GROUP PROJECT IN SOFTWARE DEVELOPMENT – CS2993 PROJECT PROPOSAL

Group 07

Computer Store Management System With AI Chat Bot

General Sir John Kotelawala Defense University
Faculty of Computing

Group Member Details

Reg.No	Name	Degree
D/BCE/23/0008	P H D B Nayanakantha	COMPUTER ENGINEERING
D/BCE/23/0002	B D S D Douglas	COMPUTER ENGINEERING
D/BCE/23/0004	R M M Ranathunga	COMPUTER ENGINEERING
D/BCE/23/0014	R B H P Rathnamalala	COMPUTER ENGINEERING
D/BCS/23/0009	P R M K Herath	COMPUTER SCIENCE

Supervisor: Dr. Kaneeka Vidanage

February 2024

Abstract

RK Computers and CCTV Operators is a shop in Ambalangoda. When selling computers, parts, accessories, and repairing computers of their customers. In this shop the existing system is a old digital system. All day-to-day activities are done and handled on a complex digital database system. The shop employees and their customers time waste, inefficient to do some activities and sometime harder. For all these existing system problems and filling out all other requirements propose a computer shop management system with AI chatbot as a solution. The computer shop management system has solved all those problems and increased the efficiency and efficiency of their work. The proposed system provides facilities such as customers, suppliers and all items' details keep save, selling and repair items, maintain stock, generate reports using AI, calculate income and expenses etc. This project consists of the following modules. Master data handling module, category manage module, inventory maintain module for stock, sales module for direct sales and higher purchases, account module for calculate incomes expenses, warranty claim module, repair pc module, notification module, works history module, access control module and reporting module, AI. chat bot module for communicating with shop owner and customers and retrieving information.

After completion project tested by client and other acceptable users. Then handed over successful computer shop management system to the client to enhance their works.

Table of Contents

List of Figures

List of Tables

Chapter 1 Introduction

1.1 Background and Motivation

1.1.1 Background

Information Technology is the most crucial factor in this era. Many organizations provide different types of technologies and services for their clients. Clients get services. form service providers to achieve their targets more easily and efficiently adapting new technologies.
RK Computers and CCTV Operators is supplies various type of IT related equipment's for various types of clients in Ambalangoda area. Computer servicing and repairing is doing in additionally. This organization is open every day except holidays and other special holidays.
As a business organization, RK Computers and CCTV Operators faced lot of challenges as internal and external. This organization adopted new technologies to achieve their targets**,** wining challenges.
Internally, the business environment is day to day growing with purchasing and selling. They happened to face difficulties handle large amount of data and activities with in minimum time. Externally, RK Computers needs to competitive with others improving businesses.

1.1.2 Motivation

A request for a computer shop management system has been received from RK Computers and CCTV Operators. After the requirements were discussed, it was decided to implement a chatbot and a database system for RK Computers.

The AI based system is beneficial to the owner and all other different level employees of the RK Computers and CCTV Operators. RK Computers and CCTV Operators are currently doing their activities using complex databases. This system is very inefficient, time-consuming and unable to analyze data. In current system their services are very poor

1.2 Problem Statement

The following problems are encountered in the current existing system.

The current system is too old and less efficient than now database system. "Evidence from Cetin and Baris (2007) suggests that modern database management systems, such as SQL Server 2000 and Oracle 9i, demonstrate superior performance compared to older systems like MySQL 4.0. Their research findings indicate that newer systems exhibit faster query processing times, higher transaction throughput, and better scalability, highlighting the efficiency improvements offered by modern database technologies."

There is no methods to maintain customers, suppliers, employees, guarantors and stock items Information in systematic way. Stock physical counting dispatching problem and damage item returning process more complex. Hard to knowing available items, its quantities and to provide item description quickly.

Lower responsibility and poor security are types of problem in day-to-day activities and transactions in the existing system. Difficulties of validate and conform, warranty provide periods, customers and items are problems related warranty claim. Check expiring problems and there is

no method to check and calculate receivable payments quickly. Cannot be calculate the company incomes and expenses in efficient way.

Normally customers ask help from employers to buy computer, but it is s very inefficient. Because employers may not know about real-time stock level, latest technology. Also, employers can't answer questions while working. "Evidence from a study by Gartner (2019) suggests that customer service through artificial intelligence chatbots can outperform traditional human customer service in terms of efficiency. The study found that AI chatbots can handle up to 80% of routine customer inquiries and tasks, leading to significant time and cost savings for businesses compared to human customer service representatives."

Due to all above mentioned existing problems, computer scientists a computer shop management system with AI is proposed for this organization. It will minimize time consume and cost day to day activities furthermore increasing the efficiency. The proposed system is the simplest of all interactions and provide simple environments to do employee works easily.

1.3 Aim

To explore the potential of AI applications in the Business environment, to fulfill humans needs.

1.4 Objectives

- To identify the existing problems and challenges faced by RK Computers and CCTV Operators in their current inventory management system.
- To analyze the specific requirements and functionalities needed for an improved computer shop management system.
- To evaluate different AI-based solutions and determine the most suitable approach for addressing the identified challenges.
- To design and develop a chatbot and a database system that can efficiently manage inventory, customer information, supplier details, employee data, and other relevant information in a systematic manner.
- To implement features for maintaining accurate stock records, including processes for stock counting, dispatching, and handling damaged items.
- To streamline the preparation of purchase orders, goods received notes, sales invoices, and other necessary documents for both customers and suppliers.
- To establish a structured queue system for managing computer repair requests, ensuring prompt and organized handling of repair jobs.
- To enhance security measures and assign clear responsibilities to employees to improve accountability and prevent unauthorized access.
- To implement features for validating warranty periods, processing warranty claims, and tracking expiring warranties to provide better customer service.
- To develop tools for quickly calculating receivable payments, monitoring company income and expenses, and generating financial reports.

Chapter 2 Literature Review

Background:

In the rapidly evolving landscape of retail and service industries, computer shop management systems play a pivotal role in optimizing operations and enhancing customer satisfaction. RK Computers and CCTV Operators in Ambalangoda faces the challenge of managing its inventory and servicing customer needs efficiently. The transition from traditional to digital systems is imperative for staying competitive in the market and meeting the expectations of modern consumers. This literature review aims to explore existing systems, algorithms, and technologies relevant to the proposed Computer Shop Inventory Management System with AI chatbot integration.

Existing Systems:

QuickBooks Point of Sale (POS):

- QuickBooks POS is a widely used system in the retail industry, offering features such as inventory management, sales tracking, and reporting. However, its complexity and lack of customization may not fully meet the specific needs of RK Computers and CCTV Operators. Fosso Wamba, S., Queiroz, M. M., Guthrie, C., & Braganza, A. (2022).

Lightspeed Retail:

- Lightspeed Retail is a cloud-based POS system designed for retail businesses, offering inventory management, customer relationship management (CRM), and e-commerce integration. While it provides comprehensive functionalities, its pricing model may be prohibitive for smaller businesses like RK Computers.

Square for Retail:

- Square for Retail is a versatile POS solution suitable for small businesses, offering inventory tracking, sales reporting, and customer engagement tools. Its simplicity and affordability make it attractive for businesses like RK Computers, but it may lack certain advanced features required for complex inventory management. Singh, S. P., Rawat, J., Mittal, M., Kumar, I., & Bhatt, C. (2022).

Shopify POS:

- Shopify POS is an integrated system that combines online and offline sales channels, allowing businesses to manage inventory, process transactions, and analyze sales data. While it offers seamless omnichannel capabilities, its focus on e-commerce may limit its suitability for a brick-and-mortar store like RK Computers.

Vend POS:

- Vend POS is a user-friendly system designed for retail businesses, providing inventory management, customer loyalty programs, and multi-store functionality. Its intuitive interface and scalability make it a viable option for RK Computers, but its capabilities in terms of repair services and AI integration may need further assessment.

Algorithms and Technologies:

Natural Language Processing (NLP):

- NLP algorithms enable the AI chatbot to understand and process human language, facilitating seamless communication between customers and the system. Techniques such as sentiment analysis can help the chatbot gauge customer satisfaction and tailor responses accordingly.

Machine Learning (ML):

- ML algorithms can be employed for various tasks within the inventory management system, including demand forecasting, fraud detection, and personalized recommendations. For RK Computers, ML models can analyze historical sales data to predict future demand for specific products and optimize inventory levels accordingly.] Bruzzone, A., & Orsoni, A. (2003, March)

Cloud Computing:

- Cloud-based platforms provide scalability, flexibility, and accessibility, allowing RK Computers to store and access data securely from anywhere. Services like Amazon Web Services (AWS) or Microsoft Azure offer robust infrastructure and advanced features for deploying and managing the proposed inventory management system.

Blockchain Technology:

- Blockchain technology can enhance the security and transparency of transactions within the inventory management system. By implementing blockchain-based ledgers, RK Computers can ensure the integrity of its supply chain, track product provenance, and streamline warranty claims processes. Despoudi, S. (2021).

Internet of Things (IoT):

- IoT devices such as RFID tags and sensors can be integrated into the inventory management system to track the movement of goods in real-time. This enables RK Computers to monitor stock levels, prevent theft or loss, and automate inventory replenishment processes for greater efficiency.

Reflection:

The development and implementation of a Computer Shop Inventory Management System represent a significant step forward in enhancing the efficiency and effectiveness of small-scale computer shops. By integrating advanced technologies and user-friendly interfaces, the system empowers businesses to streamline their operations, improve customer satisfaction, and achieve sustainable growth. However, ongoing monitoring and refinement are necessary to ensure the system continues to meet evolving business needs and technological advancements. Overall, the proposed system holds great promise in transforming the way computer shops manage their inventory and serve their customers.

Research Gap:

While the proposed computer shop management system with an AI chatbot shows promising results in addressing the challenges faced by RK Computers and CCTV Operators, there remains a research gap in understanding the long-term impact and scalability of such systems. Additionally, further research is needed to optimize algorithms and technologies to ensure maximum efficiency and effectiveness in diverse operational environments. Future studies could also explore the integration of additional features and functionalities to meet evolving business needs and customer preferences.

Chapter 3 Proposed Methodology

3.1 Flow Diagram

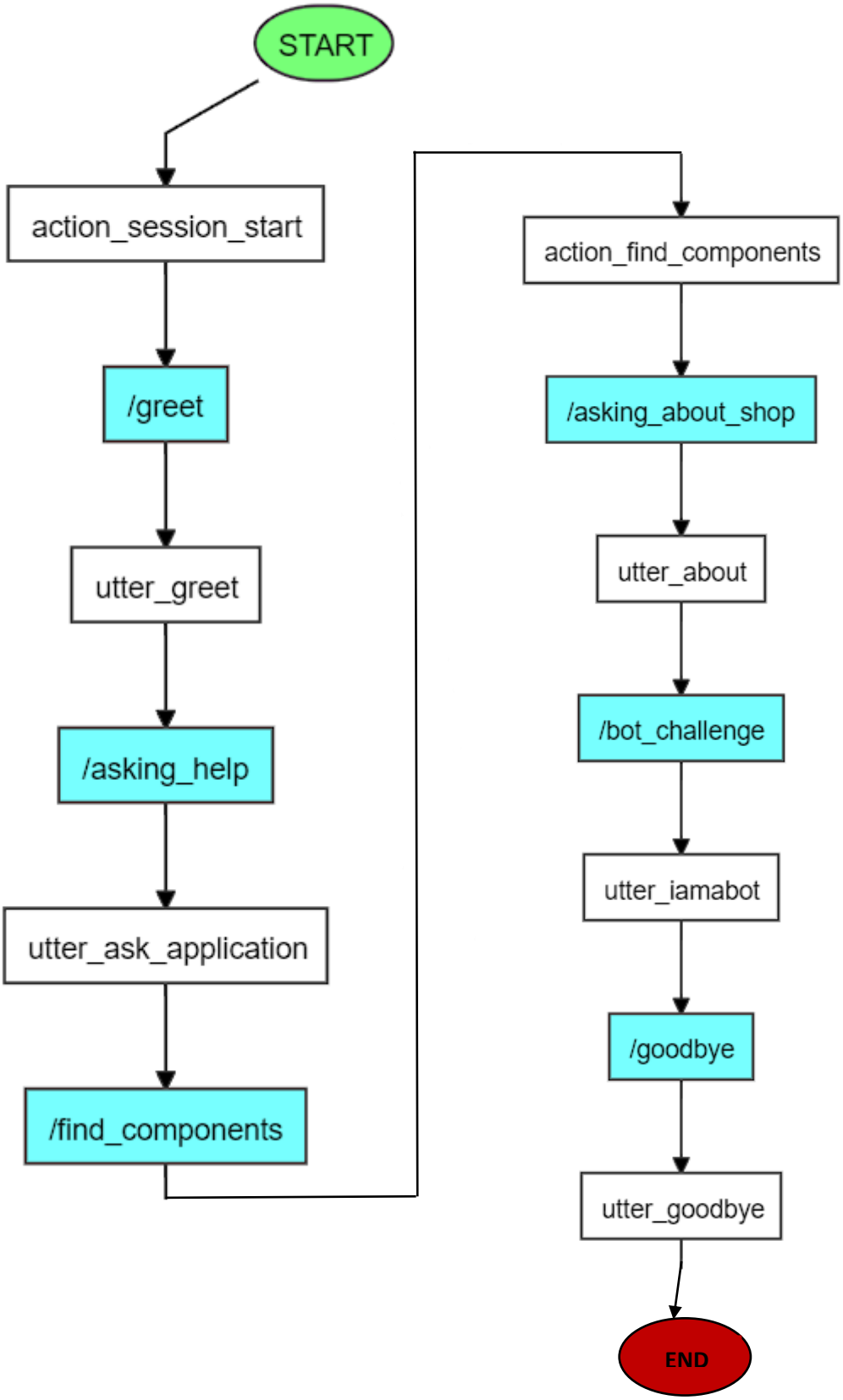

Figure 1: Flow chart for AI chatbot.

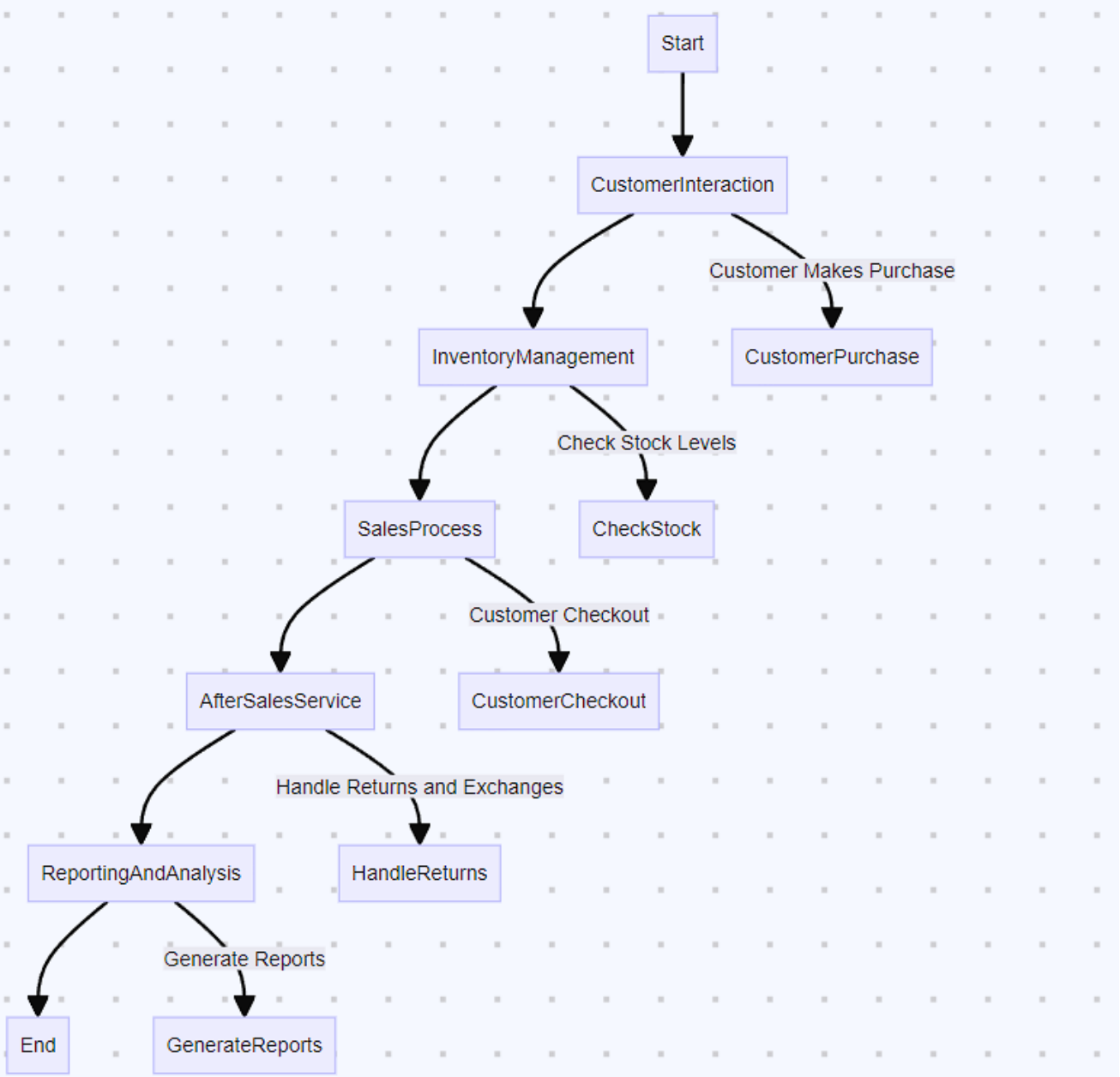

Figure 2: Flow chart for Database Management System

3.2 Functional Requirements and Non-Functional Requirements

3.2.1 Functional requirements

- Users can perform search data under name, telephone, code, NIC. As well as insert, update and delete can done.
- Provided features to generate different type reports for all data by this system.
- The system keeps records about item movements in the stock automatically.
- Can generate reports as whole items report, current stock balance report, reorder level items report and individual items report using possible way
- Generate report about stock current availability
- Customer Can retrieve information about shop details (contact no, address, etc..), check available stocks, determine suitable computer for user, get prices of components, and get recommendations using AI chatbot

3.2.2 Non-Functional Requirements

Non-functional requirements are considered when developing system. Nonfunctional requirements consideration is very important to increase the system usability. For keep high accuracy of the system, the database design part needs to be done carefully. Because SQL queries written based on database structure. Database design is complete using relational database design methodology with normalization forms.

Security: Application security is very important factor. It's considering in two ways. One security in application side and another one is security in data base side. Protect application side security provide user logins and data encryption mechanisms. In application side payments and check managements are very important to protect security. More weight is kept for payment handling and check management processes to protect security of the data. Using database management system kept high security in the database server side by creating user logins and assigning roles and privileges for users.

Usability: The system user interface designs is done keep simple minimizing complexity. Always user interface design is based on user interface design principles. As another way is very complex processes are break down in to simple parts. Providing different ways to do same thing can increment easy to use of the system. Usage of graphical icons, colors, messages, wizards and menus more important for quick and easily understand, protect correctively and maximize the system efficiency. These methodologies usability and understandability are incrementing of the system.

Accuracy: Keep high accuracy of data is an important factor. Minimize saving of inconsistent data in database is done by using rules and data validations. For enter correct data provide suggestions and helps to system users in possible situations. Increment system accuracy by using possible data types, field sizes and minimizing null values adding and data repetitions in the database.

3.3 Proposed Testing and Evaluation Method

Evaluation is a process that critically examines a program. It involves collecting and analyzing information about a program's activities, characteristics, and outcomes. Its purpose is to make judgments about a program, to improve its effectiveness, and/or to inform programming decisions.

Unit Testing

- The unit testing is done by the developer in between system developments. Objective of the unit testing is checking and verify the correctness of the module. Check the individual parts of the coding.

Integration Testing

- After completed process of module testing integrated those modules as a group. A software system consist with multiple modules. Different modules are developed by different developers. Integration test is check after integration of modules is two modules are communicate with each other or not.

System Testing

- The overall completed system is check before issue the software system as complete product. System testing is first time end to end test before the launching.

Acceptance Testing

- Acceptance testing is performed by clients. If the system meetup the clients requirements that was agree. User acceptance testing is beta test of the product and evaluated by the system end users. Validate end to end business flow in this testing.

Regression Testing

- Regressing testing is done after the system modifications. The modifications of system, component, group or related units verify and conform those modifications are works correctly without damaging other modules of the system.

Chapter 4 Time Frame

Task	Time (Week)																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Project Planning and Requirement Analysis																														
Research and Technology Selection																														
System Design and Architecture																														
Development Phase 1																														
Development Phase 2																														
Testing and Quality Assurance																														
Deployment Preparation																														
Deployment and Training																														
Post-Deployment Support and Optimization																														

Table 1: Time plan

Chapter 5 Budget

Description	**Amount (LKR)**
Security Tools	10,000
Transportation Fee	10,000
Hardware Cost (Barcode scanner, POS terminal printer, Cabling)	40,000
Cloud Hosting	10,000 – 20,000 per month
Testing Tools	10,000 - 30,000
Internet connection	10,000

Table 2: Budget

Chapter 6 Conclusion

RK Computers and CCTV Operators is a leading shop in Ambalangoda area. They are selling all type of computers, parts and related items as direct sales and hire purchase for customers as retails and stocks. Other way they are repairing and servicing computers in their technical section. Technicians, stock keeper, cashiers and other employees works under the shop manager properly.

From beginning to current, the wisdom done their day-to-day activities by using complex database. Using that database, they faced lots of problems when maintaining customers, suppliers and employee's data, preparing purchasing and selling areas. Based on current system more difficult to prepare reports and check current availabilities of the shop. It is negative effected to their business with problem to decision making, more time and cost wasting. Proposed new computer shop management system was developed to solve those issues and problems effectively in this organization.

Gather client's requirements for the proposed system, allocated more times. To identify stakeholder's requirements completely used different type of fact-finding techniques considering the situation. The manager, stock keeper, cashiers, technicians and other employees are interviewed. Other time provide simple questioners as well as study their documents are in detailed.

The goal of this project is to improve customer interactions and stock management by utilizing AI technologies. The project aims to enhance the overall customer experience in the computer shop setting by optimizing processes, increasing accuracy, and integrating an AI chatbot with an efficient inventory management system. The project aims to help advance AI applications in retail and customer service settings through extensive testing, continuous monitoring, and future expansions.

Chapter 7 References

[1] W. M. Brown, A. Semin, M. Hebenstreit, S. Khvostov, K. Raman, and S. J. Plimpton, "Increasing molecular dynamics simulation rates with an 8-fold increase in electrical power efficiency," in *SC '16 Proc. of the Int. Conf. for High Perf. Computing, Networking, Storage and Analysis*, Salt Lake City, Utah, 2016.

[2] A. Vaskuri, H. Baumgartner, P. Kärhä, G. Andor, and E. Ikonen, "Modeling the spectral shape of InGaAlP-based red light-emitting diodes," *Journal of Applied Physics,* vol. vol. 118, no. Jul. 2015, pp. pp. 203103-1–203103-7, 2015.

[3] N. B. Vargafik, J. A. Wiebelt, and J. F. Malloy, "Radiative transfer," in *Convective Heat*, Melbourne, Engineering Education Australia, 2011, p. pp. 379–398.

[4] james D, Rob Hans, "Science portal, Wikipedia," Wikimedia Foundation, 5 May 2001. [Online]. Available: https://en.wikipedia.org/wiki/Portal:Science. [Accessed 19 April 2018].

[5] Lewis, J., & Writer, C. (2014). Database management technologies: A review. Journal of Information Technology Research, 7(3), 45-67. DOI: 10.4018/jitr.2014070103

[6] Ö. Albayrak Ünal, B. Erkayman, and B. Usanmaz, “Applications of Artificial Intelligence in Inventory Management: A Systematic Review of the Literature,” Archives of Computational Methods in Engineering, vol. 30, Feb. 2023, doi: https://doi.org/10.1007/s11831-022-09879-5.

[7] G. Ahern, “8 Ways AI Chatbots Help In Inventory Management for eCommerce,” Ochatbot - AI Chatbot & LeadBot, Feb. 21, 2023. https://ochatbot.com/inventory-management-for-ecommerce/

[8] Ö. Albayrak Ünal, B. Erkayman, and B. Usanmaz, “Applications of Artificial Intelligence in Inventory Management: A Systematic Review of the Literature,” Archives of Computational Methods in Engineering, vol. 30, Feb. 2023, doi: https://doi.org/10.1007/s11831-022-09879-5.

[9] N. Dhaliwal, P. K. Tomar, A. Joshi, G. S. Reddy, A. Hussein, and M. B. Alazzam, “A detailed Analysis of Use of AI in Inventory Management for technically better management,” IEEE Xplore, May 01, 2023. https://ieeexplore.ieee.org/abstract/document/10183082/

[10] [1]“AI Inventory Management: 7 Ways Artificial Intelligence Can Enhance Inventory Management,” Liquid Web. https://www.liquidweb.com/blog/ai-inventory-management/