, limitations, and trade-offs associated with solution and demonstrates a basic understanding of their implications | Proposed technological solution is well-developed, logically structured, and effectively addresses the problem.  Artefact demonstrates proficiency and competence, with evidence of critical thinking, analytical skills in problem-solving.  Conducts a comprehensive evaluation of the feasibility, effectiveness, and potential impacts of the proposed solution, considering multiple factors and perspectives. | Proposed technological solution is well-developed, logically structured, and highly effective in addressing the problem.  Artefact demonstrates mastery, excellence, and sophistication, with evidence of exceptional critical thinking, analytical skills, creativity, and insight in solving the defined problem.  Identifies, analyses, and synthesises potential risks, limitations, and trade-offs associated with the solution with depth, insight, and sophistication. | Proposed technological solution is of exceptional quality, innovation, and effectiveness in addressing the problem.  Artefact demonstrates insight, supported by robust reasoning, evidence, and theoretical insight in problem-solving excellence.  Conducts a comprehensive and rigorous evaluation of the feasibility, effectiveness, and potential impacts of the proposed solution of unparalleled depth, insight, and sophistication. |
| **LO5: Deal with complex issues both systematically and creatively, make sound judgments in the absence of complete data, and communicate their conclusions clearly, relating theory to practice.** | Conclusions | Nothing submitted or demonstrates limited ability to break down complex problems into manageable components or identify key factors influencing the situation.  Fails to effectively relate theoretical concepts to practical applications, resulting in disjointed or irrelevant discussions.  Lacks depth, coherence, and relevance, when applying theoretical concepts to practical situations. | Demonstrates some attempt to address complex issues systematically but struggles to comprehend complex problems, relying on conventional solutions or superficial analyses.  Attempts to relate theoretical concepts to practical applications, but the connection may be unclear or superficial. | Demonstrates some ability in breaking down complex problems into manageable components and /or identifying key influencing factors.  Makes partially sound judgments when faced with incomplete data.  Demonstrates some ability to relate theoretical knowledge to practical situations but may lack depth or relevance. | Demonstrates an ability to address complex issues systematically, identifying key components and considering relevant factors.  Makes generally sound judgments when faced with incomplete data, and considers potential implications.  Demonstrates an ability to incorporate theoretical insights into practical decision-making processes or problem-solving approaches, albeit inconsistently. | Demonstrates an ability to address complex issues systematically, identifying key components and considering relevant factors effectively.  Some judgement shown in exercising caution when drawing conclusions in the absence of complete data.  Demonstrates a good ability to relate theoretical knowledge to practical situations, applying theoretical insights to inform decision-making processes. | Addresses complex issues systematically, adeptly identifying key components and considering relevant factors comprehensively.  Makes sound judgments when faced with incomplete data, weighing alternative perspectives and implications with a high degree of effectiveness.  Articulates theoretical concepts to practical applications seamlessly, establishing a clear and meaningful connection between theory and practice. | Analyses complex problems with exceptional depth and applies structured approaches with precision and ingenuity, demonstrating mastery in problem-solving.  Expresses caution when drawing conclusions in the absence of complete data, demonstrating an exceptional understanding of uncertainty and risk.  Consistently integrates theoretical concepts into practical contexts with depth, relevance, and insight, to inform decision-making processes or problem-solving approaches |
| **Spelling, Punctuation and Grammar** |  | Frequent significant errors in spelling, punctuation, and grammar severely affecting the meaning / comprehension of scientific arguments and reasoning.  Little, no or very repetitive use of relevant technical terminology.  Very poor sentence and paragraph structure which seriously affects the clarity of the discussion. | Some significant errors in spelling, punctuation, and grammar affecting the meaning / comprehension of scientific arguments and reasoning.  Limited or repetitive use of relevant technical terminology.  Poor sentence and paragraph structure which affects the clarity of the discussion. | Reoccurring errors in spelling, punctuation, and grammar that may affect the meaning / comprehension of scientific arguments and reasoning.  Some appropriate vocabulary incorporating some technical terminology is present.  Sentence and paragraph structures are partially correct and contain appropriate syntax aiding the clarity of the discussion. | Errors in spelling, punctuation and grammar that do not affect meaning / comprehension of scientific arguments and reasoning and are not recurring.  A variety of appropriate vocabulary incorporating some relevant technical terminology is present and generally effective.  Sentence and paragraph structures are partially correct and contain appropriate syntax and relevant vocabulary, aiding the understanding of the discussion. | Only very minor and not recurring errors in spelling, punctuation that do not affect meaning / comprehension of scientific arguments and reasoning and are not recurring.  Effective and accurate use of a variety of appropriate vocabulary, incorporating adequate and accurately used technical terminology.  Correct sentence and paragraph structures that contain appropriate syntax and relevant vocabulary, aiding the understanding of the discussion. | No or negligible errors in spelling, punctuation, and grammar.  Effective and accurate use of a variety of appropriate vocabulary, incorporating adequate and accurately used technical terminology.  Correct sentence and paragraph structures that contain appropriate syntax and relevant vocabulary, aiding the understanding of the discussion.  Adopts a professional and academic writing style and conventions, with each paragraph following the [*SEED*](http://eshare.edgehill.ac.uk/7165/1/Paragraph%20Structure%20%28SEED%29.pdf) structure. | No errors in spelling, punctuation, and grammar.  Highly effective and accurate use of a variety of appropriate vocabulary, incorporating adequate and accurately used technical terminology.  Consistent use of correct sentence and paragraph structures that contain appropriate syntax and relevant vocabulary, aiding the understanding of the discussion.  Adopts a professional and academic writing style and conventions, with each paragraph following the [*SEED*](http://eshare.edgehill.ac.uk/7165/1/Paragraph%20Structure%20%28SEED%29.pdf) structure. |