DUY TÂN UNIVERSITY

Capstone Project 2

CMU-SE 451

Proposal Document

Version 1.0

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Intelligence IT Job Finding - The Recruitment System support with Chatbot

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Project Information

Project acronym	IIJF		
Project Title	Intelligence IT Job Finding		
Start Date	15th Feb 2024	End Date	27th May 2024
Lead Institution	International School, Duy Tan University		
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Proposal Document

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Version	Date	Comments
1.0	15/02/2024	Initial Release

Document Approvals

The following signatures are required for approval of this document.

	Signature	Date
Mr. Hoang, Nguyen Thai *Mentor*		
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Table of Contents

1. Introduction

1.1. Purpose

The purpose of the proposal is to:

- Define the business needs and problem in detail.

- Provide solutions for business needs and show the overview of system architecture.

- Provide an overview of resources, schedule, solution, and budget for the project.

1.2. Scope

This document provides an overview of a project that will be developed. It includes the description of business needs, the proposed solution, the financial forecast, and some constraints that are involved in the project.

The document provides a comprehensive master plan for each phase of software development based on the processes that have been selected.

This document is made for senior management to put forward a proposal.

2. Project Overview

2.1 Project definition

This project develops an advanced recruitment website, integrating online testing function from the system test, using machine learning to evaluate the possibility of cheating on the test. In addition, it also provides suggestions for suitable jobs based on candidates' assessment scores. This helps optimize the recruitment process and improve the quality of the workforce in the recruitment system.

2.2 Business needs/ User needs

Employers are facing the challenge of making the recruitment process more efficient, especially in evaluating and selecting suitable candidates for each job position. The process of reviewing and sorting CVs from candidates requires a lot of time and effort and can also lead to an ineffective selection process.

Limitations of traditional recruitment methods:

- Time and Effort: The process of reviewing a series of CVs requires a lot of time and effort from the employer. There is a possibility of missing out on potential candidates due to the manual selection process.

- Quality and Compatibility: Risk of selecting candidates who are not suitable or donot

meet the specific requirements of the job position.

● Recruitment cost: Recruitment costs can increase due to the large amount of time and effort invested in the candidate selection process.

To meet these challenges, we have developed a "Intelligence IT Job Finding", which uses algorithms to suggest candidates who match the employer's requirements and suggest suitable jobs for the employer, applicants, in addition to integrating chat bots to suggest CV writing for applicants. Chatbots will help to provide detailed information about job positions, job requirements, and the candidate's skill match, assist in the process of assessing candidate skills by providing online quizzes or tests. This helps optimize the recruitment process and improve the quality of human resources in the recruitment system.

2.3 Prior Art:

Up to now, there are very few job recruitment applications, other applications only integrate the CV recruitment system but do not have an automatic virtual interview system.

Example:

- Itviec, TopDev, …

Functions description	SRS	ITviec	TopDev
Published Recruitment	√	√	√
Search and View Jobs	√	√	√
Register an Account	√	√	√
Write CV Online	√	√	√
Resume Analyzer & Candidate Suggest	√		
Interact with Chat Bot	√		
Evaluate suitable & Recommend Jobs	√	√	√

2.4   Proposed Solution

Propose a solution for the project "Building a system for analyzing CVs and suggesting candidates for employers". The system will be designed to automatically analyze candidate CVs, using classification algorithms and natural language understanding to extract key information about skills, work experience and other factors.

A unique feature of the solution is the ability to customize requirements and weights for each job position. Employers can identify important requirements and set weights to reflect the importance of each requirement. The system will automatically match the candidate's experience and skills with the established requirements, creating an assessment score that helps employers quickly determine the candidate's suitability for the job position.

2.4.1   Project goal

Suggest suitable candidates: We will use data from the employer's request and the applicant's CV to suggest suitable candidates to the employer. Machine learning technology will help us optimize candidate recommendations to match employer requirements and ensure a match between candidate needs and vacancies.

Chatbot supports helping candidates about learning about the company's recruitment process from finding candidates to accepting the job. Suggest some questions that HR will ask candidates.

Provide suitable job suggestions based on candidates' assessment scores.

The project aims to build a CV analysis system, focusing on information about candidates' skills, work experience and other factors to suggest suitable candidates for each position for employers and employers. At the same time, provide chatbot support to provide information about jobs, recruitment process, CV writing instructions... The goal is that the system will be completed with all features, on schedule and on budget. set out previously.

2.4.2   Introduction AI

Artificial intelligence (AI) is the ability of machines to perform tasks that are typically associated with human intelligence, such as learning and problem-solving. AI applications include advanced web search engines (e.g., Google Search), recommendation systems (used by YouTube, Amazon, and Netflix), understanding human speech (such as Siri and Alexa), self-driving cars (e.g., Waymo), generative or creative tools (ChatGPT and AI art), and competing at the highest level in strategic games (such as chess and Go).

2.4.2.1. Introduction to RASA Chatbot

RASA is a framework for building conversational chatbots, supporting many tools

so users can build chatbots quickly and effectively even when the data provided is little.

Consists of 2 basic components:

RASA NLU (Natural Language Understanding): This is the module that plays the role of processing user conversation input (tokenize, featurize), determining user intent (Intent Classification) and entity extraction (Entity Extraction).

RASA Core is to control the conversation flow, deciding what actions are taken in response to user conversations. RASA Core includes policies to handle conversation flow.

2.4.3   System overview

2.4.3.1   System context
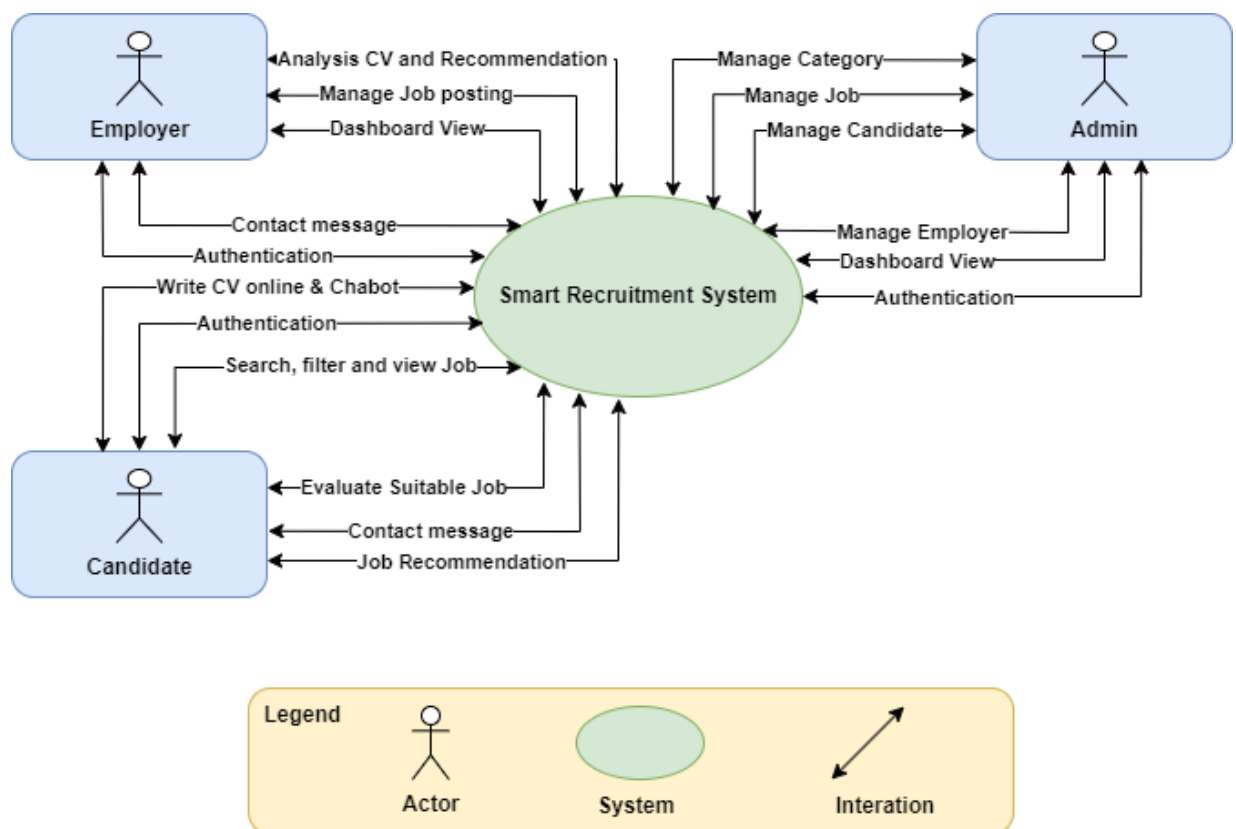
Figure 2.6.1: System context overview

2.4.3.2   System context description

Administrator has the responsibility to:

-   Authentication.
-   Dashboard view.
-   Job management.
-   Candidate management.

- Employer management.
- Category job management.

Employer has the responsibility to:
- Authentication.
- Dashboard view.
- Manage job posting.
- Manage CV & Recommendation.
- Contact message.
- **Candidate has responsibility to:**
- Authentication.
- Search, filter and view job.
- Apply job.
- Contact message.
- Write CV online.
- Job recommendation.
- Evaluate suitable job.

2.4.4 Technical Constraints

Client

- Programming Language: JavaScript.

- Framework: ReactJS.

- Library: Material Tailwind, RTK Query, Mapbox, …

- Operating System: Windows.

- Code Editor: Visual Studio Code.

- Web Browser: Chrome, Firefox, Microsoft Edge

Server

- Programming Language: Javascript

- Framework: NodeJS, RaSa.

- Library: Mongoose, ExpressJS, Tensorflow.js, Socket.io

- Database: MongoDB

- Operating System: Windows.

- Code Editor: Visual Studio Code.

Business constraints
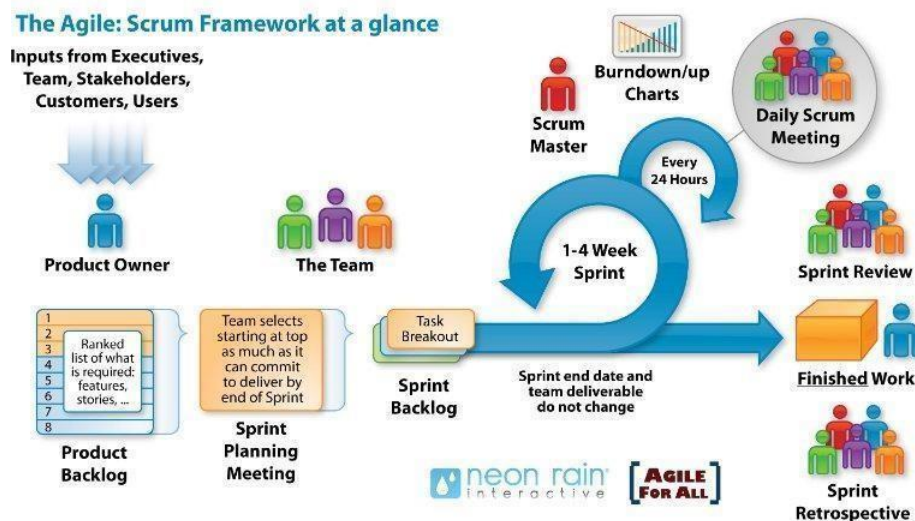
- Resource: 4 people.

- Budget: 5000$.

- Time: The project must be completed within 3 months.

Tool Management

- Source code Version control: Git, Github.

- Document management: Google Driver.

- Manage task and project progress: Jira.

- Other: Postman, Figma, Zalo, Zoom

3. **Master Plan**

3.1. **Scrum Process**

Figure: General SCRUM Process

● Scrum is an agile project management framework that emphasizes collaboration, iterative development, and rapid delivery of high-quality products. It enables teams to work in a flexible and adaptive manner, responding to changing requirements and customer feedback.

● In Scrum, it is crucial for teams to possess this agility to effectively navigate challenges, make informed decisions, and drive innovation.

● Mechanisms of empirical process control, where feedback loops that constitute the core management technique are used as opposed to traditional command-and-control management.

● By breaking work into manageable iterations, teams can focus on delivering incremental value, improving efficiency, and maximizing their output. This approach boosts overall productivity and ensures a faster time to market.

4. Organization Management

4.1 Human Resource

➤ Team's Information

Full Name	Phone	Email	Position
Hoang, Nguyen Thai	0914083388	hoang.nguyenthai@axonactive.com	Mentor
Tuan, Nguyen Anh	0975523135	tuanquynh1111050102@gmail.com	Team Leader
Dat, Nguyen Thanh	0788691936	nguyendat16111210@gmail.com	Team Member
Tri, Le Minh	0395967905	Leminhtri2002@gmail.com	Team Member
Duyet, Pham The	0705235603	duyetpham322@gmail.com	Team Member

4.2 Master plan

NO	Task Name	Duration	Start	Finish
1	**Start Up**	**15 days**	**22/02/2024**	**05/03/2024**
1.1	Project Kick Off Meeting	1 day	22/02/2024	22/02/2024
1.2	Discuss about project ideal	2 days	23/02/2024	24/02/2024
1.3	Create Document for project	12 days	25/02/2024	05/03/2024
2	**Development**	**80 days**	**06/03/2024**	**25/05/2024**

2.1	Sprint 1	20 days	06/03/2024	25/03/2024
2.2	Sprint 2	20 days	26/03/2024	14/04/2024
2.3	Sprint 3	20 days	15/04/2024	09/05/2024
2.4	Sprint 4	20 days	10/05/2024	29/05/2024
3	**Project's Meeting**	**1 day**	30/05/2024	30/05/2024
4	**Final Release**	**1 day**	31/05/2024	31/05/2024

5. Cost Estimation

The following outlines the cost of completing all the identified components for the project.

No.	Phase	Milestone	Cost (4 hours/day) USD
1.	Start-up	STU	$200
2.	Development	SPR1	$1100
		SPR2	$1100
		SPR3	$1100
		SPR4	$1100
3.	Other costs	OTH	$100
4.	Project's Meeting	PM	$100
5.	Final Release	FR	$200
6.	**Total**		**$5000**

6. Project Constraints

Constraint	Constraints Description	Guidelines for Acceptance
Economic	N/A	Elements for consideration are design costs, production costs, maintenance costs, operating costs, and sales price
Environmental	N/A	The impact of the design on the environment as well as the impact of the environment (e.g. Temperature range, humidity, vibration, electromagnetic interference immunity, and shock) on the design should be considered. Design for recycling and design to use recycled materials should also be considered
Ethical	It is necessary to ensure that the use of AI in interviews does not violate candidates' privacy rights and complies with ethical standards in recruitment	Ethical considerations can be broad. Areas that are typically addressed include intellectual property, reverse - engineering, privacy, security, and the conflict between cost and safety

Public health, safety, and welfare	N/A	Includes safety standards as well as the impact of the design on users (for example, electrical or physical hazards)
Socialand Global	Comply with regulations on privacy and data security. Ensure fairness and non- discrimination during the interview process.	Addresses aspects such as benefits, risks, the man-machine interface, the acceptance of products by the intended user or by society at large, and global and socially responsible engineering.
Cultural	Support for conducting virtual interviews according to culture-specific rules and restrictions.	Which cultural characteristics could influence the approach? How do the designs from different cultures differ?
Sustainability	Ensure sustainability in the process of collecting, storing and using applicants' personal data. Research and apply principles of sustainable development during system development and operation.	Refers to the sustainability of resources, including material, energy, supplies, manufacturing techniques, personnel, operation, and the need for additional infrastructure, as well as the sustainability of the design including reliability, lifetime, durability, reusability, maintainability.

7. Conclusion

In summary, the goal of the project is to develop a recruitment website system to find commonalities between candidates and employers. The expected outcome is to optimize the recruitment process, saving time and resources for both employers and candidates, providing objective and reliable assessments, and reducing the risk of errors in the hiring process. Additionally, it will integrate web development technologies to create a user-friendly job search website, making it easy for users to interact and find job opportunities.

8. References

No	References	Document Information
1	Scrum Model	https://en.wikipedia.org/wiki/Scrum_(software_development)
		https://www.atlassian.com/agile/scrum
		https://www.digite.com/agile/scrum-methodology/
		https://docs.microsoft.com/en-us/azure/devops/boards/sprints/b est-practices-scrum?view=azure-devops
		https://www.scrum.org/resources/scrum-guide
		Essential Scrum - A Practical Guide to the Most Popular Agile Process by Kenneth S. Rubin
2	Technical	https://cloud.google.com/dialogflow/docs/
		https://reactnative.dev/docs/getting-started

		https://congdongchatbot.com/co-the-phan-loai-chatbot-nhu-the- nao
		https://medium.com/@ngoquocvinh/ch%C6%B0%C6%A1ng-1 -c%C3%A1c-lo%E1%BA%A1i-chatbot-bf10ed7c2a09
		https://oabigroup.com/blog/2019/07/19/5-chatbot-pho-bien-o-vi et-nam/
		https://congdongchatbot.com/so-sanh-chatbot-su-dung-ngon-ng u-tu-nhien-va-chatbot-kieu-menu-button/
3	Software Engineering Standards	https://www.nws.noaa.gov/oh/hrl/developers_docs/General_So ftware_Standards.pdf
		https://standards.ieee.org/standard/12208-2017.html
		https://sw-eng.larc.nasa.gov/

9. Attachment: DESCRIPTION OF PRODUCT REQUIREMENTS FORM

9.1 Short description of product ideals

The job recruitment website system we propose will provide an effective and flexible experience for both employers and job seekers. First, the system will provide a secure means of user authentication, ensuring the security of personal information.

The main function of the system will focus on automatic and complete CV analysis. This includes the ability to analyze key information such as skills, experience and education from a candidate's CV. The system will also integrate a powerful job suggestion engine, based on extensive analysis and information from CVs, helping employers find the most suitable candidate for each position.

9.2 Requirements

High-level Functional Requirements	1. Authentication
	2. Online test (Monitored by AI)
	3. Write CV online
	4. Manage Job Listings
	5. Search and view Jobs
	6. Chatbot
	7. Message

Quality Attributes Requirements (example related to issues: Ease Use, Easy to Like, Easy to Learn, Easy to Understand, Easy to Buy / Yes, ...)	1. Tasks should be completed within 5 seconds and have the ability to handle multiple requests simultaneously
	2. User can use easily website without taking much time
	3. The processing functionalities are rational and straightforward to comprehend
	4. Adding a new feature can be accomplished with ease without requiring significant modification of the architecture

Operation Requirements (related to issues: Speed, Accuracy, Performance, Stability, Load Resistance, Scalability, Safety, ...)	1. Complete short tasks within a maximum time limit of 5 seconds per task
	2. Guarantee the responsibilities related to the security of user information
	3. Load the application fully within a maximum time of 10 seconds
	4. Compatible with all browsers

Environment & Operation	1. Web browsers: Google Chrome latest

Requirements	version.
(related to issues: physical impacts on the environment, interact with relevant or existing systems, conditions for product commercialization, ...)	3. External Services: OpenAI, Rest API, Google Cloud Speech-to-Text
	4. Ensuring technical quality during the process of making a product or service available for sale
	5. Operating systems: Microsoft Windows 10 (11), Ubuntu 18.04 with SSD 512GB, RAM 8G

Requirements for Maintenance & Support	1. Identifying and fixing underlying problems
	2. Consistently enhancing the ease of use, speed, and dependability of the software
	3. Resolving issues that have been reported by users or detected through monitoring processes
	4. Updating software to align with evolving business requirements

Security/ Safety Requirements	1. Terms for users
(related to issues: conditions of use / access to products, personal freedom, inspection, ...)	2. User information security
	3. Authenticate user information

Culture Requirements	1. Vietnamese and English language support
	2. Culture according to international standards
	3. Interface and policies suitable for many different cultures

Evaluate the complexity of engineering problems	1. Involving wide-ranging or conflicting technical issues

	2. Having no obvious solution
	3. Addressing problems not encompassed by current standards and codes
	4. Involving diverse groups of stakeholders
	5. Including many component parts or sub-problems
	6. Involving multiple disciplines
	7. Having significant consequences in a range of contexts

Standard requirements	1. Code standard. (HTML,CSS, JS)
	2. Design standard. (design patterns, object-oriented analysis and design,…).
	3. IEEE (1058, 1540, 830, 1016, 829, 1012, 1008)
	4. ISO/IEC/IEEE 12207:2017 (TCVN 10539:2014); ISO/IEC 25051:2006(TCVN 10540:2014);
	5. Other standards. (related to specific topics)