**CHAT – IRA**

**MUSTANG’S CHATBOT**

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**1.Introduction:**

**1.1 Overview of the Project:**

Chatbots are computer programs that replicate human interaction and respond automatically to user inputs. They comprehend and interpret human language using natural language processing (NLP) and machine learning techniques, and then they react in accordance with that understanding.

AI-powered chatbots can also be rule-based ones. Rule-based chatbots can only react to user inputs and obey a predetermined set of rules. Contrarily, AI-powered chatbots utilize machine learning algorithms to adapt their responses over time in response to user interactions.

Businesses are increasingly utilizing chatbots to automate customer service, boost sales and marketing, and increase user engagement. They give a cost-effective solution to deliver 24/7 assistance, enhance response times, and personalize client interactions. Chatbots are becoming smarter and more capable of handling increasingly difficult tasks as AI and NLP technologies progress.

**1.2 Objectives of the Project:**

The objectives of this project is to-

* Provide instant support to students for the immediate response.
* It offers personalized guidance to student needs and preferences.
* They provide career guidance and job search assistance to students.
* Students often find chatbots to be user-friendly and easy to use, which can enhance their engagement and motivation.
* They provide students with access to emergency services and safety information.

**1.3 The Need for the Project:**

Mustang's chatbot accepts user questions, attempts to understand questions written in English, and responds appropriately. It accomplishes this by translating the English inquiry into a machine query, examining the relevant data to provide the necessary information, and using Natural Language Processing to provide the answer in a phrase using natural language (NLP). The primary purpose of this project is to provide students and professors with a quick and easy way to get answers to their inquiries, as well as to encourage other developers to implement chatbots into their projects.

One of the main problems with universities is that staff members spend a lot of time answering the same questions for new students each year. For first-year students to understand more about their college, a college handbook is crucial. The ideal answer to that problem could be a chatbot for university inquiries. Also, the staff is not always on hand to respond to new students' inquiries. This chatbot will be a big assistance to students who want to enroll in universities because it is specifically made to inform them about college history, student opportunities, course information, and other things.

**1.4 Overview of Existing Systems and Technologies:**

The development and implementation of chatbots based on Python to deliver answers to questions is still in its early stages. Yet, these are constrained in terms of functionality and application. But, as technology develops, these bots change over time. As databases are utilized to generate output, these bots have limited data and may struggle to handle unsaved queries. But, since we added a feature that asks for a rephrase of the question or says I don't understand your question if the chatbot doesn't have an answer, our chatbot cannot fail. Siri from Apple, Alexa from Amazon, and other chatbots are some instances.

Main technologies associated with Chatbots:

* Web programming technologies (HTML, CSS, JavaScript)
* Postgres SQL (Database)
* Flask or Django (Python Framework)

**1.5 Scope of the Project:**

According to Grand View Research Inc., the market for chatbots is expected to reach $1.25 billion by 2025, rising at a rate of 24% annually now. But, beyond the next five years, the success of chatbots depends on their being widely used in business; their use must extend typical sectors (such as technology, banking, and healthcare) and become general. The first step in achieving widespread acceptance is to lower the access barriers for using chatbots.

**Main actors of this system:**

* Students
* Professors
* Parents
* Administrative Staff

**Main use cases:**

1. **Students:**

* Students can enquire about university.
* Students can find their professors contact information.
* Students can access career options like resume building**.**

1. **Professors:**

* Professors can access the course portals for more information.

1. **Parents:**

* Parents can investigate about college history and search for the courses before joining their children.

1. **Administrative staff:**

* Can ask work related queries like website links.

**1.6 Deliverables:**

This is a web-base software system runs in the host system.

**2. Feasibility Study:**

**2.1 Financial Feasibility:**

The financial feasibility of a chatbot can vary depending on several factors, including the chatbot's purpose, the complexity of its deployment, and the predicted advantages and ROI. These are some important things to think about:

* **Costs of Implementation:** The costs of developing and deploying a chatbot vary greatly based on the complexity of the bot, the platform chosen, and the resources required. Our chatbot is basically university based and is easily affordable.
* **Costs of maintenance:** After going live, the chatbot will require ongoing upkeep and revisions to keep it useful and current. This can include continuing development effort to add new features or improve performance, as well as monitoring and analysis to identify and resolve any concerns.
* **ROI:** Depending on the chatbot's goal and the advantages it offers, its return on investment (ROI) will vary. For example, a chatbot created to answer customer support inquiries may eliminate the need for human employees, saving money and boosting productivity. With our chatbot, it saves a lot of time to the university employees to answer the queries of the students.

From these above mentioned, it can be understood that chatbot is financially feasible.

**2.2 Technical Feasibility:**

Mustang’s Chatbot is completely a web-based application. The main technologies and tools associated with chatbot are:

* HTML
* CSS
* JavaScript
* Postgres SQL
* Jupyter Notebook
* Vscode

Each of these technologies is open source, and the necessary technical knowledge is achievable. The simplicity of integrating these technologies and the time constraints of product development is linked.

As of now, this is implemented on the host system i.e. Windows or IOS, but if the desired accuracy is met, then an android version may be developed based on the time constraints.

By the above factors, it can be understood that chatbot is technically feasible.

**2.3 Resource and Time Feasibility:**

**Resource Feasibility:**

* It requires a web server to host the software (Freely available).
* Programming Device (Laptop).
* NLP Engine.
* Programming Tools (Freely available).
* Programming individuals.

**Time Feasibility:**

The time feasibility of chatbot depends on several factors:

* Complexity of the task.
* Size of database.
* Speed of the server.
* Quality of Natural Language Processing Algorithms.

For our chatbot we use all the resources that are open source & freely available and since we use University data, which is limited, the bot have a good response time for the queries asked. By the above factors taken into consideration, chatbot is Resource & Time feasible.

**2.4 Risk Feasibility:**

There are numerous contexts in which risk feasibility can be discussed.

**Risk associated with size:**

The software is expected to be under or near a megabyte in size. This small size of the program will seemingly not be a great risk to the users or developers.

**Users of the product:**

* Students
* Professors
* Parents
* Administrative staff

**Number of projected changes to the requirements for the product? Before the delivery? After the delivery?**

Because the criteria were explicitly stated prior to the implementation phase, no changes are expected to be made outside of open-source development by other users to include more functionality.

**Amount of Reused Software?**

No, we use Django which is a python web framework.

**Business impact risks**

**Effect of this product on company revenue:**

Chatbot can be implemented either as individual system or it can be integrated to an existing system like university website. It gives quick response on some of the college key points from the website, the users can increase the revenue.

**Reasonableness of delivery deadlines?**

For a small project with a team of three developers an Eleven-week deadline seems reasonable for final delivery.

**Number of customers who will use this product and the consistency of their need’s relative to the product.**

It is unknown now, as how many are willing to use the application. But as per the college usage, it is believed that 60% of the enquiries will be resolved by using chatbots.

**Number of other products/systems with which this product must be interoperable?**

At present, the data used is limited to college website. To expand the data to other organizations or industries, we need to gather the relevant information and retrain the model.

**Sophistication of end users?**

No prior programming or computer science knowledge is assumed from end users. They must be capable of posing questions to the chatbot and waiting for a response.

**Amount and quality of product documentation that must be produced and delivered to the customer?**

Any user who is interested will have quick access to the pre-compiled source file, the open-source code with comments, and a Readme text file with end user usage instructions.

**Costs Associated with delivery?**

None. We will use Github.

**Customers related risk:**

Chatbots rely on technology, and like all technology, they can have problems and make mistakes. Customers may find this to be frustrating, particularly if the chatbot is unable to give them the assistance or information they require.

**Development Environment Risks:**

**Is a software project management tool available?**

Github will be the primary project management tool that developers will engage with.

**Are tools for analysis and design available?**

Lucid.app will be used for all UML class diagrams.

**Are compilers or code generators available and appropriate for the product to be built?**

Visual Studio and Google Colab are used for software development, both are freely available and accessible.

**Are testing tools available and appropriate for the product to be built?**

For our application, we use Visual Studio and Google Colab which are adequate testing tool.

**Are software configuration management tools available?**

Software Configuration management will be achieved using GIT which is freely available.

**Does the environment make use of a database or repository?**

No database is used or needed for the construction of our product, but an active repository is kept on Github.

**Are all the software tools integrated with one another?**

The main deliverables will be packaged under a single project that all stakeholders will have access to,

* **Process issue risks:**

The Agile software development process will be used to create the chatbot. This gives a clear, transparent, and adaptable structure for accommodating any unplanned but essential improvements to the software requirements.

* **Technical issue risk:**

**Are specific conventions for code documentation defined and used?**

Software code and documentation will be made available for free.

**Do you use a specific method for case design?**

**No.**

**Are configuration management software tools used to control and track change activity throughout the software process?**

The software development process will be managed and monitored using Github.

* **Technology risks:**

**Is the technology to be built new?**

No, the chatbots are already available.

**Do the system requirements demand the creation of new algorithms, input, or output technologies?**

No.

**2.5 Social/Legal Feasibility:**

The chatbot makes use of open-source software and free development tools. This system uses free open-source libraries for its software.

Our system will drastically impact how universities perform since it eliminates the necessity to build statistical distributions.

**3. Considerations:**

**3.1 Performance:**

The performance of the chatbot won't be affected by an increase in user numbers because it uses a small amount of bandwidth. A free hosting service is used while the website is in development. But, when deployed in a university environment, it will be hosted on a much more stable server to improve performance.

Postgres SQL will offer sufficient speed for database operations. Because our data is limited, Postgres SQL is the best database for the job.

* Response time: Less than 3 sec.
* Processing time: Less than 3 sec.
* Query and Reporting times: Yet to be tested.
* Throughput: Yet to be tested.
* Storage: Yet to be tested.

**3.2 Security:**

Substantial security precautions were not required, and so are not included in this system.

**3.3 Usability and ease of use:**

Our chatbot gives concise and quick responses that are simple to understand. It is simple to use, with obvious options and buttons that let the user advance from one conversational level to the next. Additionally, it comprehends the conversation's context and offers relevant responses. It keeps track of prior communications and uses them to customize future interactions.

**3.4 Capacity and Scalability:**

Chatbot accommodate many simultaneous users. The system is designed to make it easy to integrate to an existing system like the ChatGPT.

**3.5 Availability:**

The system must be always accessible. The application will be available as long as Windows systems do not update to break compatibility and a computer to run it is available.

**3.6 Maintainability:**

Chatbot is designed using the best practices of RUP and OOP. Since every single segment in the system is very well structured, the system is highly maintainable. Standard UML model will be used as the main architectural pattern in this system. Hence the separation of each task is improved, hence maintainability improved.

**4.References:**

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* <https://www.dialpad.com/blog/chatbot-use-cases/#:~:text=Today%2C%20chatbots%20are%20used%20in,and%20drive%20large%20sales%20pipelines>.