

**CHAT-BOT SYSTEM FOR COMPUTERS, ACCESSORIES  
& REPAIR CENTER RECOMMENDATION**

TMP-23-283

Project Proposal Report

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Science

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## DECLARATION

I declare that this is my own work, and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Signature of the Supervisor  
(Dr. Lakmini Abeywardhana)

Date

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.....

## **ABSTRACT**

In earlier days most users used to buy products without doing background research so that product might lead to dissatisfaction with product purchases. but in the modern age, most users use online reviews, and video reviews regarding a product before the purchase so that they can get an overview idea about the product they are going to purchase therefore gathering all the reviews the chat-bot system for computers, accessories & repair center recommendation is designed to identify and cater the users' needs more precisely and enhance the user experience in buying the best product that available in the marketplaces for their purpose. This system operates through a chatbot interface that interacts with the customers via a messaging platform and understands the requirements and preferences of the customers more accurately and displays the pin-point exact requirement and most optimum results & preferences by neglecting unnecessary search results saving their time and effort systems are based on text recognition and apart from that additional features like Machine Learning, Natural Language Processing, Image processing, Web Scraping, Speech recognition or speech to text transcription is used as well. furthermore, apart from the product's recommendation, a repair center recommendation system is also used to suggest the best repair centers available in an area for users' needs based on top-rated google reviews.

**Keywords:** *online reviews, video reviews, chat-bot, Machine Learning, Natural Language Processing, text recognition, image processing, Web Scraping, Speech recognition, speech-to-text transcription, google reviews*

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## LIST OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Description</b>
ML	Machine Learning
IT	Information Technology
NLP	Natural language Processing
CNN	Convolutional Neural Network
NER	Named-entity recognition
SRS	System Requirements Specifications
ASR	Automatic Speech Recognition
API	Application Programming Interface
GCP	Google Cloud Platform
WBS	Work Breakdown Structure
RNN	Recurrent Neural Network
DNN	Deep Neural Network

# 1. INTRODUCTION

With the development of technologies and online platforms, people nowadays are used to full fill their needs by shopping for various products through different types of e-commerce websites and platforms. with this development, users can easily browse, compare, and purchase products with different e-commerce websites. But most of the users are still struggling to find the best product, this struggle can be classified into different sectors. First and the most important sector is the purpose, the user must clearly identify the purpose and the requirement that he/she needs to be fulfilled, whether buying that product can full fill the purpose or the user need to consider another product, and so on. The second sector might be the budget. Where one product cost much higher than the other product in such case the user might get discomfort with whether to purchase or not. the third sector might be durability so all the struggling factors when trying to purchase a product are interconnected to each other one sector might affect the other sector.

To cater to this problem chatbot system comes in. A Chatbot system is a software system that was programmed and designed by the developers to interact with the users and simulate conversation with humans. with the development of technologies nowadays chatbots have become more popular. chatbots can interacts and assist and recommend products to the user to fulfill all the requirements which were provided by them. with the help of the chatbot system users struggling factors when trying to purchase a product can be minimized to a certain level since by gathering the purpose and the requirement which was provided by the user to the chatbot system and it can recommend the most suitable products and the services for the users based on their purpose, budget, durability and much more sectors. chatbot recommendation system will act like a well knowledge elder person who guides the younger persons into the right pathways.

In this research, we will try to study the effectiveness of the chatbot recommendation system to cater to the user's needs and we will deeply explore which factors might get affected customer satisfaction with this chatbot system and how this chatbot system will lead users' day to day life activities to a different level with less time and effort while fulfilling all the needed requirements. And finally, the aim of this research is to improve the user experience and increase the satisfaction of the users in the context of computers, accessories & repair centers.

### **1.1 Background & Literature survey**

A collection of important studies, theories, and research findings that have been made on the topic of the proposed study is referred to as "background literature." Considering that it establishes the significance and applicability of the offered topic, it is essential in the presentation of a research proposal. Also, it helps the audience understand the research problem, the context, and the knowledge gaps that the proposed study is intended to solve.

Before selecting this research topic as a group, we had tried to find out day to day issues that we face, so personally as an undergraduate students before buying any of a product I used to search and study regarding that product whether its worth to buy, whether it can satisfy my requirement, whether to buy it or not are some of the requirements that I tried to fulfill for myself. With that Idea we have seen some gap in the real-world scenario regarding that product purchase. In the modern technological development users get used to going through some online and video reviews regarding any of a product prior to purchase. So as a student with IT knowledge background we also surf some different platforms like google, YouTube, Reddit to get the good and bad side of a product.

With this idea we have been to some local websites regarding computer retail shops [1]. In there also we had identified that only the filtering and sorting options are available for the users, if they want to purchase a computer accessory, they can search that accessory only using an accessory specific filters like brand, capacity etc. Any of the websites are not going to provide a reviews-based recommendation system, apart from that they are not requesting any of the users' requirements that he/she need to fulfil with this purchase if they want to do so they must physically visit the computer accessories shop and tell the full requirement for a technical knowledge person and try to cater that through them. In here there might be raise communication issues where there can be some communication gaps.

Then the next thing that we had seen in our Sri Lankan community is that there is a huge amount of computer accessories repair centers widely spread across the country but only a small amount of computer accessories repair centers is positively rated [2] with their work. There are several local websites where they display several repair centers but not exactly to the positive reviews and to the nearest location. [3] This also identified as a gap for the computer accessories. But with the development of geo location and google maps people that application for their day-to-day activities like to find a location, for traveling, for distance calculations and finally for rating some places around them. With the help of google maps reviews and google reviews to a particular place it can be used to filter some best computer accessories repair center with the feedbacks.

The one of the most and the last important things that we had identified that not any Sri Lankan websites regarding computer accessories retails haven't included the image identification where user enters images to the system and with that image systems going to recognize the product and suggest that similar products to the user. [4]

With all these current issues regarding computer accessories recommendation and finding repair centers we have identified the system. where if we can use a chatbot to

interact with users requirements, recommendation system to recommend products and repair centers to users and video to speech system to extract the speech in video reviews can be a result for the above mentioned real world issues.

With the development of modern technologies, chatbot is a system which is developed to simulate human conversation through some messaging. [5] These chat bots can be used to perform different task and finally with the users' requirements identification this one is a major part which can be used to satisfy the user interaction.

Recommendation system is a system which was develop so give some recommendation regarding user's requirements [6] and it will play a vital role in this identified system development since recommending some products, accessories, and repair centers with the help of user reviews. This system will greatly impact the overall system where that the proposed development of this overall system's accuracy will be dependent on this specific component.

Since the proposed system is based on user reviews , the available written user reviews in platforms are not enough for do a proper recommendation so that we had proposed to build a text to speech system [7] where it captures videos related to users requirement and convert the speech in the video into text where those converted text can be used to compare with written reviews and output that to the users. We had seen that not many of the video streaming platforms enable subtitles for the videos so with the help of this system even a deaf person who has disabilities in hearing would be able to use this and full fill his/her requirements.

With all these specific reason as a team we had selected a chatbot recommendation system for computer accessories and repair centers as our research topic and trying to full cater the issues which I had mentioned above to full fill the users' requirements more specifically.

## 1.2 Research Gap

According to the findings of the literature reviews a few aspects that were unconcerned in past research initiatives have been highlighted. The table 1.3.1 clearly shows the comparison between each previously completed research project and the proposing solution.

The Research [8] A Knowledge-Based Recommendation System That Includes Sentiment Analysis and Deep Learning is research done to clarify the

The Research [9] Convolutional Neural Networks (CNNs) for speech recognition which tries to prove that CNN which is more excellent in performance in image processing can also be used for speech recognition tasks due to local capture patterns and ability to train large amount of data.

The Research [10] Deep Learning-based Semantic Personalized Recommendation System, deep learning techniques can be used to improve the performance of this system consists of two main components:

1. A feature extractor, which is responsible for extracting useful features from the input data,
2. A recommender, which uses the extracted features to generate personalized recommendations The feature extractor uses a Deep Learning model based on Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) to extract semantic features from the input data, which includes textual, visual, and contextual information.

Application Reference	Usage of Speech to text system for computer & computer accessories domain	Integration of Sentiment analysis and deep learning with Speech to text system	application of Hybrid Methodologies
Research [8]	X	X	X
Research [9]	X	X	X
Research [10]	X	✓	X
Proposed System	✓	✓	✓

*Table 1 Existing system and feature comparison*

The proposed system is hoping to cater for the Sri Lankan community and with that the main difference or the gap which was clearly identified as when we visit to a E commerce platforms which includes different types of laptops and devices they are only providing us filtering and product sorting methods only where this can be bit hard to satisfy our requirement not any kind of recommendation system , Speech to text system can be seen in this websites so that a user who wants to buy a product must have IT related knowledge or must do a background knowledge about a product manually by visiting each and every reviews based sites to get a knowledge about a product.

And the above-mentioned research [10] where it focuses on integration of sentiment analysis and deep learning but it not focused with speech to text system. Since we are conducting this research on computer domain with combining of different sectors like chat bots, Recommendation System, Speech to text system haven't been seen in the previous research. Our proposed system uses the integration method of both deep



learning and sentiment analysis technologies which will lead our research results to be more accurate and more personalized to users requirements.

The Research which mentioned conduct in speech to text recognition system has done only focusing on single approach methodologies but in our proposed system we are hoping to approach our solution with a hybrid approach where it use more than two development methodologies.

### **1.3 Research Problem**

This research will be based on a real-world scenario as many of the users in modern days do some research and study about the reviews regarding a product before you buy it. So mostly users will do is that use search engines like google, Bing to enter their query regarding a particular product and then with the displayed results the user need to go through each and every website and read all the articles, comments related to that product and get a background idea of it. In this scenario user must follow different platforms like websites, Video streaming platforms, community platforms and must compare all the comments and ideas regarding that product and must analyze about that and finally conclude whether which product might cater and full his or her requirement and needs. Here all the things are done from the users end where only the related documents and videos were displayed through a retrieval system for the query which user provided.

This traditional method has some major challengers where it take the more time and effort of a user to find the optimal product for his/her requirements and the final conclusion might not be the best result for the requirement so when studying this problem will be the design and development of a chatbot system that really focusses on

the customers queries and cater them with personalized recommendations for all the computers, accessories, and repair centers to them where it will full fill their wants and needs. The system that going to develop has an ability to understand the queries which was entered by the user. Where there is an interaction phase that the user needs to point out the basic requirement and with that understanding more personalized the outputs will be displayed to the users. Focusing on personalizing the outputs with different factors like price or the cost, durability and much more. This overall system acts as a hybrid system where both computers, accessories, repair centers recommendation connected through a chatbot. Where it will increase the user interaction and the user friendliness of that system

The main Research question which I identified to cater the users requirements was that how can product and repair center reviews be extracted comprehensively from all media types?. In here all media types are mentioned to be as the text reviews and Video reviews. In this research mainly focuses on extracting the video reviews to a particular product where those speech will be retrieved and compared with the written reviews and store those extracted information in a database for later analysis for product recommendations.

## **2. OBJECTIVES**

### **2.1 Main Objectives**

Objective is to deeply explore the feasibility and potential benefits of planning and developing such a system. Accessory sales, product recommendations, service center recommendations are based on the user reviews given by the users which already consumed those. So as a system catering users personalized requirements more accurately and precisely with the help of the user reviews to a product or a service center which was already been published in various platforms like YouTube, online forums (reddit) and google. The system is trying to uplift the satisfaction by identifying the

challenges faced by the users. The main objective of this study can be categorized into two main sectors such as.

1. Data gathering from different sources and implementing a dataset.

Since we are using reviews to recommend a product and a repair center to a user we need to gather all those reviews regarding products and repair centers so that for this proposed research not going to use a prebuild dataset main objective is to gather all those reviews into one data frame and store those in a database where it can be accessed by the system users to do further analysis.

2. Development of a speech to text recognition system.

When gathering data we can gather data from different types of platforms like YouTube, online forums (reddit) and google. In here to develop a speech to text recognition system we mainly focus on video streaming platforms where we can see tons of product related reviews and explanations. By building a speech to text recognition system we can explore more on the video reviews on different type of video streaming platform

## **2.2 Specific Objectives**

These mentioned specific objectives must be reached to achieve the overall objective.

### **2.2.1 Identification of websites to be Scraped.**

- For the research study without using a prebuilt dataset regarding devices and service centers we are developing the dataset with the help of Web Scraping technique. Scraping the needed data and information from the text and video reviews which was already been published in various sources like online forums, online video streaming platforms, google reviews, retails websites and from product manufacturing sites, first thing is to clearly identify those websites, Since we are focusing on Sri Lankan going to scrape data from local websites, and not going to use any API to access the global websites like Amazon etc..

### **2.2.2 Preprocessing of scraped data**

- Once we have scraped the data, we need to clean and process it to ensure that it is accurate and consistent. This could involve removing duplicates, correcting errors, and formatting the data.

### **2.2.3 Identification Speech recognition algorithms and Machine Learning Models**

- There are 5 types of methodologies can use to build a speech to text recognition system, Hidden Markov Model (HMM), Deep Neural Network(DNN),Recurrent Neural Network(RNN),Convolutional Neural Network(CNN),Hybrid approaches
- So to develop the speech to text system mainly focusing on hybrid approach where it uses more than one methodology, Using both deep neural networks (DNN) and recurrent neural networks (RNN).
- DNNs would be useful for processing video reviews, extracting features, and generating speech-to-text transcriptions. Meanwhile, RNNs can be used to process the transcriptions and analyze the text for sentiment and meaning, helping the chatbot to make appropriate recommendations. Using a hybrid

approach that combines DNNs and RNNs would allow for the processing and analysis of both video reviews and text data.

#### **2.2.4 Identification of language and domain on speech data**

- models may incorporate domain-specific vocabulary and language models to improve the accuracy of the speech-to-text system. For instance, a speech-to-text system designed for computer accessories recommendation may use computer details related vocabularies and dictionaries.

#### **2.2.5 Collection of Speech data for model training**

- Since we develop a speech to text system using a model we must train that model to get more accurate results so that must collect diverse speech data where to build and robust speech recognition system the commonly used benchmark dataset named as “LibriSpeech” dataset will be used to train the model

#### **2.2.6 Evaluation Matrices to evaluate the system.**

- To evaluate the performance of the system we will be using an evaluation matrices commonly used metrics to evaluate the performance of speech-to-text systems are Word Error Rate (WER) and Character Error Rate (CER)
  - Word Error Rate (WER) measures the percentage of incorrectly recognized words in the transcribed text. (Lower WER rate higher accuracy)
  - Character Error Rate (CER) measures the percentage of incorrectly recognized characters in the transcribed text. (Lower CER rate higher accuracy)

- Comparing the performance of a system with other state-of-the-art systems (Google's Cloud Speech-to-Text API, Amazon Transcribe, and Microsoft Azure Speech Services) using the same dataset and evaluation metrics can provide insights into the system's strengths and weaknesses.

### **3. METHODOLOGY**

This section provides an explanation of the research technique and the anticipated manner of doing the research effort to establish. As a webapp, a type of software application, would be the ultimate result where it can be used by any Sri Lankan citizen Island wide.

The main possible methodologies that can be used to archive the main objective are mentioned below:

1. Web Scraping - will extract data and details from text and video evaluations posted on a range of channels, such as online forums, online video streaming platforms, Google reviews, retail websites, and product production sites, using web scraping techniques. This is due to the lack of a pre-built dataset for this study. With this information, the chatbot system will be trained to provide customized suggestions based on user requirements.
2. Speech to Text System - It is possible to analyze and translate user-generated video reviews of the devices into text using speech-to-text technology. Those who are deaf could find this helpful because it is easy to discern the reviewers' opinions on the goods by listening to their speech and examining the words they use.

3. Machine Learning - Machine learning algorithms may be used to develop a recommendation system that predicts and proposes the best device to the user based on reviews. The text gathered via speech-to-text technology may be compared to online reviews of various items that have been placed on various websites, and a device can be recommended to the customer with two sections classified as good and poor.
4. Speech recognition algorithms and models – Using both Deep Neural Network and Recurrent Neural Network as a Hybrid approach can be used to develop this system with Improving the accuracy by combining different methodologies ,Better feature extraction, Robustness to noise and variability where with this combination can be used to robust to noise and variability in data.

These approaches can aid in the creation of a speech to text which helps the chatbot system for recommending repair shops, accessories, and computers.

### 3.1 System Architecture

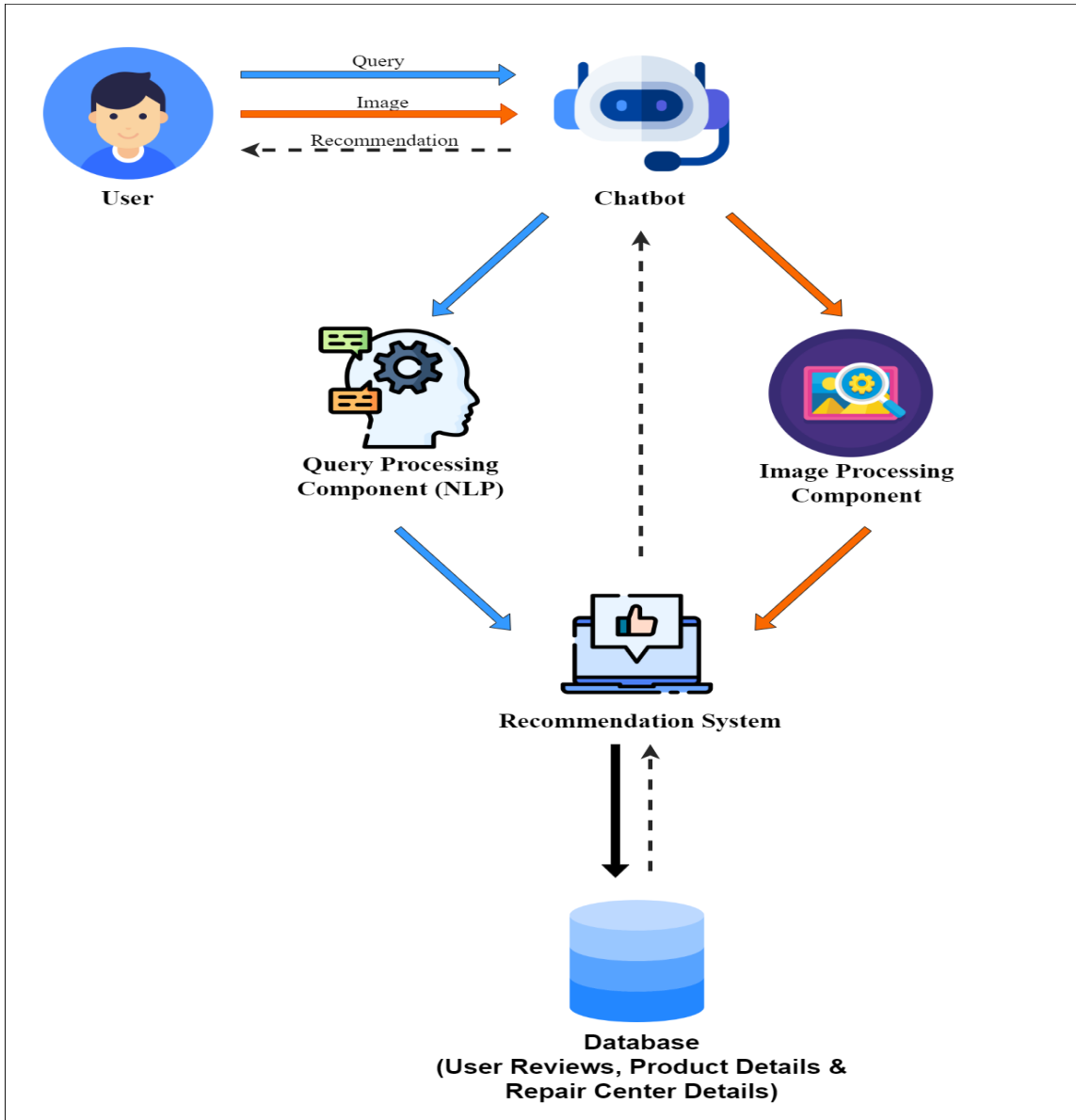


Figure 3.1.1 Overall System Architecture

Figure 3.1.1 illustrates the overall high-level diagram of the proposed system, where at the first point user is the one who wants to know about a specific product or a service



center in that situation basic requirement is created and that requirement must pass to the chatbot using a simple query for that the User inputs the query or a message into that chatbot interface (mentioned with blue colored arrow). Chatbot is the one who captures that query, which was passed to it by the user, with the help of NLP algorithms chatbot tries to understand the user's intent by breaking down that received into small components and trying to identify the key words and phrases. Then later the chatbot matches the user's intent to a predefined list of responses or actions, Based on these keywords and phrases identification the chatbot sends request to the recommendation system for the relevant items and counts. Then the recommendation system can use various types of algorithms such as content based filtering or collaborative filtering to generate personalized recommendations for the user. Generated responses can be present back to the user (mentioned with dotted arrow) through the chatbot as the reply for the query or the message received from the user.

Apart from the product recommendation the system can process image recognition. When the user uploads an image of a computer accessory to the chatbot interface (mentioned with orange colored arrow), The developed chatbot uses computer vision algorithms to identify the accessory in the provided image lately the chatbot uses NLP to identify the users request with the image comparison and with the help of the database which already created using web scraping. Finally with the database search the return of a list of results matching the identified accessory will be send to the user as a response. (Mentioned with dotted arrow)

### 3.2 Component specific system diagram

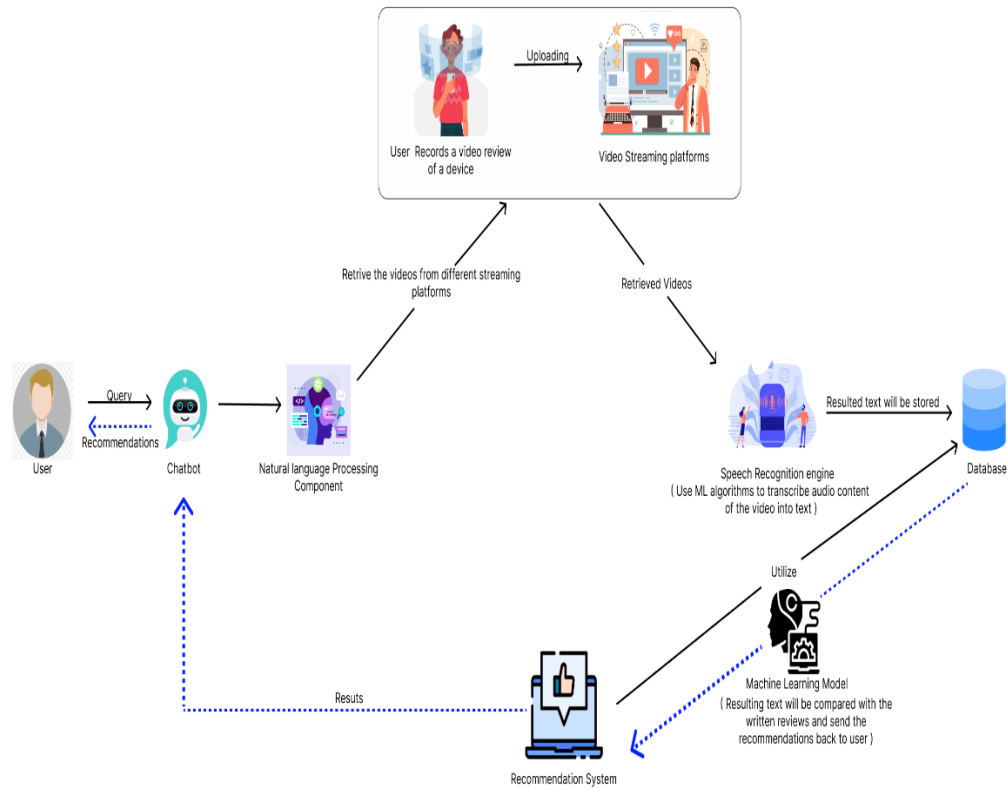


Figure 3.2.1 Component Diagram

Figure 3.2.1 illustrates the component diagram of the proposed system. The user interacts with the chatbot by providing the query then the chatbot understands the query which was received with the help of NLP component. Then the NLP component interacts with the videos, Here the users use mobile phone, cameras and computer to record their review about a certain computer accessory or a device and that recorded reviews are published on video streaming platforms. Here the NLP component structure down the user query with different keywords and phrase and with the identification NLP component request to access and retrieve the video related to those captured keywords with the help of a speech recognition engine. Inside the speech recognition engine ML

algorithms work to convert the speech in the video into text and that text is going to store in the database. This is the main scenario of the speech to text system.

Later the text which was stored in the database is utilize by the recommendation system where a Machine Learning model works out to compare the extracted text with the already having written reviews text then the recommendation system return the most personalized results to the user for the entered query.

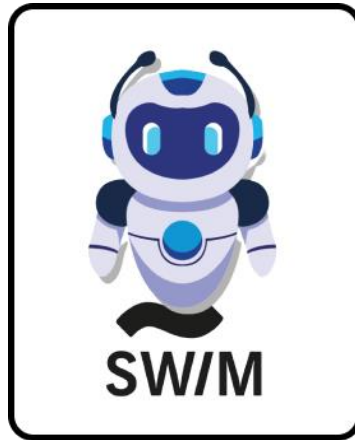
### **3.3 Commercialization of the Product**

Commercializing a Chat-Bot system for laptops, accessories, and service center recommendations can be a successful business venture if handled effectively. In order to do so there are certain factors to be considered.

The most initial and crucial factor is identifying the target market and potential buyers of the developed product. In that case, we propose this system towards computer selling companies. In such ways, they will be able to increase their sales & customer base as well.

In comparison to the competition seen in the available market, there are none too rare instances where we see Chat-Bot systems. Hence, commercializing such a product would be very useful. In addition, we don't see such system in the Sri Lanka market as well. So, implementing such a system would raise customer satisfaction and raise develop the competition in the Sri Lankan market as well.

As proposed, shown below is the product logo. We are targeting Sri Lankan e-commerce platforms, computer retail shops & repair centers to promote this product.



*Figure 3.3.1 Logo of proposed system*

### **3.4 Software solution**

The Software Development Life Cycle is a methodical approach to software development that ensures accuracy and consistency. When a need changes, developers cannot go back to the earlier step in the conventional process. As a result, the developers must adhere to every instruction precisely. But, if the agile methodology is used, developers will adapt to the change in requirements. As we employ the Agile strategy, the team members should adapt to the changes. Scrum is the agile framework that has the most sway in contrast to the others. Moreover, Scrum is a simple project management tool that can handle challenging problems. The Scrum approach, in general, breaks down the drawn-out waterfall process delivery into shorter cycles, enabling product teams and the end user to periodically evaluate functioning software and ensure that it fits their business needs. This ensures that the final product also meets the demands of the consumer. When needs change, SCRUM may be examined and modified. As a consequence, the hypothesis that was tested in both the literature review and the actual survey is what served as the foundation for the authors' suggested remedy. Adjustments will be made on an ongoing basis in response to client demands and commercialization. [8].



Figure 3.4.1 Agile methodology Structure

### 3.5 Requirement gathering and analysis.

The procedure of obtaining requirements will be the initial stage. As this phase is all about discovery, it simply entails understanding and identifying the technical requirements for the business project before moving on with a clear strategy. The information acquired at this stage will serve as the foundation for the System Requirements Specifications (SRS) document, therefore it is crucial.

#### 3.5.1 Requirements gathering

The research aims to concentrate on and gain a better understanding of public opinion regarding the project, whether there are positive and negative marks on attempting to implement a chatbot recommendation system for computer accessories and repair centers. The initial business problem was identified by posing a questionnaire. There was discussion of the general flaws in the current manual reviews recommendation systems and consideration methods for computer accessories. Consumers of E-commerce websites and those with a technical bent around Sri Lanka were given the.

Google Form was used to administer the survey. The response rate of the public to the execution of each component was also included in the questionnaire. Further study involved interviews with several corporate users who discussed the shortcomings of the present systems. The input from the business users has significantly advanced the component's specified goals and project milestones. Please refer to APPENDIX A, APPENDIX B for the questionnaire.

### **3.5.2 Functional Requirements**

#### 1. Filtering the accurate text

The system must have the ability to recognize and extract the most accurate text through a speech to text recognition from user generated video reviews.

#### 2. Storing the extracted text

The system must have the ability to store the transcribe text into the database for future analysis where those extracted text can be used to analyze the vocal tones and patterns to determine the sentiment or emotions towards that device (sentimental analysis)

### **3.5.3 Non-Functional Requirements**

- Reliability

The functioning of the system should be highly stable and constant, and it shouldn't falter while offering recommendations to consumers. The final advice or the recommendation should be reliable.

- User-friendliness

The system will provide an easy environment for users to use the existing features like entering a query and having the recommendation results.

Since we are using Image processing with the chat bot the user interaction might get easier where it will directly impact the user friendliness.

- Accuracy

The system should have a high level of accuracy of predicting and recommending the products to the users since the system has promises the users to recommend the best product for their requirement. Systems accuracy can be increased due to the hybrid approach where we take DNN and RNN for the speech to text model development.

#### **3.5.4 Feasibility study (Planning)**

- **Economic feasibility**

The benefit and project development cost are covered in the economic feasibility study. When a good economic feasibility plan is in place, the procedure will be successful. Consequently, the suggested system should be effective and less costly.

- **Scheduled feasibility.**

In feasibility study, Since the project's intent will be defeated if the timeline is not followed, scheduled feasibility assesses the timeline (period) for the planned, proposed project. As a result, the tasks in the suggested solution ought to be finished in around the same amount of time, as shown in figure 6.

- **Technical feasibility**

Technical feasibility is the assessment of the expertise, resources, and skills needed to create the proposed web application, as well as the knowledge of the system architecture and the communication abilities needed to comprehend the demands of the stakeholders to complete the suggested project solution.

## 3.6 Tools and Technologies

### 3.6.1 Tools

**IDE: VS Code** - Visual Studio Code provides an interactive workspace to develop deep learning models and contains crucial extensions like Visual Studio Code Tools for AI to quickly deal with machine learning-powered model.

**Google Colab** - The free cloud-based Jupiter notebook environment Google Colab enables the training of deep learning and machine learning models on CPUs, GPUs, and TPUs. The accessibility of free GPUs and TPUs is the main benefit of using Google Colab. Training models, especially deep learning ones, take several hours on a CPU, GPUs and TPUs on the local machines, on the other hand, can train these models in a matter of minutes or seconds.

**GitHub** - GitHub is a web-based version control system that allows developers to collaborate on code and track changes over time while several people work on the same project at once. It may be challenging to make sure that everyone is using the most recent version of the code and to keep track of developer changes. This is why tools for version control, like GitHub, are useful. To facilitate team collaboration and task management, GitHub also offers capabilities like code reviews, issue tracking, and project management tools.

**TensorFlow** - A tool and technology for creating and implementing machine learning models is called TensorFlow. TensorFlow is a Google-developed open-source toolkit that gives programmers the ability to create and train a variety of machine learning models, including neural networks, deep learning models, and other statistical models.

### 3.6.2 Technologies

**Python** - Python is easy to learn and offers rapid model development speed. Python takes less code than some other programming languages, therefore we will be able to develop prototypes and test our ideas more quickly and simply with Python. Python offers several excellent libraries for handling audio. One of the most well-known and full of features is Librosa. Several speech recognition engines are supported by Speech Recognition, including Wit.ai, CMU Sphinx, and Google Speech Recognition.



**Systems for automatic speech recognition (ASR)** - These algorithms are capable of transcribing speech in real time. To translate voice into text, they employ methods like Deep Neural Network(DNN) and Recurrent Neural Network(RNN)

**Deep Neural Network (DNN)**- A supervised learning process where deep neural network can be used as a technology to build a speech-to-text system by training the network on large amounts of audio data and their corresponding transcriptions.

**Recurrent Neural Network(RNN)** – A recurrent neural network (RNN) can be used to build a speech-to-text system by taking audio inputs, such as spoken words, and converting them into text outputs

### **3.7 Implementation**

#### **Web application development**

The finished solution includes a web application to real-time every output detail. Authors of the program should be well-versed in Visual Studio code and web application development.

#### **Front End Development**

For front-end web development Preact is used. Preact is a lightweight alternative to React, and it is well-suited for front-end development. Preact has a small footprint where it is a lightweight library, weighing in at only 3kb minified and gzipped. Because of Preact's highly optimized virtual DOM implementation, user interfaces are quick and responsive. Preact's minimal footprint helps it run more quickly since there is less code to download and parse. Since React and Preact share a similar API, getting started with Preact shouldn't be a problem. This implies that when working with Preact, we may make use of our current expertise and abilities.

#### **Back End Development**

Python's Flask web framework is nimble and adaptable, enabling programmers to create web applications rapidly. Flask is a popular option for creating web applications of all sizes because of its simplicity, versatility, and usability. Python flask can be effectively used to develop the backend more easily since it's easy to start where getting started with flask is straightforward and intuitive because of its simple and intuitive API. The boilerplate code and settings needed for Flask are minimal. Without being constrained by superfluous functionality, this enables us as

developers to create unique apps that cater to our requirements. Flask's modular architecture makes it simple to add or remove features as necessary. As a result, developing and maintaining complicated applications becomes simple.

### **Database handling**

The voice input from the video reviewers and the text outputs from the written reviews will be stored in MongoDB, a NoSQL database that is free, open-source, highly scalable, and document-oriented. To manage the database, it will be necessary to be familiar with adding, updating, removing, securing, and filtering data with Mongoose. The ideal option to store these kinds of unstructured data is to utilize MongoDB because the system will generate millions of data for the server.

## **3.8 Deployment**

### **Cloud Platform – Google Cloud Platform (GCP)**

Since this is a chatbot system and more user interactions can occur so thinking about the scalability is more important, depending on demand, GCP enables us to scale your application resources up or down as necessary. This enables your application to manage traffic peaks and provide a positive user experience at all times. For the bulk of its services, GCP offers an infrastructure with a 99.95% SLA for uptime. This ensures that our users can access our application at all times. Since we are considering the cost-effectiveness pay as you go pricing models would be important to us to deploy this web application.

## 4 WORK BREAKDOWN STRUCTURE AND TIMELINE

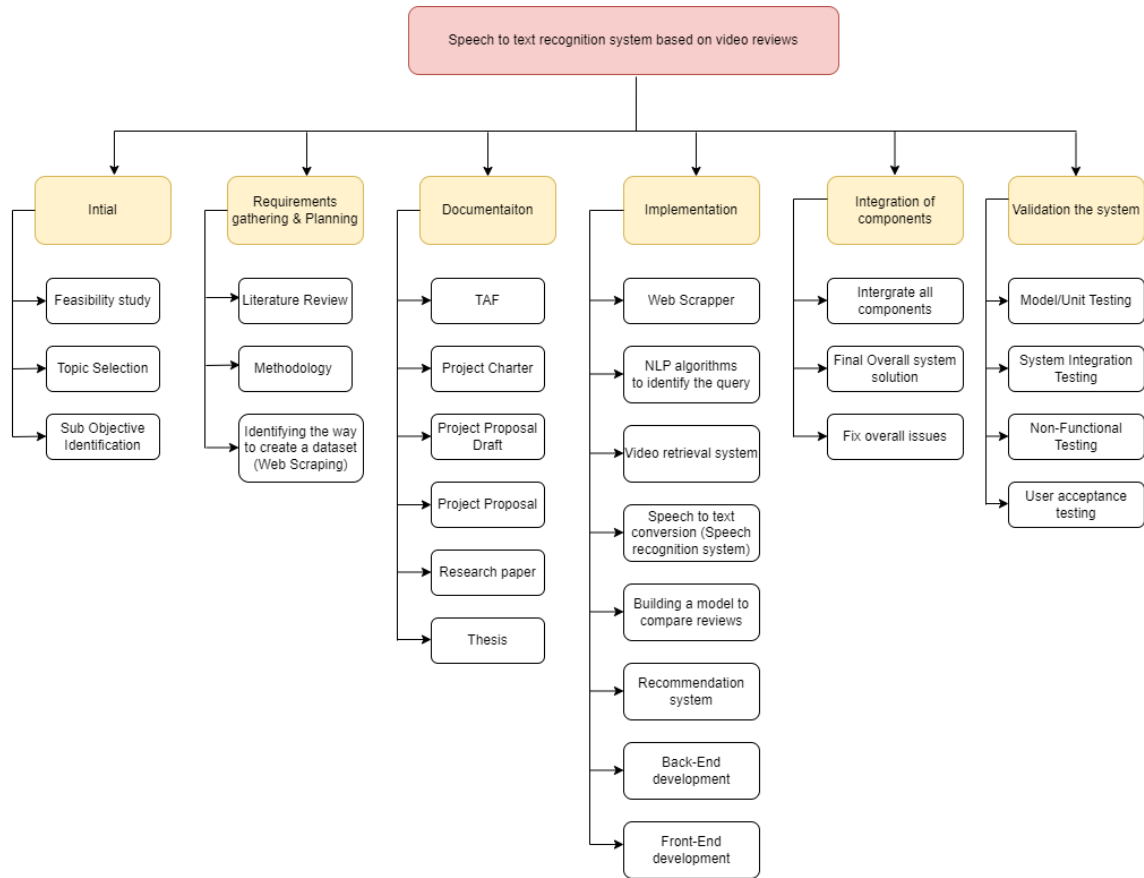


Figure 4.1 Work Breakdown Structure

The project management tool of choice is a WBS (Work Breakdown Structure), which adopts a step-by-step methodology to finish the project and approaches the sub-goals and primary objectives with several moving parts. This tool aids in project breakdown into manageable components and provides a clear view of the project's scope and deliverables.

# 5 GANTT CHART

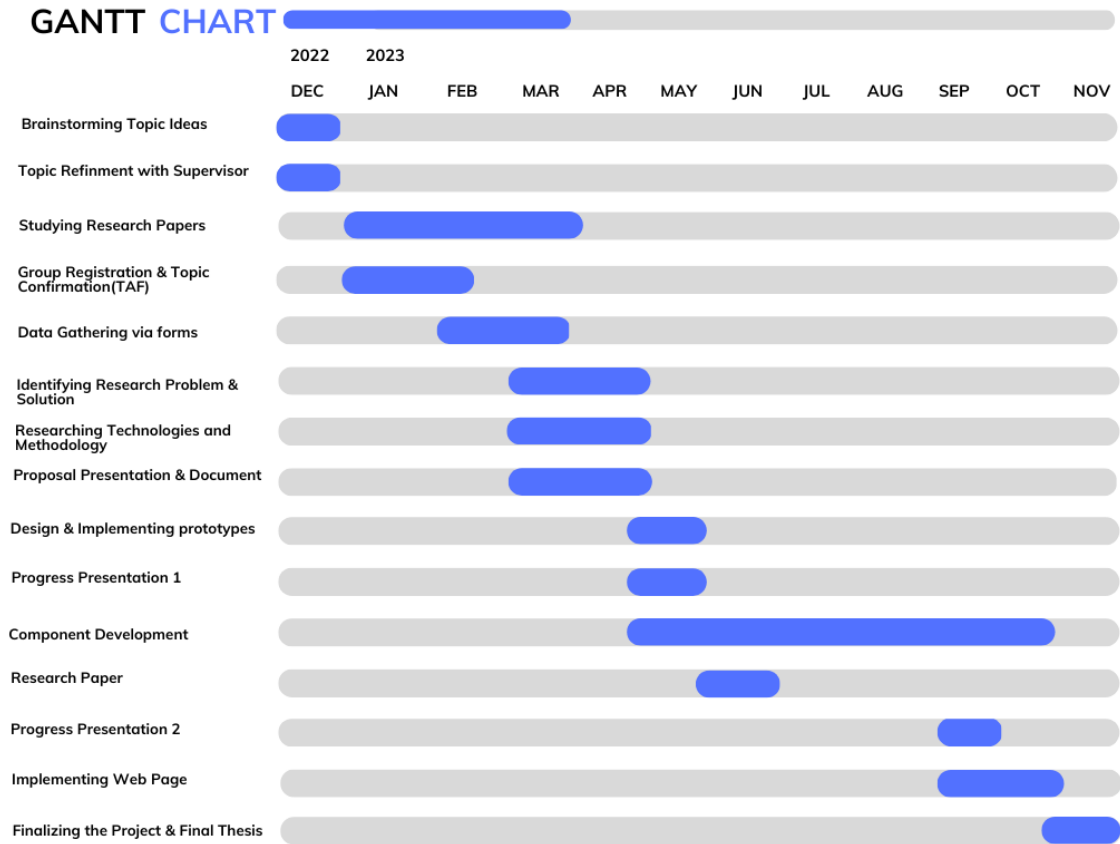


Figure 5.1 Gantt Chart

## **6 BUDGET AND BUDGET JUSTIFICATION**

The total budget for this proposal is Rs.8,000, which will cover the expenses necessary for the project. Members of our team will bear this cost.

### **Materials and Supplies:**

The materials and supplies cost are estimated to be Rs. 5,000. This includes the cost of Google Cloud and other infrastructure costs, printing costs, and the cost of other necessary supplies.

### **Other Expenses:**

The remaining budget of Rs.3, 000 will be allocated for any other expenses that may arise during the research project, such as unforeseen costs related to the research design or implementation.

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# 8 APPENDICES

## Appendix A: Sample Questionnaire

<https://forms.gle/FNLZidzXDE5MZKbX8>

