



Project Report

on

BVBot

Submitted in partial fulfillment of Semester-II of

Master of Computer Application (MCA)

at

University of Mumbai

Submitted by

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2023 - 2025



Bharati Vidyapeeth's
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Navi Mumbai

Certificate of Approval

This is to certify that the Project titled ' **BVBot** ' is successfully done by **Akanksha Anil Jagtap** during Mini Project of her course in partial fulfillment of **Masters of Computer Application** under the **University of Mumbai, Mumbai**, through the Bharati Vidyapeeths Institute of Management and Information Technology, Navi Mumbai carried out by her under our guidance and supervision.

Sign & Date

Guide

External Examiner

Signature and Date

Principal

Dr. Suhasini Vijaykumar

College Seal

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Chapter 1

Introduction

1.1 Introduction to Project

In recent years, there has been a significant surge in the adoption of artificial intelligence (AI) technologies across various domains, revolutionizing the way businesses interact with their customers and users. One notable application of AI is the development of chatbots, conversational agents capable of simulating human-like conversations through natural language processing (NLP) techniques. As we all know, chatbots measure a really trending approach to communication between the user, the text interface of the system. The BVBot is a Chatbot for College Information and it aims to develop a conversational AI system using the Rasa framework to provide information and assistance related to college queries. With the increasing demand for accessible and user-friendly information platforms, a chatbot provides an efficient solution for students, applicants seeking information about colleges. Students can use the college website's chatbot to ask questions rather than going straight to college or the university for getting an information.

1.2 Domain Knowledge

Domain knowledge for the "BVBot" project refers to understanding the specific area or field in which the project operates. In this case, the domain revolves around chatbot for students seeking information about the college. Here's an overview of the domain knowledge:

1. Chatbots in Education:

- Chatbots offer 24/7 support to students, assisting them with queries related to course information, deadlines, and academic resources.
- Offer tailored advice on career planning, internship opportunities, extracurricular activities, and academic pathways based on individual interests and goals.
- Help with tasks like course registration, scheduling appointments with advisors, accessing campus services, and navigating college policies.

2. Leveraging Natural Language Processing (NLP):

- Implement NLP algorithms to understand user intents and extract relevant information from their messages, enabling the chatbot to generate appropriate responses.
- Identify specific entities mentioned in user queries, such as course names, dates, locations, and preferences, to provide accurate and contextually relevant assistance.

1.3 Problem Description

In the modern college environment, students often encounter challenges in accessing timely information, navigating complex administrative processes, and receiving personalized support. Existing communication channels between students and college administration are fragmented, leading to delays, confusion, and inefficiencies. Traditional support systems rely heavily on manual intervention, resulting in long wait times and inconsistent service quality. Moreover, the growing complexity of college procedures, coupled with the diverse needs of students.

Therefore, there is a pressing need for an intelligent chatbot solution that can bridge the communication gap, streamline administrative workflows, and provide personalized assistance to students and staff alike. The BVBot project seeks to address these challenges by leveraging the capabilities of the RASA Framework to develop a sophisticated chatbot interface capable of understanding natural language queries.

Chapter 2

System Study

2.1 Existing system

The current college support system typically comprises a combination of manual processes and digital resources. Students primarily rely on in-person interactions with advisors, faculty, and administrative staff to address their queries and concerns. This involves visiting various offices on campus or scheduling appointments via email or phone. Colleges often provide information through the website, including FAQs, academic calendars, course catalogs, and departmental contact details. Additionally, the institution offers online portals for tasks like course registration, financial aid applications, and grade viewing. Students reach out to college departments via email or phone for specific inquiries or support. However, sometimes responses get delayed due to the volume of requests and limited availability of staff.

2.2 Limitations

1. **Limited Accessibility:** The reliance on in-person visits and office hours restricts access to support services, especially for students with busy schedules or those studying remotely.
2. **Response Time:** Email and phone communication can result in delays in receiving assistance, particularly during peak periods such as registration or exam season.
3. **Fragmented Information:** Information is often dispersed across multiple channels and platforms, making it challenging for students to locate and access relevant resources efficiently.
4. **Lack of Personalization:** The current system may not provide personalized support tailored to individual student needs, leading to generic responses and recommendations.
5. **Administrative Burden:** College staff may be overwhelmed by the volume of inquiries and administrative tasks, resulting in slower response times and potential errors.

2.3 Proposed system

BVBot is an intelligent chatbot solution designed to revolutionize the college support system by providing instant assistance, streamlining administrative workflows, and enhancing the overall student experience. Leveraging the power of the RASA Framework, BVBot offers a user-friendly conversational interface that understands natural language queries, navigates college systems and databases, and delivers personalized responses and recommendations in real-time.

2.4 Objectives

1. Enhance Accessibility:

BVBot aims to provide round-the-clock access to support services and information, empowering students to obtain assistance anytime, anywhere they want.

2. Improve Response Time:

By automating routine inquiries and tasks, BVBot reduces response times and minimizes delays in providing assistance, ensuring students receive timely and accurate support.

3. Facilitate Communication:

BVBot facilitates seamless communication between students and administrative departments, enabling efficient information exchange, collaboration, and problem resolution.

4. Promote Self-Service:

BVBot empowers students to find answers to their questions independently and learn how to navigate college procedures effectively, promoting self-reliance and autonomy in academic and administrative tasks.

2.5 Feasibility Studies

A feasibility study is a crucial step in determining the viability and potential success of a project. It assesses various aspects, including technical, economic, operational, and scheduling feasibility. Here is an outline for the feasibility study of the "BVBot" project:

2.5.1 Technical

- **Evaluation of Required Technologies:**

RASA Framework: Assess the suitability of the RASA Framework for developing BVBot. Consider factors such as its capabilities for natural language understanding (NLU), dialogue management, integration with external systems, and scalability.

Programming Languages: Determine the programming languages and frameworks required for developing BVBot. RASA typically uses Python for backend development.

- **Natural Language Understanding (NLU) Capabilities:**

Training Data Availability: Evaluate the availability and quality of training data for training the NLU model. Considered collecting and annotating domain-specific data to improve the accuracy and effectiveness of BVBot's NLU capabilities.

Model Training and Tuning: Assess the feasibility of training and fine-tuning the NLU model to accurately understand user intents, entities, and context. Considered factors like model complexity, computational resources, and training time.

2.5.2 Operational

- **Stakeholder Analysis:**

Identify and analyze the stakeholders involved in BVBot, including students, faculty, administrative staff, and IT personnel.

Assess their willingness to adopt and support BVBot, as well as any potential concerns or resistance to change.

- **Organizational Readiness:**

Evaluate the readiness of the college organization to implement BVBot, considering factors such as leadership support, cultural norms, and change management strategies.

Assess the availability of resources, infrastructure, and expertise needed to support BVBot's development, deployment, and maintenance.

Chapter 3

System Analysis

3.1 Gantt chart

A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities (tasks or events) displayed against time. On the left of the chart is a list of the activities and along the top is a suitable time scale. Each activity is represented by a bar; the position and length of the bar reflects the start date, duration and end date of the activity. This allows you to see at a glance:

- What the various activities are
- When each activity begins and ends
- How long each activity is scheduled to last
- Where activities overlap with other activities, and by how much.
- The start and end date of the whole project.

3.2 Use Case Diagram

Creating a Use Case Diagram for a Project involves identifying the different actors and the interactions they have with the system.

- **User:** Interacts with the BVBot ,can ask any query related to the college, can get any information regarding the college activities.
- **Bot:** Bot gets a query from the user, Bot processes that particular query, and responds back to the user.

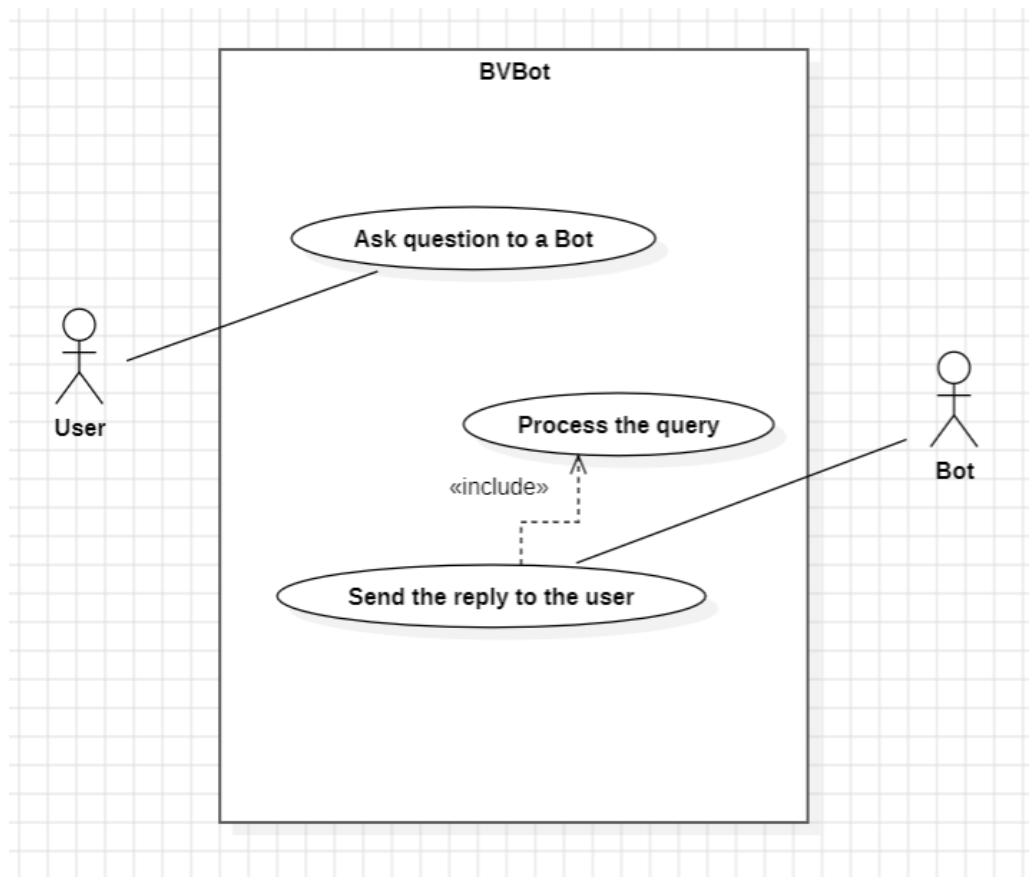


Figure 3.3: Use case

3.3 Operating tools and technology

3.3.1 Technologies Used

1. Frontend Development:

React.js:

- React.js is an open-source JavaScript library developed and maintained by Facebook.
- It is widely used for building user interfaces, especially for single-page applications where the user interacts with the page without reloading it.
- React.js follows a component-based architecture, making it a powerful and efficient tool for creating dynamic and interactive web applications.
- It encourages the creation of reusable UI components, which present data that changes over time.
- React can also render on the server using Node, and it can power native apps using React Native.
- React implements one-way data flow which makes it easy to reason about our app.

2. Backend Development:

RASA Framework:

- Rasa is a tool to build custom AI chatbots using Python and natural language understanding (NLU).
- Rasa provides a framework for developing AI chatbots that uses natural language understanding (NLU).
- It allows the user to train the model and add custom actions.
- Chatbots built using Rasa deployed on multiple platforms like FB messenger, Microsoft bot and slack etc.

3. Styling:

- **CSS3:** For styling and layout design.
- **Styled Components:** For component-level styling.

4. Development Tool:

- **Visual Studio Code:** The primary integrated development environment (IDE). Optimized for building and debugging modern web and cloud applications.

5. Hardware Requirements:

- Since the application must run over the internet, all the hardware shall require to connect internet will be hardware interface for the system.
- As for e.g. Modem, WAN LAN, Ethernet Cross-Cable.

Chapter 4

System Design

4.1 Activity Diagram

The activity diagram helps in envisioning the workflow from one activity to another. It put emphasis on the condition of flow and the order in which it occurs. The flow can be sequential, branched, or concurrent, and to deal with such kinds of flows, the activity diagram has come up with a fork, join, etc.

Activity Diagram of bot represents sequence of actions between user and BVBot. Some of the important activities are listed in this diagram such as intent classification and prediction of next action by the bot.

4.1.1 Activity Diagram

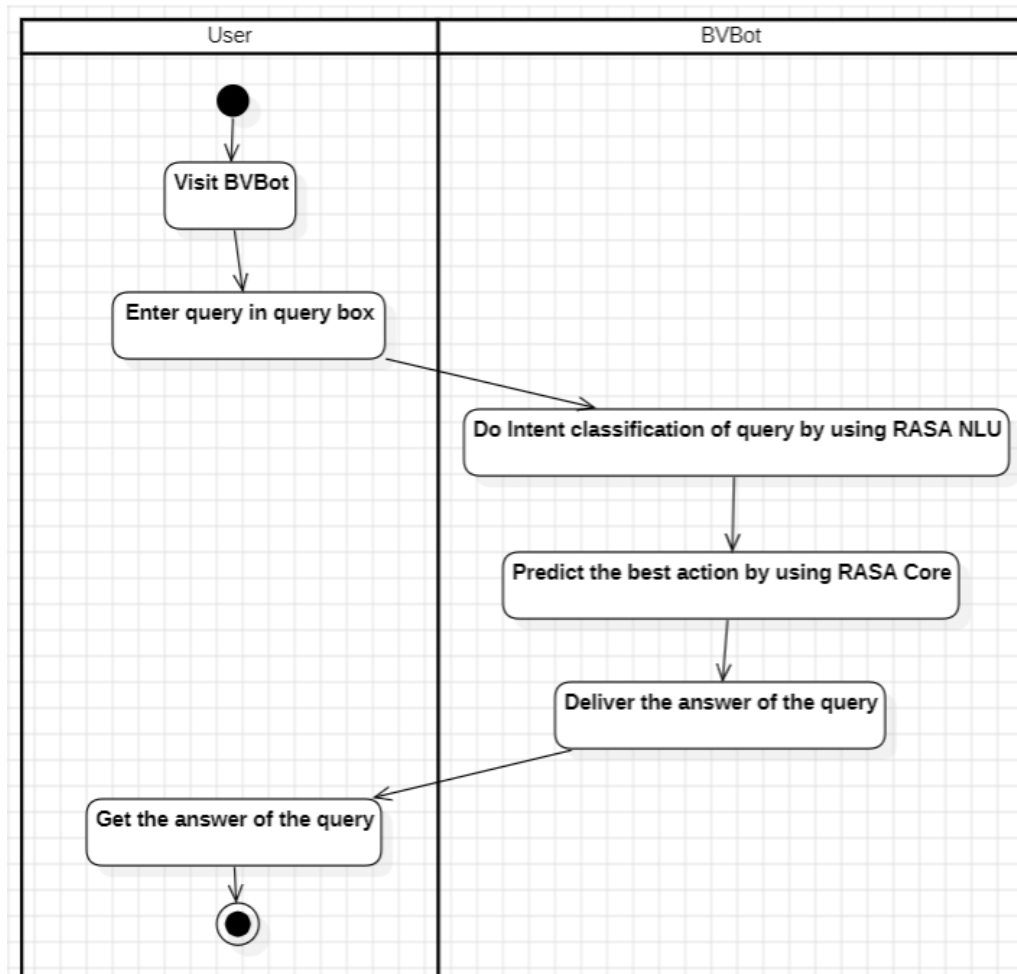


Figure 4.1: Activity Diagram

System Implementation

```
(AjBotBv) PS D:\SEM2 BOT Proj Files\bot1> rasa train
D:\AjBotBv\lib\site-packages\rasa\core\tracker_store.py:1044: MovedIn20Warning: Deprecated API features detected! These featu
re(s) are not compatible with SQLAlchemy 2.0. To prevent incompatible upgrades prior to updating applications, ensure require
ments files are pinned to "sqlalchemy<2.0". Set environment variable SQLALCHEMY_WARN_20=1 to show all deprecation warnings.
Set environment variable SQLALCHEMY_SILENCE_UBER_WARNING=1 to silence this message. (Background on SQLAlchemy 2.0 at: https:/
/sqlalche.me/e/b8d9)
  Base: DeclarativeMeta = declarative_base()
D:\AjBotBv\lib\site-packages\rasa\shared\utils\validation.py:134: DeprecationWarning: pkg_resources is deprecated as an API.
See https://setuptools.pypa.io/en/latest/pkg_resources.html
  import pkg_resources
D:\AjBotBv\lib\site-packages\pkg_resources\__init__.py:2832: DeprecationWarning: Deprecated call to `pkg_resources.declare_na
mespace('mpl_toolkits')`.
Implementing implicit namespace packages (as specified in PEP 420) is preferred to `pkg_resources.declare_namespace`. See htt
ps://setuptools.pypa.io/en/latest/references/keywords.html#keyword-namespace-packages
  declare_namespace(pkg)
D:\AjBotBv\lib\site-packages\pkg_resources\__init__.py:2832: DeprecationWarning: Deprecated call to `pkg_resources.declare_na
mespace('ruamel')`.
Implementing implicit namespace packages (as specified in PEP 420) is preferred to `pkg_resources.declare_namespace`. See htt
ps://setuptools.pypa.io/en/latest/references/keywords.html#keyword-namespace-packages
```

```
2024-04-14 23:35:26 INFO rasa.engine.training.hooks - Starting to train component 'RulePolicy'.
Processed trackers: 100%|██████████████████████████████████████████████████████████████████████████████| 2/2 [00:00<00:00, 667.78it/s, # action=5]
Processed actions: 5it [00:00, 5015.91it/s, # examples=4]
Processed trackers: 100%|██████████████████████████████████████████████████████████████████████████████| 17/17 [00:00<00:00, 895.35it/s, # action=40]
Processed trackers: 100%|██████████████████████████████████████████████████████████████████████████████| 2/2 [00:00<00:00, 317.49it/s]
Processed trackers: 100%|██████████████████████████████████████████████████████████████████████████████| 19/19 [00:00<00:00, 1584.46it/s]
2024-04-14 23:35:27 INFO rasa.engine.training.hooks - Finished training component 'RulePolicy'.
2024-04-14 23:35:27 INFO rasa.engine.training.hooks - Starting to train component 'TEDPolicy'.
Processed trackers: 100%|██████████████████████████████████████████████████████████████████████████████| 517/517 [00:00<00:00, 716.69it/s, # action=1040]
Epochs: 100%|██████████████████████████████████████████████████████████████████████████████| 100/100 [01:30<00:00, 1.11it/s, t_loss=0.836, loss=0.591, acc=1]
2024-04-14 23:37:00 INFO rasa.engine.training.hooks - Finished training component 'TEDPolicy'.
2024-04-14 23:37:01 INFO rasa.engine.training.hooks - Starting to train component 'UnexpectedIntentPolicy'.
2024-04-14 23:37:01 WARNING rasa.shared.utils.common - The Unexpected Intent Policy is currently experimental and might change or be removed in the future 🛠 Please share your feedback on it in the forum (https://forum.rasa.com) to help us make this feature ready for production.
Processed trackers: 100%|██████████████████████████████████████████████████████████████████████████████| 517/517 [00:00<00:00, 1220.38it/s, # intent=165]
Epochs: 100%|██████████████████████████████████████████████████████████████████████████████| 100/100 [00:30<00:00, 3.29it/s, t_loss=0.411, loss=0.317, acc=0.819]
2024-04-14 23:37:37 INFO rasa.engine.training.hooks - Finished training component 'UnexpectedIntentPolicy'.
Your Rasa model is trained and saved at 'models\20240414-233329-radioactive-pug.tar.gz'.
```

6.2 RASA Shell

```
(AjBotBv) PS D:\SEM2 BOT Proj Files\bot1> rasa shell
D:\AjBotBv\lib\site-packages\rasa\core\tracker_store.py:1044: MovedIn20Warning: Deprecated API features detected! These feature(s) are not compatible with SQLAlchemy 2.0. To prevent incompatible upgrades prior to updating applications, ensure requirements files are pinned to "sqlalchemy<2.0". Set environment variable SQLALCHEMY_WARN_20=1 to show all deprecation warnings. Set environment variable SQLALCHEMY_SILENCE_UBER_WARNING=1 to silence this message. (Background on SQLAlchemy 2.0 at: https://sqlalche.me/e/b8d9)
Base: DeclarativeMeta = declarative_base()
D:\AjBotBv\lib\site-packages\rasa\shared\utils\validation.py:134: DeprecationWarning: pkg_resources is deprecated as an API. See https://setuptools.pypa.io/en/latest/pkg_resources.html
import pkg_resources
D:\AjBotBv\lib\site-packages\pkg_resources\__init__.py:2832: DeprecationWarning: Deprecated call to `pkg_resources.declare_namespace('mpl_toolkits')`. Implementing implicit namespace packages (as specified in PEP 420) is preferred to `pkg_resources.declare_namespace`. See https://setuptools.pypa.io/en/latest/references/keywords.html#keyword-namespace-packages
declare_namespace(pkg)
D:\AjBotBv\lib\site-packages\pkg_resources\__init__.py:2832: DeprecationWarning: Deprecated call to `pkg_resources.declare_namespace('ruamel')`. Implementing implicit namespace packages (as specified in PEP 420) is preferred to `pkg_resources.declare_namespace`. See https://setuptools.pypa.io/en/latest/references/keywords.html#keyword-namespace-packages
declare_namespace(pkg)
```

```
ng or be removed in the future. Please share your feedback on it in the forum (https://forum.rasa.com) to help us make this feature ready for production.
2024-04-14 23:40:09 INFO root - Rasa server is up and running.
Bot loaded. Type a message and press enter (use '/stop' to exit):
Your input -> hiii
Hey! How are you?
Your input -> good
Great, carry on!
Your input -> what is your name?
I am a bot, My name is BVBot.
Your input -> can I get some information about college?
During the last 55 years, Bharati Vidyapeeth has made astonishing strides in the field of education, particularly, higher and professional education. Today Bharati Vidyapeeth conducts more than 156 educational units of various kinds, right from pre-primary schools to postgraduate institutions and a full-fledged professional university (BVPU). At Bharati Vidyapeeth, our objective has been to contribute to intellectual awakening and social transformation in different spheres such as education, economic, social & cultural fields in India and more particularly in Maharashtra. Information Technology has invaded our society in a very significant manner. Hence to keep pace with the modern times, the year 2002 marked the establishment of Bharati Vidyapeeth's Institute of Management & Information Technology. At BVIMIT MCA course, we impart I.T. Management education to meet the demand of the I.T. Industry.
Your input -> give me some information about courses
BVIMIT offers industry-oriented professional program in MCA with the lowest course fee as compared to other universities in the region. For more information visit our official site 'https://bvimit.co.in/bvimit/course_mca.php'
Your input ->
```

```

Your input -> do you have syllabus copy?
The syllabus for the MCA degree for both year are : 'https://bvimit.co.in/bvimit/pdf/MCA syllabus%20AC20-21UOM.pdf'
Your input -> which companies visits BVIMIT and what are the packages?
Carwala.com - 9LPA
Josh Technologies- 8.70LPA
BANK OF AMERICA- 6.45LPA
BNP- 6LPA
PRINCETON BLUE- 6.25LPA
ZEUS LEARNING- 7.5LPA
V2S Technology- 4.20 LPA
CRM NEXT- 4.5LPA
Finovate- 4.5LPA
IDBI Intech 3.25 - 4.5LPA
Your input -> how many facilities does BVIMIT provides?
There are several facilities such as:
1. CANTEEN
2. HOSTEL
3. LIBRARY
4. SPORTS

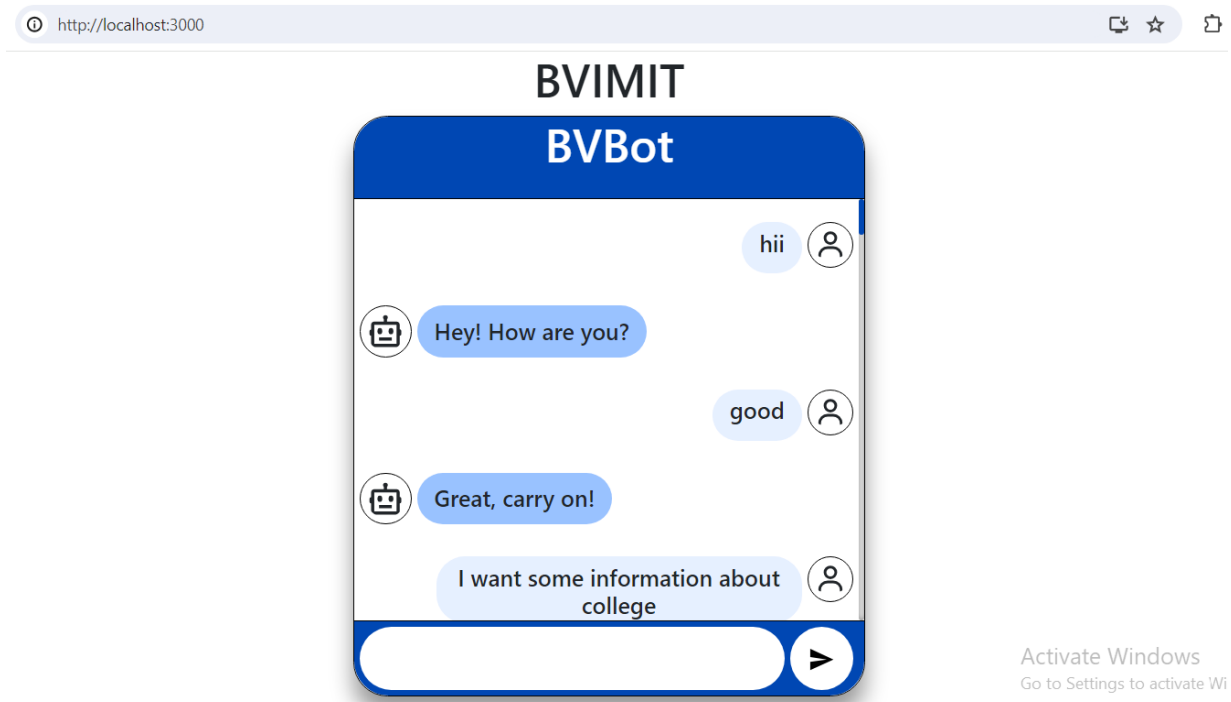
```

```

Your input -> how many facilities does BVIMIT provides?
There are several facilities such as:
1. CANTEEN
2. HOSTEL
3. LIBRARY
4. SPORTS
Your input -> does BVIMIT conduct events?
Yes there are several events such as:
'https://bvimit.co.in/bvimit/events_seminars.php' -> Seminars,
'https://bvimit.co.in/bvimit/events_workshops.php' -> Workshops,
'https://bvimit.co.in/bvimit/pdf/ICET%202022-CONFERENCE%20REPORT.pdf' -> ICET-2022,
'https://bvimit.co.in/bvimit/manthan2022.php' -> MANTHAN 2022
Your input -> ohh thanks.
Welcome.. It's my pleasure..
Your input ->

```

6.3 Final Bot



http://localhost:3000



BVIMIT

BVBot



Sure, I can help you with that. Please visit [official site](#)

how many courses are there?



BVIMIT offers industry-oriented professional program in MCA with the lowest course fee as compared to other universities in the region. For more information



Activate Windows

Go to Settings to activate Windows

http://localhost:3000



BVIMIT

BVBot

What about placements?

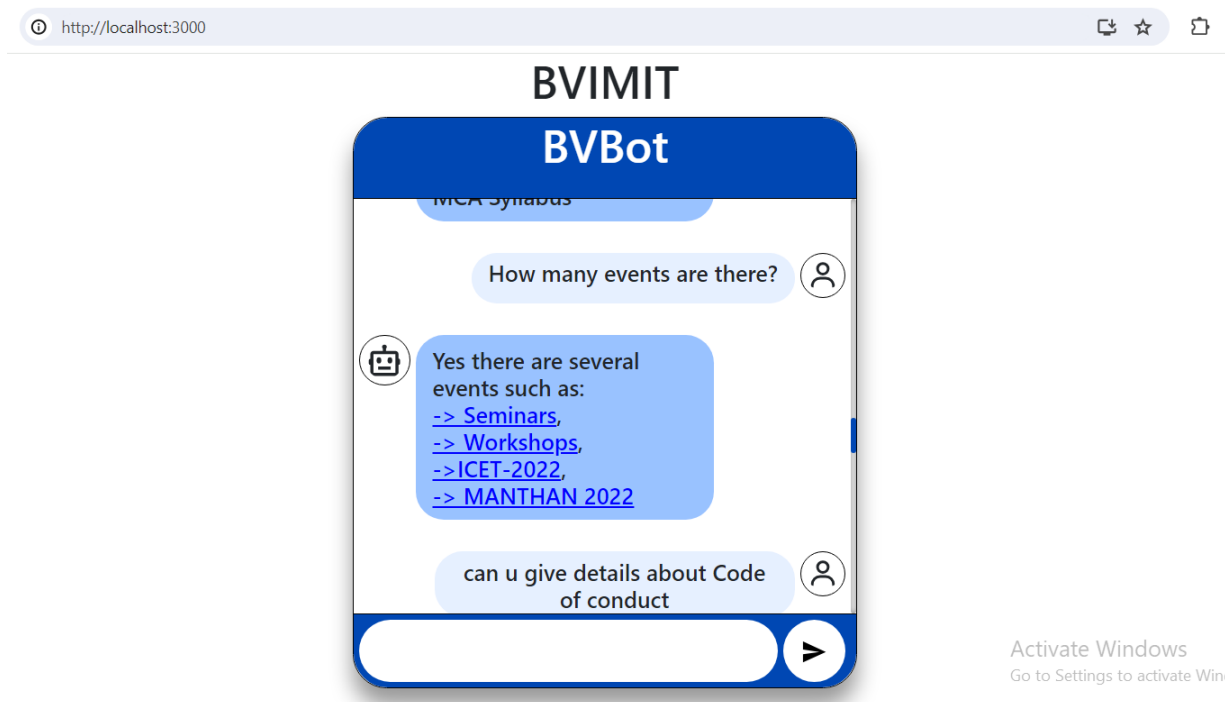
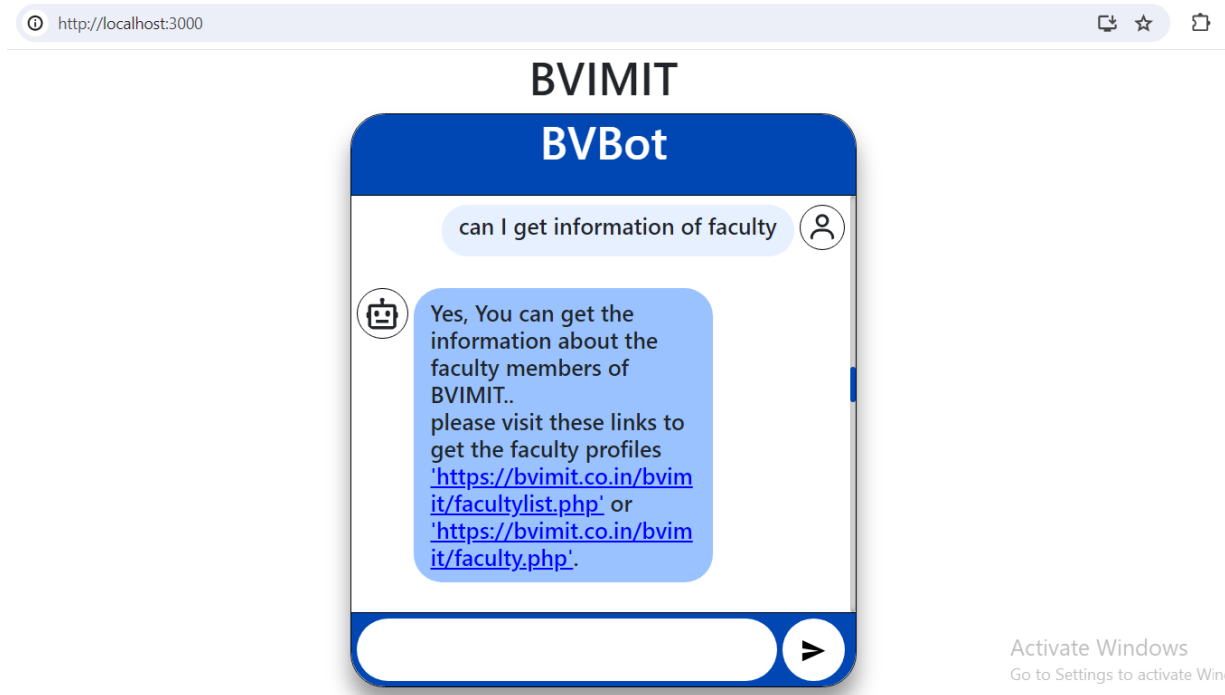


The Training & Placement Cell facilitates the process of internship and placement of students passing out from the Institute besides collaborating with leading organizations. please visit these links to get more information about placement.. [Placements page](#) for



Activate Windows

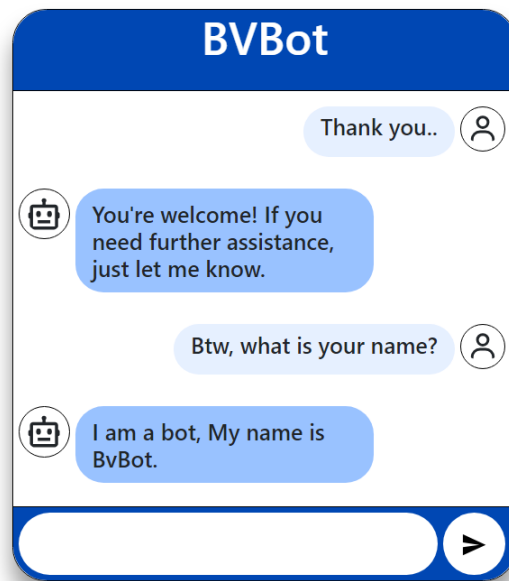
Go to Settings to activate Windows



http://localhost:3000



BVIMIT



Activate Windows
Go to Settings to activate Windows

Chapter 7

System Testing

7.1 Test Cases

Test Case ID	Module	Form	Test Condition	Steps	Input Test Data	Expected Output	Actual Output	Status
TC01	Chatbot	Response	To check the bot's response to user greeting	User types "Hello"	"Hello"	"Hi there! How can I help you today?"	"Hi there! How can I help you today?"	Pass
TC02	Chatbot	Response	To check the bot's response when asked for its name	User types "What is your name?"	"What is your name?"	"I am a bot, My name is BvBot."	"I am a bot, My name is BvBot."	Pass
TC03	Chatbot	Response	To check the bot's response to a thank you message	User types "Thank you"	"Thank you"	"You're welcome! If you need further assistance, just let me know."	"You're welcome! If you need further assistance, just let me know."	Pass
TC04	Chatbot	Error Handling	To check the bot's response to an unrecognized input	User types a random string, e.g., "aslkdja"	"aslkdja"	"I'm sorry, I didn't understand that. Can you please rephrase?"	"I'm sorry, I didn't understand that. Can you please rephrase?"	Pass
TC05	Chatbot	Error Handling	To check the bot's response to an empty input	User submits an empty message	Empty message	"Please enter a message."	"Please enter a message."	Pass
TC06	Chatbot	Inquiry	To check the bot's response to an inquiry about courses	User asks "What courses are available?"	"What courses are available?"	List of available courses or a link to the courses page	List of available courses or a link to the courses page	Pass

TC07	Chatbot	Inquiry	To check the bot's response to any valid inquiry	User asks any valid question	any valid question	Responds back with respective answer	Responds back with respective answer	Pass
TC08	Chatbot	Response Time	To check the bot's response time	User asks a question	Any valid question	Bot responds within 2 seconds	Bot responds within 2 seconds	Pass

Chapter 8

Limitation and Future Enhancement

8.1 Limitations

While BVBot promises significant benefits for college support systems, there are several potential limitations to consider:

- The effectiveness of BVBot heavily relies on the accuracy and comprehensiveness of its natural language processing (NLP) capabilities. If the NLU models are not well-trained or updated, BVBot may struggle to understand user queries correctly.
- Integrating BVBot with existing college systems and databases can be complex and time-consuming. Compatibility issues, data format discrepancies, and security concerns may arise during the integration process.
- While BVBot excels at handling routine and straightforward inquiries, it may struggle with more complex or nuanced queries that require contextual understanding or human intervention.
- Regular maintenance and updates are crucial to keep BVBot functioning optimally. Failure to update its knowledge base, NLP models, or integrations could lead to decreased accuracy and relevance over time.

8.2 Future Enhancement of the Project

Looking ahead, several future enhancements could further elevate BVBot's capabilities and its impact on the college support system:

- Continuously improving BVBot's NLU capabilities will enhance its ability to understand and respond to complex queries, including those with nuanced contexts and variations in language.
- Incorporating advanced AI and machine learning algorithms can enable BVBot to offer predictive analytics and personalized recommendations. For example, it could suggest courses based on a student's academic performance and interests.

- Introducing a voice-enabled interface would allow users to interact with BVBot through voice commands, making it more convenient for users who prefer spoken communication.
- Enhancing BVBot's ability to seamlessly integrate with a wider range of college systems and third-party platforms would further streamline administrative workflows and access to information.

References

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- [4] Lam, K. N., Le, N. N., Kalita, J. (2020, December). Building a Chatbot on a Closed Domain using RASA. In Proceedings of the 4th International Conference on Natural Language Processing and Information Retrieval (pp. 144-148).
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