

Software Requirements Engineering

Project Proposal

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About Project

RequirementSage shall be an innovative and intelligent chatbot designed to streamline the critical process of software requirements gathering. It leverages cutting-edge Natural Language Processing (NLP) and Machine Learning (ML) techniques to interact with stakeholders and extract comprehensive software requirements through natural, conversational interactions. The chatbot shall automate the process of requirements gathering for small-scale projects.

1. Main Features

F-1.1 User Account Management

This feature shall allow users to create and manage their accounts within the software. User account management shall be an essential part of gathering requirements because it can help identify and track user preferences and feedback.

F-1.2 Requirements Gathering via Chat

This shall be a core feature of the software. It shall enable users to interact with the software to discuss and specify their software requirements. This shall use Natural Language Processing (NLP) for asking questions, providing information, and receiving clarifications from the user to ensure that the requirements are well-understood and documented.

F-1.3 Project Proposal Generation

This feature shall automatically generate a project proposal document. It shall include details like project scope, objectives, timelines, features, and other relevant information based on the input received during the requirements-gathering process.

F-1.4 Requirements Listing

This feature shall serve as the initial step in documenting software requirements. It shall involve compiling the list of all the identified software requirements during the requirements gathering phase and providing the user with that list.

F-1.5 Creation of Software Requirement Document (SRD)

This feature shall involve the comprehensive documentation of all the software requirements in a structured and detailed manner. It shall include a thorough description of each requirement and the relation between them and provide the user with that document.

F-1.6 User Feedback Collection

This feature shall focus on gathering feedback from the user and based on that feedback it shall give the updated version of the requirement listing and software requirement document.

2. Scope of the Project

2.1 Business Goal and Objectives

- **2.1.1** The primary objective is to automate the process of gathering requirements for users in the context of small-scale projects.
- **2.1.2** Reduce the effort and time required for the requirements-gathering phase for small-scale projects.
- **2.1.3** Summarize the requirements to enhance user satisfaction for small-scale projects.
- **2.1.4** Enable real-time generation of documentation to minimize user effort specifically for small-scale projects.

2.2 Project's Goal and Objectives

- **2.2.1** Ensure that the chatbot has a fair understanding of human language and phrases for small-scale projects.
- **2.2.2** Enable the chatbot to understand synonyms, misspelled words, and context related to requirements for small-scale projects.
- **2.2.3** Recognize user intent accurately to tailor requirements for the specific situation in small-scale projects.
- **2.2.4** Enable the chatbot to categorize and organize entities related to each other for small-scale projects.

2.3 Project Assumptions

- **2.3.1** Assume that users have a reliable internet connection for accessing the chatbot.
- **2.3.2** Prioritize chatbot design and performance to avoid user dissatisfaction, recognizing that an unreliable chatbot can have negative consequences for small-scale projects.

2.4 Project Deliverables

- **2.4.1** Provide clear instructions to users on how to interact with the chatbot during their first interaction. These instructions should be tailored to small-scale projects.
- **2.4.2** Develop predefined scripts as functional requirements to confirm and validate discovered and generated requirements for small-scale projects.
- **2.4.3** Continuously validate the chatbot's functionality during its development, training, and ongoing operations, with a focus on small-scale project requirements.

2.5 Limitations and Constraints

- **2.5.1** The project focuses on incorporating AI and NLP approaches to cater specifically to small-scale projects.
- **2.5.2** Acknowledge the limited time available for development, training, and operations, which may affect project timelines. Emphasize efficiency for small-scale projects.
- **2.5.3** Recognize that handling a large number of users might impact the system's efficiency due to potentially underpowered systems. However, this should be less of a concern given the focus on small-scale projects.

This chatbot shall be only limited to requirements gathering of small-scale projects in the initial phase because of the complexities of the requirements gathering of large-scale projects. To clarify the scope, below are two examples of how the chatbot would interact with the user, what kind of questions would it ask, and what kind of responses would be generated by it.

Example-1: An E-commerce Store

Chatbot: Hello! How can I assist you today?

Client: Hi there! I'm looking to build some software, and I could use some guidance.

Chatbot: Of course! I'd be happy to help. Let's start by getting a better understanding of your project. Could you tell me what type of software you have in mind?

Client: Sure, I'm thinking of developing an e-commerce store.

Chatbot: Great! E-commerce stores can vary quite a bit. Can you provide more details about your store? What products or services will you be selling?

Client: I plan to sell handmade jewelry and accessories.

Chatbot: Wonderful! Handmade jewelry and accessories sound unique. Are you planning to offer a wide range of products, or do you have a specific niche in mind?

Client: I'd like to start with a small selection, maybe around 20 different items, and then expand as the business grows.

Chatbot: That sounds like a good plan for a small-scale project. Are you interested in any specific features for your e-commerce store, such as online payments, user reviews, or newsletter signups?

Client: Yes, I definitely want online payments, and it would be great to have user reviews as well. Newsletter signup is something I hadn't thought of, but it sounds like a good idea.

Chatbot: Excellent! Online payments and user reviews can enhance the customer experience. For the newsletter signup, do you have any specific email marketing tools or platforms in mind?

Client: I'm open to suggestions, but I've heard MailChimp is a good option.

Chatbot: That's a popular choice. We can integrate with MailChimp for your newsletter. Speaking of integration, do you have any existing systems or tools you'd like to integrate with your e-commerce store, such as inventory management or social media sharing?

Client: Not at the moment, but I might consider social media integration later on.

Chatbot: Understood. We can keep that in mind for future enhancements. Are there any design preferences you have for your e-commerce store? For example, do you have specific colors or styles in mind?

Client: I'm thinking of a clean and modern design, maybe with pastel colors to match the jewelry theme.

Chatbot: That sounds lovely! Finally, do you have a timeline in mind for this project, and is there a specific budget you'd like to work with?

Client: I'm hoping to launch the store within three months, and I have a budget of around \$10,000 for the initial development.

Chatbot: Thank you for providing those details. It gives us a good starting point. We can definitely work within your budget and timeline. Is there anything else you'd like to add or any specific questions you have at this stage?

Client: Not right now, but I appreciate your help in gathering these requirements.

Chatbot: You're very welcome! We'll use these requirements to create a project proposal for you. If you have any more questions in the future or need further assistance, please don't hesitate to reach out. Good luck with your e-commerce store project!

Client: Thank you! I'm looking forward to it.

Example-2: A software for a small photography business

Chatbot: Hello there! How can I assist you today?

Client: Hi! I'm looking to develop some software for my small photography business.

Chatbot: That sounds exciting! Could you provide more details about the software you have in mind for your photography business?

Client: Sure thing. I'd like to create a simple website where I can showcase my photography portfolio and allow clients to book photography sessions.

Chatbot: Great! Let's dive deeper into this. What kind of photography services do you offer, and how many different types of sessions do you have in mind?

Client: I specialize in family portraits and engagement sessions. So, I'd need two main categories.

Chatbot: Understood. In addition to showcasing your portfolio and booking sessions, are there any other features you'd like to include on your website?

Client: Yes, I'd like a contact form for inquiries and a place to display client testimonials. A blog could be a future consideration.

Chatbot: Those are valuable additions to your website. Regarding booking sessions, do you have any specific requirements in mind, such as allowing clients to select dates and times, or offering different packages with pricing options?

Client: Yes, I'd like clients to be able to view available dates and times and choose the package that suits them.

Chatbot: Perfect! How do you plan to handle payments for booking sessions? Would you like to integrate payment processing into the website?

Client: Yes, I'd prefer to have online payment processing to secure bookings.

Chatbot: That makes sense. Are there any particular design preferences you have for your photography website? Any specific colors or styles you'd like to incorporate?

Client: I want a clean and elegant design, mostly black and white with a pop of color to highlight my photos.

Chatbot: Sounds like a classic and sophisticated choice. Lastly, do you have a timeline in mind for this project, and have you set a budget for the development of your photography website?

Client: I'd like to have the website up and running within two months, and I have a budget of around \$5,000.

Chatbot: Thank you for sharing those details. This will help us create a tailored solution for your photography business. If you have any more questions or additional information you'd like to provide in the future, please feel free to reach out. We look forward to working on your photography website project!

Client: Thank you! I'm excited to get started on this project.

3. Feasibility Study

3.1 Technical Feasibility

3.1.1 NLP capabilities:

- **3.1.1.1 Pre-trained Language Models:** Several pre-trained language models like GPT-3, BERT, and RoBERTa excel in understanding and generating human-like text. These models can be fine-tuned for specific tasks, including chatbot interactions.
- **3.1.1.2 Transfer Learning:** Transfer learning techniques shall be used to leverage pre-trained models, reducing the amount of labeled data required for training and improving chatbot performance.

3.1.2 Data and Annotation:

- **3.1.2.1** Gathering and annotating training data is a crucial step. We shall need a dataset of software-related conversations and user queries to train our chatbot effectively.
- **3.1.2.2** Crowd-sourced platforms like Kaggle and Amazon Mechanical Turk and tools like Prodigy shall assist in data collection and annotation.

3.1.3 Computing Resources:

Heavy computational resources shall be needed to train the chatbot. For this purpose, we shall use **Google Colab** which comes with free GPU and TPU support.

3.2 Financial Feasibility:

The budget for the project is minimal so it shall deliver just an initial workable product that shall also be proof of concept. It shall not be a full-fledged application built to target the actual market audience.

3.3 Market Feasibility:

- **3.3.1 Market Demand:** The Global Chatbot Market size is estimated at **USD 5.86** billion in **2023**, and is expected to reach **USD 21.08** billion by **2028**, growing at a **CAGR of 29.18%** during the forecast period (**2023-2028**).

3.4 Competitor Analysis:

The chatbots or frameworks that are already available in the market that can be used for requirements gathering are as follows:

1. **Talla:** Talla is an AI-powered chatbot that can assist in software requirements gathering by engaging with stakeholders, asking relevant questions, and documenting the gathered information.
2. **Zoho Sprints:** Zoho Sprints offers a chatbot feature that can help gather requirements and manage agile software development projects.
3. **Jira Assistant:** Some third-party plugins for Atlassian Jira, like "Jira Assistant," provide chatbot functionality for gathering requirements within the Jira environment.
4. **Witlingo:** Witlingo is a platform for building voice and chatbot applications. It can be customized to gather software requirements through voice or text-based interactions.

5. **Dialogflow:** Dialogflow by Google allows you to create conversational agents (chatbots) that can be used for requirements gathering through natural language conversations.
6. **Microsoft Bot Framework:** This framework allows users to build chatbots for various purposes, including software requirements gathering, using Microsoft technologies.
7. **Botpress:** Botpress is an open-source chatbot platform that can be customized to create chatbots for requirements gathering and other tasks.
8. **Twilio Autopilot:** Twilio Autopilot is a platform for building chatbots and virtual assistants that can be used to interact with stakeholders and gather software requirements.
9. **Conversational UI Frameworks:** You can also build custom chatbots for requirements gathering using frameworks like Rasa, Bot Framework, or custom development using Python, Node.js, or other programming languages.

	AI Powered Chatbots↔				
Features↕	Talla	Zoho Sprints	Jira Assistant	Witlingo Most Competitive	Requirements Sage [Expectations]
User Account Management	✓	✓	✓	✓	✓
Requirements Gathering via Chat	✓	✗	✓	✓	✓
Project Proposal Generation	✗	✗	✓	✓	✓
Requirements Listing	✗	✓	✓	✗	✓
Creation of Software Requirement Document (SRD)	✗	✓	✗	✓	✓
User Feedback Collection	✓	✓	✓	✓	✓

3.5 Resource Availability:

- **3.5.1 Skilled Workforce:** The team members working on the products are the newbies in the industry who just have some basic understanding of NLP and Software Engineering. The workforce isn't skilled so they might use internet resources to assist them.
- **3.5.2 Timeframe:** The deadline to deliver the product is **November 2023**. All the processes of training and testing of the product shall be completed before the deadline to ensure the delivery of a seamless and flawless product before the deadline.

3.6 User Acceptance:

- **3.6.1 User Training:** Users shall be given brief training on how to effectively use the chatbot before actually using it. They shall also be informed about the limitations of the chatbot.
- **3.6.2 User Testing:** A few surveys and interviews shall be conducted once the product is delivered to get feedback from the users on how efficient the product is and what improvements should be made to make it even better.

3.7 Scalability Plan:

A scalability plan shall be developed to scale the product for the growing audience once the product starts serving the users.

3.8 Risk Assessment:

- **3.8.1 Identification of Risks:**

R-3.8.1.1 The major risk that shall be assessed is the quality of replies the chatbot delivers. Since we are trying to replace the verbal conversation with the textual conversation, there shall be certain limitations in understanding what type of requirements the user is thinking. This shall be a major hindrance in the conversation between the chatbot and the user.

R-3.8.1.2 Another risk that shall be involved in the project is the lack of user adoption. Since we are trying to automate the process of requirements gathering which is typically done by human resources, the market shall not adopt it because of its new trend.

- **3.8.2 Mitigation Strategies:**

3.8.2.1 The chatbot shall ask the user repeatedly about a requirement until and unless it is not narrowed down enough. Then the chatbot shall ask the user to confirm whether it is what they want or if they want to make more changes. The chatbot shall also make use of examples to understand what type of requirements the user wants. The chatbot shall also make sure that all the requirements are linked with each other to ensure the quality of the final product.

3.8.2.2 To cope with the second risk, the team shall advertise the chatbot in a way that proves that eliciting requirements with the help of the chatbot is faster, uses less resources, and automates the task of requirements gathering to save time. Some demos for the working of the product shall be conducted in this regard.

3.9 Prototype or Proof of Concept:

An initial prototype or proof of concept shall be made to gather user feedback on the working of the chatbot and test the feasibility of the technical approach.