

Project Scope

The chosen technology for this project is **Artificial Intelligence (AI)**, and the industry in focus is **software development within the wider computing sector**. AI has become a transformative force in this industry, helping organisations automate processes, analyse large datasets, improve decision-making, and accelerate software engineering tasks. Companies now integrate AI into different stages of development to enhance accuracy and productivity. In a typical software development organisation, different departments have adopted AI tools to support their work. The **Software Development Department** uses AI-powered code assistants, automated debugging, and intelligent testing systems to reduce errors and speed up development cycles. The **Quality Assurance (QA) Department** benefits from AI-generated test cases, automated bug detection, and predictive analysis to ensure higher-quality output. The **Cybersecurity Department** relies on AI to detect unusual patterns, identify threats, and provide real-time protection. The **Data Analytics Department** uses AI for data processing, trend prediction, and business intelligence reports. Together, these departments demonstrate how AI has become an essential asset across the organisation.

AI provides significant benefits to the organisation. It increases productivity, reduces manual workload, improves accuracy, and enables faster software release cycles. Developers can focus on creative problem-solving while AI handles repetitive tasks. However, AI also has drawbacks. Implementing AI tools can be expensive, and organisations require skilled staff to manage them. AI systems may produce errors if the data fed into them is biased or incomplete. There are also concerns about job displacement, over-reliance on automation, and ethical challenges regarding data privacy.

Looking ahead, AI is expected to evolve further and reshape software development even more deeply. Future AI technologies may allow fully automated testing pipelines, intelligent project management, advanced predictive modelling, and more personalised digital services. These developments will impact software departments by requiring continuous upskilling, stronger collaboration with data science teams, and new ethical frameworks. Overall, the future of software development will depend strongly on how organisations strategically adopt and manage AI innovations.

Proposed Solution

This project is based on a **pragmatic research philosophy**, meaning it focuses on real problems faced by the computing industry and practical solutions that can improve software development. The motivation behind this study comes from observing how rapidly technology changes and how important it has

become for developers to adopt new tools like AI to stay competitive. The expectation from this research is to gain a better understanding of how AI-based tools can support development tasks, reduce errors, and enhance efficiency. By investigating the strengths and weaknesses of AI, this project aims to create recommendations that software teams can apply when choosing AI tools for coding, testing, and debugging. The problem this research attempts to solve is the challenge many organisations face when integrating AI into their existing systems. Developers often struggle with unfamiliar tools, data integration issues, or unclear long-term outcomes. This research is motivated by the need to understand how these issues can be reduced and how AI can be implemented in a structured and effective way.

Research Tools, Technologies and Resources

I. Research Tools & Sources

To collect relevant data for this project, several research tools and academic databases were used.

- **Google Scholar** was used to find peer-reviewed articles on AI in software development. Search keywords included “AI in software engineering,” “automated testing,” and “machine learning for debugging.”
- **IEEE Xplore** provided technical papers on computing innovations and AI algorithms.
- **Microsoft Learn & IBM Research** were used to gather industry-focused information about AI implementation.
- Search strategies included Boolean operators such as:
 - *AI AND software development*
 - *machine learning OR automation*
 - *AI impact NOT robotics*

To check the credibility of sources, the publication year, author qualifications, citations, and publisher reputation (e.g., IEEE, Elsevier, Springer) were carefully reviewed.

II. Technologies Considered

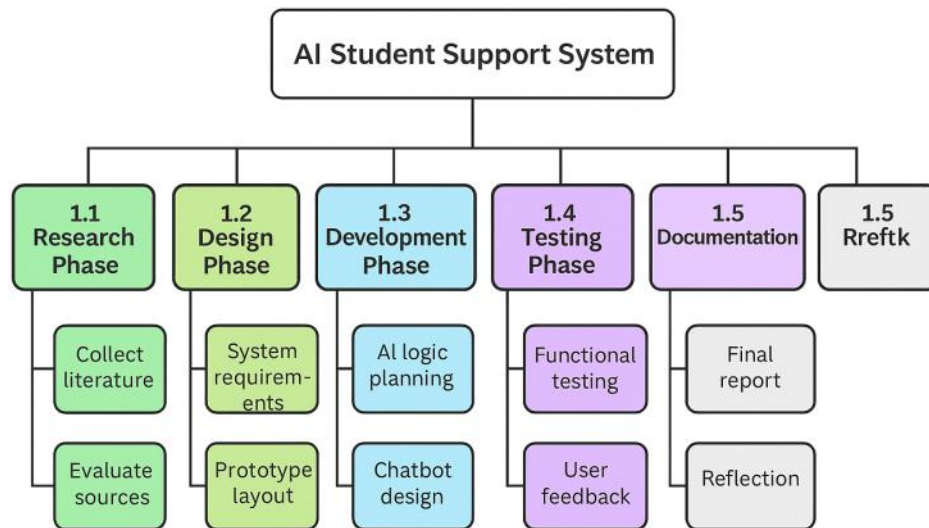
To implement the project idea, the following technologies are considered:

- **AI-powered code assistants** (GitHub Copilot, ChatGPT Code Interpreter)
- **Automated testing tools** (Selenium with AI support)
- **Machine learning libraries** (TensorFlow, Scikit-learn)
- **Cybersecurity AI frameworks** (IBM QRadar, Microsoft Defender AI)

These technologies help examine how AI enhances development and testing processes.

Task Schedule

Work Breakdown Structure (WBS)



Project Timeline

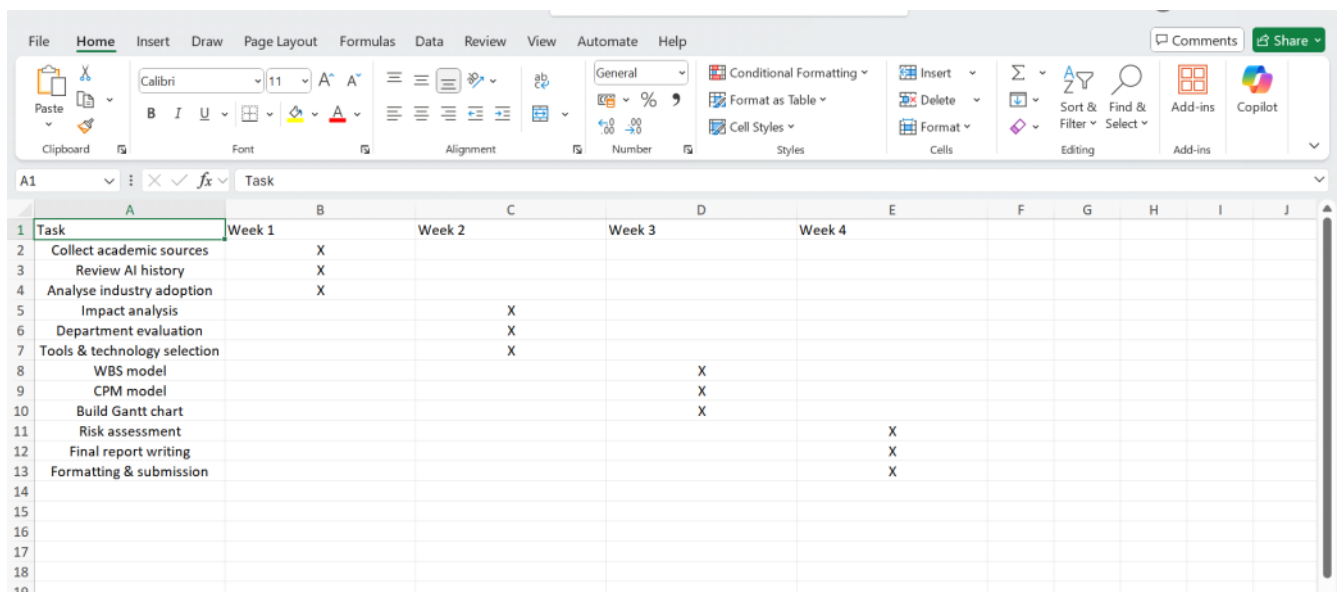
Critical Path Method (CPM)

The CPM model helps identify the sequence of tasks that must be completed on time for the project to finish successfully. For this project, the critical path includes:

- Research & Literature Review →
- Impact Analysis →
- Technology Evaluation →
- Gantt Chart Development →
- Report Writing

Any delay in these tasks will delay the entire project.

Gantt Chart Screenshot



Risk Assessment

Potential Risks

- Lack of accurate or up-to-date sources
- Difficulty in understanding technical AI tools
- Time-management challenges
- Data privacy concerns in AI tools
- Technical issues using software tools

Risk Mitigation

- Use verified academic databases
- Allocate weekly research time
- Seek alternative credible sources when needed
- Use secure AI platforms with strong privacy policies
- Back up all work on OneDrive

Innovation

Paragraph 1 – Summary of Topic 1 (Unit 1 on Moodle)

Topic 1 of Unit 1 introduces how innovation shapes the world and explains three key concepts: *Innovation is Everywhere*, *The Onward March of Technology*, and *Creativity and You*. In the first section, the content highlights that innovation exists in everyday life, not only in major inventions. Even small improvements to daily tools, services, or processes count as innovation because they add value and solve problems. The second section focuses on the fast and constant progress of technology. It explains that technology moves forward in a continuous cycle, replacing old methods and creating new opportunities in industries, education, healthcare, transportation, and communication. The third section, *Creativity and You*, emphasises that creativity is not limited to a few people. Instead, it is a skill that everyone can develop through practice, curiosity, and problem-solving. The main message of Topic 1 is that innovation and creativity work together and influence how society grows and how individuals become more capable and confident in facing new challenges.

Paragraph 2 – How innovation shapes society and individuals

Innovation plays an important role in transforming societies by improving quality of life and offering solutions to both old and new problems. Many changes that we see around us today from smart devices to digital banking and online learning exist because someone recognised a need and created a new idea. Innovation encourages economic growth, helps businesses become more efficient, and supports better services for communities. On a personal level, innovation and creativity help individuals develop confidence, improve their problem-solving skills, and discover new opportunities. When people learn to think creatively, they become more adaptable and open to change, which is important for modern workplaces. Innovation therefore shapes both society and the individual by encouraging continuous learning, improvement, and progress.

Paragraph 3 – Example Technology: Artificial Intelligence in the Computing Industry

One technology that is creating major innovation in the computing industry is Artificial Intelligence (AI). AI is now used across many areas within this industry. In software development, AI-powered tools help developers identify errors, generate code suggestions, and speed up the development process. This reduces workload and increases productivity. In cybersecurity, AI systems analyse online behaviour, detect suspicious activity, and prevent cyberattacks.

faster than traditional methods. In customer service, many companies use AI chatbots to assist customers at all times. AI is also commonly used in data analytics, where it analyses large volumes of data to identify trends and support decision-making. Because of these contributions, AI has become a key driver of innovation in computing and continues to transform how organisations operate.

Ideation

Project Title:

AI-Enhanced Smart Student Support System

Aim of the Project:

To design a digital support system that uses Artificial Intelligence to help students with personalised study assistance, time-management, and access to academic resources.

Objectives:

1. To investigate how AI technologies support learning and problem-solving.
2. To analyse how AI is used in education systems around the world.
3. To identify how AI can improve student experience in higher education.
4. To develop a simple prototype or design idea for an AI-based student support system.
5. To evaluate both the benefits and potential drawbacks of using AI tools in education.

Brief Description of the Project Idea:

This project focuses on designing a smart support system that uses AI to provide personalised recommendations, reminders, learning tips, and access to university information. The system will help students manage deadlines, organise tasks, and receive instant academic support.

1. History of the Technology

Artificial Intelligence began in the 1950s when early researchers developed the first algorithms for machine learning. Over time it expanded with better computing power, larger datasets, and advanced neural networks. Today AI is used in almost every major industry.

2. How different industries use AI worldwide

AI is used globally in healthcare (diagnosis support), finance (fraud detection), transportation (self-driving systems), retail (customer analytics), and education (adaptive learning platforms). Countries like the UK, USA, China, and Germany use AI widely across public and private sectors.

3. Impact of AI on the Education Industry

AI provides personalised learning, automates administrative tasks, supports student monitoring, and improves online learning platforms. Universities use chatbots for enquiries, AI tools for plagiarism checks, and smart systems for academic planning.

4. Contribution of this Project to the Modern World

The proposed AI-based student support system can help learners manage their studies more effectively, reduce stress, and enhance academic performance. It also contributes to the growing need for smarter, more personalised digital education tools.

5. Positive and Negative Impacts of AI

Positive impacts:

- Faster access to information
- Personalised study recommendations
- Automated assistance
- Improved accuracy and organisation

Negative impacts:

- Risk of over-dependence
- Privacy concerns
- Limited human interaction
- Requires reliable data

6. Challenges in Implementing AI in Education

Challenges include high development costs, data protection regulations, training requirements, and ensuring accuracy in AI responses. Educational institutions must ensure that systems are secure and fair for all students.

7. Benefits for Stakeholders

Students benefit from personalised support, lecturers benefit from reduced workload, universities benefit from improved efficiency, and the overall learning environment becomes more organised and student-friendly.

Research Sources (3–5 key sources)

1. McKinsey & Company – “The State of AI in 2023.”
2. OECD – “AI in Education: Opportunities and Challenges.”
3. PwC – “AI Predictions Report 2024.”
4. J. Tidd & J. Bessant – *Innovation and Entrepreneurship*, 2020.
5. UNESCO – “AI and the Future of Learning,” 2023.

Development Method

Software development projects are typically organised around a structured process known as the Software Development Life Cycle (SDLC). Several SDLC models are commonly used in industry, each offering different advantages depending on the size and nature of the project. One of the earliest models is the **Waterfall model**, which follows a strictly linear sequence of phases: requirements, design, implementation, testing, deployment, and maintenance. Although Waterfall is easy to understand, it lacks flexibility because teams cannot return to previous stages once a phase is completed. This makes it less suitable for projects that require ongoing changes or experimentation.

A more flexible model is the **Agile methodology**, which is based on iterative development. Instead of following a fixed sequence, Agile breaks the project into small cycles known as sprints. Each sprint contains planning, development, testing, and review activities. Agile encourages continuous feedback, collaboration, and adaptation. Because requirements can evolve during the project, Agile is especially useful for research-based or technology-driven work. Many software teams prefer Agile because it supports quick adjustments, reduces risk, and keeps the project aligned with user needs.

Another model is the **Spiral model**, which combines aspects of Waterfall and iterative development. Spiral emphasises risk assessment at every iteration, meaning the team constantly reviews potential challenges before moving forward. While this model is highly thorough, it can be complex and time-consuming.

A modern alternative is the **DevOps model**, which integrates development and operations roles. DevOps focuses on automation, continuous integration, and fast deployment. It is widely used in large organisations, especially where frequent updates are required.

For this project, **Agile** is chosen as the most suitable development method. Since the project involves analysing AI-based tools, reviewing their impact, and refining the findings, an iterative method is essential. Agile allows continuous review of research sources, updating findings based on new information, and improving the design elements through multiple cycles. Compared to Waterfall, Agile provides greater flexibility; compared to Spiral, it is simpler and more practical for academic research; and compared to DevOps, it is easier for a student-level project. Therefore, Agile is selected because of its adaptability, simplicity, and strong suitability for research-focused work (Sommerville, 2016).

Design

The design phase of the project includes two preliminary design works that support the analysis of AI in software development. These designs help clarify system expectations and the flow of activities.

A basic Requirements Specification is created to outline the key functionalities relevant to an AI supported development environment. The table includes both functional and non-functional requirements:

ID	Requirement Description	Priority	Type
1	Data collection for project research	High	Functional
2	AI code assistant integration	High	Functional
3	Automated AI-based testing	Medium	Functional
4	Secure handling of research data	High	Non-functional

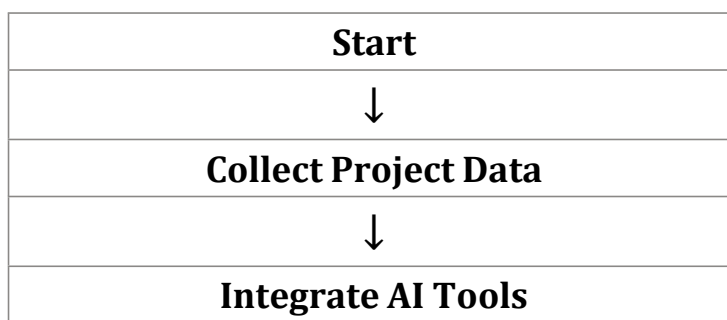
These requirements reflect the core stages used in this research: gathering information, analysing AI tools, and evaluating their testing capabilities.

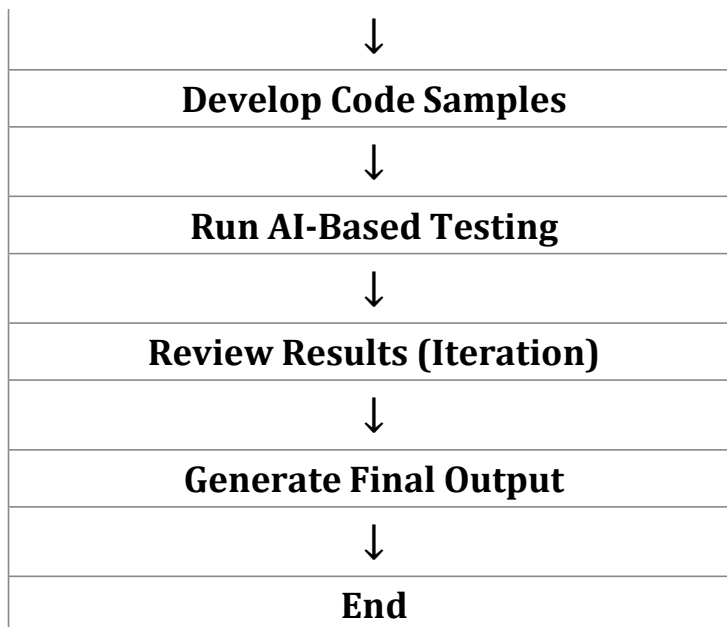
Design Work 2

To illustrate the overall flow of the project, a simple UML Activity Diagram is created. It outlines how project data is collected, how AI tools are integrated, and how evaluation is performed. The diagram includes the following activities:

- **Start**
- Collect Project Data
- Integrate AI Tools
- Develop Code Samples
- Run AI-Based Testing
- Review Results (Iteration)
- Generate Final Output
- **End**

This activity diagram demonstrates the iterative nature of the project, reflecting the Agile method. The review stage feeds back into earlier activities, showing that improvements can be made in multiple cycle





Conclusion

The analysis of SDLC models showed that Agile is the best option for a research-oriented academic project. Its iterative nature supports continuous refinement, which is essential when evaluating modern technologies such as Artificial Intelligence. The design work, including the Requirements Specification and UML Activity Diagram, provides a clear structure for examining how AI tools interact with software development tasks. Overall, the development method and design elements help organise the project effectively and support a deeper understanding of AI's impact on the software development process.

References

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- [2] K. Schwaber and J. Sutherland, "The Scrum Guide," 2020.
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