American International University-Bangladesh (AIUB)

Thesis

Smart Virtual Assistant for Student Portal

Submitted by:

Shakil Ahmed, 17-34405-1

Md. Taraqul Islam Rony, 17-34342-1

Department of Computer Science

Faculty of Science & Technology

American International University-Bangladesh

January 2021

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Name: Md. Taraqul Islam Rony
Id: 17-34342-1
Department of Computer Science

Name: Shakil Ahmed
Id: 17-34405-1
Department of Computer Science

Approval

This thesis titled "Smart Virtual Assistant for Student Portal" has been submitted to the following respected member of the board of Examiners of the faculty of Science and Information Technology Impartial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering on January 18, 2021 and has been accepted satisfactory.

Dr. Md. Abdullah- Al - Jubair
Assistant Professor and Supervisor
Department of Computer Science
American International University-Bangladesh

Dr. Ashraf Uddin
Assistant Professor and External
Department of Computer Science
American International University-Bangladesh

Dr. Mahbub Chowdhury Mishu
Head (Undergraduate Program)
Department of Computer Science
American International University-Bangladesh

Prof. Dr. Tafazzal Hossain
Dean
Faculty of Science and Technology
American International University-Bangladesh

Dr. Carmen Z. Lamagna
Vice Chancellor
American International University-Bangladesh

Acknowledgement

This Thesis is our cordial effort and our supervisor's initiative and constant motivation. But First, we would like to be grateful to the Almighty Allah, who gives us the effort to work on this thesis for the last one semester. Especially thanks go to our honorable supervisor faculty member, American International University-Bangladesh [AIUB] for his enormous support, inspiration, and helpful criticism. His excellent supervision and constant support make this thesis possible. We are very grateful to him for giving us the opportunity to work with him. We also convey our thanks to our honorable Vice Chancellor, Dr. Carmen Z. Lamagna, our Dean, Prof. Dr. Tafazzal Hossain, our Associate Dean, Mashiour Rahman, our Director, Dr. Dip Nandi, and our Head of Department Dr. Mahbub Chowdhury Mishu for their constant motivation and support.

Finally, yet importantly, we thank our respectable parents for educating us with aspect from both arts and sciences, for their unconditional support and encouragement to pursue out interests, even when interests went out of boundary.

Abstract

A virtual assistant (VA) is a trained assistant who can do daily tasks that are time-consuming and repetitive in nature. A student portal requires choosing courses, read about the administrative environment, libraries, bookshops, exam schedules, results, notices, calendars, and much more. Students have to do these things by using a web browser. But sometimes it is annoying and even a waste of time. To overcome this problem, we propose a smart virtual assistant (SVA) system. Using a specific voice command, this system will help the user to get the required information or to access a page in a very short time without memorizing any route. This study reviewed previous research in the area of virtual assistants. From the review, we propose a new framework to implement the SVA system for the student portal. This study proposes a machine learning algorithm approach to categorize the given user input command. For this approach, we use speech recognition and text to speech API to translate between speech and text. This study shows the testing of SVA and finds an accuracy of 95% for selected commands. This system has created a creative solution to real-life problems with less labor cost and less prone to human error. The finding of our system shown that our system is satisfactory enough.

Keywords Virtual assistant, Student portal, Machine learning approach, Speech recognition, API, voice commands, Smart Virtual Assistant (SVA) system,

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Chapter 1
Introduction

1.1 Overview

A virtual assistant (or VA) is an independent consultant that can work remotely, support administrative tasks and manage just about any online or manageable job. In certain instances, a virtual assistant is a freelancer with a variety of unique assignments, which are dependent on his ability to simplify your life (Kenitz, 2019). Particularly Virtual Assistants are pursued by startups and online companies who need assistance but do not want to spend money on a workspace for their workers. However often small and medium-sized enterprises use virtual support, in particular for specialized activities, such as handling social media or task scheduling.

A student portal is an internet portal through which students can view important curriculum details on a university's website. Student portals provide information on offered classes, transcripts, e-mail services, calendars, test schedules, results, advisory documents and phone numbers for offices. They can also connect to valuable web services, including research tools and online papers.

In our study, we will have suggested an extensive interactive student platform assistant in English language. Our program will have various kinds of data on different types of possible answers to different commands. Our system can provide various kind of information such as, notices, results, exam schedule, daily routine, exam syllabus etc. Users do not need to find the route or memorize the route to capture any data. This system will help the users to get the required information from the portal using just voice commands. Extracting necessary information from the portal using voice commands will be very beneficial for every student, teacher and other users. In order to respond by ourselves using its knowledge and understanding contained in its database, we will establish our framework. However, unknown commands may be managed and the device often relies on external API calls for the latest details.

1.2 **Background**

In the Experimental phase, Radio Rex was the first voice activated toy released in 1911(Tom, 2010). It was a dog who, when its name was called, would come out of its home. In later, For the year 1952 Bell Labs introduce Automatic Digit Recognition machine. This machine recognizes the basic speech and phonemes. But The correct identification of digits spoken by designated speakers was limited.

In 1990 speech recognition technology became a staple of the computer with IBM, Philips and Lemout & Hauspie competing for users. For the year 1994 IBM Simon become the first smartphone is base for the virtual assistant (Pandey et al., 2020).

Siri is the first standard virtual assistant on a phone when the iPhone 4s release, 2011. When the Home Pod launched in February 2018, Siri shifted into the smart speaker era. (Fathe, Ahmed & Islam, 2017)

In 2017, virtual assistant features and use are increasingly expanding, with new technologies entering the market and a heavy focus on both email and voice user interfaces. Apple and Google have wide user bases built on smartphones. Microsoft is a large install database computer, phones and smart speakers based on Windows and Amazon has a large install base for smart speakers (Kline, 2017). Via its Insightful Virtual Assistants for Business email and sms interface, Conversica has over 100 million engagements.

The Online portal was a Web IT buzzword in the late 1990s (Pandey et al., 2020). Many organizations tried to build or purchase a platform since the proliferation of web browsers in the late 1990s to try to gain a share of the internet market. Despite the significant use of my.yahoo.com-type Web portals in the business field, as of January 2003, only a few libraries had implemented Web portal technology. When internet businesses merge or are purchased, the content and identity of a portal could change. Netscape is part of America Online, Go.com as launched by Walt Disney Company, IBM and others launched Prodigy. Portal metaphors are commonly used by borrowers using a password as visitors of public library pages, and by university intranets for students and teachers (Paul et al., 2018).

So, we see previously, a significant amount of work has already been performed in virtual assistant in English and other Languages like Google Assistant from Google, Siri from Apple, Cortana to Microsoft, and Bixby to Samsung etc. They all have the same functionality but each of them have some different features and capabilities (Varma, 2018). No personal virtual assistant developed in Bangla language. Although, some Chabot developed in Bangla language. In 2017, T.D Orin proposed Bangla basic text conversations chatbot called Golpo

(Orin & T 2017). A contextual closed domain was implied by Anirudha, Paul in 2018 which is chatbot platform for Bangla languages that are resource-poor (Paul et al., 2018). These are just text chatbots for general discussions and thus have very minimal features.

1.3 Problem Statement

The portal requires students to choose courses, read about the administrative environment, classrooms, libraries, bookshops, exam schedules, results, notices, calendars and much more. Students have to do these things by clicking on the GUI (Graphical User Interface). But sometimes it is annoying and even a waste of time. Especially checking the exam schedule or daily class routine.

A solution is needed to reduce this kind of problem. And our proposed solution is to create a smart virtual assistant system. This system will help the user to get the required information or to access a page in a very short time using a specific voice command. This system will solve the problem of wasting time. And with this system, users do not have to memorize any route and do not need to browse the portal. There will be no harassment to get an exam schedule or class routine using the proposed system. Users only need to give a voice command and the system will perform the given task.

1.4 Research objective

1.4.1 General objective

A virtual assistant (VA) is a trained assistant who can do daily tasks that are time-consuming and repetitive in nature. Our system will play the role of virtual assistant an online student portal. Our system will set up and manage portal accounts, schedule, notice, answer queries on behalf of the student.

1.4.2 Specific objective

- To propose a smart virtualized assistant (SVA) system framework for the student portal. It includes a wide collection of commands and combinations of certain commands that are most frequent.

- To design and develop a smart virtual assistant system according to the proposed framework.
- To evaluate the VPA system and find out the result of the system.
- To execute any uncertain user input data.

1.5 Motivation Studies

Human computer communication has been rising demand recent days. Voice assistants will appear everywhere in our life, including vehicles, employers, houses, hotels and restaurants. Voice assistants like this will do everything in our house, including answering questions, making jokes, playing music, and monitoring things such as lighting, fans, door locks, and smart home appliances. Technology is evolving and shifting continuously, and along with it, the voice assistant industry will advance. The consulting firm Gartner projected in April 2015 that 30 percent of technology encounters will be by "conversations" with smart machines, many of them through voice, by the end of 2018 (Zinck, 2018). According to Global Business Insights, Inc., the market share of technology will rise at an annual pace of almost 35 per cent between 2016 and 2024. In addition to those used in products such as smart speakers and tablets, more and more segments of the market, including healthcare and the automobile industry, are seeking applications for speech recognition technologies (Zinck, 2018).
That’s why we become interested in working with smart virtual assistant. A System truly understand if it behaves as if it understands. Then we were interested that field. Our dream is to contribute in this field. That’s why we select this topic.

1.6 Contribution of the Study

We will create our system for students. We will implement a student portal that includes smart assistants. The project is to create a conversation, understand and answer what the user says in a simple and reliable speech method. The main focus of our paper is to create a smart portal with virtual assistants.

1.7 Summary

This chapter we discussed background of virtual assistant, student portal. Problem statement of student portal. Motivation of our study. Student portal now carries too much information in universities and colleges. Details of the students, results, installations, classes, departments, profile details, class closures alerts, class changes, review calendar, etc. Through using a portal, student can monitor it all. But a virtual support portal can provide unified, safe access to student information and facilities by connection to these networks and through voice command or machine learning intelligence activity, bring crucial information from the portal via voice command or web application. To make a student activity simple and easy, this assistant is perfect. Each student needs the best resources in promoting his/her learning activities and works hard to ensure that educational facilities will develop the correct student environment based on their individual cases.

This student portal will enable colleges and universities to create a brand-new experience that will show the individuality of the school and its participating students. In order to simplify and develop the way to access information, online tools and help handle certain day-to-day tasks, smart assistant for a student portal was configured simply to pose natural language questions to intelligent agent. By the help of this assistant student can easily find out their necessary information just to use their voice.

Chapter 2
Literature Review

2.1 Overview

In this chapter describes the literature review that explains the Smart Virtual Assistant (SVA) both manual and computerized techniques. We also include previous studies of virtual assistant work has been achieved or feedback analysis.

2.2 Virtual Private Assistant

Requires the handling of portal, calendar meetings, files, and listing. Virtual Personal Assistants are capable of organizing and storing details. Some digital personal assistants can work as concierge or provide voice feedback or command-based information and some smart personal agents who can control or handle information remotely electronically, without user beginning or communicating (Massai, Nesi & Pantaleo, 2019).

Personal Assistant program is an application designed to help users accomplish simple tasks with an interactive user interface in a natural language. Smart personal helpers respond and answer questions on the basis of the data the user enters. Robot systems are designed to solve real-time challenges that increase human resources and productivity (Imanuel, 2017)

2.2.1 Virtual Private Assistant using Voice

The true potential of speech recognition systems is yet far from being understood. This refers to both the refining and organization of the invention itself in our lives. Current digital staff can decode fantastic discourses, but they are not the dialog interfaces that innovation providers require. In comparison, voice recognition is limited to just a few items. Apple's Siri started in 2011 around time before speech recognition technologies. IBM introduced a device called Shoebox in 1962. It had the size of a shoe box and was able to execute scientific activities and understanding of 16 spoken words and numbers of 0 to 9 (Bradeško & Mladenić,2017; Rost & Michael,2015).

However, the preparation of a voice assistant needs several data: 10,000 hours of recordings. In this sense, all TED discussions are going to take about 100 hours. That's why Mozilla

opened the popular voice project to allow the public to give voice to themselves. The experiment called Voice fill has been developed to allow you to search Google, Yahoo and duck go using voice (Nancy et al, 2019).

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2.2.2 Virtual Private Assistant using Text

A Virtual Private Assistant using Text is a private assistant that is used instead of providing direct contact with a live human agent to conduct an online chat conversation via text or text-to-speech (Rouse, 2017). Designed to believably visualize the way a person would act as a communicator, chatbot system that uses continuous tuning and checking, and many in development remain unable to fully converse or pass the Turing industry basic test (Bradeško & Mladenić,2017). Michael Mauldin originally created the name "ChatterBot" to describe these conversational pro-Turing tests in 1994. For different uses, including customer support, request filtering, or for information processing, using text is dialog systems. While some text system implementations use elaborate word classification processes, natural language processors, and advanced AI, others merely use standard phrases retrieved from a related library or database to search for general keywords and produce responses. Via webpage popups or by virtual assistants, most text system are accessible online. They can be divided into different categories of use: commerce (chat e-commerce), education, culture, banking, fitness, news, and living standards (Baron, 2017). Other recent noteworthy systems include A.L.I.C.E., Jabberwacky and DU.D.E.E. Text base virtual private assistant from many businesses operate on chat apps or simply via SMS. They are used for client support, distribution and promotion of B2C (Beaver & Laurie, 2016). Facebook Messenger made it possible for creators to put text-to-text system on Facebook website in 2016. In the first few months, 30,000 bots were generated for Messenger, rising to 100,000 by September 2017(Jonson, 2017). This has already been part of a trial programmed on WhatsApp since September 2017. Both Airlines KLM and Aeroméxico confirmed their inclusion in the tests (Forbes, 2017) both airlines have recently released Facebook Messenger customer services. Typically, the text function as being among the user's contacts, but may also serve as group chat users. text-to-text system have been used by many banks, insurance firms, publishing companies, e-commerce companies, airlines, hotel chains, manufacturers, health care services, government agencies and restaurant chains to answer basic questions, improve consumer engagement (Jonson, 2017) to encourage and provide additional forms of buying from them (Staff, 2016). Several reports report a substantial decrease in customer service

prices, projected to lead to economic gains of hundreds of billions over the next ten years. In 2019, Gartner estimated that AI will perform 15 percent of all customer service transactions worldwide by 2021. A 2019 analysis by Research Firm predicts retail revenue from chatbot-based interactions.

In the healthcare industry, chatbots are also appearing. (Larson & Selena, 2016) A study showed that doctors in the Western World believed that chatbots would be most helpful for scheduling doctor visits, locating medical centers, or giving details on medications. (Adam et al., 2019). Many text-to-text has partnered with the World Health Organization (WHO) to create a chatbot service to respond to questions from users about health care (Adam et al., 2019). The development and deployment of virtual private assistant using text is still an evolving field, heavily linked to artificial intelligence and machine learning, so the solutions offered have some major shortcomings in terms of functionality and use cases, while having clear advantages. This however, varies over time.

2.3 Personal Assistant Apps

Various technologies are developed for voice assistance and used as smartphone apps in everyday life. The following smart voice assistant are:

AIVC: AIVC (Alice) is a completely typical, modally registered virtual assistant. It contains the ability to request basic items such as beginning multiple applications, the weather, time, date, memories and mathematical problems. Fun information about Nations, stocks and much more can also be questioned. It requires basics such as calling, sending SMS, routing, warnings, of course. It's neither simple or complicated like Google. But now just wanting something easy isn't a bad idea.

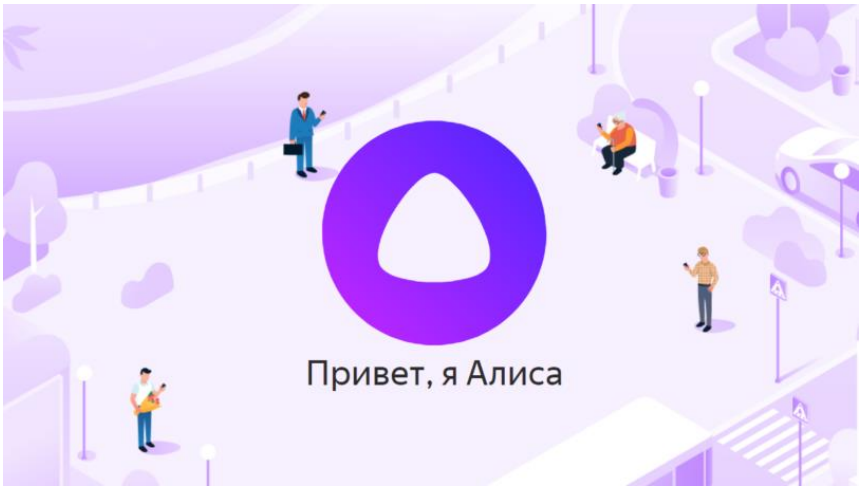

Figure 2.1 Alice

Cortana: Cortana also needs practice, but it has a lot of courage to leave a list like that. The response from Microsoft to Siri has a lot of stuff he can do and is structured into Windows 10 to support an almost unlined cross-platform. Many of the functionality include calling users, Text messaging and email, monitoring sets, jokes, taking notes, adding items to the schedule, and more. Again, the edges are a little harsh now but Cortana is even better than others and just gets better with time.

Figure 2.2 Microsoft Cortana

Dragon mobile Assistant: DMA was launched by Nuance speak. The specific features are available to ensure you can anticipate very regular features. This includes something called Attentive Mode, which can be triggered even though the screen is switched off and

bound. Dragon Mobile is therefore one of the first to have this service. You can even choose from different voices and even call your employee anything you want (Pandey et al., 2020).

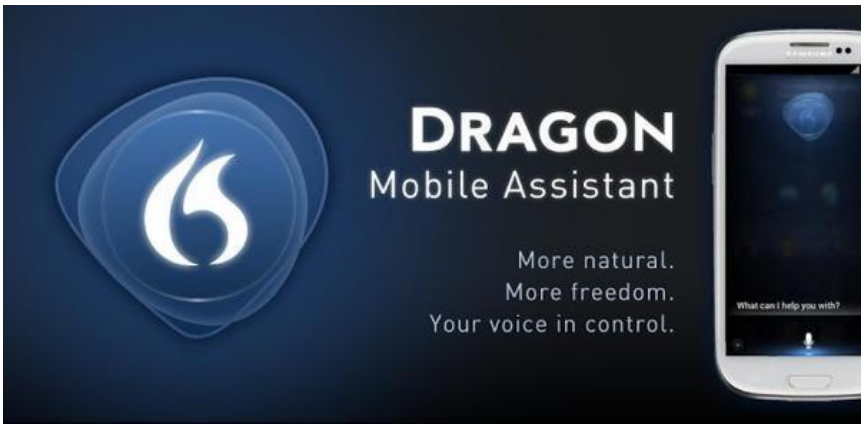

Figure 2.3 Dragon mobile Assistant

Google now: Google is the well-known champion of clever Smartphone applications. It comes with a metric analog ton that includes the basics, more sophisticated airless than you thought, Google now on Tap, and much more. This app is not good enough to be a shattered wall. It is still almost continuously updated by Google and still seems to be added to the analog ballast and selection. If any system can accommodate Google Play, it will definitely have it enabled by now, meaning it needs to be allowed only (Nancy et al., 2019).

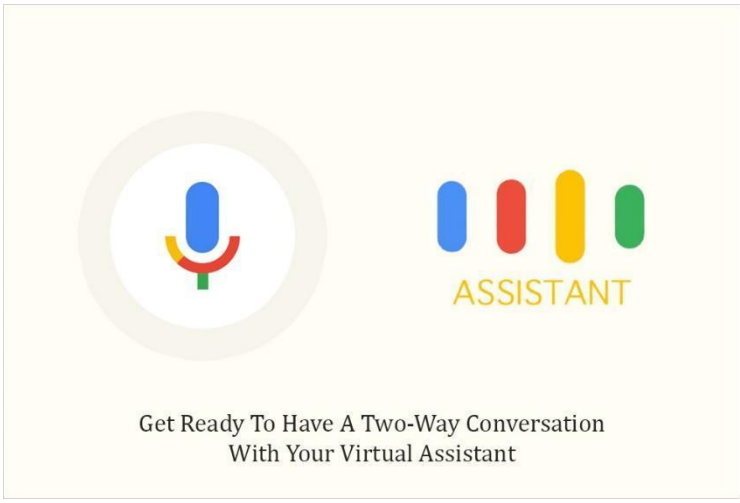

Figure 2.4 Google Assistant

Hound: Hound beta is another of Cortana's forthcoming personal support applications. Sound Hound does stuff and really is very decent. This is a positive thing. These are all protected here with an advanced airless appreciation for a mortgage calculator; Expedia integral for hotel reservations; Sound Hound Now, which unlocks a quest for singing songs. It can also play Hangman immersive sports. It's just for the US, so it's beta-free and ready to use (Nancy et al., 2019).

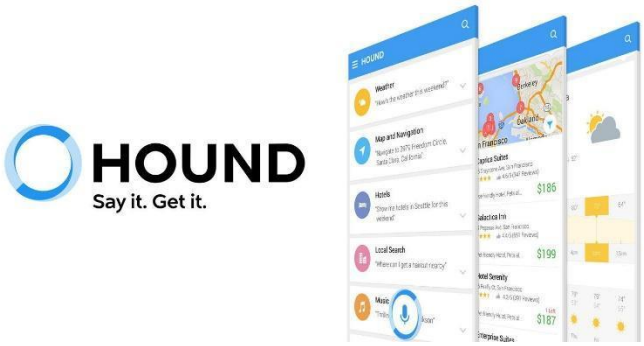

Figure 2.5 Hound

Bing: The search engine of Microsoft Bing is voice-capable of making statements and is able to represent its competitor Google from diverse viewpoints. It has a liquid, ordinary and elegant GUI that allows users to find what they need in style for the first time. The GUI is smooth, smooth and centered. This device is assisted by intelligent voice search affirmation. It provides multifaceted searches such as desktop Decision Engine. It's user-friendly, quick and easy to support. A number of questions and submission criteria can be addressed (Nancy et al., 2019).

Figure 2.6 Microsoft Bing

Alice: Alice is an extremely particular voice companion that looks for Android consumers with trustworthy assistance. Alice is intelligent enough to see anything more than instructions and the desire to understand and to know new information by observation. The Voice calls for explicit applications to be submitted and to search for objects. It responds to requests for environment, time, scores and this is only an example of a big challenge. Customers are able to differentiate themselves. It produces a strong routine plan, plans, cautions and alerts. It functions with flexible features such as SMS, calling etc. Helps to recognize problems in mathematics in just a few instants (Pandey et al., 2020).

Bixby: The Bixby system is readily accessible from Samsung's smartphones and isn't always practical on Google Play. The most valuable thing about this voice is that it allows you to rely on what is important and holds an eye on your past searches and learns what your applications or resources are most cherished. Which requires searches on the Internet. It will import Play software. It has direct support for different applications. It is an intelligent home technology. It knows the conversational language every day which less complicates communication. It will receive voice instructions in English (US), Chinese and Korean (Mandarin) (Nancy et al., 2019).

Figure 2.7 Bixby

2.4 Method of Virtual Private Assistant

A digital assistance that uses speech recognition, natural language processing and voice synthesis to support consumers via telephone systems and smart devices like the Siri speaker. It is almost difficult to identify or label any invention by a name that simplifies our lives and makes it smarter. There are also words that apply to agents that may perform particular roles or services which are nearly synonymous but not yet comparable. These variations are primarily due to how we communicate with the technology. Such fundamental concepts, parallels and variations are as follows:

Smart Personal Assistants (IPA): People with a few simple tasks normally in the natural language may use this kind of program. Smart personal assistants are also so wise that they go online to seek answers to a question from a customer. It can cause an intervention by text or voice (Pandey et al., 2020).

Automatic Personal Assistant: automated ensures that the job itself is carried out. The personal helpers use AI and are able to do any automatic activity according to their expertise and attitudes towards the IPA (Pandey et al., 2020).

Smart Assistant: it typically refers to the types of physical devices which can provide different functionality and facilities using clever speakers to wake-up words and to execute certain tasks. Examples of some voice assistant devices: Echo, Google Home assistant and Apple Home Pod (Pandey et al., 2020).

Chatbot: It uses text as a means to connect and give information to users and execute the job. Chatbots can mimic a human user conversation. Most banking firms today use them to address critical questions in the customer support field or maintain their accounts, so do not worry about connecting to an online individual if Bot is unable to solve your question (Pandey et al., 2020).

Voice Assistant: Our voice is the gateway to this input. He is a digital assistant who uses speech recognition, voice synthesis and natural language processing (NLP) as well as AI to provide an outstanding service through the Siri, Ok Google app test. Cortana and so on. (Pandey et al., 2020)

2.5 Related work

In 2006 a team proposed a paper on Personal Assistant for Task and Time Management at AI magazine, the intelligent personal assistant who was created to assist a busy intelligent employee to handle time schedules and work was identified in the project. In order to remove users from repetitive activities, the framework was designed to concentrate on tasks that require critical human problem-solving capabilities and action in cases where cognitive excess contributes to user overviews and errors (Myers et al., 2006). The paper described a method known as PEXA, which was intended to enhance a knowledge worker's effectiveness and performance by assisting her in arranging and carrying out activities. The paper described PExA focuses on two primary fields, time management and task management, from a practical point of view. Time management refers to the consumer mechanism in which real- and future-time requirements are handled. Time management includes the arranging of meetings and appointments, but also the generation of alerts and the balance of workload. Project management requires task preparation, delivery and control. Task management These activities can be informal, since they come from the user or originate from project obligations (Myers et al., 2006).

In 2016, Yogenda Kumar Sharma published a review paper on intelligent personal helpers to ease the current intelligent service such as Google now, Cortana, Hound, AIVC and Dragon Mobile Assistant (DMA). Their goal was to explain the present situation with intelligent personal support (Kumar & Sharma, 2016).

A Bangla virtual assistant was published on may, 2019 at 1st International Conference on Advances in Science, Engineering and Robotics Technology. They showed a detailed design and production methodologies for mobile devices like smartphones and personal computers by a Bangla virtual AI assistant "Adheetee." They protected a large range of controls with 94,065 percent precision in the most popular control schemes. They referred to their system as "Adheetee," which means "Erudite." It includes a wide variety of most common commands and combinations of the aforementioned commands. Their system consists of a large database of all kinds of information and possible reactions to different commands. This system consists of several different commands. As basic commands and key commands they have transmitted their commands. Basic commands like a chatbot manage a basic speak. The framework performs more complex device-based operations in the core commands (Mohidul et al., 2019).

From the basic application of telling time to watching songs or movies to handling our communications, Automated Personal Assistance can provide a number of uses. If the camera module is an interface, it can also be used for monitoring purposes, so it can do surveillance work. Still, Lizzy also has power over hardware, i.e. User can only send Lizzy command and control whatever hardware we have with her GUI. We should incorporate deep learning (Paul et al., 2018) on Lizzy in the future so that she can learn to own herself and create modules of her own. It is also possible to create a smartphone app for Lizzy, so we can allow her access from our smart phones.

Online Personal Assistance performs in real time, since it instantaneously delivers the required performance. When user send the order to it through the microphone, the speech or command we have provided is first interpreted and then translated to text, then the key words are extracted from the text and then verify with the modules stored on the local hard drive whether the keywords match any of the modules, then the particular module will be implemented if the keyword does not match any of the modules. As we use withal as a voice to text translator, with our Virtual Personal Assistance, we get the option to store the conversation we had and we can use it later to quickly make more modules (Tom, 2010).

Since speech is a time-varying signal, we need to execute a windowing technique to remove the signal from the speech signal. The speech signal consists of signals that are articulated and unvoiced. Hamming window is also used for phoneme extraction. After phoneme extraction, by extracting the characteristics of the signal and sending it to phonetic unit recognition, we determine which word belongs to that phoneme. There are many words and dialects present in the world, so the output language model must be set to decide the title. They set it to English for given method (UK). For predicting the next term, the language model often consists of the hidden Markov chain model. After the statement is decided, it will be shown on the screen as a digital text. (Takawale et al., 2020)

2.6 Usefulness of Virtual Private Assistant

"SIRI" is the most popular iPhone application which enables the end user to communicate with a mobile voice on a mobile phone. The Google "Google Voice Search" that is used for in Android Phones often develops the same form of feature. We also have related software, such as Bixby, Cortana and Google Assistant (personal assistants only available in Samsung devices). We would create a software application to provide a voice assistant for a given website. We have taken a college website as an example of this proposed framework. It can

modify the way end-user-website experiences operate (Pandey et al., 2020). The program is designed in such a manner that the end user can control all the resources offered by the website using the voice commands of the user. A consumer is only able to locate his expected effects by voice order. You may receive reports or findings on the admission specifics, accessible classes, rules and regulations at the university, test arrangements, upcoming activities, college scholars and accomplishers, departmental detailed statistics, technical details, syllabuses, frequently updated reports, department toppers and information for all participants, full forms and so on. On the website of the specific college or university.

2.7. Summary

The literature review conducted for this study includes previous research in the area of smart virtual assistant (SVA). Private virtual assistant is one the text and voice base system. Another outcome of this chapter is finding previous research on virtual assistant and its existing approaches. The chapter also shows necessity of Virtual Private Assistant. Also, we discussed preview text and voice apps. We were shown methods of Virtual Private Assistant, related work and Usefulness of Smart Virtual Assistant.

Chapter 3

Methodology

3.1 Overview

In this chapter we will focus methods which will be used for the development and design of the first chapter of virtual assistant for student portal. The primary concern of this chapter is to propose a system framework, and also discuss about the methodology which will be use in our study.

3.2 Framework Proposal

The purpose of this study is to create a smart voice assistant that makes using voice command computers convenient for students and makes it easier for them to do study. Python libraries and the Google Speech Recognition API will be use for the language recognition and analysis of voice responses to introduce an intelligent smart voice assistant. For the development we will use Python 3.9.1. We will be used gTTs (google text to speech) to convert text into voice commands. Pyttsx3 (version 2.71) will be used to execute the text command into an audio format.

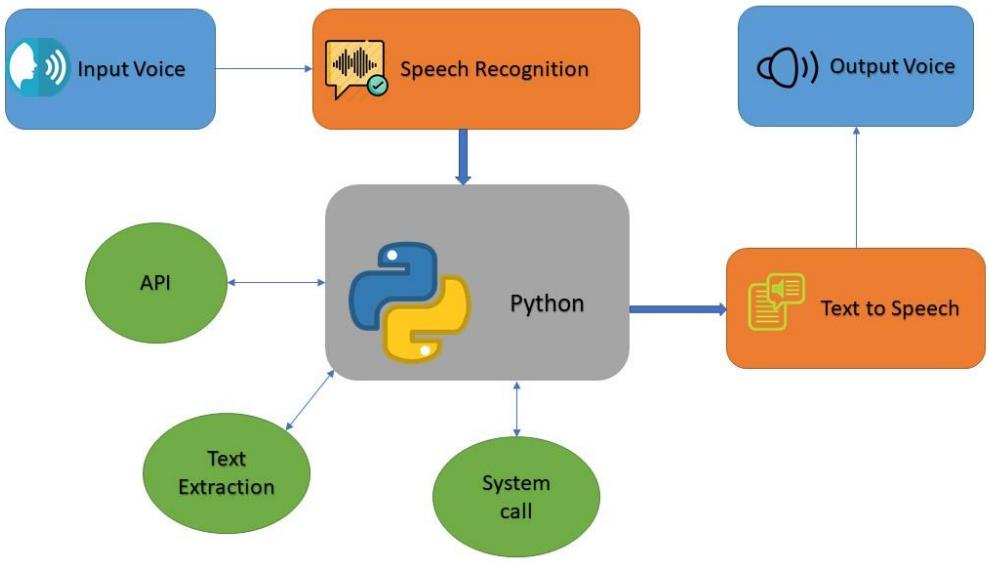

Figure 3.1- Proposed Framework of SVA for Student Portal.

Speech Recognition: There are many companies developing speech recognition and this technology is lead to state-of-the-art technology. The system will use the speech recognition system of Google to translate voice data to text. This module uses the speech-recognition library 3.8.1 with several engine and APIs online and offline for speech recognition.

Python: We will use python 3.9.1 in our system. It receives the output from the language recognition module. It decides if the command or speech output is an API request, Text Extraction and System Call and then sends the output back to the python backend to give the user the required output.

API (Application programming Interface): It sends the request to the provider who asks for it and sends the answer back. For example, Speech recognition is an API. It sends the audio and receives the text file. It acts like two programs are permitted to speak to each other.

Text Extraction: It's the feature of the automated or robot excerpt from unstructured, semi-structured or computer readable documentation of structured knowledge (Saini & Pandey, 2015). In the most instances, this activity concerns the encoding by natural language processing (NLP) of human language texts.

System call: It is the programmatic way to retrieve a service from the operating system kernel that is running on a computer program. The service includes hardware-related assistants and resources such as hard drive control, new process development and execution and interaction in process programming with integral kernel services (Galvin, Gagne & Abraham, 2018). The interface between a method and the operating system is important.

Text-To-Speech (TTS)**:** This engine refers to computers' ability to read text. The engine transforms written text into a phonemic image, converts the phonemic image to waveforms and can be output as sound (Goel, 2017). In our system we will use pyttsx3 (version 2.71). Google has also a natural voice engine. For the Embracing Diverse Solution, we will use gTTS (google text to speech) module, we will use their TTS engine.

These types of methods or APIs are appropriate for our system and with the help of this methods we can successfully reach our objective goals.

3.3 Proposed System Development Process

Every project is related to public health, protection and welfare. when we design our study, we collect all possible information that gives a good idea about the impact on the environment. For the proposed Virtual Assistant of Student Portal system, Agile SDLC (Software Development Life Cycle) model has been considered as a system development process.as it focuses on adaptability of the system by quick implementation of working product software.

As an evidence of this argumentation, The DDJ Project Performance Survey 2007 has shown that when people themselves define success, Agile ventures have 72% success, compared with 63% conventional and 43% offshoring. (Dobb, 2007).

The whole study will be split into corresponding stages:

1. Planning
2. Analysis
3. Design
4. Coding
5. Testing and evaluation

A completed result is presented to the consumer and relevant partners at the conclusion of the iteration.

Plan-driven strategies work well where planners are able to assess the specifications in advance and when the requirements remain reasonably constant, just one percent per month in order to adjust speeds (Boehm, 2010). The output is divided into small sequential constructions by Agile Techniques. These structures are described in iterations. Usually, each iteration extends from about between one three weeks. Agile (Rally, 2010) approaches address the exploration of specifications and the creation of solutions through the collective effort of self-organizing and cross-functional teams and their customer/end users in the development of applications (Collier & Ken, 2011). It promotes strategic preparation, evolutionary growth, early implementation, and quality enhancement, and promotes agile change responses. (Beck et al., 2013).

Therefore, by this argumentation of method selection, we are choosing agile as the technique for software production as our framework requires a great deal of commitment to the central development and the final performance.

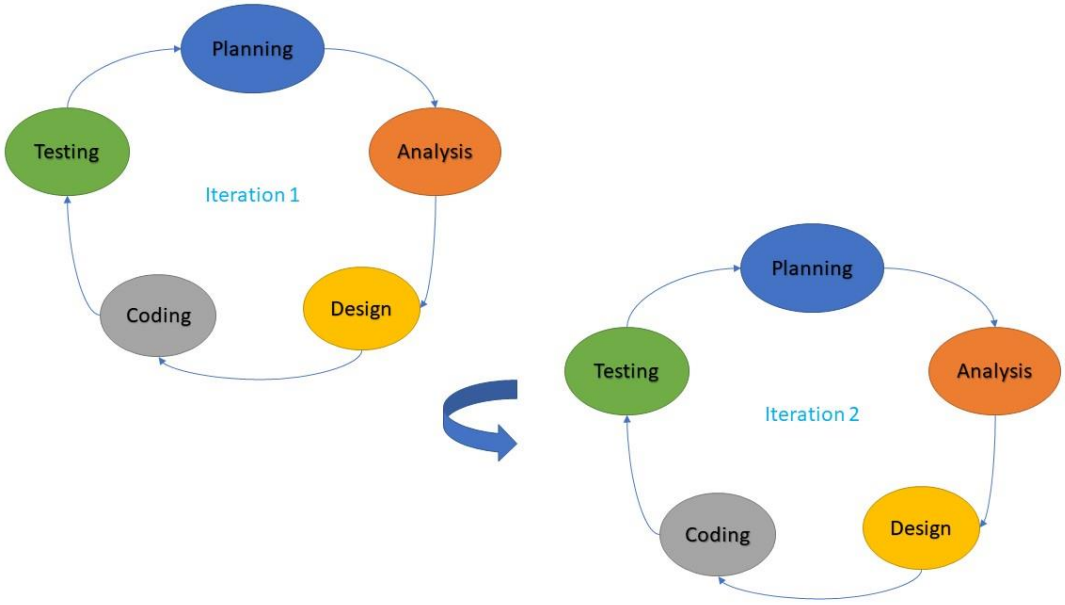

Figure 3.2- Flowchart of the methodology

3.3.1 Planning

For our study, our initial main focus is planning. It is thus the very initial step of the proposed method which will be used for our research. First of all, we fixed our goal as a story. And we approved by it the thesis supervisor, Dr. Md. Abdullah-Al-Jubair.

Then, we translated our stories into iterations by cover a limited portion of the necessary functionality or functions. A mixture of iterations makes the final completely usable system.

Next, we plan the schedule, time, and expenditures for the iterations to be carried out. The project plan strategy, grouping iterations required for project advancement in a linear manner, and preparing for the execution of other iterations adjacent to the main path, is one preparation technique.

3.3.2 Analysis

After planning, the second step will be requirements analysis. In this phase, first of all, we will collect our Virtual assistant and student portal requirements. Next, we will write-down and document our requirements. Then, we will also check completeness of our requirements. Next, we will validation and marge our requirements.

3.3.3 Design

After requirements analysis, the third step will be design. In this phase, we plan how to build our system into requirements. We follow by voicing a thing just once and not adding functionality in expectation, Force on usability.

We will use the metaphor or specifications of structures on names, class names and procedures and deciding on standardized types and formats to ensure compatibility.

We will use CRC (Class Responsibilities and Collaboration) program cards that allow a deviation from the conventional procedural approach and make object-oriented programming feasible.

We will also have made spike solutions or basic programs that we discover possible solutions to a particular problem, to minimize harm, to disregard all other problems

3.3.4 Coding

This forth phase is the most important phase in the Agile method life cycle. We'll assign real coding priority to all other activities, such as documents.

We will create the code on the basis of accepted metaphors and criteria, and to follow a mutual code management policy.

We will follow Pair programming technology that means we develop our code by two thesis member work on a same computer so that we generate better quality code at the same or lower expense.

We will strict commitment to more workweeks. That means we ensures our mental and physical faculties.

In the end, we will merge the code into the dedicated registry, with just one pair implementing conflict avoidance and optimization at a stage.

3.3.5 Testing

In this phase we integration of the whole system. And then we will test our system. Our all codes will need to unit tests to eliminate bugs, so code need to passes all such unit tests before ready to our system.

After the development of the system, we will be integrated with the specific commands. Then we will be getting out final output.

3.3.6 Evaluation

After the testing phase, we will evaluate our system using certain commands. We will collect some commands from some students and try to evaluate all the commands of the user and try to determine if it has any errors or not.

3.4 Data collection

The study collected some specific commands from students. Total 100 commands were collected from the targeted students. We extract some keywords from the collected commands. And our system will detect the keyword and execute it to avoid uncertainty.
Here are some specific commands and keywords:

Specific Data	Keyword
“go to portal”	“portal”
“open portal”	“portal”
“go to courses”	“courses”
“tell me about courses”	“courses”
“go to teacher’s section”	“teachers”
“tell me about teachers”	“teachers”

Table 3.1 Example of specific commands and keywords.

3.5 Work planning and execution

We have started our team formation on July 20, 2020. And we will complete all of the chapters by the end of 5 January 5, 2021. For our work planning schedule, we have designed a Gantt chart.

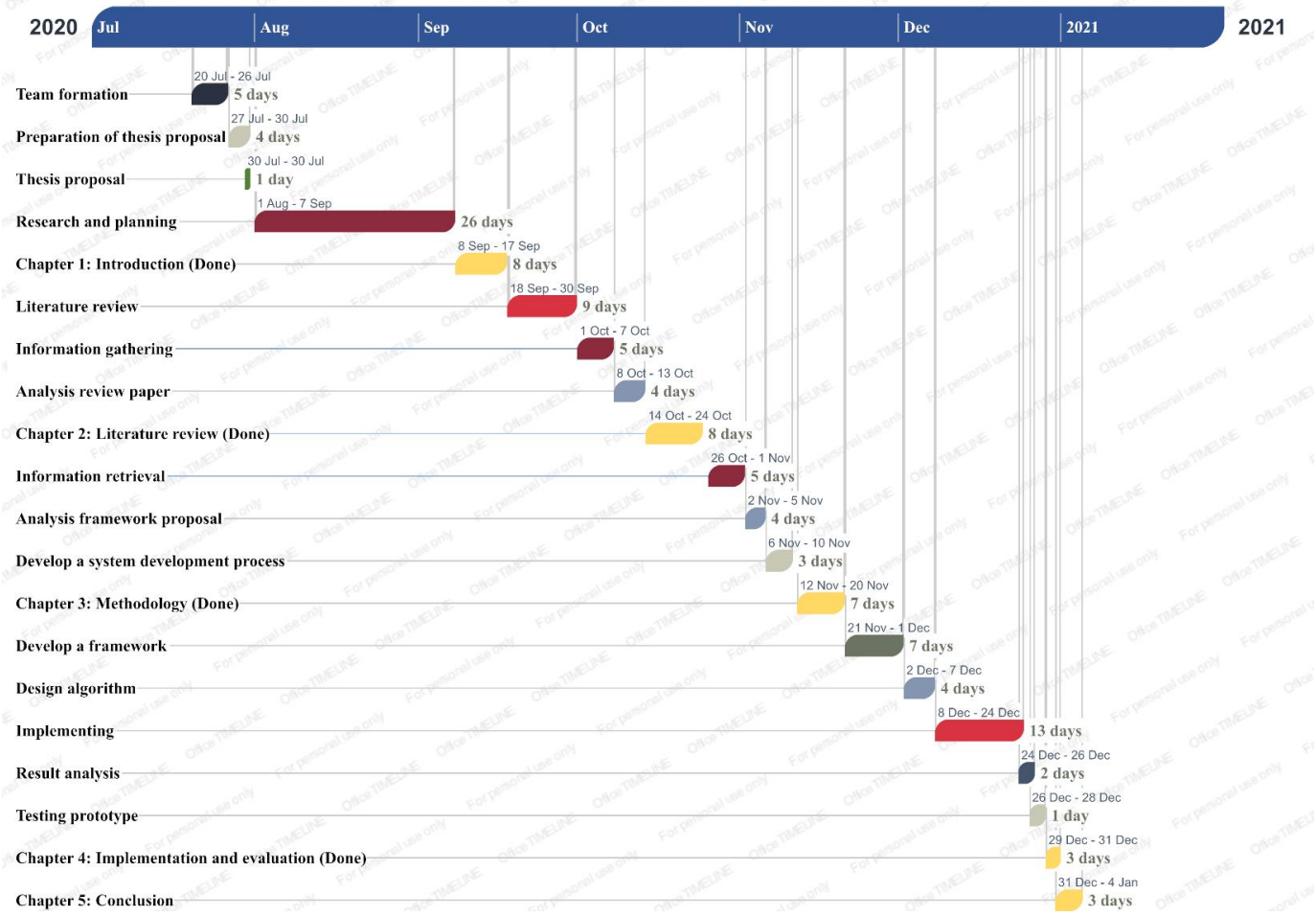

Figure 3.3 Gantt chart of work plan.

We have completed chapter 1 and 2 on time. And we will surely complete other chapters by the following Gantt chart.

Chapters	Meeting deadlines
1	26 July, 2020
2	24 October, 2020
3	20 November, 2020
4	31 December, 2020
5	05 January, 2021

Table 3.2 Meeting deadlines schedule list.

The budget of this system is little low as compared to other software projects. We have 2 members in our team. So, our budget will be as following table:

Item	Cost
Personal computer	2*30,000 = 60,000 Tk (Minimum amount)
Internet connection	2*1,000 = 2,000 Tk

Table 3.3 Budget estimation.

As we have 2 members so that we need 2 personal computer (PC). 30,000 Tk per PC is the minimum price of each. Because we need APIs so the internet connection cost is 2,000 Tk for both. Our project value is so reasonable to the current market value. This system has promising profitability compare to other system that exist to market.

3.6 Stakeholders

A formal definition of a stakeholder means: people and associations, who are involved in a project or, as a result of project implementation or satisfactory completion, may have a positive or negative impact on their interests (Smith, 2000).
Supervisor, team members and users are the stakeholders in our case.

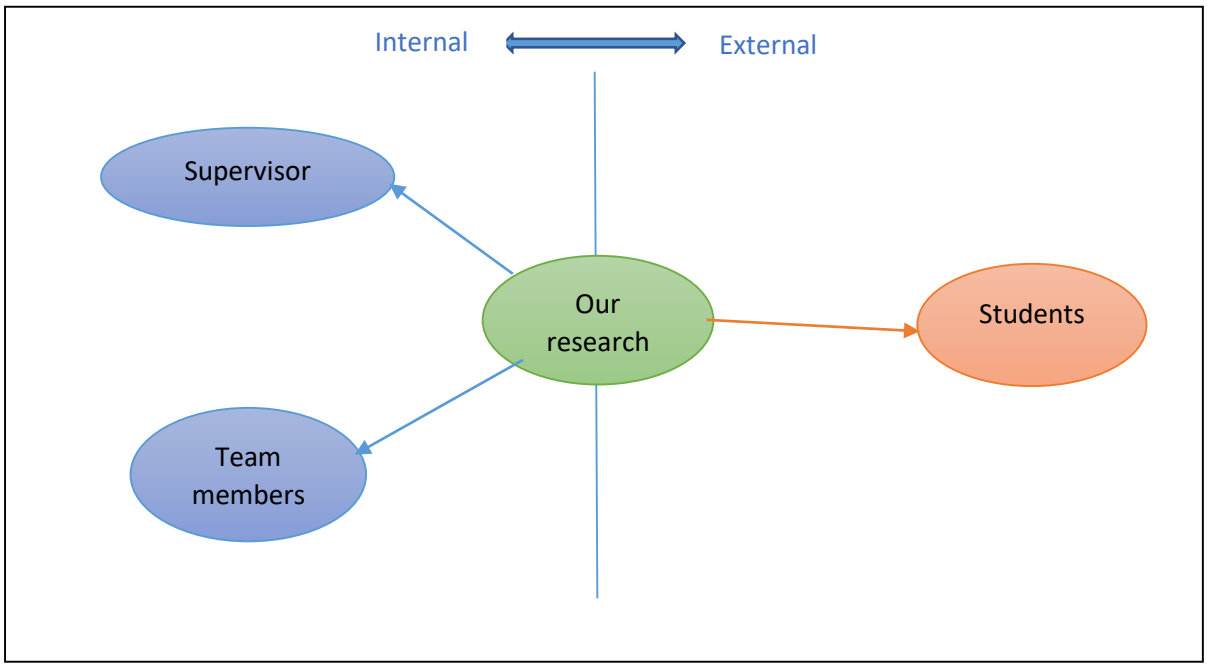

Figure 3.4 Stakeholder analysis diagram.

Supervisor is a part of project operations to satisfy the needs of stakeholders by means of information, expertise, tools and techniques. Dr. Md. Abdullah-Al-Jubair does the supervision of our research.

All team members would like to succeed. When it starts well, a project is more likely to succeed. Team members are the core stakeholder of this research.

Students are the main user of our research. Students are the external part of the stakeholder but hold the major priorities. Only users make decisions of positive and negative interest.

3.7 Ethical Issues

Honestly and integrity: Research needs to be done honestly and we report our research honestly and this applies to our methods and results.

Objectivity: Aim to avoid bias in any area of research and we highly avoid bias in any aspect of our research, including design, data analysis, interpretation and peer review.

Carefulness: Need to be very careful and we take care of our research to avoid careless mistakes.

Respect to intellectual property: Do not plagiarize. We never try to plagiarize or copy other people's work and try to pass it as our own.

Confidently: Value anything with trust. We respect all that has provided in confidence.

Legality: Aware of laws. We are always aware of the laws and regulations that govern our work.

So, we follow the code of ethics consideration properly.

3.8 Summary

This chapter we discussed research methodologies focused on the research goals of our proposed system for virtual student portal assistants. The research methodology includes planning, analysis, design, coding and testing. The entire process is divided into five stages and Agile SDLC (Software Development Life Cycle) model was selected for the strategy of our system development. In this section, the proposed architecture for our computerized system has been seen and mentioned. For our study, our methods are highly suitable and are

closely related to our objective. So our method is highly appropriateness. Following the completeness, we write details description of methods and diagrams. It also involves the viewpoint analysis process for the computerized methodology and how it can be analyzed after the final answer is collected. The method involves speech recognition, API (Application Programming Interface), system call, text extraction and TTS (Text to speech).

Chapter 4
Implementation and Evaluation

4.1 Overview

This chapter describes the implementation of the proposed framework for Smart Virtual Assistant (SVA) for Student Portal. The chapter will have divided into three parts; section 4.2 describes about the development of machine learning algorithm and implementation, and section 4.3 shows the final result of SVA for Student Portal.

4.2 Designing of the system

The proposed framework of our system is combination of machine learning based approach, text-based approach and voice-based approach. Our framework uses voice commands as well as text commands as input.

By having open our system, our Virtual Assistant is activated then you'll be asked by our system to chat about what you want. For voice commands, using a Speech to Text (STT) method, we translate the speech into text. To do this job, we have used Google's STT API. Because, Speech-to-Text allows Google speech recognition technology to be quickly incorporated into developer apps. Submit audio and obtain a Speech-to-Text API support text transcription.

Then, from the text command, we extract keys. Due to the fact that the commands are given in machine translation, we must extract the keywords from the instruction. A particular user will, however, talk or write the same order in various ways. Moreover, in various time intervals, even the same user will talk or write differently.

4.2.1 Framework for the Proposed Algorithm

Based on the objective of virtual assistant of portal system, we create a framework for development of the algorithm which uses in our system. This framework represents how the algorithm uses database for user command selection and detects the final result. The form of command is defined, such as whether it is a simple command or a central command. We've broken commands into two distinct stages.

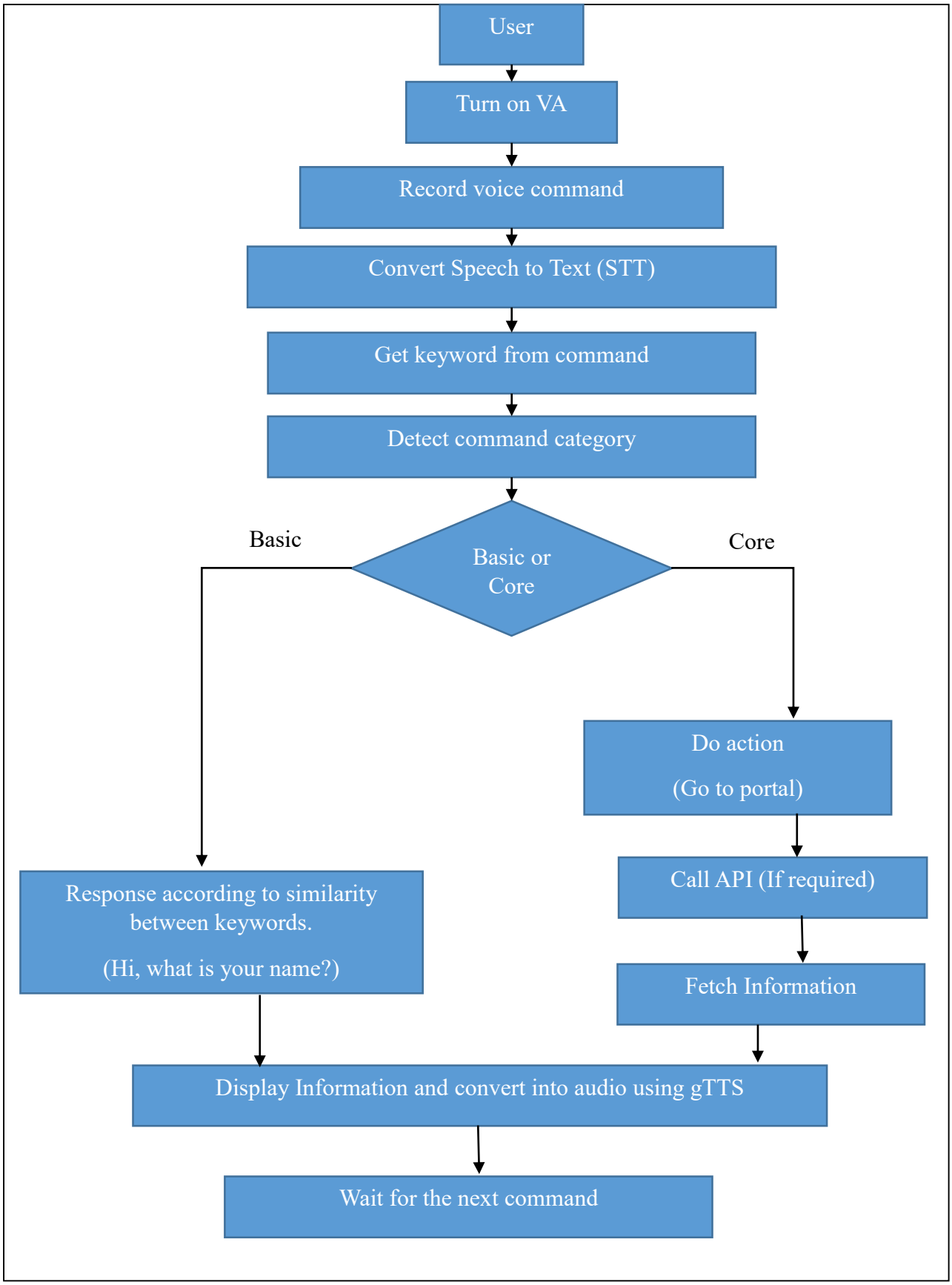

Figure 4.1 Propose system flow-chart.

4.2.2 Proposed Algorithm

The analysis involves the algorithm applied for our Virtual Assistant in portal system. The algorithm is modified from the algorithm based on user command. We build our virtual system engine that is work in user command. We also generated a keyword dataset and its subsequent behaviour. However, if anyone places a keyword command outside of our keyword dataset, we search Google for the whole command and view the answer accordingly.

Algorithm 1: System algorithm [pseudocode].

1. **Begin**
2. Press "**Voice**" button to active VA
3. **Record_audio** <- Record voice command
4. **Voice**_To_**Text** <- Convert speech to text (Using Google TTS)
5. Extract **keyword** by analyzing **Text**
6. **Response(Text)** <- Generating answer according to **keyword**
7. **IF** command category is base **Then**
8. **Greetings[**commands**]:** <- generating answer according to given similar command.
9. **Machine_voice(command)** <- Speak out and display answer.
10. **Return(**voice command**)** <- using pyaudio.
11. **Display** with text.
12. Based on commands determine closest similar command to give answer accordingly.
13. **Store_user_info(user_data)** <- Store user necessary data for future query (user name)
14. **Else** command category is core **Then**
15. Detected the command.
16. Indicate the system to do the following task for the detected command.

17. Do the action for **redirect** or get the information regarding command.
18. Call **API** (if required).
19. **Machine_voice(**command**)** <- Speak out and display answer.
20. **Return(**voice command**)** <- using pyaudio
21. **Display** with text and do the particular action.
22. **End If**
23. **End**

4.2.3 Steps of System

The proposed framework our virtual assistant system has a set of steps in order to analyse of user command. There are different rules for different category extraction in a user command. Finally, these words will together determine the action of that command.

- Step-1: Open system.
- Step-2: Record user command.
- Step-3: Convert voice to text.
- Step-4: Extract keyword by text.
- Step-5: Command category.
- Step-6: If greeting command then response.
- Step-7: Return voice command.
- Step-8: Display with result.

4.2.4 System Implementation

For the system, we are using a template of a portal for the front-end part. The system uses python 3.9.1 libraries for the backend part. It takes the input of the user command and also receives the output from different needed API. Python decides the request path, where its needs API or not. It handles the whole process with the needed API. Data analysis is required

for the user input voice data. And for that, google speech recognition API is used here. It recognises the voice into text. This module uses 3.8.1 library to recognise the voice data.

```
def record_audio(ask=""):
    with sr.Microphone() as source:  # microphone as source
        if ask:
            engine_speak(ask)
        audio = r.listen(source, 5, 5)  # listen for the audio via source
        print("Done Listening")
        voice_data = ''
        try:
            voice_data = r.recognize_google(audio)  # convert audio to text
        except sr.UnknownValueError:  # if recognizer does not understand
            engine_speak('I did not get that')
        except sr.RequestError:
            engine_speak('Sorry, the service is down')  # if recognizer is not connected
        print(">>", voice_data.lower())  # print user command
        return voice_data.lower()
```

Figure:4.2 Source code of google speech recognition.

In this system, the user command executes data into a python function, where it is comparing the data between basic command and core command. Python is enough for basic commands.

```
def respond(voice_data):
    # 1: greeting
    if there_exists(['hay', 'hai', 'hello']):
        greetings = ["hey, how can I help you?" + person_obj.name, "hey, what's up?" + person_obj.name,
                     "I'm listening" + person_obj.name, "how can I help you?" + person_obj.name]
        greet = greetings[random.randint(0, len(greetings) - 1)]
        engine_speak(greet)
```

Figure:4.3 Basic command execution.

But for core commands this system needs an API to execute the command. We use several API for the system. Like for sound conversion we use pyttsx3 API. And to convert text to audio we use google text to speech (gTTS) API. Python calls API to execute the command and API send the data to provider and receive the answer data.

```
    if there_exists(["open portal"]):
        search_term = voice_data.split("for")[-1]
        url = "file:///X:/AIUB/Thesis/tmp2/academics-master/index.html"
        webbrowser.get().open(url)
        engine_speak("here you can check your portal")
```

Figure:4.4 Core command execution with the help of web browser API.

Finally, Google text to speech (gTTS) converts the final executable text data into speech. This gTTS engine transforms text data into an image and converts into a waveform. Then its output as a sound. In our system we are using pyttsx3 version 2.71.

```
def engine_speak(audio_string):
    audio_string = str(audio_string)
    tts = gTTS(text=audio_string, lang='en')  # text to speech(voice)
    r = random.randint(1, 20000000)
    audio_file = 'audio' + str(r) + '.mp3'
    tts.save(audio_file)  # save as mp3
    playsound.playsound(audio_file)  # play the audio file
    print(asis_obj.name + ":", audio_string)  # print what app said
    os.remove(audio_file)  # remove audio file
```

Figure:4.5 Text to speech conversion.

For the portal related command our system takes the command and redirects to the portal. Then our program grabs the information and executes it with voice output and portal as well. Teachers information, course information, about the university this kind information can be executable by this system.

“Go to courses in portal” by this command program open courses page at portal and program ask for the next command with the voice and text command of “what course do you need to find?”.

Depending on next user command program will run according to the input command. If user says “all” then the program open courses page and speak all courses data that are given into the portal.

```
if there_exists(["go to courses in portal"]):
    url = "file:///X:/AIUB/Thesis/tmp2/academics-master/courses.html"
    html = urlopen(url).read()
    soup = bs.BeautifulSoup(html, "html.parser")
    webbrowser.get().open(url)
    # kill all script and style elements
    for script in soup(["script", "style"]):
        script.extract()  # rip it out
    # get text
    text = soup.get_text()
    h = []
    definitions = []
    for h2 in soup.find_all('h2'):
        h.append(str(h2.text))
    if h:
        h = record_audio("what course do you need to find?")
        if h == 'all':
            for paragraph in soup.find_all('p'):
              definitions.append(str(paragraph.text))

            if definitions:
                if definitions[1]:
                    engine_speak('here is what i found. ' + definitions[1])
                    engine_speak('next course is ' + definitions[3])
                    engine_speak('last course is ' + definitions[5])
        elif h == 'computer science':
                for paragraph in soup.find_all('p'):
                    definitions.append(str(paragraph.text))
                if definitions:
                    if definitions[1]:
                        engine_speak('here is what i found. ' + definitions[1])
```

Figure: 4.6 Back-end to portal interaction.

Our study design is able to retrieve some general information from multiple sources. Our system answers to almost selected all questions about general knowledge. We design our study with uncertain data or user command. If our system found uncertain command from user, then our system search it on google. If uncertain command is about portal, then our system redirect to portal web.

4.3 Results and Analysis

In this section, we show result of our virtual assistant for student portal system. Previously, we told that our smart virtual assistant distributed the commands into Basic and Core commands. Our data analysis is highly suitable for our study and we use the google speech reorganization methods to analyse user data.

In basic commands, we have stored commands that users use to know basic knowledge about our device and some basic mathematics for an initial discussion. We also built answers as natural as normal communication, and essential information for textual responses are stored

by our system. Initially our system has no name when a user opens our system, our system recoding user voice and user can set a name of our system. Then user can tell the system him/her name. After that When user says initial terms such as 'Hi', 'Hello' or 'Hello Bornomala at the very beginning of a communication with our device, our system reacts by mentioning the name. For normal, polite communication, having an understanding of a consumer is very important.

We stored many basic commands and combinations of these commands such that, much as a person does, it reacts in a natural way. The basic command examples are:

1. Hay, hi, hello
2. What is your name, tell me your name?
3. Your name should be
4. What is my name? tell my name
5. My name is Shakil.
6. How are you, how are you doing?

```
portal: Recording
Done Listening
>> hello
portal: hey, how can I help you?
portal: Recording
Done Listening
>> what is your name
portal: i don't know my name. suggest me a name
portal: Recording
Done Listening
>> your name should be bornomala
portal: okay, i will remember that my name is bornomala
bornomala: Recording
Done Listening
>> what is my name
bornomala: i don't know your name. what's your name?
bornomala: Recording
Done Listening
>> my name is ronnie
bornomala: okay, i will remember that ronnie
bornomala: Recording
Done Listening
>> tell my name
bornomala: your name is ronnie
bornomala: Recording
Done Listening
>> how are you
bornomala: I'm very well, thanks for asking ronnie
bornomala: Recording
Done Listening
>> stop
bornomala: we could continue more sir, bye
```

Figure 4.7 A very new dialog with a user is illustrated.

We also processed commands for core commands that require unique behaviour, such as opening a window, setting an alert, opening a file, playing a song, etc. Core instructions and very little interaction are mainly action-based. In our system, we have processed more than 100 key commands. Examples of core commands include,

1. Go to about in student portal.
2. Go to Course in portal
3. Go to Teacher Section in portal
4. Go to Academic History in portal
5. Go to Academic in portal
6. Open the Chrome browser.
7. Play video tutorial of Python in YouTube.
8. What is the temperature today in my area?
9. Set an alarm for 11.59 AM.
10. Tell me World war 2 history
11. Play my favorite song.
12. Capital of BD?
13. Toss a coin
14. Multiplication 8 and 5

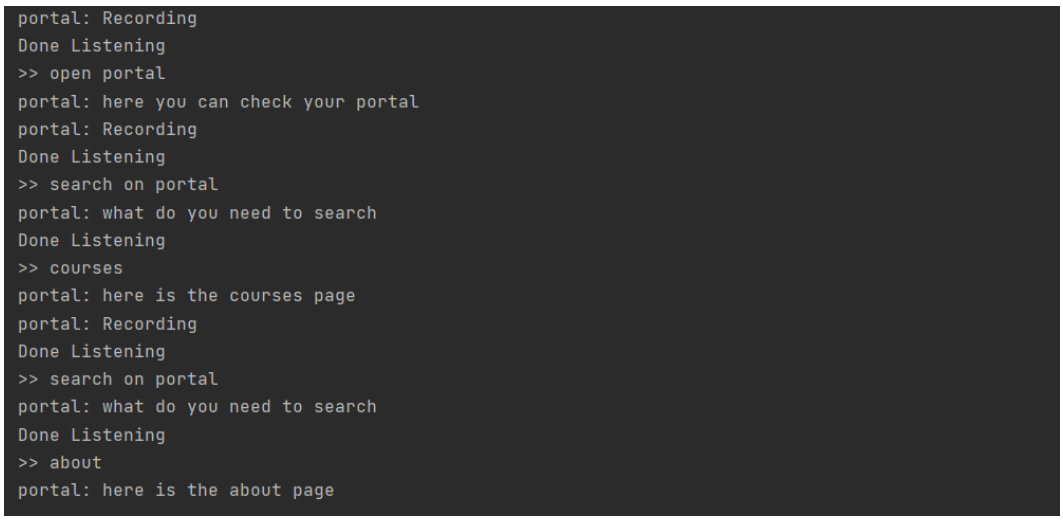

Figure 4.8 shows go to portal about command.

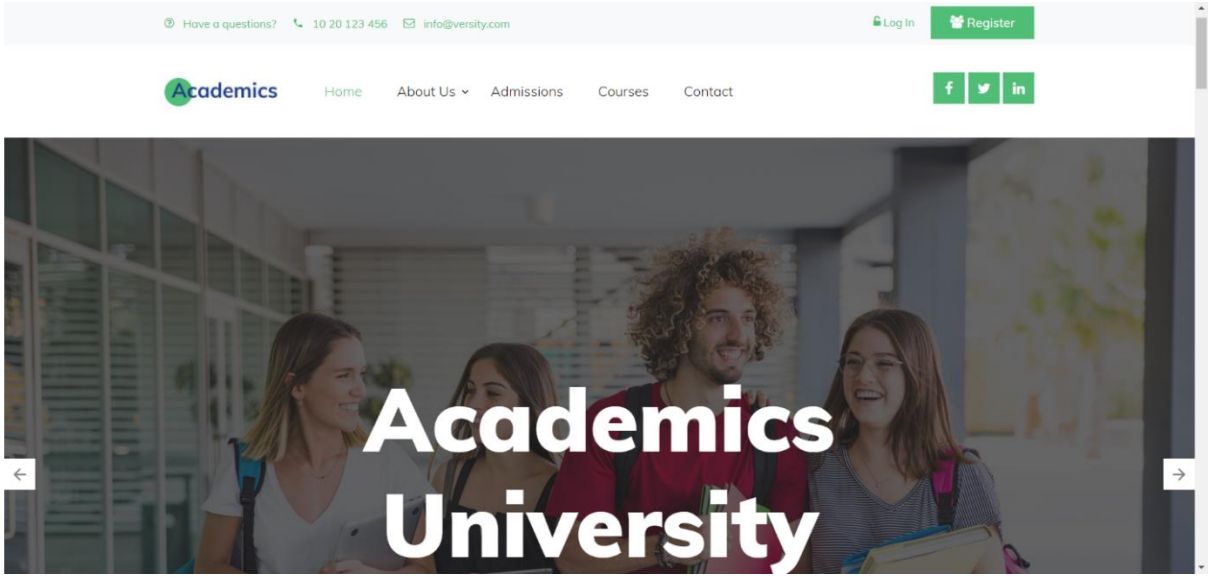

Figure 4.9 our system responds for go to portal about command.

Figure 4.8 and 4.9 shows how our system responds for a go to portal course command. As course information, we fetch different information but Our system shows all this information for a generic weather command. However, if a user asks for specific information the system shows only that specific information.

```
portal: Recording
Done Listening
>> go to portal
portal: what do you need to find
Done Listening
>> about
portal: here is what i found. This university is all about study, study and study. Thank you
portal: Recording
Done Listening
>> go to portal
portal: what do you need to find
Done Listening
>> courses
portal: here is what i found. We university is offering 3 courses.
```

Figure 4.10 shows go to portal courses command.

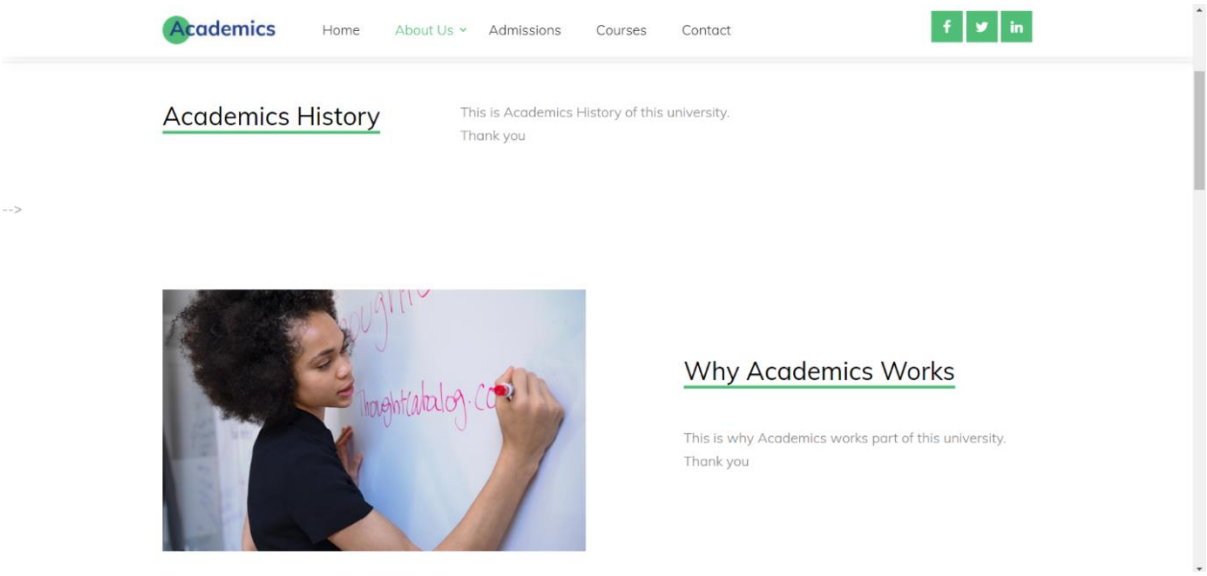

Figure 4.11 our system responds for portal courses command.

```
portal: Recording
Done Listening
>> go to about in portal
portal: what do you need to find
Done Listening
>> teachers
portal: here is what i found. This is Craig Daniel. He is English teacher
portal: next teacher,This is Taylor Simpson. He is math teacher
portal: last teacher is,This is Jonas Tabble. He is Physics teacher
portal: Recording
Done Listening
>> go to about in portal
portal: what do you need to find
Done Listening
>> academic history
portal: here is what i found. This is Academics History of this university. Thank you
```

Figure 4.12 academic history command.

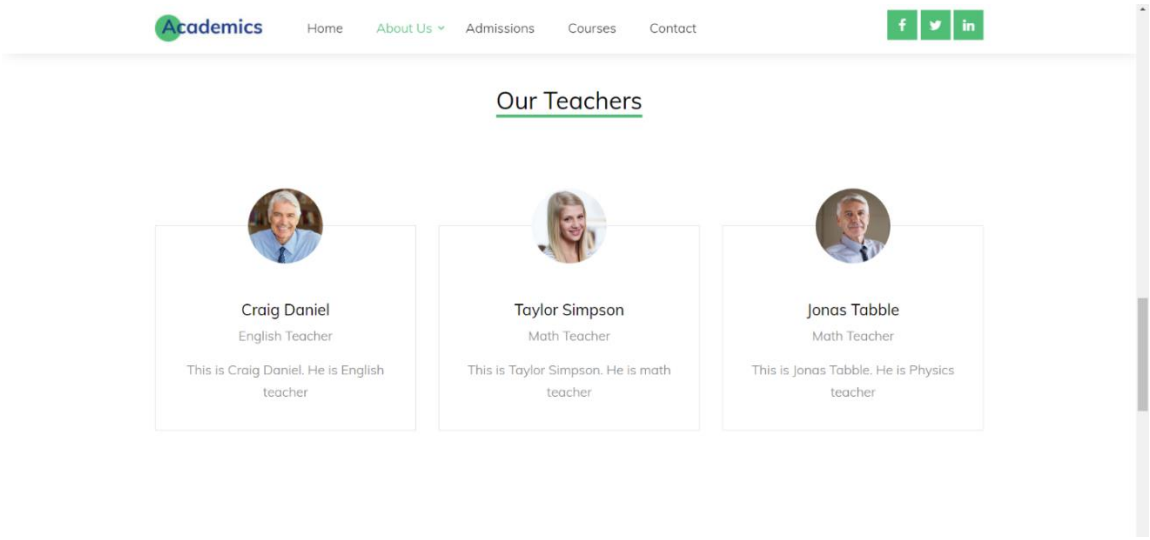

Figure 4.13 our system responds for portal Teacher command.

```
portal: Recording
Done Listening
>> go to courses in portal
portal: what course do you need to find?
Done Listening
>> all
portal: here is what i found. Computer science and engineering Course, total fee is ten lakh taka.
portal: next course is Electrical and electronic engineering Course, total fee is ten lakh taka.
portal: last course is Bachelors of Business Administration course, total fee is eight lakh taka.
portal: Recording
Done Listening
>> go to courses in portal
portal: what course do you need to find?
Done Listening
>> computer science
portal: here is what i found. Computer science and engineering Course, total fee is ten lakh taka.
```

Figure 4.14 go to computer science department command.

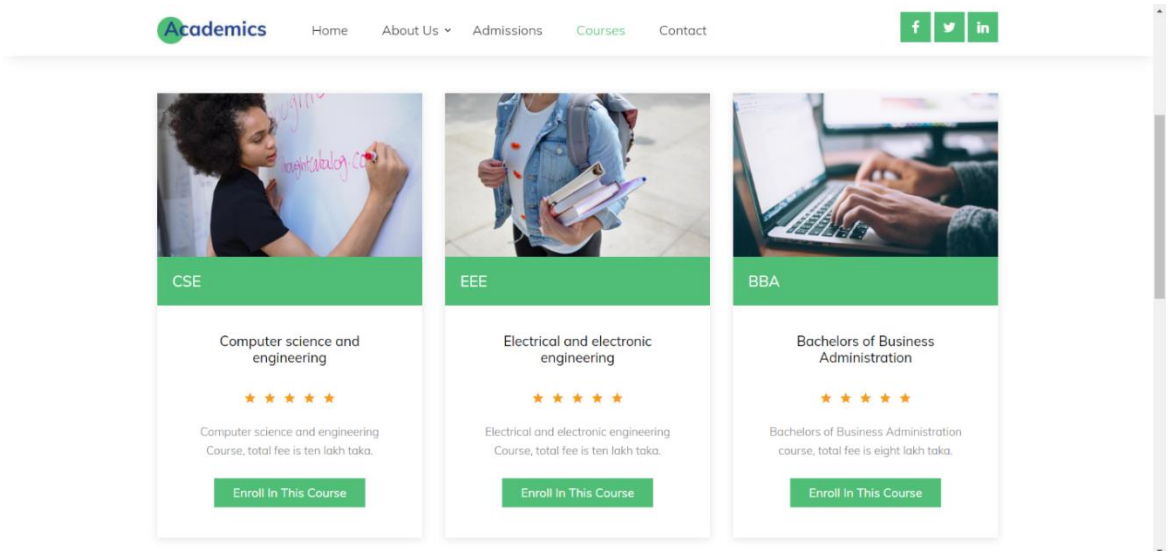

Figure 4.15 our system responds to computer science department command.

```
portal: Recording
Done Listening
>> toss a coin
portal: its tails
portal: Recording
Done Listening
>> 5 multiply 2
portal: 10
portal: Recording
Done Listening
>> 5 power 2
portal: 25
```

Figure 4.16 5 multiple 2 command and answer.

```
>> let's play a game
portal: choose among rock paper or scissor
Done Listening
>> rock
portal: i chose scissor
portal: You chose rock
portal: oh no! you win
portal: Recording
Done Listening
>> let's play another round
portal: choose among rock paper or scissor
Done Listening
>> rock
portal: i chose paper
portal: You chose rock
portal: yes! i win
portal: Recording
Done Listening
>> let's play another round
portal: choose among rock paper or scissor
Done Listening
>> paper
portal: i chose scissor
portal: You chose paper
portal: i am the winner!
```

Figure 4.17 Playing rock paper and scissor command.

```
portal: Recording
Done Listening
>> what's the time
portal: Current time is 04:50 PM
portal: Recording
Done Listening
>> search for world war 1
portal: Here is what I found for world war 1 on google
portal: Recording
Done Listening
>> search on youtube for world war 2
portal: Here is what I found for  world war 2on youtube
portal: Recording
Done Listening
>> price of playstation 5
portal: Here is what I found for price of playstation 5 on google
portal: Recording
Done Listening
```

Figure 4.18 Google search command.

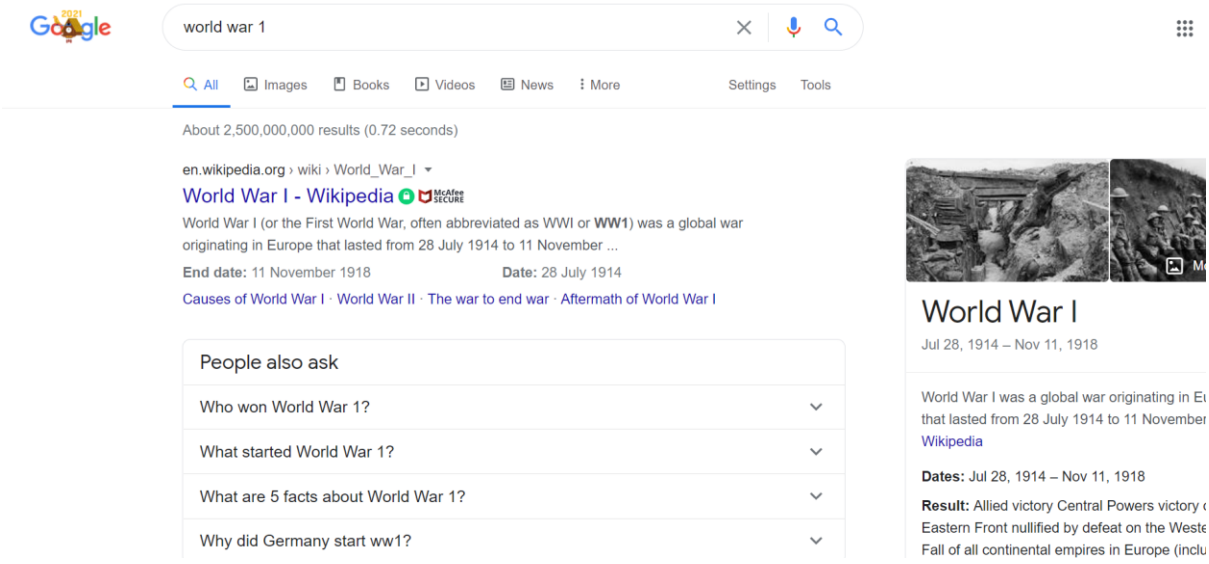

Figure 4.19 our system responds to google search command.

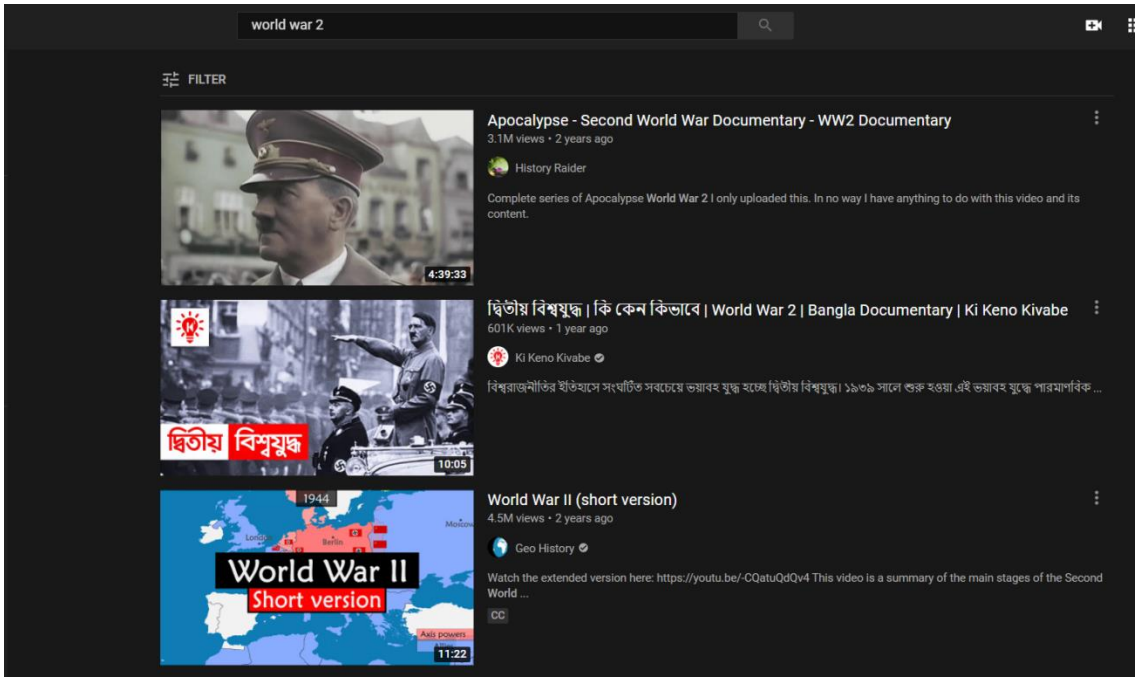

Figure 4.20 our system responds to google search command.

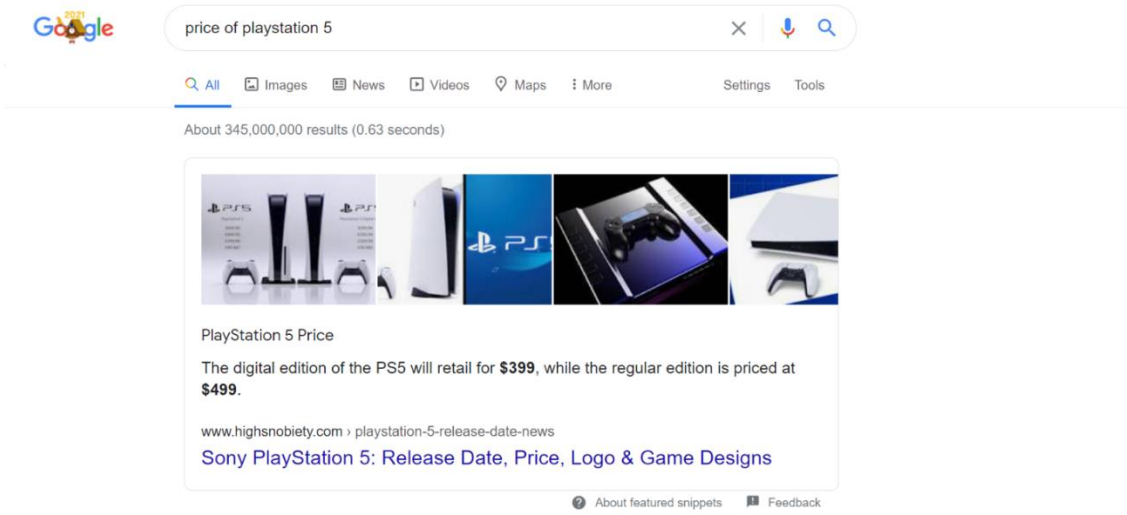

Figure 4.21 our system responds to google search command.

Our system is able to retrieve some general information from multiple sources. It will have answers to almost all questions about general knowledge.

4.4 Finding of Results

This study includes an evaluation procedure to test our virtual assistant for portal system to measure effectiveness and efficiency based on user command. The main purpose of the evaluation of our virtual system is to calculate the consistency level of the user command recognition classification and working on that command to found from the outcome. In this section, in our suggested method and review of the outcomes, we have explained the performance of various commands. We have split the commands into the commands Basic and Centre.

In contrast with the user command, the precision of the computerized system was rated for effectiveness evaluation. We selected some command and cheek effectiveness.

User Command	Response
what is your name, tell me your name?	✓
how are you, how are you doing?	✓
what is the time, tell me the time, what time it is?	✓
search on portal (courses, about)	✓
open my portal	✓
make a note	✓
go to courses in portal (all, computer science, electrical engineering, bba)	✓
8 multiply 2	✓
what about today's weather	✓
play Game (rock, paper scissors)	✓
5 power 2	✓
wikipedia search	✓
toss a coin	✓

search on YouTube for world war 1	✓
go to about in portal (teachers, academic history, academic work)	✓
send an email to karim saying hello	X
price of Playstation five	✓
go to portal (search)	✓
search for World war 2	✓
10 divide 2	✓

Table 4.1 Results of the system

We select 20 command for testing our system. Our system responds 19 commands and 1 commands did not respond. In the sense of user command, our system is 95 percent correct, according to the outcome study.

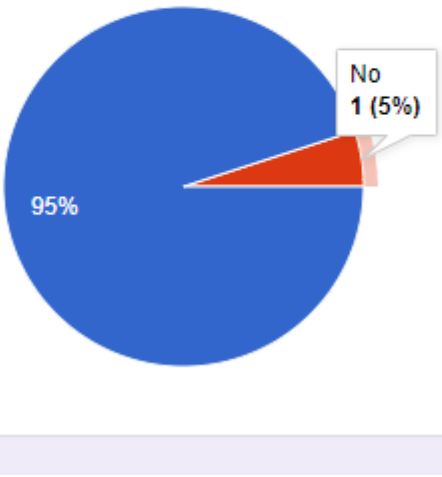

Figure 4.22 Pie chart of Effectiveness of our system

4.5 Contribution to the team

In our study, there are two team member. Our all members collect and presents information. They offer well-developed and clearly expressed ideas that are directly connected to our SVA for student portal system. All the members have a good understanding of our study and they taking responsibility. They conduct all activities are very effectively, they join all meetings and are knowledgeable and very reliable attendees. Every team member always valuing other team members. Our team member always often listening to others team member and their suggestions, always helping to make a rational decision for our study. They always giving full credit to each other and encouraging them to grow their ideas when giving them full credit. In the beginning of our study we distribute our work. We use pair work technique that's means when one-member write down engine code another member checks the code as result our implementation part take less time. So our work distribution was equally and fairly allocated.

4.6 Summary

This chapter information conveyed about design process and results. This chapter we shown the development of the algorithm for virtual assistant of student portal, which is a crucial part of the whole research. This chapter shown from development algorithm, proposed algorithm of virtual portal assistant, Theoretical Algorithm for our system and described proposed algorithm. We demonstrate fully knowledge of our Content Knowledge of the project and we explanations and elaboration with our study. This chapter also described the evaluation of our system in based on user command. The effectiveness of virtual assistant of student portal has been shown by the accuracy. According to the result analysis, our system has shown 95% accuracy for user commands. The finding of our system shown that our system is satisfactory.

Chapter 5
Conclusion

5.1 Overview

This chapter describes overall summary of our research which is based on the research objective of our study. This chapter also summarizes all the work and findings of our study.

5.2 Virtual Assistant and Student Portal

Virtual assistant features and use are increasingly expanding day by day, with new technologies and voice user interfaces. Apple and Google build user bases smartphones. Microsoft has large install database computer, phones and smart speakers based on windows and Amazon has a smart speaker. Previously, a significant amount of work has been performed in virtual assistant in English languages such as google assistant from Google, Siri from Apple, Cortana to Microsoft etc.

Students can choose courses, read about the administrative environment, classrooms, libraries, bookshops, exam schedules, results, notices, calendars and much more in the student portal. These have to be done by the students by clicking on GU. But sometimes it is a waste of time and even annoying. Especially when student checking the exam schedule or check class routine.

5.3 Proposed Virtual Assistant in Student Portal Framework

On the basis of the limitations of previous studies, we analysis and developed a new Virtual Assistant in Student Portal system. The goal of this study was to transcend the limits of other methods and to find a simpler and more effective alternative to the challenges of manual processes. We used Python libraries and the google speech recognition APIs for the language recognition and analysis of voice command to introduced an intelligent smart voice assistant. Python 3.9.1 we used for our virtual assistant development. We were used gTTs (google text to speech) to convert text into voice command. for executing the text command into an audio format we used pyttsx3 (version 2.71).

5.4 Proposed System Development Process

For our study, our initial main objective was analysis previous student portal. We had collected student problem on current student's portal. We selected higher secondary levels and university levels of students. We mainly focus on university student portal. In the first phase we were find out current portals problem. The second stage was problem analysis, after problem find. Then we developed our algorithm. For our Smart Virtual Assistant (SVA) for Student Portal system, the whole process is divided into five phases and Agile SDLC (Software Development Life Cycle) model has been considered as a system development strategy. Because agile model focuses on adaptability of the system by quick implementation of working product software.

5.5 Proposed Algorithm and Implementation for our System

This study consists of algorithm and implementation for SVA for Student Portal. The algorithm is voice command and text command based algorithm with machine learning approach. The algorithm modified from the based on user command. The virtual system engine was work in user command. In implementation we used a template of a portal for front-end part. We used python 3.9.1 libraries for user command. If system needed API then python decided it. It handles the process if API needed. System analysed user data with google speech recognition API. This module used for recognise the voice data. In basic command no need any additional API. But core command gTTs used for data to speech convertor. Python called API and executed command and also receive the output.

5.6 Result Analysis of SVA for Student Portal

The research was based on the evaluation of two methods, the manual method as well as the computerized method suggested. An extensive our SVA for student portal is illustrated in this article. We also shown each and every step of the system's development. In addition, we have seen multiple laboratory findings and results interpretation, and eventually, the research results have been demonstrated. According to our testing results, we find our device very impressive.

In addition, while we had achieved our target, there are some drawbacks to the method. For example, our system relies more on external APIs to obtain information that makes the

system dependent on other systems. Since the system relies on the internet to collect much of the data, the speed of the internet can influence the system's performance. Finally, at this point, we have covered a small range of commands, making the scheme less flexible.

5.7 Significant of the Study

Our study was able to support student in finding the information from student portal. Our system greatly complements student everyday routines, enhance student time efficiency and enhance student work-life balance. Our system can immersive student interface with all applications, knowledge and material with a single entry point and hub. So, student can easily use our SVA for student portal system. Our system has created creative solutions to real life problems.

If this technology has a good impact on the education sector, it will last a long time because we will always update our system. As a result, if this technology can be used in other sectors, then sustainability of this technology will increase.

5.8 Limitations

We have also some limitation with our SVA for student portal system. When we connected system engine with system frontend sometimes system don’t work. It’s a major limitation of our study. Then we use only console application.

5.9 Future Studies

The study proposed and builds Virtual Assistant in Student Portal. Satisfactory performance of this computerized solution also in the manual one, but further research is recommended in the following area to make this system better.

In the future, we expect to conduct an HCI-discipline customer interface study focused on a comprehensive online and offline test. To reduce the reliance on external APIs, we are creating several APIs. In addition, we are creating a smartphone device for both Android and IOS Platforms. Our most critical potential role is the management of more regular orders. We intend to test the system with much more complex commands and thereby improve the system's accuracy score. We were using python extension for voice command and sometimes it’s not working or don’t understand user command. So in future we working in this.

5.10 Summary

The research discusses the current frameworks of student portal and implement a smart virtual assistant for student platform which is one of the key aims of our study. The study also includes an idea about SVA for student portal and lack of research in this particular context. The study proposes a new framework for smart virtual assistant for student portal system based on the voice command. After the proposal, the study also implemented the system based on framework. We analysis our system, evaluation and the research results was demonstrated. Also our testing results was very impressive, which means the main objective of the study have been met. The study also includes possible future aspects of research in SVA for student portal. An overall we are satisfied our system.

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