

**A Project Report on**

**Virtual Personal Assistant - JARVIS**



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING.**

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## **DECLARATION**

We do hereby declare that the report entitled “**Virtual Personal Assistant - JARVIS**” submitted by us to Bangladesh University of Business and Technology (BUBT) in partial of the requirement for Bachelor of Computer Science & Engineering degree embodies our work with suggestions received during the work, which has been suitably acknowledged.

## **DEDICATION**

*Dedicated to our parents for all their love and inspiration.*

## ACKNOWLEDGMENT

We would like to express our deepest sense of gratitude to our reverend teacher and supervisor Dr. M. Firoz Mirdha, Associate Professor & Chairman, Department of Computer Science & Engineering (CSE), BUBT, and, for his untiring guidance, constant supervision, enthusiastic encouragement, sagacious advice and effective surveillance throughout the entire period of our project work and preparation of the manuscript. We greatly say thanks and wish to express our heart full thanks to all of our honorable teachers of the Department of Computer Science & Engineering (CSE), BUBT.

We are thankful to **Dr. M. Firoz Mirdha**, who has a vast knowledge of Algorithms, Python Programming concepts and Python Modules which are the building blocks of the project.

We also want to express our appreciation to our classmates and friends who helped us in one way or another during developing this project. They endured the long hours of our absence during the development of this project.

We deeply express my respect to our parents and our teachers for their blessing and constant inspiration in every step of our education. We are very thankful to all our friends for their help and company during the project work and for encouraging me to carry out the work.

## **ABSTRACT**

The project aims to develop a Virtual Personal Assistant- Jarvis draws its inspiration from virtual assistants like Cortana for Microsoft and Siri for Apple. It has been designed to provide a variety of tasks by employing certain well-defined commands. Users can interact with the assistant either through voice commands or using keyboard input. As a personal assistant, Jarvis assists the end-user with day-to-day activities like a general human conversation, searching queries in Google, searching for videos, playing music, telling jokes, live weather conditions, reminding the user about the scheduled events and tasks etc.

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# **Chapter One**

## **Introduction**

### **1.1 Introduction**

### **1.2 Problem Background**

### **1.3 Project Objectives**

### **1.4 Motivations of the Project**

### **1.5 Project Contributions**



## **1.1 Introduction**

In today's era, almost all tasks are digitized. These days we aren't even using fingers. We just speak of the task and it is done. "Virtual Personal Assistant - JARVIS" is a desktop-based system. This system enables speak and reply, speech recognition, and the answer of simple commands through the pc or laptop. The system provides opening websites like Google for search queries, playing music by user's command, search on youtube. It improves user productivity by managing routine tasks of the user and by providing information from online sources to the user. A virtual personal assistant like JARVIS is effortless to use.

The primary aim of this system is to provide less work and be user friendly. Nowadays life is full of technology. To make easy schedules, personal assistants like JARVIS are a really helpful system. This system encourages people to work more technically.

## **1.2 Problem Background**

We are all well aware of Cortana, Siri, Google Assistant, and many other virtual assistants which are designed to aid the tasks of users in Windows, Android, and iOS platforms.

## **1.3 Project Objectives**

The main objective of building a virtual personal assistant (a voice assistant) is using semantic data sources available on the web, user-generated content, and providing knowledge from knowledge databases. Personal assistants can tremendously save time. We spend hours in online search while JARVIS can do this for the users.

One of the main advantages of voice searches is their rapidity. In fact, voice is reputed to be four times faster than a written search: whereas we can write about 40 words per minute, we are capable of speaking around 150 words during the same period of time. In this respect, the ability of personal assistants to accurately recognize spoken words is a prerequisite for them to be adopted by consumers.

## **1.4 Motivations of the Project**

We were motivated to build a system capable of voice interaction, music playback, making notes, setting alarms, providing weather conditions and other real-time information, such as news. This Virtual assistant enables users to speak natural language voice commands in order to operate the system. In this ever-evolving digital world where speed, efficiency, and convenience are constantly being optimized. The mass adoption of artificial intelligence in users' everyday lives is also fueling the shift towards voice. It's clear that we are moving towards less screen interaction.

## **1.5 Project Contributions**

This project can be considered as a smart system. With this system for users, technology life can be quite easy. Through command, the user can do a search or note when he/she is busy with other things. This system can be quite useful for physically disabled or sick people because by their single command they can do whatever they want.

# **Chapter Two**

## **Background**

### **2.1 Existing System**

### **2.2 Problem analysis**

### **2.3 Supporting theory**

## **2.1 Existing System**

There already exists a number of desktop virtual personal assistants. One thing is for sure. Personal voice assistant technology is here to stay. Just the simple thought of talking to a device to get some tasks done is an appealing innovation that presents multiple opportunities. A few examples of current personal assistants available in the market are SIRI from Apple, Cortana from Microsoft etc. Until this project, we hadn't any personal assistants so we used the keyboard and mouse we worked on before. Had to work manually no matter what the function needs to use.

## **2.2 Problem analysis**

Usually, a user needs to manually manage multiple sets of applications to complete one task. There is a need for a system that can manage tasks effortlessly. We already have multiple virtual assistants. But we hardly use it. There are a number of people who have issues in voice recognition. These systems can understand English phrases but they fail to recognize our accent. Our way of pronunciation is way distinct from theirs. Also, they are easier to use on mobile devices than desktop systems. There is a need for a virtual assistant that can understand English in our accent which is a little bit similar to Indian accent and works on a desktop system. When a virtual assistant is not able to answer questions accurately, it's because it lacks the proper context or doesn't understand the intent of the question. Its ability to answer questions relevantly only happens with rigorous optimization, involving both humans and machine learning. Continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviors. They require a large amount of information to be fed in order for it to work efficiently.

## **2.3 Supporting theory**

A personal assistant is a software agent that can perform tasks or services for an individual based on verbal commands. Users can ask questions and manage other basic tasks such as write a note, open or close application.

Personal assistants come in somewhat small packages and can perform a variety of actions after hearing commands.

## **Chapter Three**

### **Proposed Model**

#### **3.1 Feasibility Analysis**

#### **3.2 Requirement analysis**

#### **3.3 System Architecture**

#### **3.4 Used Packages**

#### **3.5 Implementation**

### 3.1 Feasibility Analysis

The feasibility study can help us determine whether or not we should proceed with our project. It is essential to evaluate the cost and benefit of the proposed system. Five types of feasibility analysis are taken into consideration.

**1. Technical feasibility:** It includes finding out technologies for the project, both hardware, and software. For personal assistants, users can have a microphone to convey their message (it's not necessary) and a speaker to listen when the system speaks (it's also not necessary). These are very cheap nowadays and everyone generally possesses them. Besides, the system needs an internet connection. While using JARVIS, users have to make sure to have a steady internet connection. It is also not an issue in this era where almost every home or office has Wi-Fi.

**2. Operational feasibility:** It is the ease and simplicity of operation of the proposed system. The system does not require any special skill set for users to operate it. In fact, it is designed to be used by almost everyone. Kids who still don't know how to write can read out problems for the system and get answers.

**3. Economical feasibility:** Here, we find the total cost and benefit of the proposed system over the current system. For this project, the main cost is users would have to pay for microphones and speakers if they don't have any and users have to pay for the internet bill. Again, they are cheap and available. As far as maintenance is concerned, JARVIS won't cost too much.

**4. Organizational feasibility:** This shows the management and organizational structure of the project. This project is built by a team or group. The management tasks are all to be carried out by the team. And it won't create any management issues and increase the feasibility of the project.

**5. Cultural feasibility:** It deals with the compatibility of the project with the cultural environment. A virtual personal assistant is built in accordance with the general culture. This project is technically feasible with no external hardware requirements. Also, it is simple in operation and does not cost training or repairs. Overall feasibility analysis of the project

reveals that the goals of the proposed system are achievable. The decision is taken to proceed with the project.

### **3.2 Requirement analysis**

The software is designed to be light-weighted so that it doesn't be a burden on the machine running it. This system is being built keeping in mind the generally available hardware and software compatibility. Here are the minimum hardware and software requirements for a personal assistant.

#### **Hardware:**

- Pentium-pro processor or later.
- RAM 512MB or more.

#### **Software:**

- Windows 10 or above
- Python 3.8 or later
- Pycharm.

There are some other requirements also -

#### **Functional Requirements:**

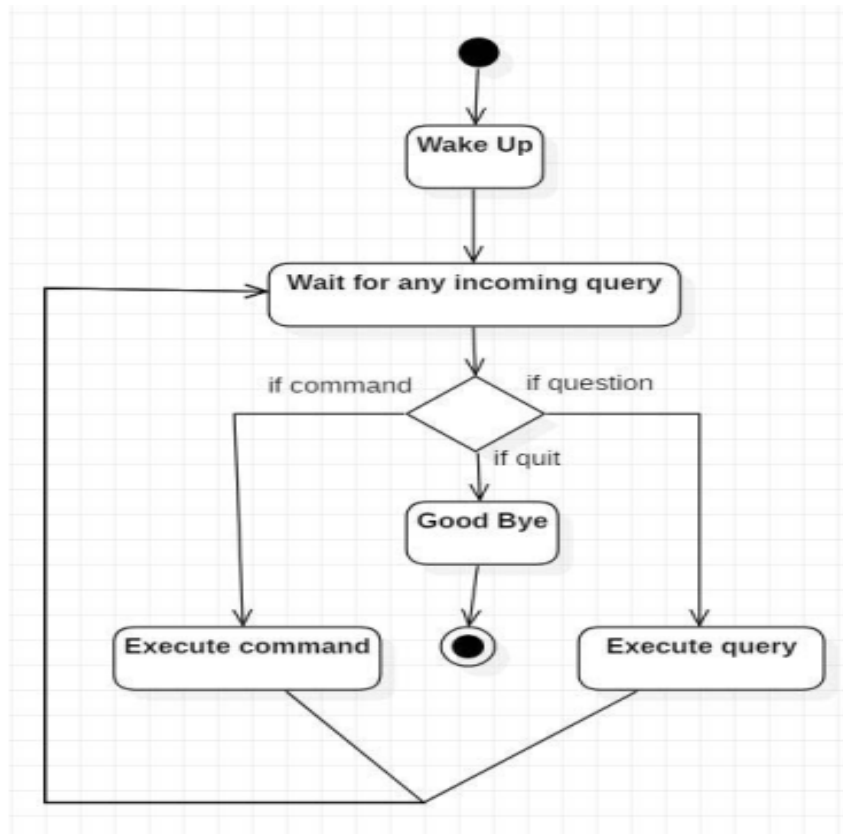
- Proper Internet Connection
- Python 3.8
- Chromium-based browsers, like Chrome, Edge

#### **Non-Functional Requirements:**

- The system ensures safety, security, and usability, which are observable during operation (at run time).
- The system is adaptable to different situations.
- The project is light on resources.

### 3.3 System Architecture

#### Activity Diagram

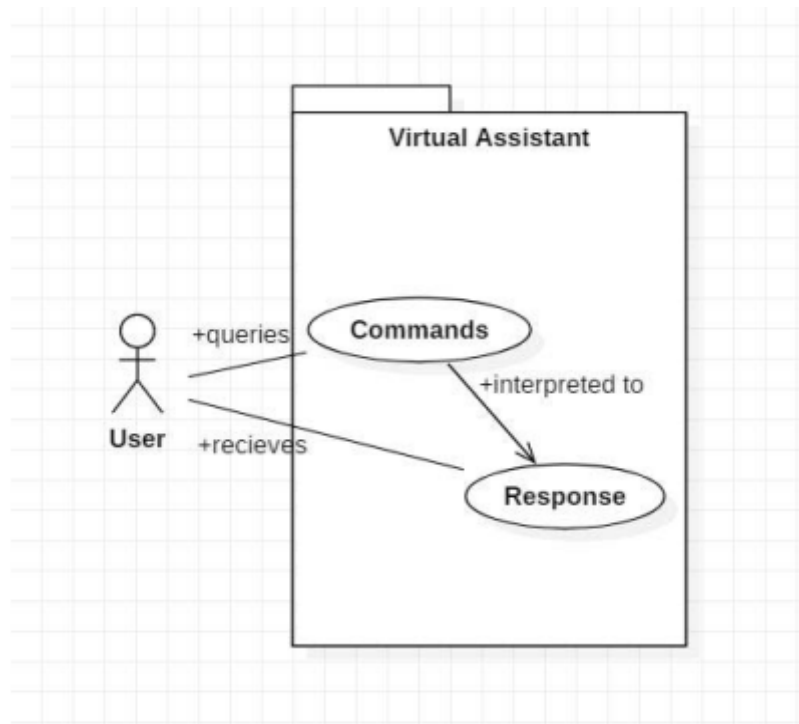


**Figure 1: Activity diagram of our system**

Initially, the system is in idle mode. As it receives any wake up call it begins execution. The received command is identified whether it is a questionnaire or a task to be performed. Specific action is taken accordingly. After the Question is being answered or the task is being performed, the system waits for another command. This loop continues unless it receives a quit command.



## Use Case Diagram



**Figure 2: Use case diagram of our system**

In this project there is only one user. The user queries command to the system. System then interprets it and fetches an answer. The response is sent back to the user.

### 3.4 Used Packages

The following Modules or packages we used in our project.

- **Pyttsx 3**

Pyttsx3 is a text-to-speech conversion library in Python. Unlike alternative libraries, it works offline and is compatible with both Python 2 and 3. Basically, it provides an engine that will convert our text to speech.

- **Speech Recognition**

Speech Recognition is an important feature in several applications used such as home automation, artificial intelligence, etc. It's a library that supports several engines and APIs, online and offline.

- **PyAudio**

It is required only if we need to use microphone input.

- **Date Time**

The date-time module supplies classes for manipulating dates & times in both simple and complex ways.

- **Wikipedia**

Wikipedia is a python library that makes it easy to access and parse data from Wikipedia. It wraps the Media Wiki API so that the user can focus on using Wikipedia data, not getting it.

- **Wheel package**

Wheels are a component of the Python ecosystem that helps to make package installs just work. They allow for faster installations and more stability in the package distribution process.

- **os**

The main purpose of the OS module is to interact with our operating system. The primary use for it is to create folders, remove folders, move folders, and sometimes change the working directory.

- **PyAutoGUI**

PyAutoGUI is a cross-platform GUI automation Python module for human beings. Used to programmatically control the mouse & keyboard.

- **psutil**

psutil (process and system utilities) is a cross-platform library for retrieving information on running processes and system utilization (CPU, memory, disks, network, sensors) in Python. It is useful mainly for system monitoring, profiling and limiting process resources and management of running processes.

We used this to know the battery percentage of the laptop.

- **speedtest-cli (for internet speed)**

This will measure the host internet speed. It uses boto3 under the hood, so it config files to be present in the user's home directory.

- **pywikihow (for wiki how)**

Simple Decorator to measure a function execution time.

- **Webbrowser**

This is a dummy implementation of a module for the standard library of Pycopy project

- **sys**

This package is an ongoing development from Andreas Evensen, a student at Lund University. Packages contain numerical-analysis tools that were used through the bachelor program of physics, at mentioned University. Mainly the Analysis-tools are simple but effective, some use brute force to compute.

- **pyjokes**

Pyjokes is a python library that is used to create one-line jokes for users.

- **requests**

Requests is a simple, yet elegant, HTTP library.

### **3.5 Implementation**

A virtual assistant is a technology based on artificial intelligence. The system uses a device's microphone to receive voice requests while the voice output takes place at the speaker. But the most exciting thing happens between these two actions. It is a combination of technologies: speech/voice recognition and text to speech conversion. We build it using one of the most powerful languages, python.

## **Chapter Four Implementation**

### **4.1 Result Analysis**

### **4.2 System Outcome**

## **4.1 Result Analysis**

A virtual assistant system is mainly used to get precise answers to any question asked. Getting an answer in a moment is of no use if the answer is not correct. Accuracy is of utmost importance in a virtual assistant system. Our system provides accurate results most of the time.

Time is very critical in a voice based system. When we are not typing inputs, we are speaking them. The system must also reply in a moment. Users must get an instant response to the query made. Our system completes it's command within a short time most of the time.

Overall our system works smoothly most of the time. But there are some problems. We are aiming to solve those problems in the near future.

## **4.2 System Outcome**

One of the main advantages of voice searches is their rapidity. In fact, the voice is reputed. To be four times faster than a written search, the ability of personal assistants to accurately recognize spoken words is a prerequisite for them to be adopted by consumers. Virtual assistants like Jarvis can save time. We spend hours in online research and then making the report in our terms of understanding.

# **Chapter Five**

## **Conclusion**

### **5.1 Introduction**

### **5.2 Future Works**

## **5.1 Introduction**

As a personal assistant, Jarvis assists the user with day-to-day activities like a general human conversation, searching queries in google, bing, or any web browser, searching for videos, images, live weather conditions, word meanings, and some more things. It's a desktop-based system. We tried our best to make it user-friendly. We even tested several times so that we could come up with a better system. The main reason for choosing this project is to make users' life easier with technology. We aim to make this project a complete personal virtual assistant and make it smart enough to act as like current available virtual assistants.

## **5.2 Future Works**

We plan to Integrate Jarvis with IoT to do home automation tasks. Further, in the long run, Jarvis is planned to add more features so that it can become more intelligent. The use of virtual assistants can also enhance the system of IoT (Internet of Things). Twenty years from now, Microsoft and its competitors will be offering personal digital assistants that will offer the services of a full-time employee usually reserved for the rich and famous.