Chapter 1

Introduction

1.1.Artificial Intelligence:

Artificial Intelligence (AI) is technology and a branch of computer science that studies and develops intelligent machines and software. Major AI researchers and textbooks define the field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success. John McCarthy, who coined the term in 1955, defines it as "the science and engineering of making intelligent machines".

The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects.

1.2. Natural Brain v/s Artificial Brain

1.2.1. Natural Brain:

Input-

Through the natural neurons.

Interpretation-

By different states of neurons in the brain.

Output-

Through the natural neurons.

Processing-

Through arithmetic and logical calculations.

Memory-

Through permanent states of neurons.

1.2.2. Artificial Brain:

Input-

Through the silicon chip.

Interpretation-

By set of bits in the set of register.

Output-

Through the silicon chip.

Processing-

Through arithmetic and logical calculation and artificial intelligence.

Memory-

Through secondary memory.

1.1. Introduction to Brain Simulator:

This document is to describe the working and use of Brain Simulator. The user can ask question to the system via text which will be sent to search in the database. If found it is displayed to the user and if not, the internet connectivity is checked. If internet connection is available, the answer for the question is searched on Google. Google gives related links from which user selects one then copies the appropriate answer and paste it in the textbox. After clicking on Insert button the question and answer both will be saved into the database.

If internet connection is not available, then the question will be temporarily saved in the database. The questions that are unanswered are displayed to the user in separate tab.

The user can also send an e- mail to required person. Moreover the user can also ask question in "Slang Language".

1.2. Modules:

1.3.1. Database creation:

The database is created using MySQL.Mainly the database consists two tables.Table1 is the main table that contains two attributes namely Question and Answer. Question attribute contains the question asked and the Answer attribute contains the answer selected by the user. Table2 contains two attributes namely Serial number and Question unanswered.

1.3.2. Interface Creation:

It has an eye melting User Interface (UI) with a simple user control flow. The interface contains two textboxes .One for question and another for selected answer.

1.3.3. Database Searching:

The question asked by the user will be checked in Table1.If the relevant search is found, the respective answer is displayed to the user. And if not then the same question is saved to Table2.

1.3.4. Checking for Net Connection:

When the answer for question is not found in Table1 then the system checks if the internet connection is provided or not.

1.3.5. Google Search:

If the answer is not found in Table1 and internet connection is available, the system searches the same on Google. After this process Google provides links from which anyone can be selected by the user. Then the user need to select and copy the content required as an answer to the question. This selected content pasted in the second textbox. By clicking on Insert Button, the data is saved to Table1.

1.3.6. Text to Voice:

When the answer is found out in the database, it will also provide the answer via voice. This feature is useful for the people with eye impairments.

1.3.7. Processing of unanswered questions:

The questions which are remained unanswered because of no internet connectivity will be stored in the temporary table. This table will be displayed so that the unanswered questions can be answered when internet connection is provided.

Chapter 2

Literature Survey

2.1. Reviewing Similar Software:

A literature review is a text written by someone to consider the critical points of current knowledge including substantive findings, as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, and as such, do not report any new or original experimental work. Also, a literature review can be interpreted as a review of an abstract accomplishment.

2.1.1. Blue Brain Project

The Blue Brain Project is an attempt to create a synthetic brain by reverse-engineering the mammalian brain down to the molecular level. The Blue Brain Project is an attempt to reverse engineer the human brain and recreate it at the cellular level inside a computer simulation. The project was founded in May 2005 by Henry Markram at the EPFL in Lausanne, Switzerland. Goals of the project are to gain a complete understanding of the brain and to enable better and faster development of brain disease treatments.

The research involves studying slices of living brain tissue using microscopes and patch clamp electrodes. Data is collected about all the many different neuron types. This data is used to build biologically realistic models of neurons and networks of neurons in the cerebral cortex. The simulations are carried out on a Blue Gene supercomputer built by IBM. Hence the name "Blue Brain". The simulation software is based around Michael Hines's NEURON, together with other custom-built components.

2.1.2. Cajal Blue Brain Project

Nowadays, our knowledge on the nervous system in general, and on the brain in particular, is the result of the collective work of many scientists. In spite of this, investigations of Santiago Ramon Y. Cajal contributed decisively to the creation of the scientific frame for the origin of modern neuroscience. In fact, the come out of Cajal in the neuroscience framework led to a radical change in the course of the history of this discipline. Unlike other leading researchers, Cajal not only carried out a great discovery, but also he made many important contributions to the knowledge of the structure and function of the nervous system, mainly, to the micro anatomical cerebral cortex. So, in honor to Cajal, the Spanish participation within the International Blue Brain Project (BBP) is performed under the name Cajal Blue Brain Project (CajalBBP).

The Cajal Blue Brain is coordinated by the Technical University of Madrid and uses the facilities of the Supercomputing and Visualization Center of Madrid and its supercomputer Magerit. The Cajal Institute also participates in this collaboration. The main lines of research currently being pursued at Cajal Blue Brain include neurological experimentation and computer simulations. Nanotechnology, in the form of a newly designed brain microscope, plays an important role in its research plans.

2.1.3. Project Joshua Blue:

Joshua Blue is a project under development by IBM that focuses on advancing the artificial intelligence field by designing and programming computers to emulate human mental functions. The main goal of Joshua Blue is "to achieve cognitive flexibility that approaches human functioning".

In short, IBM is aiming to design Joshua Blue to 'think like a human', mainly in terms of emotional thought; similar IBM projects focusing on logical thought and strategic reasoning include Deep Blue, a logic-based chess playing computer, and Watson, a question-driven artificial intelligence software program. Currently, the vast majority of computers and computational systems run off of an input-output model; some sort of input is entered in and some output is given back.

Through Project Joshua Blue, IBM hopes to develop computers to the point where they are asking questions and searching for answers themselves rather than relying on an external input to run or only crunching numbers to give a pre-programmed response once given a task. If they succeed in this task, the artificial intelligence knowledge gained from Project Joshua Blue could potentially be used to create social robots that work and act very much like humans do. These robots could take over tasks too dangerous for humans to engage in even if such tasks required many different decisions to be made along the way; the technology advancement gained through Joshua Blue's potential success would allow for the robots to think for themselves and work their way through problems just as humans do.

By understanding the overview the above projects we have tried to implement a brain which becomes powerful on asking questions and saving both in its memory so that it can recall it in future.

Chapter 3

Introduction to Languages

3.1. Overview of Languages:

Languages which are used in our project are

- Java
- JSP
- Ajax
- HTML
- CSS

3.1.1. Java:

- Java is object oriented programming language in which the programs developed can be executed anywhere on any system.
- Java is a set of several computer software products and specifications that together provide a system developing application software and deploying it in cross platform (multiplatform) environment.
- It requires a virtual machine which runs all of the code that is written for the language.
- Java applets are used to provide improved and secure functions while browsing the World Wide Web on computers.

3.1.2. JSP:

- Java Server Pages (JSP) is a technology that helps software developers create dynamically generated web pages based on HTML, XML, or other document types.
- Released in 1999 by Sun Microsystems.
- JSP is similar to PHP, but it uses the Java programming language.
- JSP may be viewed as a high-level abstraction of Java servlets. JSPs are translated into servlets at runtime; each JSP's servlet is cached and re-used until the original JSP is modified

- JSP can be used independently ,normally with JavaBeans as the model and Java servlets as the controller
- JSP allows Java code and certain pre-defined actions to be interleaved with static web markup content, with the resulting page being compiled and executed on the server to deliver a document.
- It is being used frequently in developing high-traffic web apps.

3.1.3. AJAX:

- Asynchronous Java script and XML
- It is a group of interrelated web development techniques used on the client-side to create asynchronous web applications.
- Ajax can be used to implement a web application that th a server in the background, without interfering with the current state of the page.
- CSS can be used in combination to mark up and style information.

3.1.4. HTML

- Hypertext Markup Language
- It is the main markup language for creating web pages and other information that can be displayed in a web page.
- HTML is written in the form of HTML elements consisting of tags.
- HTML elements form the building blocks of all websites.
- It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items.

3.1.5. CSS

- Avoid duplication.
- Make maintenance easier.

- Use the same content with different styles for different purposes.

3.2. Frontend

3.2.1. Why Java?

- Simple grammar-familiar to anyone with experience in C and C++.
- Portability-Java does run well on all the popular platforms.
- Speed.
- Garbage collection-Programmer doesn't have to worry about memory.
- Broad Industry support.
- More Secure.

3.2.2. Why JSP?

- Add server-side code to an HTML page.
- Creates dynamic pages.
- Server side scripting language.
- Invoke built in functionality from the server.
- Runs directly on the web server and local JVM.
- Provides a dynamic interface for continuously changing data and dynamically invokes server actions.

3.2.3. Why HTML?

- Creates static pages.
- Client side scripting language.
- Provide emphasis on appearance, semantics and layout of the information in the browser.
- Describe the text based information in a document.
- Loads faster as it runs on the local machine.

3.2.4. Why CSS?

- Sheet allows you to specify style for the visual elements of your website.
- It enables the separation of document content from document presentation.
- It allows the same markup page to be presented in different styles.

3.2.5. Why Ajax?

- Rapid Interaction
- Avoiding Refreshing
- Auto Complete

3.3. Backend:

3.3.1. MySQL

- It is an open-source relational database management system (RDBMS).
- MySQL is a popular choice of database for use in web applications.

3.3.2. Why MySQL

- Cross-platform support
- Updatable views
- Query caching
- Embedded database library

Chapter 4

System Requirements

4.1. System Requirements:

4.1.1. Hardware Requirements:

Pentium4 PC

RAM: 1.50 GB

HDD: 100 GB

4.1. 2. Software Requirements:

OS: Windows XP/Windows Vista

Platform: Java

Tool: NetBeans

4.1.3. Nonfunctional Requirements:

4.1.3.1. Interface Requirement:

User interfaces and user friendliness interfaces with other system.

4.1.3.2. Performance Requirement:

- Time space bounds

  Work load, Response time, Throughput and available storage space.

- Reliability:

  Integrity of information maintained and supplied to the system.

4.1.3.3. Lifecycle Requirements:

Future Proofing

Maintainability

Enhance ability

Portability

Product Life Span

4.1.4. Other Requirements:

Database-MySQL

Chapter 5

System Architecture

5.1. System Architecture:

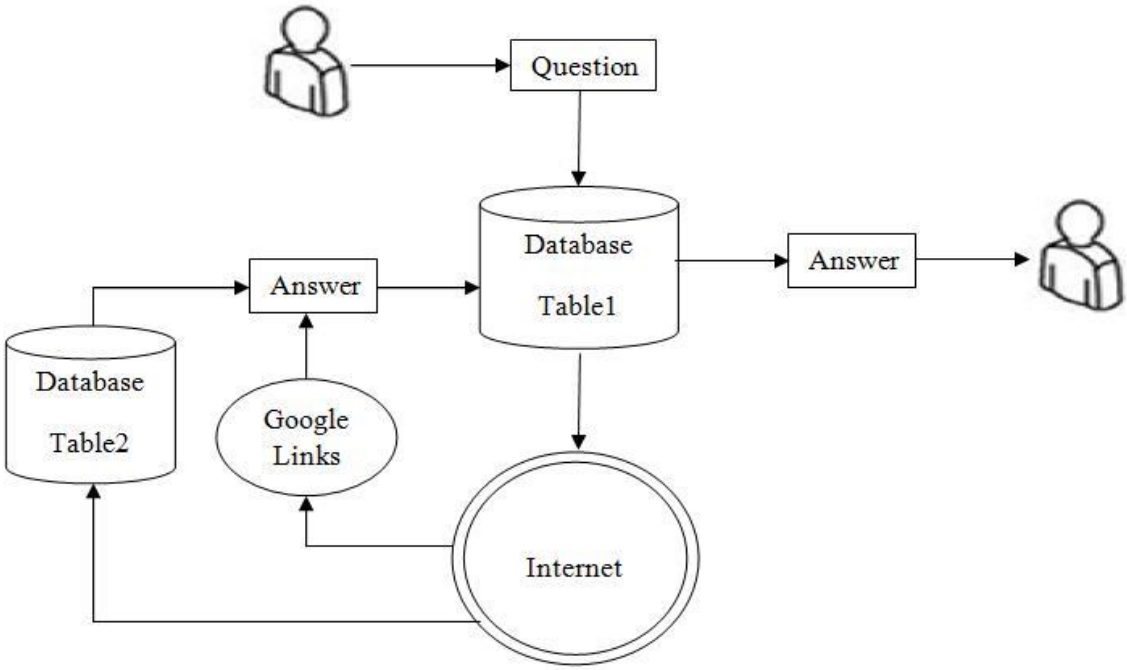

Figure 1: System Architecture of Brain Simulator.

5.2. Description:

At a glance architecture of any specific system gives its complete working .It is important to draw an accurate architecture for a system as all its further process of designing and building the software depends on it.

In environment of our brain simulator the user interacts with the tables in a database. The user's interaction with internet i.e Google depends on the answer that is whether found in database or not.

The system architecture tells us that if the user's question is not fulfilled with an answer then it is stored to separate table in database, which the user can again refer it.

Chapter 6

Project Planning

6.1. Process Model:

Process models are processes of the same nature that are classified together into a model. The use of a process model is to prescribe how things must/should/could be done in contrast to the process itself which is really what happens. A process model is roughly an anticipation of what the process will look like. What the process shall be will be determined during actual system development. Hence, we have used incremental model.

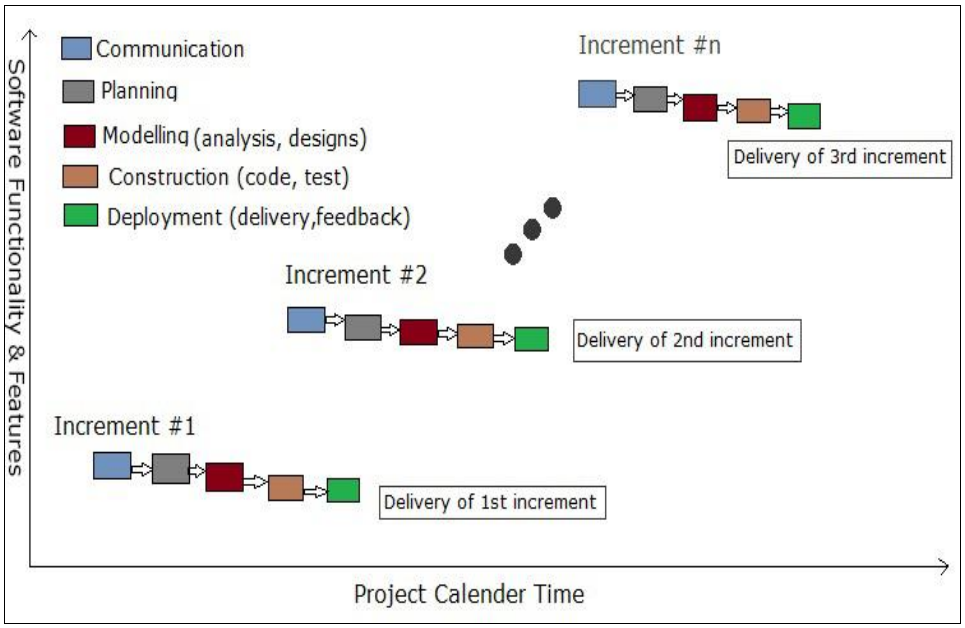

Figure 2: Incremental Model

The incremental Model is an evolution of the waterfall model, where the waterfall model is incrementally applied. In this model, each increment provides more functionality to the customers. After the first increment, a core product is delivered, which can already be used by the customer. Based on customer feedback, a plan is developed for the next increments, and modifications are made accordingly. This process continues, with increments being delivered until the complete product is delivered.

These tasks are common to all the models:

6.1.1. Communication: Helps to understand objective.

It is a complete description of the behavior of a system to be developed and may include a set of use cases that describe interactions the users will have with the software. In addition it also contains non-functional requirements. The software requirements specification document enlists all necessary requirements that are required for the project development. To derive the requirements we need to have clear and thorough understanding of the products to be developed. This is prepared after detailed communications with the project team and customer.

6.1.2. Planning: Plans resources**.**

It is based on the user requirements and the detailed analysis of a new system, the new system must be planned. Planning is the process of organizing the activities required to achieve a desired goal. It is a fundamental property of intelligent behavior. Scheduling of project is done in this phase. Planning predicts what the future should look like.

Main Characteristic of Planning:

- Increases he efficiency of an organization.
- Reduces the risks involved in modern business activities.
- Facilitates proper coordination.
- It gives right direction to the organization.
- Helps to achieve objectives of the organization.
- Motivates the personnel of an organization.
- It helps to achieve the target by using the available time and resources.

6.1.3 Modeling: Involves business modeling, data modeling, and process modeling.

6.1.3.1. System design:

Based on the user requirements and the detailed analysis of a new system, the new system must be designed. Software design is both a process and a model. The design process is a sequence of steps that enable the designer to describe all aspects of the software to be built. Software design can be considered as creating a solution to a problem in hand with available capabilities. Basic design principles enable the software engineer to navigate the design process.

- The design process should not suffer from "tunnel vision".
- The design should be traceable to the analysis model.
- Design is not coding.
- The design should be assessed for quality as it is being created, not after the fact.
- The design should be reviewed to minimize conceptual (semantic) errors.

6.1.3.2. System Analysis:

Systems analysis is a process of collecting factual data, understand the processes involved, identifying problems and recommending feasible suggestions for improving the system functioning. This involves studying the business processes, gathering operational data, understand the information flow, finding out bottlenecks and evolving solutions for overcoming the weaknesses of the system so as to achieve the organizational goals. System Analysis also includes subdividing of complex process involving the entire system, identification of data store and manual processes.

The main difference between Software analysis and design is that the output of a software analysis consists of smaller problems to solve. Also, the analysis should not be very different even if it is designed by different team members or groups.

6.1.4. Construction: This involves the reuse software components and automatic code.

6.1.4.1. Coding:

The system design needs to be implemented to make it a workable system. his demands the coding of design into computer language, i.e., programming language. This is also called the programming phase in which the programmer converts the program specifications into computer instructions, which we refer to as programs. It is an important stage where the defined procedures are transformed into control specifications by the help of a computer language.

The programs coordinate the data movements and control the entire process in a system. A well written code reduces the testing and maintenance effort. It is generally felt that the programs must be modular in nature. This helps in fast development, maintenance and future changes, if required. Programming tools like compilers, interpreters and language like c, c++, and java etc., are used for coding .with respect to the type of application. The right programming language should be chosen.

6.1.5 Testing:

Before actually implementing the new system into operations, a test run of the system is done removing all the bugs, if any. It is an important phase of a successful system. After codifying the whole programs of the system, a test plan should be developed and run on a given set of test data. The output of the test run should match the expected results. Sometimes, system testing is considered as a part of implementation process. Using the test data following test run are carried out:

- Program test
- System test

6.1.6. Deployment: Integration of all the increments.

Software deployment is all of the activities that make a software system available for use. It consists of interrelated activities with possible transitions between them. These activities can occur at producer side or at the consumer side or both. Therefore, deployment should be interpreted as general process that has to be customized according to specific requirements.

Chapter 7

System Design

7.1. Use case Diagram:

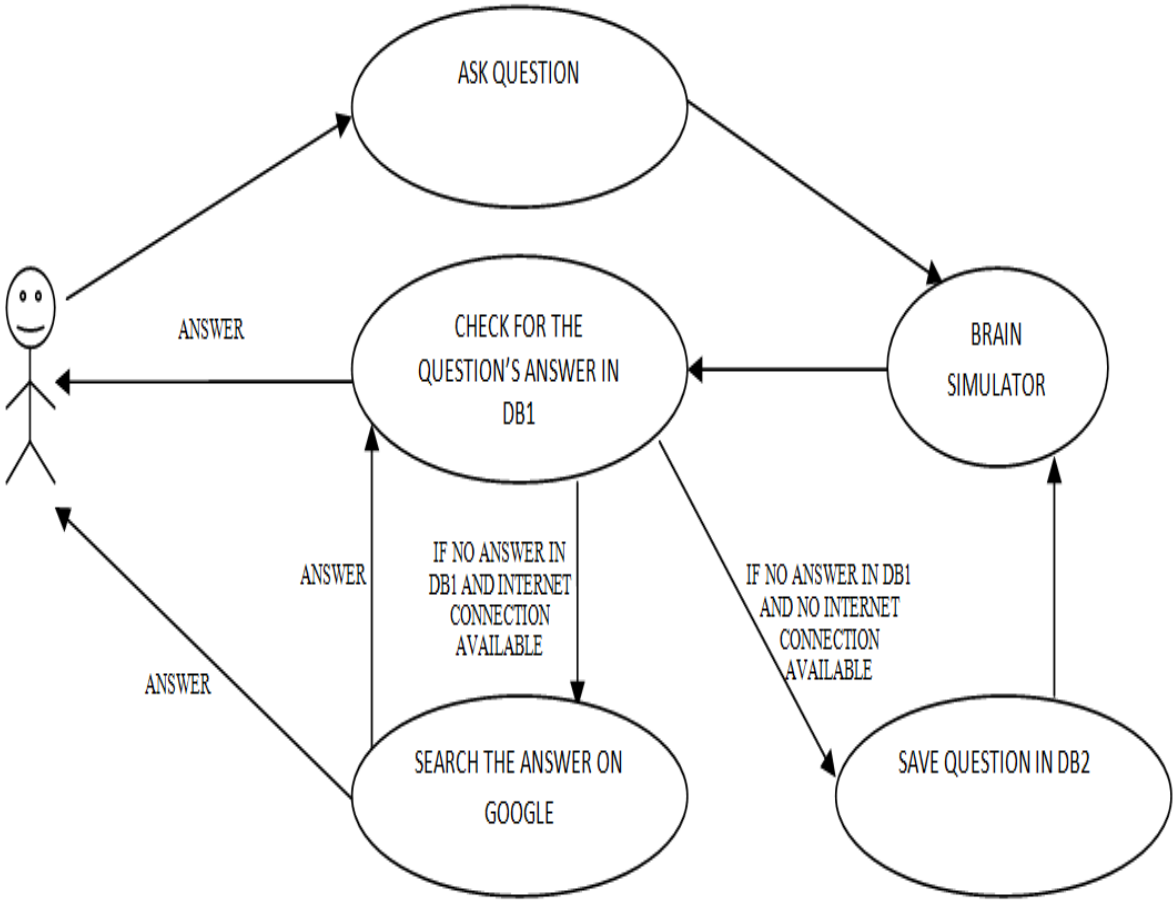

Figure 3: Use Case

7.2.Data Flow Diagram:

7.2.1. Level 0:

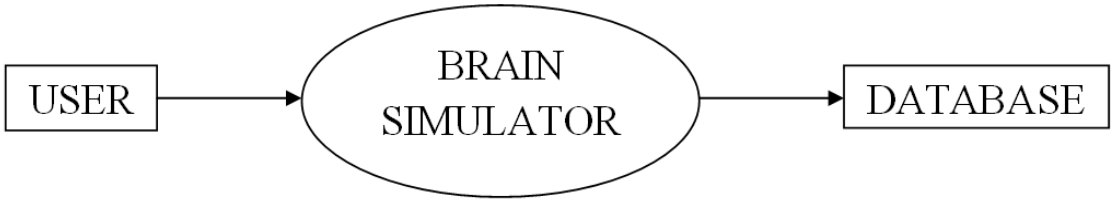

Figure 4:Data Flow Diagram Level 0

7.2.2. Level 1:

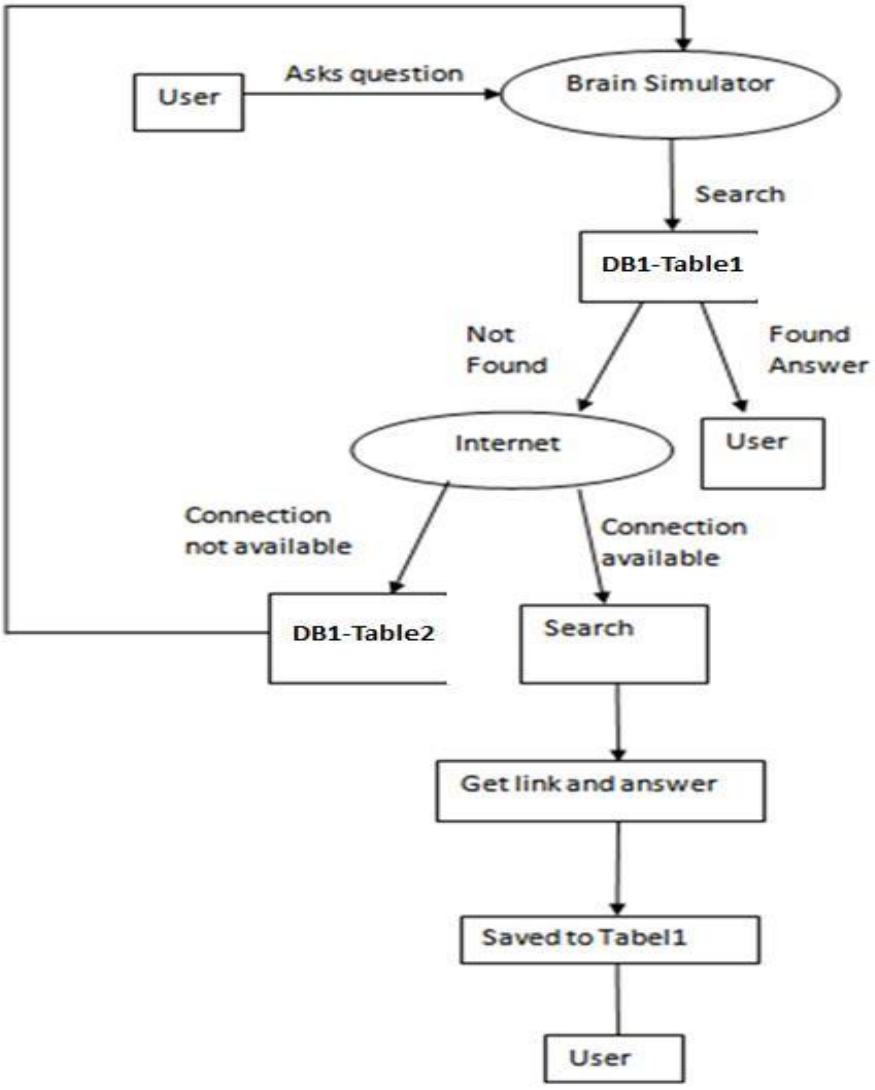

Figure 5: Data Flow Diagram Level 1

7.3. Flow Chart:

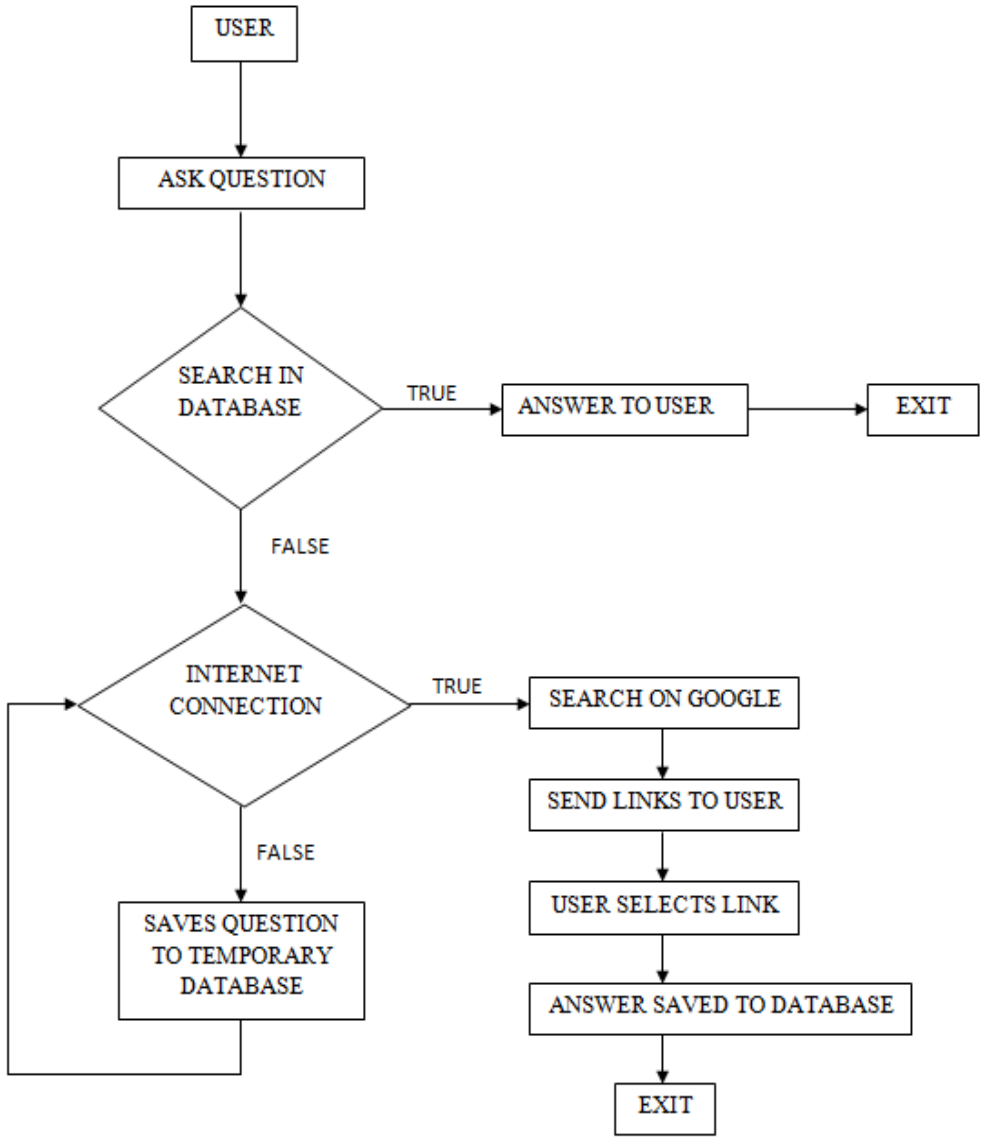

Figure 6: Flow chart

Chapter 8

Implementation

(Snapshots)

8.1. Home:

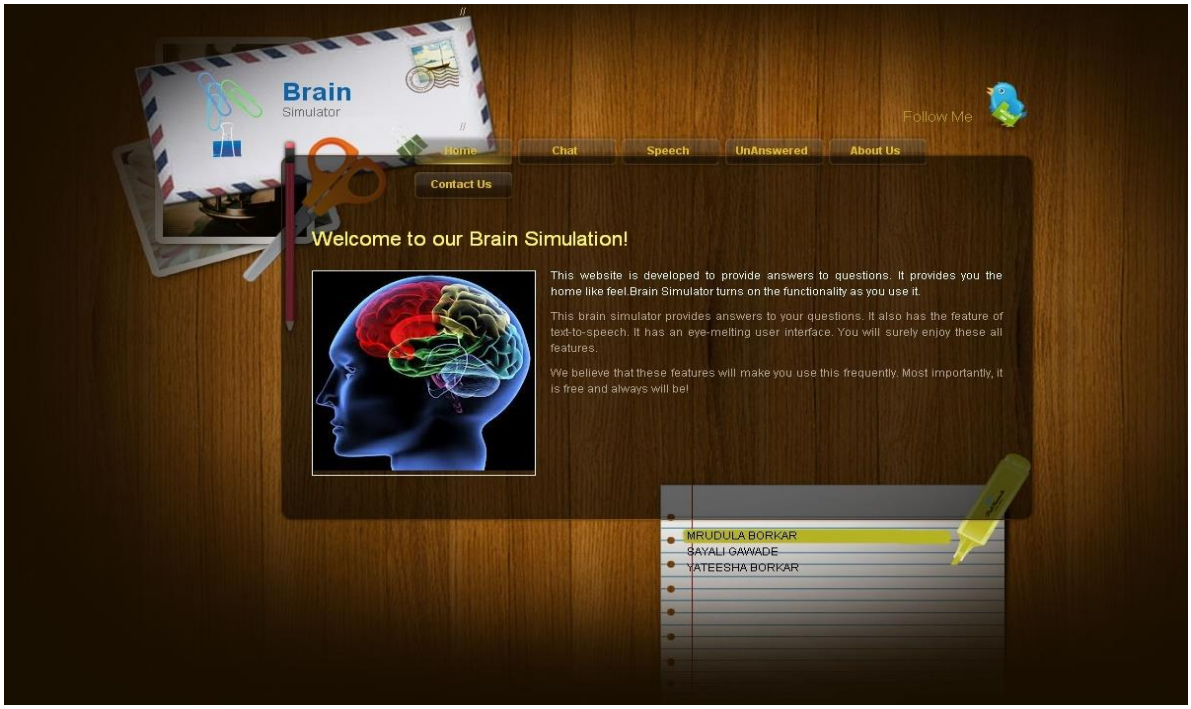

Figure 7: Home Page

8.2. Chat:

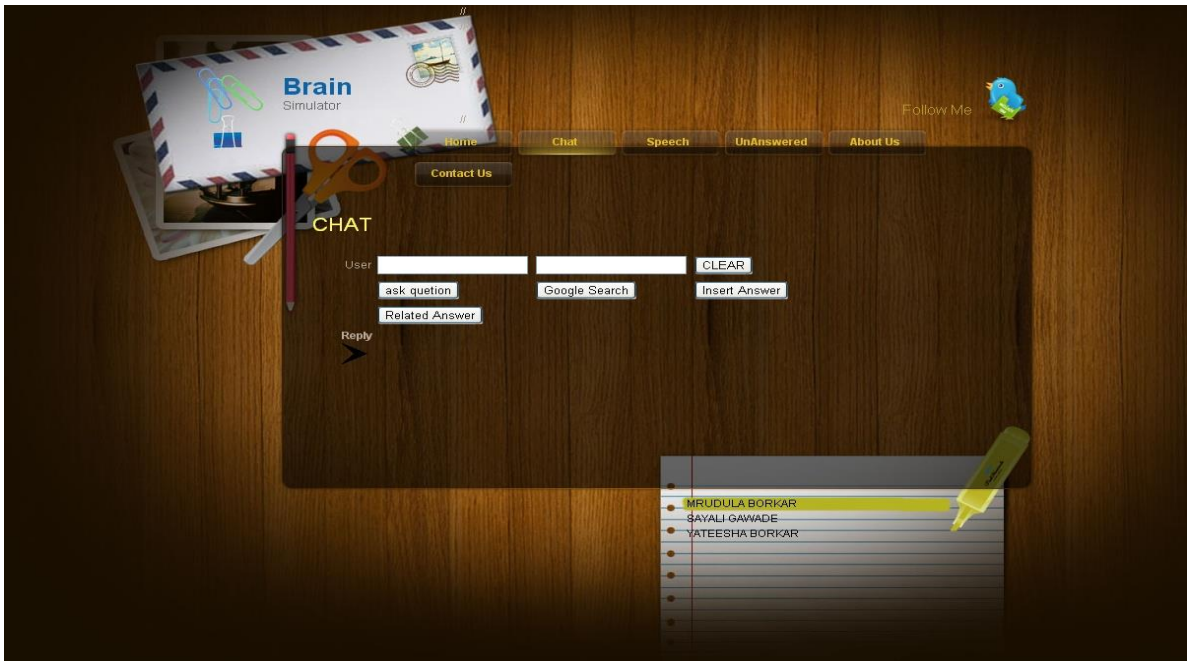

Figure 7: Chat Page

8.3. Speech:

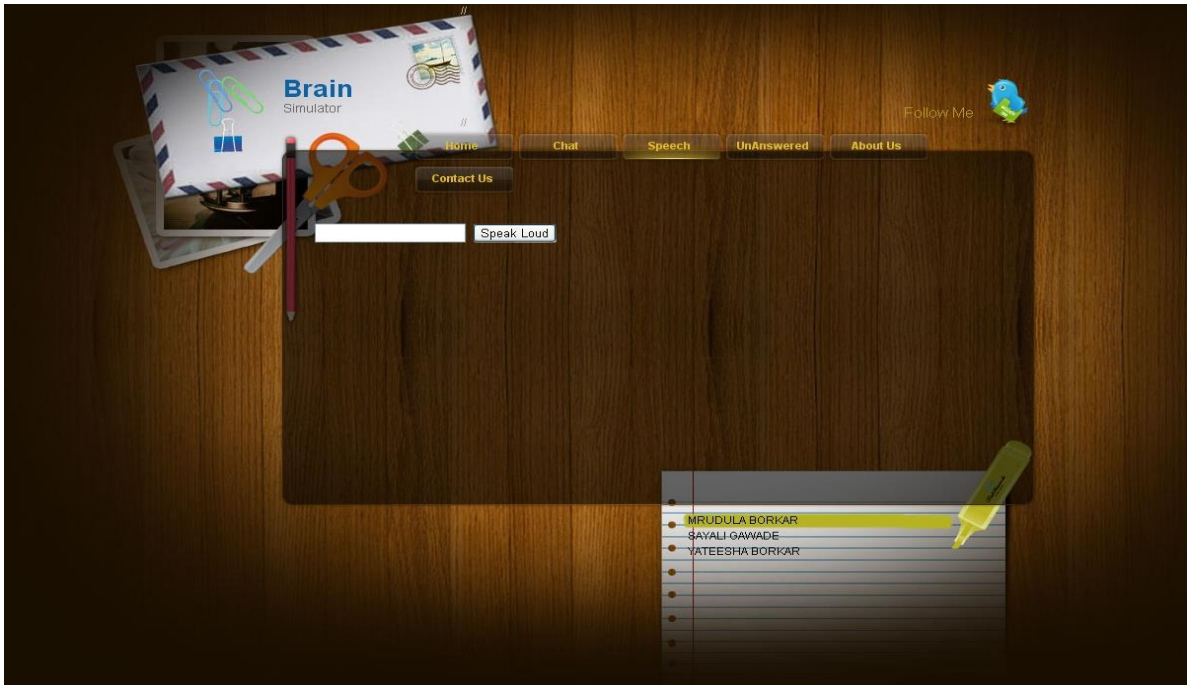

Figure 8: Speech Page

8.4. UnAnswered:

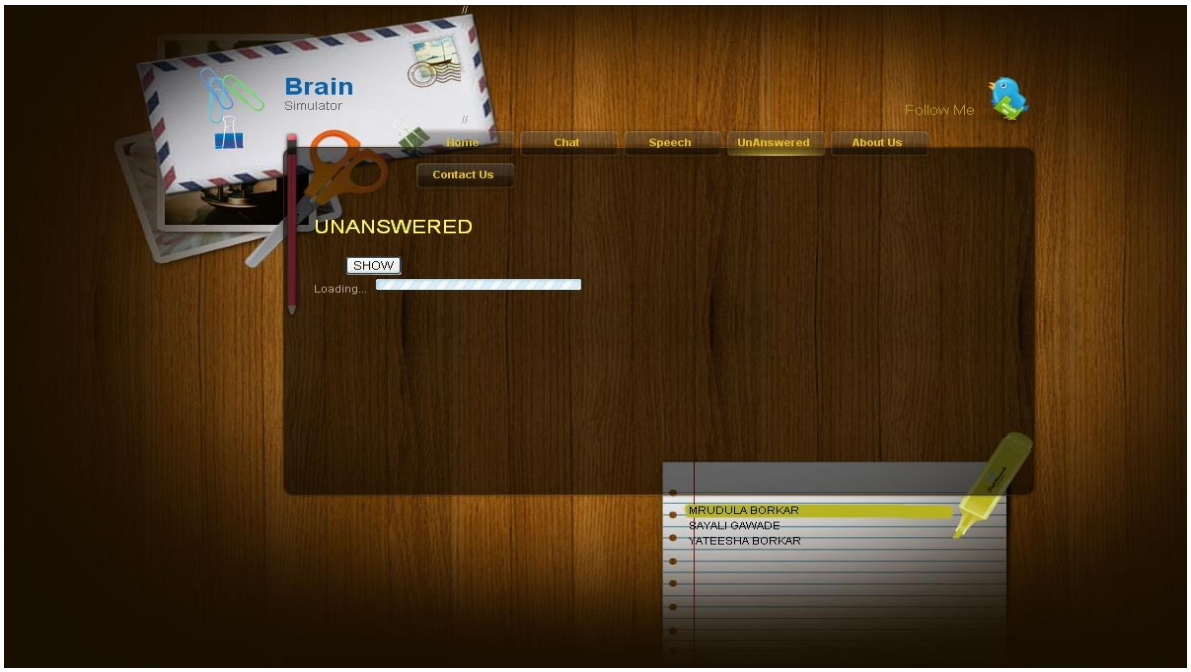

Figure 8: Un-Answered Page

8.5. About Us:

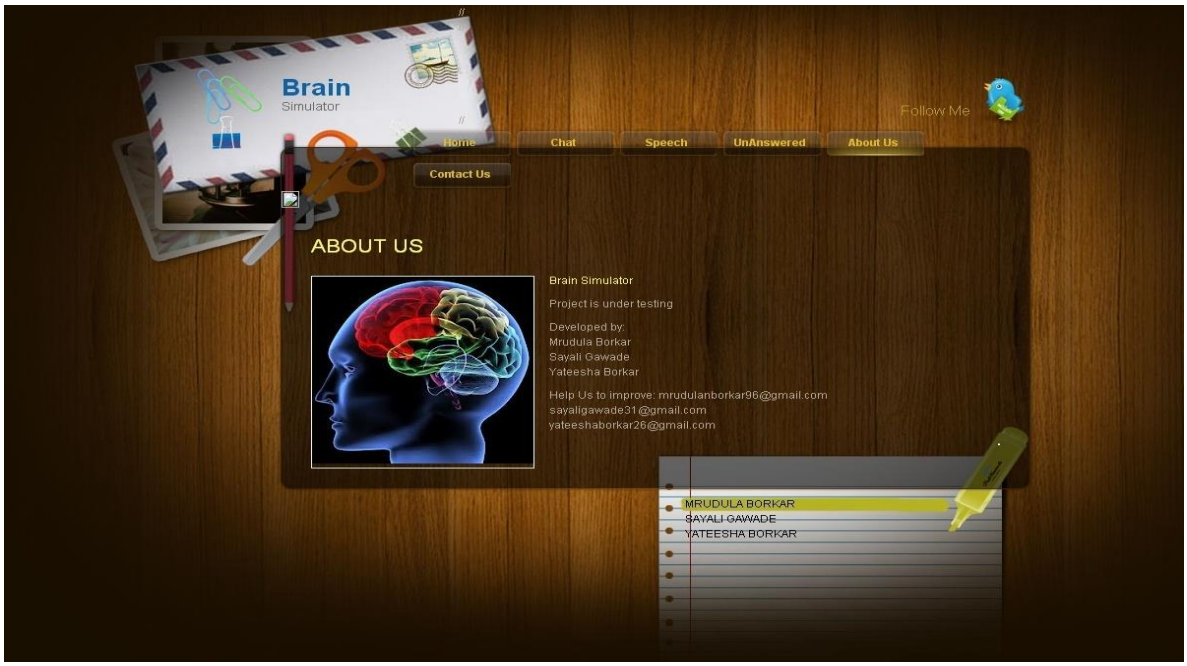

Figure 9: About Us Page

8.6. Contact Us:

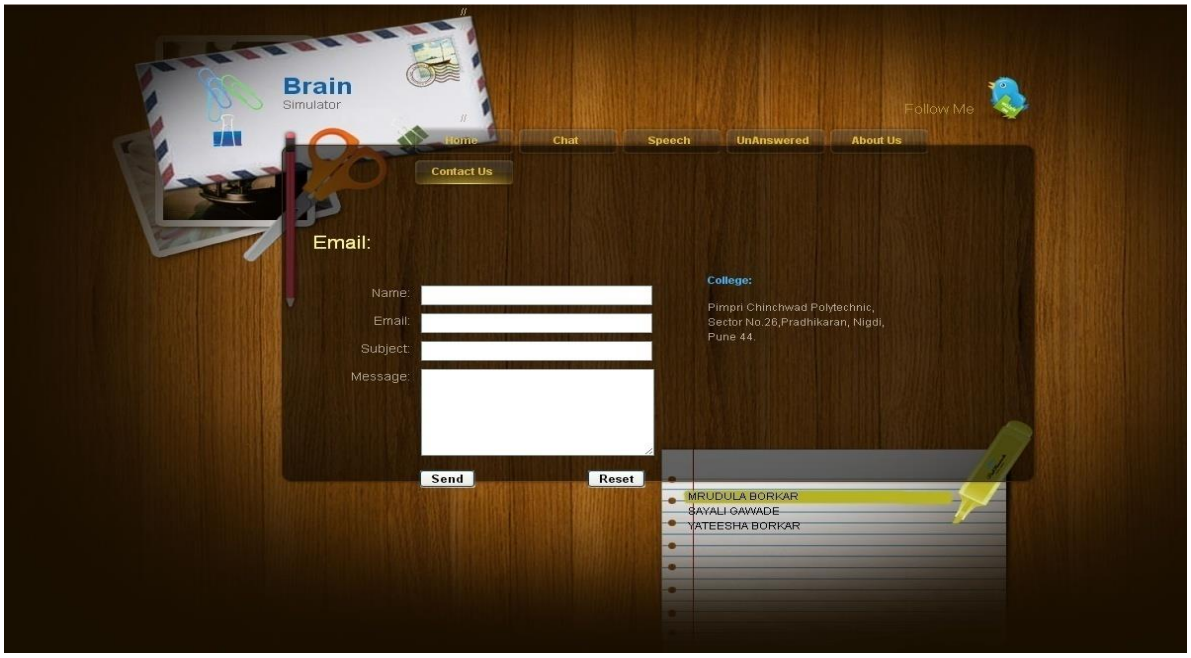

Figure 10: Contact Us Page

Chapter 9

Software Testing

Software Testing Definition:

Software testing is evaluating an application with an intension of finding bugs either manually or through automation tools to satisfy the customer requirements. It represents the ultimate review of specification, designs and code generation.

9.1. Unit Testing:

Unit testing focuses on testing the smallest unit of source code to determine if they are fit for use. Intuitively, one can view a unit as the smallest testable part of an application. Unit tests are typically written and run by software developers to ensure that code meets its design and behaves as intended. Unit testing is the next step to coding step. Unit tests find problems early in the development cycle. The unit tests allow the location of the fault or failure to be easily traced.

The unit tests alert the development team of the problem before handing the code off to testers or clients; it is still early in the development process. Readily available unit tests make it easy for the programmer to check whether a piece of code is still working properly. The goal of unit testing is to isolate each part of the program and show that the individual parts are correct. A unit test provides a strict, written contract that the piece of code must satisfy. As a result, it affords several benefits.

9.2. Integration Testing:

Integration testing is a systematic technique for constructing the software architecture while at the same time conducting tests to uncover errors associated with interfacing. The objective of integration testing is to take unit tested components and build a program structure to test the design of the software. All components are combined in advanced. The entire program is tested as a whole. A set of errors is encountered. Correction difficult because separation of causes is

complicated by the vast expanse of the entire program. Once these errors are corrected, new ones appear and the process continues in a seemingly endless loop.

9.3. Validation Testing:

Software validation testing is an important part of the software development life cycle (SDLC).The quality assurance process carried out before the software is ready for release is known as validation testing. Its goal is to validate and be confident about the product or system, and that it fulfills the requirements given by the customer.

Validation testing ensures that the software meets the quality standards set by the customer, and that the product meets customer requirements. Validation always involves with executing the code. The process of evaluating software during or at the end of the development process to determine whether it satisfies specified requirements.

9.4. Black-Box Testing:

Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings. Black-box test doesn't explicitly use knowledge of the internal structure. Black-box testing is considered as testing with respect to specification and no other knowledge is required. It is effective on larger units of code.

It is also known as "Behavioral Testing"," Functional Testing"," Opaque Testing". For instance, the tester is aware that a particular input returns a certain, invariable output but is not aware of *how* the software produces the output in the first place.

9.5. White-Box Testing:

It is also known as clear box testing, glass box testing, structural testing and transparent box testing. It is a method of testing software that tests internal structures or workings of an application, as opposed to its functionality. In white-box testing an internal perspective of the system, as well as programming skills, are used to design test cases.

White-box testing is a method of testing the application at the level of the source code. In this testing takes place once the designing and coding is complete. White-box testing involves looking at the structure of the code. When we know the internal structure of the product, test can be conducted to ensure that internal operations are performed according to the specification and all the internal components have been adequately exercised. Every path in the program is executed at least once.

9.6. Test Cases:

TEST CASE _ID	TESTCASE_NAME	DESCRIPTION	STEPS	TEST DATA	RESULT	STATUS
TC_01	Chat_window_display	To validate the chat window with valid data	1.Click on chat panel		Chat window is displayed.	Pass
TC_02	AskAnswer_button_functionality	To validate the functionality of AskAnswer button with valid data	1.Enter Question. 2.Click on AskAnswer button	1.Question=”Hi”	Answer is displayed.	Pass
TC_03	AskAnswer_button_functionality	To validate the functionality of AskAnswer button with valid data	1.Enter Question. 2.Click on AskAnswer button	1.Question=”Brain”	It displays ‘Answer not found in database’.	Pass
TC_04	Google_Search button functionality	To validate the functionality of ‘Google search’ button with valid data	1.Enter Question 2.Click on Google Search	1.Question=”Brain”	It displays links.	Pass
TC_05	Google_Search button functionality	To validate the functionality of ‘Google search’ button with valid data	1.Enter Question 2.Click on Google Search	1.Question=”Brain”	It displays message box as ‘Internet connectivity unavailable’.	Pass
TC_06	Connection_Availability	To validate internet connectivity and if not, it should be saved in table2.	1.Enter Question. 2.Click on Google Search	1.Question=”Brain”	It is saved in table2.	Pass

TC_07	Insert_Button_Functionality	To validate the functionality of Insert_Button with valid data.	1. Enter Question. 2. Click on Google Search. 3. Copy answer from link. 4.Paste it in answer field. 5.Click on insert Button.	1.Question=”Brain” 2.Answer=”Brain is an organ that serves as the center of the nervous system.”	It is saved in table1.	Pass

Chapter 10

Future Scope

Future scope:

There is always some scope for each and every project to improve. Here, in this section we are describing that how we can improve our project in future so that it can become more user friendly and useful model for the users.

10.1. Voice Tab:

The system could be developed on voice operation for the blind. It will consist of voice input as well as output. It could also provide facility to the user which will mainly emphasize on giving the voice input which will be converted into text question and then answer i.e. the output will be also given in voice.

10.2. Instead of Links, Direct Answer:

System will directly search the answer rather than giving links.

10.3. Own domain:

One can plan to buy own domain and publish this project on the web so that maximum people would be benefited by this system.

10.4. Updating Answers:

The system could be improved in a way that the user could update the answers according to the technical or required changes.

Chapter 11

Conclusion

Conclusion:

In this project, we have concluded that our project brain simulator works fine on objective listed and it is useful for the masses. The overall project gives a better access to information that the user frequently needs.

While developing the project we have gained the knowledge of different programming languages, similar types of systems and their working. Even we have acquired the skills of testing the project that will be useful in future industry experience.

Chapter 12

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