The University of Hong Kong

Department of Computer Science

COMP4801 Final Year Project

Detailed Project Plan

IntelliTrack: AI Project Manager

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Abstract

Most modern companies are adapting to the agile approach in software development by breaking projects down into components and having the developers working in continuous collaboration. In practical situations, a team might encounter different operational problems during a project, and it can stall the project or even fail it. With the help of Artificial Intelligence (AI), project management gets easier when there are tools to help automating task delivering, categorizing, and processing user stories. This project will analyse reasons of agile project failures, learn and compare the current solutions on the market and finally build an AI driven project manager which helps teams to avoid project failures and yield a better outcome for their project.

1.   Project Background

1.1   Background

The software development companies have embraced agile methodologies as the main development practice to keep up with the pace of the industry (Fitsilis, 2008). Developers are constantly giving out deliverables to clients in a short cycle to gain feedback from them. Short cycles are also beneficial for adapting to the evolving needs of clients. However, operational problems such as lack of communication, changes of deadlines might cause delay or catastrophic failure if not addressed properly. These problems include back loading documentation and testing, too many unplanned tasks, too many open issues and such (Miller, 2013).

1.2   Problem Statement

Some startups or Small and Midsize Business (SMB) does not have enough capital to acquire a project manager. Thus, the company owner might also take part in doing project management. However, the owner might not have the technical skills to host an effective discussion with the development team, or busy with acquiring potential sponsors. Causing communication gaps and misunderstanding between different development teams that might lead to lowered productivity due to creating output that are misaligned with the project goals.

Project manager often faces the challenge of being overwhelmed by the needs of managing multiple projects at the same time. Requiring them to keep track of development teams progress, interact with product owner to update the requirements, and hold meetings with developers and clients.

Given all these challenges, we hope to explore how Artificial Intelligence (AI) and Large Language Model (LLM) can be integrated natively into project management and mitigate the above issues by automating some key and repeating tasks. Specifically, we will focus on developing a platform that will generate user stories and categorize tasks for developers automatically.

1.3   Motivation

Developing a software project requires people who have deep understanding in many aspects in software development. It is essential for the one who develops and manages a project to thoroughly understand the application domain, the problem to be solved along with all its requirements, the employed software process, the technical details of the programming languages, the system's architecture and how its components integrate, and the system's interactions with its environment, among other factors (Anquetil et al., 2007, 515). Gathering all these pieces of knowledge is challenging and time consuming. Additionally, it is hard to store, and the knowledge often resides only in the minds of

software engineers who worked on the specific project (Anquetil et al., 2007, 515). It is almost impossible for a project manager who has no coding experience to understand and gather all the knowledge required, and then based on the information to provide a suitable user story for the software development team to understand. Usually, project managers can only rely on multiple meetings and discussions to further develop the need from clients, providing more required data and understanding the limits of the development team. The process is time consuming and frustrating.

Writing a good user story can greatly improve the software development process. The straightforward structure of user stories helps in developing the right software by fostering a shared understanding of the requirements (Lucassen et al., 2016). A good user story should follow a certain standard according to the project type and should follow a certain structure. The one who writes the user stories should also understand the use of it and when it will be used during the whole process. For example, most of the user story adopters (94%) use them in combination with Scrum. The most widely used user story template is the 'original' one proposed by Connextra. Stakeholders like working with user stories as it fosters a pleasant workplace. Using INVEST quality guidelines when writing user stories diminishes for experienced teams (Lucassen et al., 2016).

So, the need for writing high quality user stories exists and it is necessary for a company to utilize good user stories to build the suitable solution. The person who needs to write the user stories – project manager will have a high burden and requires lots of knowledge which will be willing to use platforms or software to assist them writing user stories and do simple operations to express the needs to the development team.

With the use of AI, the workload of processing user stories and categorizing tasks for developers can be relieved as these repetitive tasks can be analysed and solved by AI. Project managers can also focus on other tasks like delivering progress to the product owner, discussing needs with clients which are hard to automate and require more time.

While existing project management solutions, such as Jira and Zapier, both provide feature-rich platform for users to perform automation and project management, the learning curves for both solutions might be too steep for new users or non-technical people.

Moreover, the pricing models of these solutions are complex and pricey. For example, Jira charges 8.15 USD per user per month. For a SMB with 50 employees, that means a bill of 407.5 USD per month. On the other hand, Zapier did cost less compared to Jira, starting at 29.99 USD per month, but the amount of resources given in that plan are limited.

Herz and Krezdorn (2021) studied the reasons on project failures. Their findings suggest that poor project planning, such as: Unclear project goals, poor scheduling are the major factors leading to project failure. Moreover, the poor relationship between development teams and stakeholders is also a key factor for project failure.

1.4 Scope of project

The scope of this project will be limited to tech companies. The system will be designed to process user input and provide user stories and assign task automatically. This project will involve fine-tuning or prompt-tuning of LLM and designing a timetable system. This project will also involve implementing a rich-text editor that is useful for formatting of user stories. We will also conduct user surveys and data analysis to assess the effectiveness and performance of the system.

2. Project Aims and Objectives

2.1 Aims

This project aims to create a unified platform that incorporates Artificial Intelligence natively while providing project management features. Enabling better allocation of resources and potentially lead to increased productivity and project success rate, while reducing the event of decreased productivity due to improper software management practices.

2.2 Objectives

The objective of the project is to:

1. Create a platform targeted for tech companies for project management. Such as: Project Tracking, Backlog Management, Sprint Planning.
2. Alleviate stress and workload of project manager by streamlining mundane tasks such as meetings and process requirements through the use of this platform. Allowing the project manager to focus on engaging with clients.
3. Address resource limitations in startups and small and midsize businesses (SMB) by providing an affordable alternative to hiring a project manager.
4. Streamline communications and boost development efficiency by providing an all-in-one platform to generating user stories, tracking and visualizing team progress and assigning tasks automatically through the use of AI and LLM.

3. Project Methodology

This project will follow a three-step approach in attempting to create a solution for the problems stated above.

The first step is to define what we want to solve with the solution, our focus of this project would be alleviating the stress of project managers and reducing the cost of hiring one for small and medium tech companies. We aim the reduce the workload of completing repetitive tasks such as processing user stories, assigning tasks to suitable team members and logging the tasks.

With the problems defined, the second step would be looking at the current on-market solutions and find out if we can fit into the market.

The first competitor would be Jira, being the most used platform for project development as it is a product for bug tracking, issue tracking and agile project management. It provides clients with templates for projects, kanban and issue lists for tracking issues, sprints for agile project management and ticket system for assigning work to employees. It provides project managers a platform to record and visualize the progress, a system to easily assign tasks to groups of workers, and simple automations for daily operations. Recently, it also introduced the AI-powered virtual service agent that can streamline intent creation, respond to requests using generative AI, automated web requests, and automatically analyse data without code.

The second competitor would be Zapier, which mainly focuses on automating repetitive tasks. It helps project managers to automate processes like creating documentation, hold regular meetings, forward emails to different members according to certain rules set up by them, etc.

Both competitors are mature products on the market, but they are not specifically designed for tech companies and there are too many irrelevant functions. Our solution can provide a much simpler platform specifically for tech companies, making the interface as easy for non-tech people to use as possible.

The final step would be building the solution. The end product would be a web platform with tech companies as the target audience, aiming to provide an inexpensive solution to complete repetitive project managing tasks. A rough schedule has been planned such that the solution is broken down into different deliverables with reasonable milestones.

For the frontend, we decided to use React. React is a commonly used framework for website development due to its high flexibility and performance. The virtual DOM (VDOM) of React provides the ability to minimize the amount of direct edit on HTML DOM, which can enhance user experiences and the responsiveness of the platform. Moreover, the large ecosystem and community of React provide lots of resources and plugins that

allows easy implementation of advance features. Thus, React is perfectly suited as the frontend framework.

For the backend, we decided to use Express. Express is a lightweight framework while providing rich features. It also supports middleware that can be used to perform authentication and logging, making it suitable as a backend framework. Moreover, Express supports on routing and database makes it a good candidate as this project's backend.

For the database, we decided to use MySQL. MySQL is a relational database management system (RDBMS) that are commonly used in many large applications. It supports relational database that will be useful for linking user's data and AI generated data throughout the usage of the platform.

For Large Language Model (LLM), we are still exploring different solutions out in the market. For example, GPT-4o or OpenAI o1 from OpenAI, and LLaMA 3.2 from Meta. These LLM are proven to be performant and effective in understanding human input and generate human-like text, which is essential for this project. We will evaluate the LLM models on factors such as performance, accuracy, and correctness/ hallucination. As the LLM industry are rapidly developing, newer and more powerful models might be released during the development process. Therefore, there is not a final decision yet on the LLM being used.

4.   Project Evaluation

To better understand the effectiveness and success of the project. We propose the following methods to quantify our result.

4.1   User-friendliness to non-tech people and project managers

Since our problem focuses on the user experience of project managers in tech companies without years of coding experience or expertise in software development, project managers should be able to use the software with few or no coding experience. This part can be measured by using number of features provided related to software development.

4.2   User's feedback and survey results

Measuring the effectiveness of the project will be challenging as it depends on each user's subjective experience rather than an objective criterion.

We propose setting up links for users to provide feedback and also sending out surveys to users and the public to gather feedback and ratings from different perspective to analyse and derive insights into the effectiveness and limitations of the project.

5.   Project Schedule and Milestones

The following tables shows the tentative schedule of the project. Including the detailed timeline and milestones to be achieved.

Date	Milestones
October 1, 2024	- Deliverables 1: Detailed Project Plan - Deliverables 1: Project Webpage
October 30, 2024	- Design database structure - Design UML diagram - Literature review - UI design
November 15, 2024	Backend development and link with database
November 30, 2024	Complete coding of Basic Web Platform
December 30, 2024	Research: Type of AI/LLM model or platform to use
January 4, 2025	Preparation for the first presentation
January 13-17, 2025	First Presentation
January 26, 2025	- Deliverables 2: Preliminary implementation - Deliverables 2: Detailed interim report
February 15, 2025	LLM test and evaluation
March 7, 2025	- Web Platform integrated with AI/LLM - UI/UX optimization
March 30, 2025	- Preparation of final report - Preparation of exhibition poster and video - Final review and testing of the project
April 21, 2025	- Deliverables 3: Finalized tested implementation - Deliverables 3: Final report
April 22-26, 2025	Final presentation
April 30, 2025	Project exhibition

6.   References

Anquetil, N., de Oliveira, K. M., de Sousa, K. D., & Dias, M. G. B. (2007). Software maintenance seen as a knowledge management issue. *Information and Software Technology*, *49*(5), 515-529. https://doi.org/10.1016/j.infsof.2006.07.007

Fitsilis, P. (2008). Comparing PMBOK and Agile Project Management software development processes. In *Springer eBooks* (pp. 378–383). https://doi.org/10.1007/978-1-4020-8741-7_68

Herz, M., & Krezdorn, N. (2021). Epic fail: Exploring project failure's reasons, outcomes and indicators. *Review of Managerial Science*, *16*(4), 1169–1193. https://doi.org/10.1007/s11846-021-00479-4

Lucassen, G., Dalpiaz, F., Van Der Werf, J. M. E. M., & Brinkkemper, S. (2016b). The use and effectiveness of user stories in practice. In *Lecture notes in computer science* (pp. 205–222). https://doi.org/10.1007/978-3-319-30282-9_14

Miller, G. J. (2013). Agile problems, challenges, & failures. Project Management Institute.