



---

# Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons

*Nizam Uddin Ahmed*

*National University, Bangladesh*

DOI: <https://doi.org/10.55248/gengpi.4.1223.123519>

---

## ABSTRACT

This system, the "Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons," is a remarkable advancement in assisting physically impaired individuals, with a particular focus on the visually impaired. It stands out by catering to a broad spectrum of users, including those who are physically fit. The system can be controlled by both voice commands and manual input, ensuring accessibility to all. Users have the flexibility to pause, restart, edit, and send emails via voice commands, significantly enhancing efficiency and reducing the monotony of typing and reading emails. Notably, the system also features a listening function, allowing users to conveniently hear their received and sent emails. By addressing the needs of physically impaired individuals and simultaneously simplifying email-related tasks for all users, this innovation not only saves time and money but also opens new avenues for more inclusive technology solutions. It represents a significant step forward in making daily communication more accessible and convenient for everyone, regardless of their physical abilities.

Keywords: software, email automation, human-computer interaction, artificial intelligence

---

## 1. Introduction

Email is an essential medium of communication in this modern era. The popularity of this is increasing day by day. Automation is changing the way that all kinds of teams do business.

According to a survey of information workers, respondents said they believe auto-mating email marketing can improve employee productivity [1]:

69% said automation could help reduce wasted time.

59% said that they could save at least 6 hours a week if the repetitive aspects of their job were automated.

72% said that they would use the time they saved to focus on higher-value work.

To enhance the flexibility "Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons" can be used. People get lots of benefits using this system. It provides speech to text feature so users don't need to write emails by typing rather they can use their voice to write emails. Another important thing that this system provides is hearing feature that helps people to listen to their received emails without wasting their time in reading them. If they are in hurry, they can use this wonderful feature of this system. User can edit the text and can pause/start their writings at any time through their voice command. The full system can be controlled by voice or manually. However, there are millions of visually challenged people who face difficulties in accessing the existing email systems. They are very far away from email systems and the internet. Every time they want to send an email, they will have to seek help from a third person asking him/her to compose and send emails on the behalf of the visually impaired person. But this approach will not help in maintaining the integrity of the mails. Hence, we can say that the existing systems are not easily accessible to them. We identified this problem to be very important and came up with an idea that will help visually challenged people to write emails through voice commands without using a keyboard.

---

## 2. Materials and Methods

"Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons" offers an environment for the online users to send and receive emails from any-where of the world. For composing emails they don't need to write emails using their hands rather they can write emails using their voice for saving time.

For making this system I use python 3.9 which is the most powerful programming language in modern age. Python is a general-purpose programming language, so it can be used for many things. Python is used for web development, AI, machine learning, operating systems, mobile application development, and video games [2].

Django—pronounced “Jango” is a free, open source framework that was first publicly released in 2005. Django facilitates “rapid development and clean, pragmatic design.” The Django web framework, deployed on a web server, can help developers quickly produce a web frontend that’s feature-rich, secure and scalable. The latest version this framework is 2.7 which is used in this project [3].

Basically, SQL stands for Structured Query Language which is basically a language used by databases. This language allows to handle the information using tables and shows a language to query these tables and other objects related (views, functions, procedures, etc.). Most of the databases like SQL Server, Oracle, PostgreSQL, MySQL, MariaDB handle this language (with some extensions and variations) to handle the data. SQL statements are used to perform tasks such as update data on a database, or retrieve data from a database [4].

The most suitable and appropriate software development methodology I found for our software development is iterative waterfall software development model, which gave me a clear view about my software and helped me to achieve my goal.

In practical software development project, the classical waterfall model is hard to use. So the iterative waterfall model can be thought of as incorporating the necessary changes to the classical waterfall model to make it usable in practical software development projects. It is almost the same as the classical waterfall model except some changes are made to increase the efficiency of the software development. The iterative waterfall model provides feedback paths from every phase to its preceding phases, which is the main difference from the classical waterfall model [5].



Figure 1. Iterative waterfall model [6]

In this system we are using python speech recognition package for speech input and Google Web Speech, API for recognizing speech. Display device, Keyboard, Mouse and Microphone along with Speakers are used as external devices for this system. Microphone is used to input voice to the system and speaker is used to hear what the system says. Display device is used to display the emails. Visualization can be a very useful tool for getting a deeper understanding of how any business works. It helps make any processes more transparent, as well as easier to understand and analyze. The workflow diagram is one of the most popular visualization methods – it’s simple to design, read, and understand all at the same time.



Figure 2. Workflow Diagram

A use case diagram is the primary form of system/software requirements for a new software program under developed. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). It is an effective technique for communicating system behavior in the user’s terms by specifying all externally visible system behavior.



Figure 3. Use Case Diagram

A flowchart is a picture of the separate steps of a process in sequential order. It is a generic tool that can be adapted for a wide variety of purposes, and can be used to describe various processes, such as a manufacturing process, an administrative or service process, or a project plan.

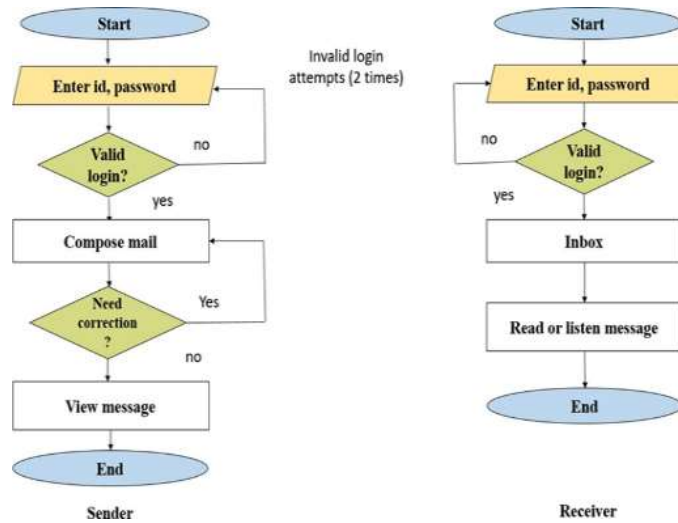


Figure 4. Flow Chart

A data-flow diagram is a way of representing a flow of data through a process or a system usually an information system. The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow — there are no decision rules and no loops.

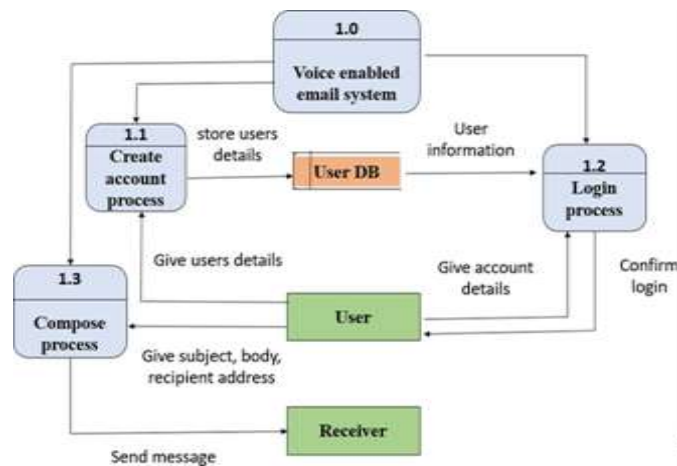


Figure 5. DFD of the proposed system

### 3. System Overview

#### 3.1 Design

Technologies that used as a base upon which “Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons” is developed are given below-

##### 3.1.1 Python

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages[7]. It can be used for automation, speech recognition, object tracking etc. The core functionalities of “Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons” like speech recognition, speech-to-text conversion, sending email and receiving emails are done using python programming language

##### 3.1.2 Django

Django is an MVT web framework that is used to build web applications. The huge Django web- framework comes with so many “batteries included” that developers often get amazed as to how everything manages to work together. The principle behind adding so many batteries is to have common web functionalities in the framework itself instead of adding latter as a separate library. Django is designed in such a way that encourages developers to develop web-sites fast, clean and with practical design. Django’s practical approach to getting things done is where it stands out from the crowd[8]. Routing and Designing the user interface of “Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons” is done using Django.

##### 3.1.3 Speech Recognition Module

Speech recognition is a machine's ability to listen to spoken words and identify them. You can then use speech recognition in Python to convert the spoken words into text, make a query or give a reply. You can even program some de-vices to respond to these spoken words. You can do speech recognition in py-thon with the help of computer programs that take in input from the micro-phone, process it, and convert it into a suitable form. Speech recognition seems highly futuristic, but it is present all around you. Automated phone calls allow you to speak out your query or the query you wish to be assisted on; your virtual assistants like Siri or Alexa also use speech recognition to talk to you seamlessly[9]. This module helps us to recognize human voice input in “Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons”.

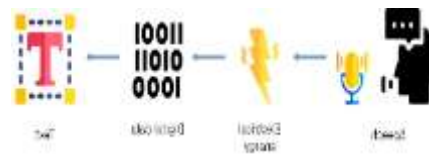


Figure 6 : Speech recognition module [10]

##### 3.1.4 speech-to-text Module

Speech is the most common means of communication and the majority of the population in the world relies on speech to communicate with one another. Speech-to-text module converts the speech into text.

##### 3.1.5 IMAP Protocol

IMAP stands for Internet Mail Access Protocol. IMAP is an email retrieval protocol which does not download the emails. It just reads them and displays them. This is very useful in low bandwidth condition. Python’s client side library called imaplib is used for accessing emails over imap protocol[11]. To display received emails imap protocol is used in “Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons”.

#### 3.2 Software Testing

Software Testing is a method to check whether the actual software product matches expected requirements and to ensure that software product is Defect free. It involves execution of software/system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements [12]. In this chapter we will take a look at the principles of testing, types of testing and some unit testing of proposed “Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons”.

### 3.2.1 Principles of Testing

Some testing principles are given below –

- All the test should meet the customer requirements.
- To make our software, testing should be performed by third party.
- Exhaustive testing is not possible. As we need the optimal amount of testing based on the risk assessment of the application.
- All the test to be conducted should be planned before implementing it.
- It follows pareto rule (80/20 rule) which states that 80% of errors comes from 20% of program components.
- Start testing with small parts and extend it to large parts [13].

### 3.2.2 Types of Testing

There are several types of software testing which can be categorized as functional testing or non- functional testing. Each type of testing has its own features, advantages & disadvantages.

### 3.2.3 Functional Testing

Functional Testing is a type of software testing that validates the software system against the functional requirements/specifications. The purpose of Functional tests is to test each function of the software application, by providing appropriate input, verifying the output against the Functional requirements [14]. Some functional testing are –

#### 3.2.3.1 Unit testing:

This software testing basic approach is followed by the program-mer to test the unit of the program. It helps developers to know whether the individual unit of the code is working properly or not.

- ❖ Integration testing: It focuses on the construction and design of the software. You need to see that the integrated units are working without errors or not.
- ❖ System testing: In this method, your software is compiled as a whole and then tested as a whole. This testing strategy checks the functionality, security, portability, amongst others.
- ❖ Sanity testing: It is done to determine if a new software version is performing well enough to accept it for a major testing effort or not.
- ❖ Smoke testing: This test is done to make sure that software under testing is ready or stable for further testing. It is called smoke test as testing initial pass is done to check if it did not catch the fire or smoked in the initial switch on.
- ❖ Interface testing: The objective of this GUI testing is to validate the GUI as per the business requirement. The GUI testing includes the size of the buttons and input field present on the screen, alignment of all text, tables and content in the tables.
- ❖ Regression testing: Every time new module is added leads to changes in pro-gram. This type of testing make sure that whole component works properly even after adding components to the complete program.
- ❖ Acceptance testing: The beta test is conducted at one or more customer sites by the end- user of the software. This version is released for the limited number of users for testing in real time environment.

### 3.2.4 Non-functional Testing

Non-Functional Testing is defined as a type of Software testing to check non-functional aspects (performance, usability, reliability, etc) of a software applica-tion. It is designed to test the readiness of a system as per nonfunctional parameters which are never addressed by functional testing [15]. Some non-functional testing are –

- ❖ Performance testing: It is designed to test the run-time performance of soft-ware within the context of an integrated system. It is used to test speed and ef-fectiveness of program.
- ❖ Load testing: It is designed to check how much of load or maximum workload a system can handle without any performance degradation.
- ❖ Stress testing: In this we gives unfavorable conditions to the system and check how they perform in those condition.

#### 4. Conclusion

A robust email automated system can help both the organizations and employees create a flexible working environment as the email system works in coordination with the organizations overall workflow and processes. Implementing an effective organization automated email strategy may seem complicated and overwhelming, but prioritizing the fundamentals correctly may prove to be a boon for any organization.

“Voice Enabled Read and Write Operation of Email System for Physically Impaired Persons“ offers an environment for the online users to send and receive emails from any-where of the world. For composing emails they don’t need to write emails using their hands rather they can write emails using their voice for saving time. Furthermore, people can listen message if they are willing to do that.

This system allows individuals to communicate through personal and business email with confidence knowing that the data within is secure.

To use this system user just need internet connection and a mail account. This system will definitely fulfill user requirements properly. It will save time and workload of a per-son and give a comfort feeling.

#### References

1. What Is Email Automation? A Beginner's Guide Available online: <https://mailchimp.com/marketing-glossary/email-automation/> [Accessed: 09- Jun- 2021].
2. Coursera, 2016. [Online]. Available: <https://www.coursera.org/articles/what-is-python-used-for-a-beginners-guide-to-using-python>. [Accessed: 09- Jun- 2021].
3. 2015. [Online]. Available: <https://www.ibm.com/cloud/learn/django-explained>&gt;. [Accessed: 11- Jun- 2021].
4. "What is Structured Query Language (SQL)?", SearchDataManagement, 2012. [Online]. Available: <https://www.techtarget.com/searchdatamanagement/definition/SQL>. [Accessed: 14- Jun- 2021].
5. "Software Engineering | Iterative Waterfall Model - GeeksforGeeks", GeeksforGeeks, 2011. [Online]. Available: <https://www.geeksforgeeks.org/software-engineering-iterative-waterfall-model/#:~:text=Iterative%20waterfall%20model%20assumes%20that,needed%20to%20complete%20the%20project.&text=Projects%20may%20suffer%20from%20various%20types%20of%20risks>. [Accessed: 19- Dec- 2021].
6. "Software Engineering | Iterative Waterfall Model - GeeksforGeeks", Geeks for Geeks, 2011. [Online]. Available: <https://www.geeksforgeeks.org/software-engineering-iterative-waterfall-model/#:~:text=Iterative%20waterfall%20model%20assumes%20that,needed%20to%20complete%20the%20project.&text=Projects%20may%20suffer%20from%20various%20types%20of%20risks> . [Accessed: 19- Dec- 2021].
7. "Python - Overview", Tutorialspoint.com, 2013. [Online]. Available: [https://www.tutorialspoint.com/python/python\\_overview.htm](https://www.tutorialspoint.com/python/python_overview.htm). [Accessed: 24- Sep- 2021].
8. "Django Framework", Tutorialspoint.com,2013. [Online]. Available: [https://www.tutorialspoint.com/python\\_web\\_development\\_libraries/python\\_web\\_development\\_libraries\\_django\\_framework.htm](https://www.tutorialspoint.com/python_web_development_libraries/python_web_development_libraries_django_framework.htm). [Accessed: 29- Sep- 2021].
9. Available: <https://www.simplilearn.com/tutorials/python-tutorial/speech-recognition-in-python#:~:text=Speech%20recognition%20is%20a%20machine's,respond%20to%20these%20spoken%20words>. [Accessed: 04- Oct- 2021].
10. "Django Framework", Tutorialspoint.com,2013. [Online]. Available: [https://www.tutorialspoint.com/python\\_webdevelopment\\_libraries/python\\_web\\_development\\_libraries\\_django\\_framework.htm](https://www.tutorialspoint.com/python_webdevelopment_libraries/python_web_development_libraries_django_framework.htm). [Accessed: 29- Sep- 2021].
11. "Python-IMAP", Tutorialspoint.com,2015. [Online]. Available: [https://www.tutorialspoint.com/python\\_network\\_programming/python\\_imap.htm#:~:text=Python's%20client%20side%20library%20called,them%20on%20the%20local%20computer](https://www.tutorialspoint.com/python_network_programming/python_imap.htm#:~:text=Python's%20client%20side%20library%20called,them%20on%20the%20local%20computer) . [Accessed: 06- Oct- 2021].
12. "What is Software Testing? Definition", Guru99, 2012. [Online]. Available: <https://www.guru99.com/software-testing-introduction-importance.html>. [Accessed: 10- Oct- 2021].
13. "Types of Software Testing - GeeksforGeeks", GeeksforGeeks, 2014. [Online]. Available: <https://www.geeksforgeeks.org/types-software-testing/>. [Accessed: 08- Nov- 2021].
14. "What is Functional Testing? Types & Examples (Complete Tutorial)", Guru99, 2013. [Online]. Available: <https://www.guru99.com/functional-testing.html>. [Accessed: 09- Nov- 2021].
15. "What is Non Functional Testing? (Types)", Guru99, 2011. [Online]. Available: <https://www.guru99.com/non-functional-testing.html>. [Accessed: 13- Nov- 2021].