

Project Proposal 1

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ACCA5033 — *Changemakers: Creativity and Value Creation*

Assignment 1

Project Proposal

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Task 1: Ideation & Mind Map

Q1 : Mind Map: Innovation, Creativity and Society

A major factor in the progression of society is innovation. According to Maki-Patola et al., innovation in technology, like artificial intelligence (AI) and machine learning, is changing industries and the creation of value in the world. The following mind map will explore the key concepts of Unit 1, Topic 1 in the module How Innovation Shapes the World in relation to a project idea based on personal interests in the BSc computing program [1].

The center of the mind map is the project: an AI chatbot for small business customer support. Surrounding this central concept are six main branches, each representing a major theme of this unit.

The first branch is **Innovation and Society**, which considers the impact of creativity and ideas on the world. Design thinking is a systematic approach to problem-solving from a human perspective. It is a way for individuals and companies to take ideas and turn them into reality through a repeated process of making and testing prototypes. This is the way the chatbot project will be developed: starting with the needs of the user and refining the product based on user feedback[1].

The second branch is focused on **Technology and AI**. The main technologies driving today's AI-based chatbots include NLP, ML, and automation technologies. According to Gill and VanBoskirk, the pace of digital transformation is accelerating in all industries. AI-based tools play a critical role in the way companies operate and compete. It is essential to understand the technologies driving AI-based tools for any student of computer studies who wishes to build innovative solutions [2].

The third branch focuses on the **Delivery of Business Value**, a factor that is especially critical for a small business, where customer service can be expensive and time-consuming. Here, the AI chatbot offers a very attractive opportunity, one where the bot can be available 24/7, reducing the cost of hiring human customer support staff and significantly reducing response times.

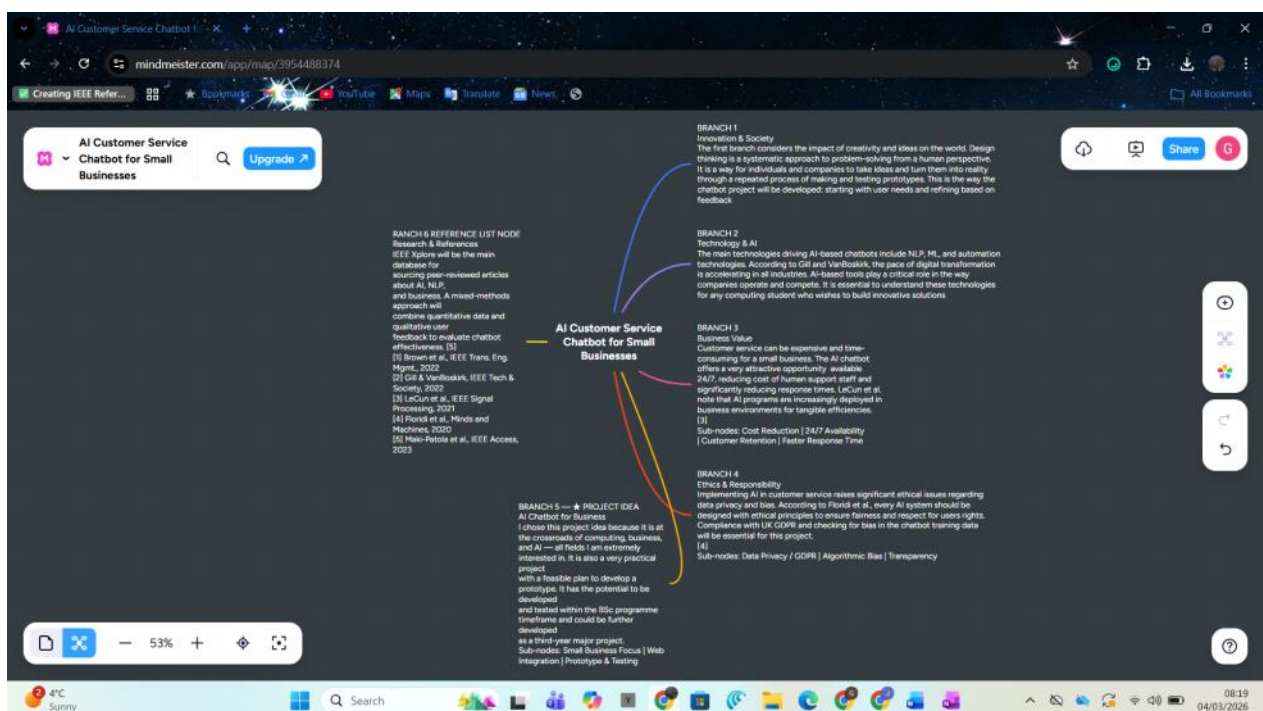
LeCun et al. note that AI programs are increasingly being deployed in business environments, where they can be utilized for the achievement of tangible efficiencies. This third branch of the project ties the technical aspects of the project directly to the business world[3].

The fourth area includes **Ethics and Responsibility**. Implementing AI in customer service roles raises significant ethical issues regarding data privacy and bias in the system. According to Floridi and colleagues, every AI system should be designed in accordance with ethical principles to ensure fairness and respect for the rights of users. For the project, compliance with the UK General Data Protection Regulation and checking for bias in the training data of the chatbot will be essential [4].

The fifth section, **Research and Data**, will describe the methods and data used in the project. The main data source for finding peer-reviewed articles about AI, NLP, and business will come from IEEE Xplore. The method of evaluating the effectiveness of the chatbot will use a combination of data (quantitative) and feedback from users (qualitative)[5].

The sixth and final branch is the Project Idea itself: An AI Customer Service Chatbot for small businesses. I chose this project idea because it is at the crossroads of computing, business, and AI all fields I am extremely interested in. It is also a very practical project with a feasible plan to develop a prototype. It has the potential to be developed and tested within the timeframe of the BSc programme and this has the potential to be further developed as a third-year major project.

In other words, the mind map demonstrates the interrelationship between innovation, digitalization, ethical considerations, and business value. The chosen project idea on creating a business customer service chatbot using AI is relevant to the above mentioned topics and forms a suitable foundation for the research and development activities described in Tasks 2 and 3.



Q2 Selected Project Idea

The project selected for further development in this proposal is: An AI-Powered Customer Service Chatbot for Small Businesses. This project was selected for development in the proposal because it aligns well with the BSc Computing program, has a well-defined and feasible scope, and addresses a critical need for small businesses who do not have large customer service teams.

Most businesses in the UK are small and medium-sized enterprises, and they face the problem of providing consistent good customer service, as they are not well-equipped to manage this. A well-designed AI chatbot can be created to assist the business on the website or on social media, answering common customer queries, thereby improving the overall customer experience. This project integrates NLP, web development, and business analysis, making it an ideal way to demonstrate computing skills.

This concept represents the focal point of the mind map, with all six branches radiating to this concept. This concept represents the focal point of the aim, objectives, research philosophy, and data collection to be described in Tasks 2 and 3.

Task 2 : Aim objectives and Research Area

Q1 Project Aim and Objectives

Aim

The goal of this project is to build an AI-based customer service chatbot for small businesses. This will enable the business to respond to common customer inquiries on its own and provide quick and accurate information to customers through a chat interface on the website.

Objectives

To conduct a systematic review of the current AI chatbots that are being utilized for business customer service and identify the main gaps and limitations.

To design a system to create a chatbot that uses NLP, recognizes user intent, and responds automatically.

To develop a working prototype of the chatbot that can be embedded into a business website using a suitable web development framework.

To evaluate the chatbot's usability and performance through structured user testing with small business owners and their customers.

To assess the ethical and legal implications of deploying AI chatbots in a business context, including data protection and algorithmic bias.

These goals follow a logical progression from review to design, development, evaluation, and ethical reflection, in accordance with traditional research methodologies in software engineering[6].

Q2 Research Philosophy

This project will use a pragmatic research philosophy. Pragmatism believes that no single philosophical approach can adequately account for the complexity of the problem, and that

the best approach will use a combination of numbers (quantitative) and descriptions (qualitative), depending on what best answers the research question[7].

This makes sense when we consider a computing project that will consider both the outcomes like the precision and speed of the chatbot) and the way people feel about it (like the satisfaction and ease of use. Being practical will also make the research more malleable and practical by considering what works best instead of adhering to one way of doing things[8].

Ontologically, this project agrees with the fact that reality has many dimensions and the success of the chatbot will be measured by both how well it performs and how it is perceived. Epistemologically, we will seek knowledge by conducting tests and observing how the users behave[8].

Q3 Search Tools, Databases and Search Strategies

A structured approach to identifying relevant literature is essential to building a credible evidence base. The following databases and strategies have been selected.

IEEE Xplore Digital Library is the main source for this project. It provides access to peer-reviewed journals, conference papers, and technical standards on AI, NLP, and software engineering. Searching the database using keywords such as "AI chatbot customer service," "NLP small business," and "evaluation of conversational AI" revealed a significant number of relevant publications from 2020 to 2025.

For the search of information regarding human-computer interaction and the usability of chatbots, the ACM Digital Library was utilized. [10] Google Scholar was also utilized as a secondary tool for the search of grey materials regarding the adoption of AI by small and medium-sized enterprises. [9]

Search strategies employed the use of Boolean search terms such as AND, OR, and NOT, for example: ("AI chatbot" OR "conversational agent") AND ("small business" OR "SME") AND ("customer service" OR "helpdesk"). All the search strategies were conducted using publications from 2020 onward. In addition, the snowballing search strategy was also employed, whereby the references of key papers were also searched for more relevant information[10].

Task 3: Research Strategies

Q1 Validity, Reliability, Generalisability and Ethical Considerations

The quality and trustworthiness of research depends on four key dimensions: validity, reliability, generalisability, and ethical considerations. Each is addressed below in the context of this project.

Validity

Validity means that the study is indeed measuring what it claims to be measuring. Internal validity will be enhanced by the use of different data sources, which include user surveys, usability tests, and system performance logs. External validity will be enhanced by the use of a diverse group of participants, which include small business owners and customers from different sectors and age groups[11].

Reliability

Reliability means that the results will be consistent. For example, all the usability tests will be conducted in the same way. In other words, the tasks will be the same for all participants. The performance of the chatbot will be measured in terms of its accuracy, precision, recall, and F1 score. In order to make the results reliable for the qualitative research, two people will be used to code the results [11].

Generalisability

The first prototype will be designed for a specific business environment, and this may not help in the overall application of the results. But by using existing NLP frameworks and documenting all decisions, the aim is to develop guidelines that can be extended to other areas and scenarios in business[12].

Ethical Considerations

All user tests will require informed consent, and the user will be made aware that they can stop at any time. The data collected from the tests will be anonymous and will be kept safe according to UK GDPR regulations. The chatbot will handle user data minimally and will be transparent about the fact that the user is interacting with a machine and not a human[12].

Q2 Research Strategies and Data Collection Methods

The approach is mixed methods, using numbers and stories. The overall approach is design science research (DSR), with the chatbot as the artefact to be created and as the means to develop new knowledge about AI in a business context.

A mixed method will be used, utilizing both numerical and descriptive data. The overall approach will be design science research (DSR), with the chatbot being the artifact and the way to learn about AI in a business environment.

Pilot Data Collection

There was a small pilot study done on the research tools before they were used on a large scale. There was a short survey administered to five people, some of whom are small business owners and others who are online shoppers, to ask them about their experience with customer service chatbots, the way they like to communicate, and what worries them about communicating with AI[13].

The key findings from the pilot study were that all the participants, who were five in total, would use the chatbot if the information provided is accurate and quick, three participants were concerned that the chatbot may not be able to handle complex or emotional questions, and two participants believed that it must be easy to reach a human. This led to the following design changes: the need to have a clear button to talk to a human, and the need to have a better intent classification model to handle different types of questions. The survey and the results are shown in Appendix A[13].

Q3 Quantitative and Qualitative Analysis

Quantitative Analysis

Quantitative analysis means collecting numbers and analyzing them with statistics. In our project, we will use quantitative analysis to measure the efficiency of the AI model in its technical performance as well as user satisfaction.

The performance of the model would be evaluated based on standard metrics for NLP. Accuracy would measure the total accuracy of correct responses, whereas precision and recall would measure the accuracy of finding the correct intent without any false matches. The F1 measure is a weighted average of precision and recall, providing a single number for model performance, especially when query types are not equally represented.

To assess user satisfaction, the System Usability Scale, which is a reliable ten-question survey with a score range of 0-100, will be used. Satisfaction scores above 68 indicate above-average usability. Descriptive statistics, including the mean, median, and standard deviation, will be used, and t-tests will be used to compare user groups.

Qualitative Analysis

Qualitative analysis will be used to interpret the richer, non-numerical data gathered through interviews and open-ended survey responses.

The main method used in this research is thematic analysis, and the framework used is Braun and Clarke's six-phase framework. This means that we have to get to know the data, create initial codes, look for themes, check and refine themes, name and define themes, and finally, write up the final analysis. This method allows us to gain an understanding of the way users perceive the chatbot in a real business context[14].

Additionally, content analysis of anonymized chat logs will be used to identify the most common types of customer queries. This, in turn, can directly inform improvements to the chatbot's intent list and response quality.

The methods, both in terms of numbers and descriptions, provide a clear and fair evaluation of the chatbot. It looks at how good the chatbot is technically and how good it is in terms of small businesses and their customers.

Appendix A: Pilot Study Survey and Feedback Summary

Pilot Survey Questions

- 1.) Have you ever used a customer service chatbot on a business website? (Yes / No)
- 2.) How satisfied were you with the experience? (1 = Very unsatisfied, 5 = Very satisfied)
- 3.) What features matter most to you in a chatbot? (Select all that apply: Speed / Accuracy / Ability to 4.) escalate to human / 24/7 availability / Other)
- 5.) What concerns, if any, do you have about chatbots handling your personal data?
- 6.) What types of questions do you most commonly ask when contacting a business? (Open response)

Summary of Pilot Feedback

There were five people who joined the pilot, including three small business owners and two regular online shoppers. The main findings are as follows: All five people would use the chatbot for simple questions, provided it gives quick and correct answers. Three people had concerns regarding the chatbot failing on complex and emotionally charged questions. Two people had concerns regarding having a way to talk to a real person. Two design changes are suggested "add a 'talk to a human' option and use a broader intent classification model." Ask away for full raw responses.

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