

# **HUMAN MACHINE INTERACTION WITH AI CHATBOT USING NATURAL LANGUAGE PROCESSING**

Submitted in partial fulfillment of the requirements

of the degree of

**Bachelor of Engineering**

by

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**DEPARTMENT OF COMPUTER ENGINEERING  
VIDYAVARDHINI'S COLLEGE OF ENGINEERING AND  
TECHNOLOGY**

**K.T.MARG, VASAI ROAD (W), DIST-PALGHAR. PIN:401202.**

(Affiliated to University of Mumbai)

**(2018-2019)**

# CERTIFICATE

This is to certify that the project entitled “**Human Machine Interaction with AI Chatbots using NLP**” is a bonafide work of “**Shweta Jha (18), Anuj Singh (69) and Haet Trivedi (73)**” submitted to the University of Mumbai in partial fulfilment of the requirement for the award of the degree of “Undergraduate” in “Computer Engineering.”

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**Prof. Smita Jawale**

Guide

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**Dr. Megha Trivedi**

Head of Department

---

**Dr. Harish Vankudre**

Principal

# Project Report Approval for B.E.

This project report entitled “**Human Machine Interaction with AI Chatbots using NLP**” by “**Shweta Jha (18), Anuj Singh (69) and Haet Trivedi (73)**” is approved for the degree of Bachelor of Engineering (Computer Engineering).

Examiners

1. \_\_\_\_\_

2. \_\_\_\_\_

Date:

Place:

# Declaration

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included. I have adequately cited and referenced the original sources. I also declare that I have adhered principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Shweta Jha (18)

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Anuj Singh (69)

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Haet Trivedi (73)

Date:

# Acknowledgement

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend our sincere thanks to all of them.

We are highly indebted to Prof. Smita Jawale for his guidance and constant supervision as well as for providing necessary information regarding the project and also for their support in completing the project.

We would like to express our gratitude towards our parents and members of Vidyavardhini's College of Engineering & Technology for their kind co-operation and encouragement which helped us in completion of this project.

Our thanks and appreciation also goes to our colleagues in developing the project and people who have willingly helped us out with their abilities.

# **Abstract**

The masses have taken resort to electronic media for obtaining any kind of information related to various fields. However they are attracted more to the websites which provide easy understanding of the page and readily available information. This has increased the need for best interface development, which are user friendly and easily accessible. These factors have been missing in our college's website, this project deals with these issues and covers many of them too. The look and feel of the overall website has been looked into. Also, artificial intelligence is used in a lot of fields like data evaluation and behaviour prediction, all such data have increased the usage of intelligent bots even in the user interfaces. This system also has a chatbot incorporated into it, which will answer all the user queries as per its knowledge. This project gives all the information related to our institute, be it the academics, circular, co-circular activities or the virtual tour of the infrastructure.

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# **Chapter 1**

## **INTRODUCTION**

### **1.1 Introduction**

Our college website contains good content but it lacks in User Interface and expression as the same UI is used for mobile as well as web application. So, we plan to make it responsive for devices of all possible screen resolutions. As it is not possible to have all the data related to college on website, it will cause problem in rendering of website. So, we plan to create Chatbot interface, which can interact with students and serve their queries. It will also remove all the level that people used to go in order to upload anything on website. We have many committees in our College, but none of them is mentioned on College Website. Committees have Facebook presence, but there is not link on College Website. We will improve the presence of all the college committees and events organized by the same in our website.

We are building improved college website with responsiveness for both desktop and mobile system. We are integrating Chatbot with college website. As our current college website does not provide responsiveness. Same college website is rendered on mobile and desktop devices without change of layout which causes user to zoom out the content on mobile devices in order to see. Only 20% of the screen is used to display website on mobile. Even process of uploading content on site is very tedious as it has to go through different level of approval.

### **1.2 Aim and Objective**

The aim of this project is to eliminate all the problems of the existing website. We have developed an improved college website which will provide responsiveness and ease of use to its user. User will not have to zoom out on mobile devices in order to see the content. They will not have to visit college to get details about different committees in the college and college notices, since they have been linked to the website directly. The objective of any web application is to reduce the job of the users and provide maximum facilities, thus we have also incorporated a virtual tour of the college for the users to have an online experience instead of visiting themselves.



### **1.3 Scope**

As mentioned above, this system is aiming to remove the discrepancies of the already existing system. These changes have been achieved and the major objective of the website is fulfilled. Our college website will be beneficial to various classes of people who visit our web page. Those can be classified as follows :

- i. The VCETians for sudden notices, for syllabus, for previous placement records and upcoming cultural and technical events.
- ii. The recruiters for performance
- iii. Students interested in getting admitted to VCET for viewing the cutoffs, offered branches, faculty members, various committees and the major events held .
- iv. Similarly, students interested in knowing the infrastructure can very easily take a virtual tour and experience the same, without actually having to visit the college.

# Chapter 2

## **REVIEW OF LITERATURE**

### **2.1 Domain Explanation – Web Development**

Web development is the work involved in developing a web site for the Internet (World Wide Web) or an intranet (a private network). Web development can range from developing a simple single static page of plain text to complex web-based internet applications (web apps) electronic businesses, and social network services. A more comprehensive list of tasks to which web development commonly refers, may include web engineering, web design, web content development, client liaison, client-side/server-side scripting, web server and network security configuration, and e-commerce development. Among web professionals, "web development" usually refers to the main non-design aspects of building web sites: writing markup and coding. Most recently Web development has come to mean the creation of content management systems (CMS). These CMS can be made from scratch, proprietary or open source. In broad terms the CMS acts as middleware between the database and the user through the browser. A principle benefit of a CMS is that it allows non-technical people to make changes to their web site without having technical knowledge.

For larger organizations and businesses, web development teams can consist of hundreds of people (web developers) and follow standard methods like Agile methodologies while developing websites. Smaller organizations may only require a single permanent or contracting developer, or secondary assignment to related job positions such as a graphic designer or information systems technician. Web development may be a collaborative effort between departments rather than the domain of a designated department. There are three kinds of web developer specialization: front-end developer, back-end developer, and full-stack developer. Front-end developers deal with the layout and visuals of a website, while back-end developers deal with the functionality of a website. Back-end developers will program in the functions of a website that will collect data.

## 2.2 Existing Problems

The earlier website was not responsive enough to be viewed in devices with small screens, it was very difficult to decipher the text or the images. It was also very difficult to navigate through the website because of this. It gave cluttered look as shown in fig 2.1.

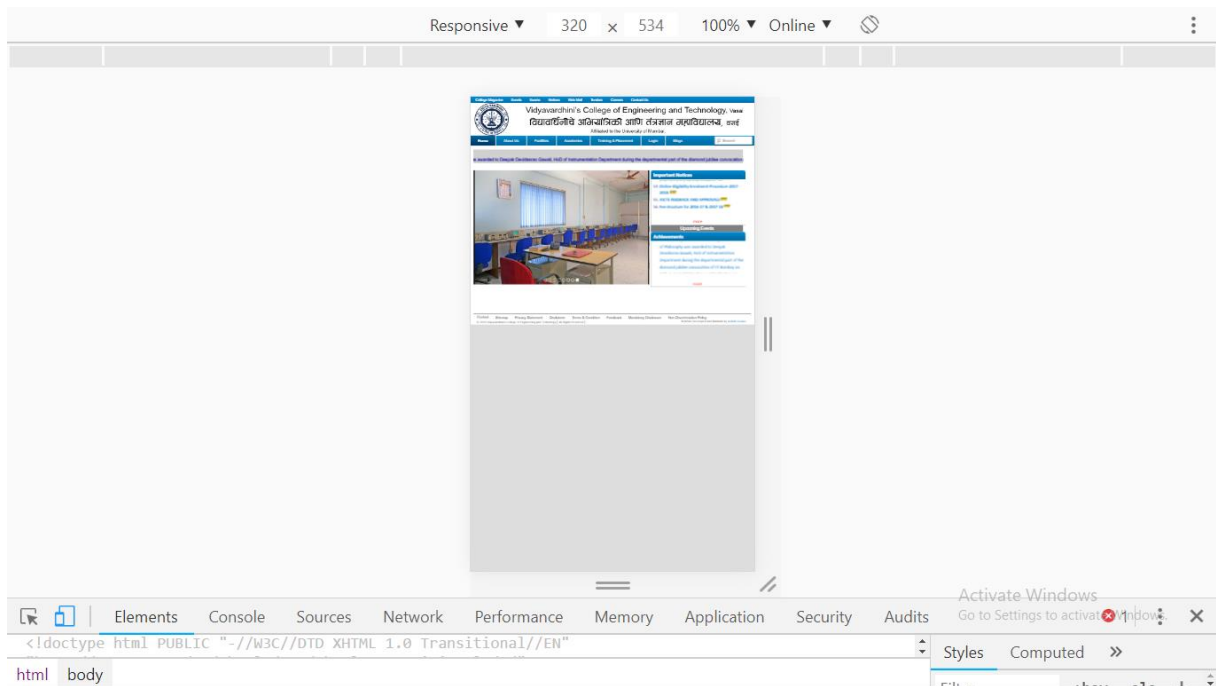


Fig 2.1

The current website, which was brought into use after we took up this system as our project resolved the problem of resolution, however it did violate the GUI principles and didn't look very appealing to the users. A lot of menu have been placed in the navbar which look awkwardly placed. Even this website suffers from the cluttered spacing because of a lot of data being placed in the main page. Also, the the images are cut off because the logo takes up more than the required screen space. This is shown in fig 2.2.



**Vidyavardhini's College of Engineering and Technology, Vasai**

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[NEW Codeathon Registration Link](#)

[NEW](#) A Special Holiday has been declared on 28th and 29th March 2019 - Principal

[NEW](#) Link for Employee Feedback

[NEW](#) Link for Convocation 2019 Photos

[Read more](#) windows

Go to Settings to activate Windows.

**ACHIEVEMENTS**

## 2.3 Hardware and Software requirements

### 2.3.1 HARDWARE REQUIREMENTS:

4GB RAM, 1TB HDD, Intel Core Processor, Graphic Card, NIC Card, Windows 10 Operating System.

### 2.3.2 SOFTWARE REQUIREMENTS:

Environment : Visual Studio Code, GitHub

Programming Languages : HTML, BootStrap, Javascript

Tool : Google Dialog Flow

# Chapter 3

## **REQUIREMENT ANALYSIS**

### **3.1 Functional requirements**

#### **3.1.1 Chatbot**

Chatbots are “computer systems equipped with natural languages for dialog processing”. In 1950, Alan Turing thought whether the machines could think, this led to the conceptualization of the chatbot for the first time ever since its formulation, this technology has seen a lot of advancements with the improve in Machine Learning and Natural Language Processing. Hence to incorporate chatbot into our website, we make use of the Google Dialog Flow. We train the system to make the chatbot functional.

#### **3.1.2 BootStrap**

This comes under making our website more responsive and easy-to-use for the users. Bootstrap is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites. Bootstrap is a free front-end framework for faster and easier web development. Bootstrap includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels and many other, as well as optional JavaScript plugins. Bootstrap also gives you the ability to easily create responsive design. Responsive web design is about creating web sites which automatically adjust themselves to look good on all devices, from small phones to large desktops.

### **3.2 Non-functional requirements**

#### **3.2.1 Reliability and Efficiency**

Reliability means the quality of being trustworthy or of performing consistently well. Our system is totally reliable as it creates a trust factor to user, as well as our system creates efficiency for variable user requirement. The chatbot responds quickly and efficiently to the users. Also, all the content on the website is reliable.

### **3.2.2 Security**

Security is very important for this project because it deals with the official data of an institution. Malicious software or unauthorized access to the code must be prevented to avoid any discrepancies or misfunctionalities.

### **3.2.3 Scalability**

The application can run smoothly on any operating system other than any version of Android OS above 4.0 i.e Ice Cream Sandwich and above. According to the scope of our project we place the piezoelectric generator beneath the sole of our shoes, however for further improvements the similar circuit with increased number of piezoelectric plates can be placed at various different locations with high number of footfall so that it can generate enough energy to be considered as a secondary source of energy.

### **3.2.4 Performance**

The application runs smoothly on all devices with average internet speed, which may be of various screen resolutions. It also responses to the queries and searches correctly and in negligible amount of time(provided device has a good internet connection).

## **3.3 Proposed System**

### **3.3.1 Natural Language Processing**

The main goal of NLP is to accept the unstructured output of the ASR(Articulatory Speech Recognition) and produce the structured representation of the text that contains SLU(spoken language understanding) or the text-based inputs, NLU(natural language understanding). Here, a number of methods for extracting semantic information and meaning from spoken and written language are discussed, to create the grammatical data structure that can be processed by the Dialogue Management unit. This is particularly non-trivial because the speech can contain:

- (i) identity-specific encodings (e.g. pitch, tone, etc.) in addition to meaning-encodings
- (ii) noise from the environment.
- (iii) grammatical mistakes
- (iv) disfluencies
- (v) interruptions
- (vi) self-corrections

### 3.3.2 Dialogue Act Recognition

For extracting the meaning from natural language, one needs to determine the function of the text/sentence (e.g. is this a question, suggestion, offer, or command); this is known as dialogue act recognition. In dialogue act recognition systems, training data(a corpus of sentences) is labeled with the function of the sentence, and a statistical machine learning model is built, which gives an output function to an input sentence. The model uses many different features to classify the sentences including:

- (i) words and phrases such as “please” (function=request) and “are you” (function=yes/no question), and
- (ii) syntactic and semantic information.

table 1.1 : dialogue act recognition example

SPEAKER	DIALOGUE ACT	ENGLISH
A	Conventional-Opening	Hello!?
B	Conventional-Opening	Hi, Peter!
B	Statement	It’s me, Michael.
B	Question	How are you?
A	Conventional-Opening	Hello, Michael!
A	Statement	Very well.
A	Question	And you?
B	Statement	I’m well too.

### 3.3.3 Architecture

The Retrieval based architectural model of a chatbot is easier to build and is very reliable. Though it is not 100% accurate in giving instant responses, you come to know the possible types of responses and make sure that no inappropriate or incorrect response is delivered by the chatbot.

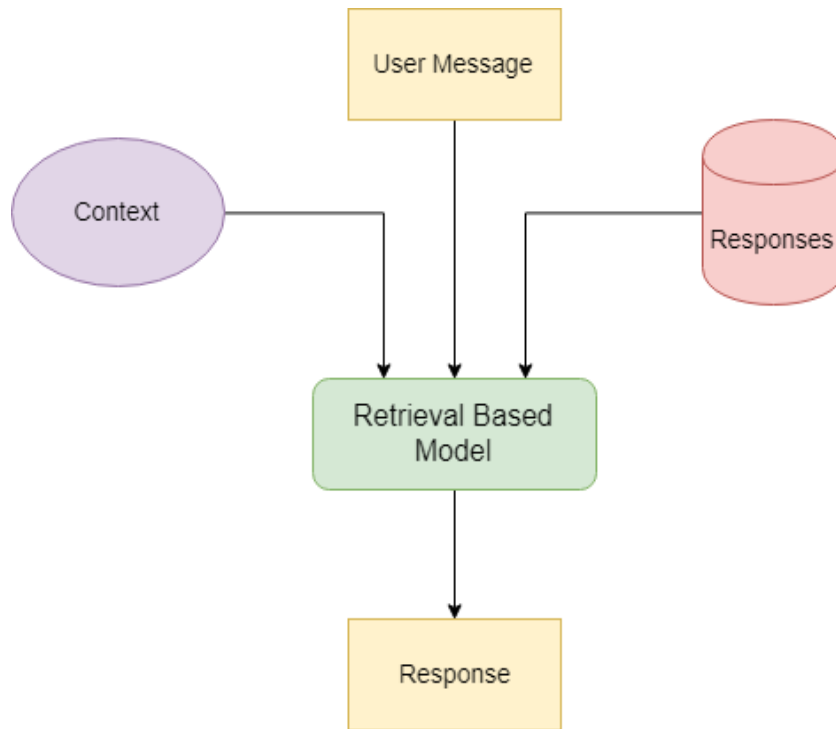


fig 2.1 : architecture of retrieval-based model

Retrieval-based models are widely used in currently because of the large increase in the usage of such technology(as mentioned above). Many APIs and algorithms are available for users who wish to develop a chatbot based on this model. One such API is provided by the Google Dialog Flow. This type of bot takes into account the previous knowledge of the conversation, also, understands the context of the conversation to deliver an appropriate response from a predefined list of possible answers to a query.



# Chapter 4

## DESIGN

### **4.1 Design Considerations**

The various design considerations for the Human Machine Interaction with AI Chatbots using NLP are :

#### **4.1.1 Responsiveness**

The system has to be responsive in all devices which may be of varying sizes and dimensions. All the attributes of the system must adjust themselves according to the size of the screen. For example, in the desktop view the tabs are arranged in a horizontal manner, however when the screen size reduces they appear in a vertical manner only after the side navigation tab is touched upon.

#### **4.1.2 Screen Resolution**

The images in the website should not get blurry in any pixel specification, however high those specifications maybe. In the existing system these images do not have any aspect ratio, they appear very disarranged if viewed any view other than the desktop view. To avoid this, we have made use of pictures of 1080 x 1280 pixel.

#### **4.1.3 Maintainability and Precision**

The website should be able to sustain the traffic and not crash easily. In case, it crashes then we should be able to recover it quickly, thus maintainable. It should allow to make updates easily. Also, the chatbot should be able to answer most of the questions properly , i.e. they should mean something to the user and must be in relation to the query fired.

## 4.2 Design Details

The Use Case Diagram, Data Flow Diagram and the Sequence Diagram shown below describes how and in what sequence the action and the data flow occurs in the program. Both the diagram contains three entities : User, System and the Database.

### 4.2.1 Use Case Diagram

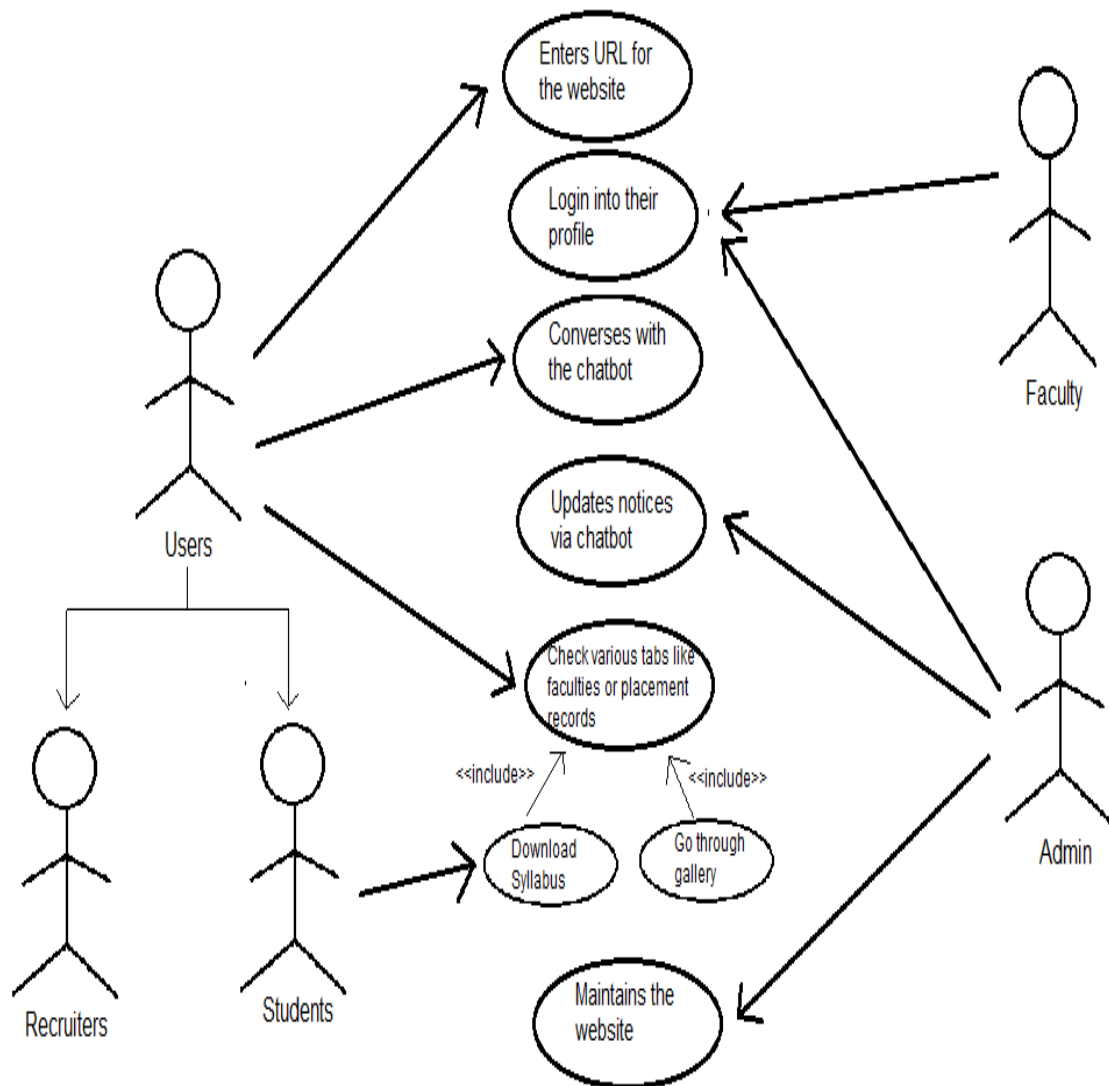


Fig 4.1 : Use Case Diagram

#### 4.2.2 Data Flow Diagrams

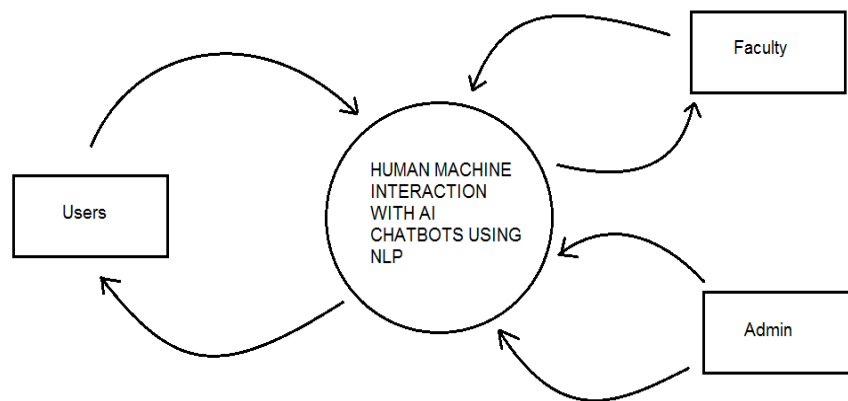


Fig 4.2 : DFD level 0

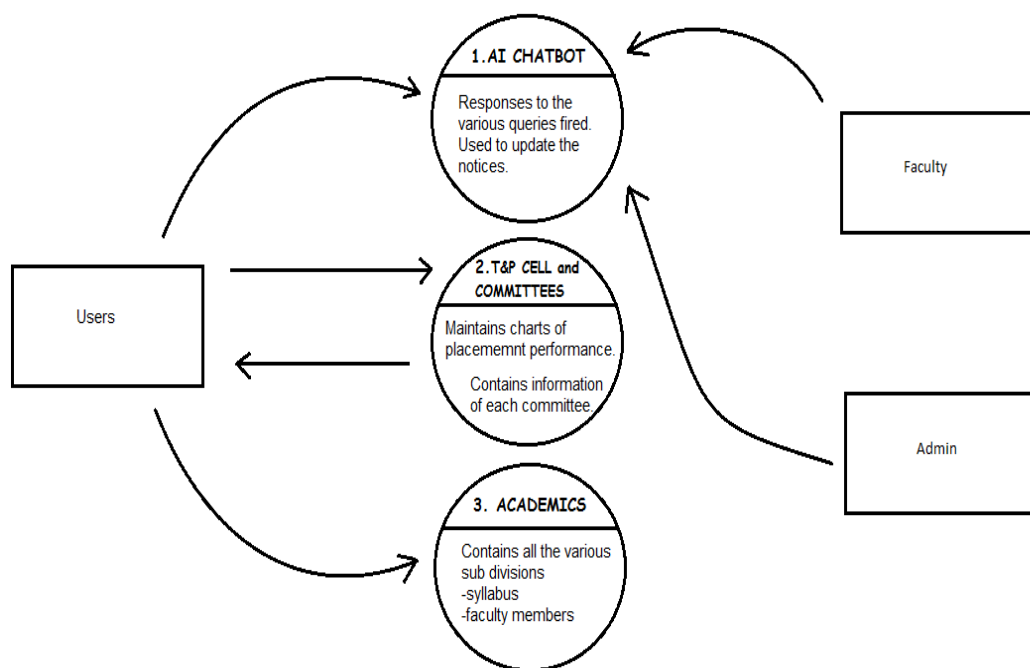


Figure 4.3 : DFD level 1

## 4.2.2 Sequence Diagram

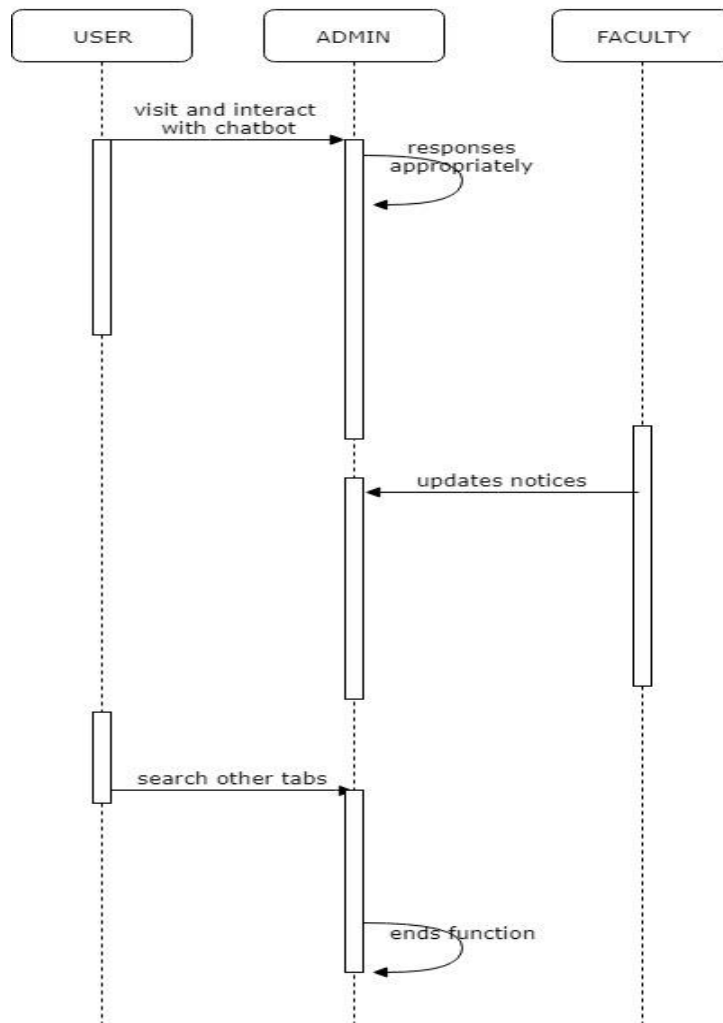


Fig 4.4 : Sequence Diagram

# Chapter 5

## IMPLEMENTATION METHODOLOGY

### 5.1 Methodology

The major steps in implementing our system was as follows :

- Since, the existing system is less user friendly, we carried out requirement gathering and to try to make the system more responsive and user friendly. We made use of materialize CSS to do the same.
- The next step was designing the layout of the front page and the succeeding pages, which was a group task. Then we incorporated the layout using the HTML and CSS.
- Also, JavaScript was used to make the events functional in the website, such as the tabs and icons in the navbar.
- The system constitutes of a chatbot, to make it more user friendly. To train the chatbot we have made use of the Google Dialog Flow.

### 5.2 Sample Code

```
<!DOCTYPE html>
<html lang="en">

<head>
  <!-- Required meta tags -->
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
  <meta http-equiv="X-UA-Compatible" content="ie=edge">

  <link rel="stylesheet" href="https://use.fontawesome.com/releases/v5.7.0/css/all.css"
  integrity="sha384-
  lZN37f5QGtY3VHgisS14W3ExzMWZxybE1SJSEsQp9S+oqd12jhcu+A56Ebc1zFSJ"
  crossorigin="anonymous">
  <!-- Bootstrap CSS -->
  <link rel="stylesheet"
  href="https://stackpath.bootstrapcdn.com/bootstrap/4.2.1/css/bootstrap.min.css"
  integrity="sha384-
  GJzZqFGwb1QTTN6wy59ffF1BuGJpLSa9DkKMP0DgiMDm4iYMj70gZWKYbI706tWS"
  crossorigin="anonymous">
```

```

<!-- External CSS Link -->
<link rel="stylesheet" href="index.css">

<title>Vidyavardhini's College of Engineering and Technology</title>
<link rel="shortcut icon" href="https://vcet.edu.in/favicon.ico" type="image/x-icon">
</head>

<body>
<div class="container ">
  <header>
    <div class="row ">
      <div class="col-md-5 col-sm-12" style="padding-right:0" style="padding-right:0">
        
      </div>
      <div class="col-md-7 col-sm-12" style="padding-left:0" style="padding-left:0">
        <nav class="navbar navbar-expand-xl navbar-light blue-color text-light">
          <div class="navbar-brand d-block d-xl-none">VCET</div>
          <button class="navbar-toggler ml-auto" data-toggle="collapse" data-
target="#navHeaderCollapse">
            <span class="navbar-toggler-icon"></span>
          </button>
          <div class="collapse navbar-collapse" id="navHeaderCollapse">
            <ul class="nav navbar-nav text-center m-auto">
              <!-- <li class="nav-item">
                <a href="/index.html" class="nav-link">HOME</a>
              </li> -->
              <li class="nav-item dropdown">
                <a href="#" class="nav-link dropdown-toggle" data-toggle="dropdown">ABOUT</a>
                <ul class="dropdown-menu">
                  <li>
                    <a href="about/vision.html" class="dropdown-item">Vision Mission </a>
                  </li>
                  <li>
                    <a href="about/principal.html" class="dropdown-item">Principal's Desk</a>
                  </li>
                  <li>
                    <a href="about/govern.html" class="dropdown-item">Governing Council</a>
                  </li>
                  <li>
                    <a href="about/img/org.png" class="dropdown-item">Organizational Structure</a>
                  </li>
                  <li>
                    <a href="about/admin.html" class="dropdown-item">Administration & other staff</a>
                  </li>
                  <li>
                    <a href="about/img/codee.pdf" class="dropdown-item" target="test1">Code of Ethics </a>

```

```

        </li>
        <li>
<a href="../about/img/codec.pdf" class="dropdown-item" target="test1">Code of Conduct
</a>
        </li>
        <li>
<a href="../about/img/core.pdf" class="dropdown-item" target="test1">Core Values</a>
        </li>
        <li>
<a href="about/strategy.html" class="dropdown-item" target="test1">Strategic Plan</a>
        </li>
    </ul>
</li>
</header>

<main>
<div class=" ">
    <marquee behavior="scroll" direction="left">
        <b>Welcome to Vidyavardhini's college of engineering and technology</b>
    </marquee>
    <div class="row">
        <div class="col-md-12">
            <!-- Corousal -->
            <div id="carouselExampleControls" class="carousel slide" data-ride="carousel">
                <div class="carousel-inner">
                    <div class="carousel-item active carousal-item">
                        
                    </div>
                    <div class="carousel-item carousal-item">
                        
                    </div>
                    <div class="carousel-item carousal-item">
                        
                    </div>
                </div>
            </div>
            <a class="carousel-control-prev" href="#carouselExampleControls" role="button" data-
            slide="prev">
                <span class="carousel-control-prev-icon" aria-hidden="true"></span>
                <span class="sr-only">Previous</span>
            </a>
            <a class="carousel-control-next" href="#carouselExampleControls" role="button" data-
            slide="next">
                <span class="carousel-control-next-icon" aria-hidden="true"></span>
                <span class="sr-only">Next</span>
            </a>
        </div>
    </div>

```

```

    </div>
<!-- Companies -->
    <div>
        <h2 class="text-center blue-color text-white">RECRUITER COMPANIES</h2>
        <br>
        <!-- Optional JavaScript -->
        <!-- jQuery first, then Popper.js, then Bootstrap JS -->
        <script src="https://code.jquery.com/jquery-3.3.1.slim.min.js" integrity="sha384-
q8i/X+965DzO0rT7abK41JStQIAqVgRVzpbzo5smXKp4YfRvH+8abtTE1Pi6jizo"
        crossorigin="anonymous"></script>
        <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.6/umd/popper.min.js"
integrity="sha384-
wHAiFfRlMFy6i5SRaxvfOCifBUQy1xHdJ/yoi7FRNXMRBu5WHdZYu1hA6ZOblgut"
        crossorigin="anonymous"></script>
        <script src="https://stackpath.bootstrapcdn.com/bootstrap/4.2.1/js/bootstrap.min.js"
integrity="sha384-
B0UglyR+jN6CkvvICOB2joaf5I4l3gm9GU6Hc1og6Ls7i6U/mkkaduKaBhlAXv9k"
        crossorigin="anonymous"></script>
        <iframe class="chatbot" allow="microphone;" width="350" height="430"
src="https://console.dialogflow.com/api-client/demo/embedded/062faad1-038a-4cb0-869d-
dd2d7bab99b1">
        </iframe>

        <div class="fixedbutton">
            <button type="button" class="btn btn-primary">
                <i class="fab fa-whatsapp"></i>
            </button>
        </div>

        <script src="https://ajax.googleapis.com/ajax/libs/jquery/2.1.3/jquery.min.js"></script>
        <script>
            function hideToggle(button, elem) {
                $(button).click(function () { $(elem).toggle('show'); });
            }
            hideToggle(".fixedbutton", ".chatbot");
        </script>
    </div>
</body>

</html>

```



# Chapter 6

## RESULT

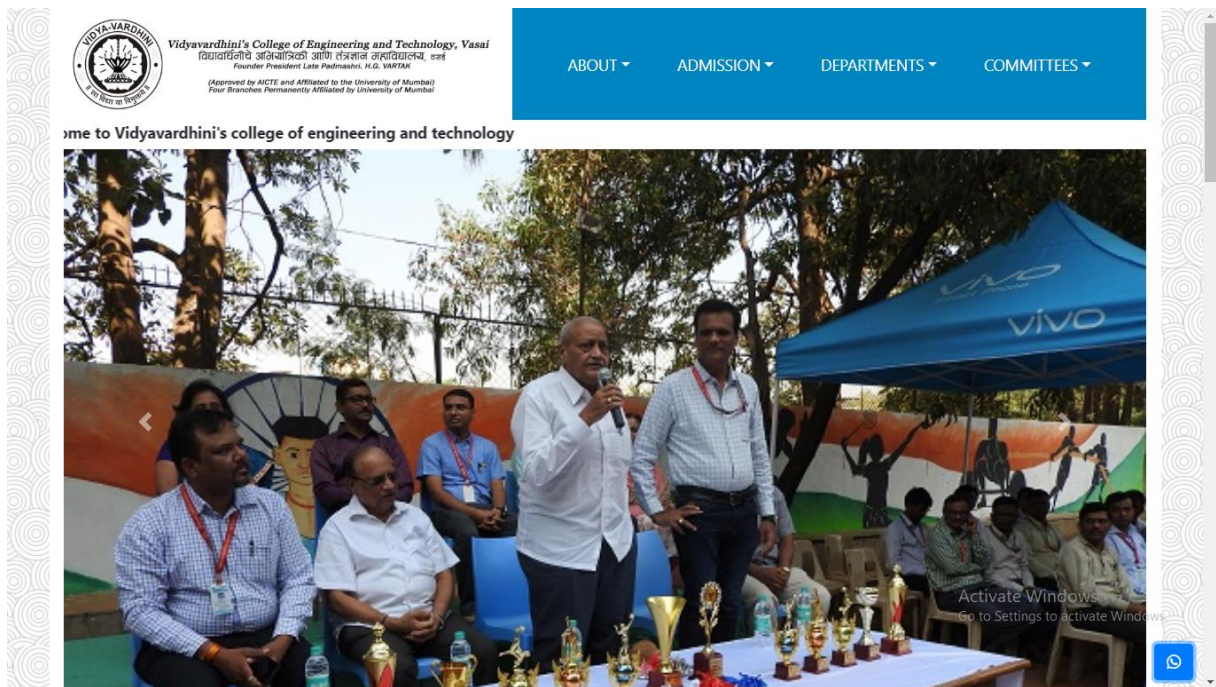


Fig 6.1 : The header and carousel

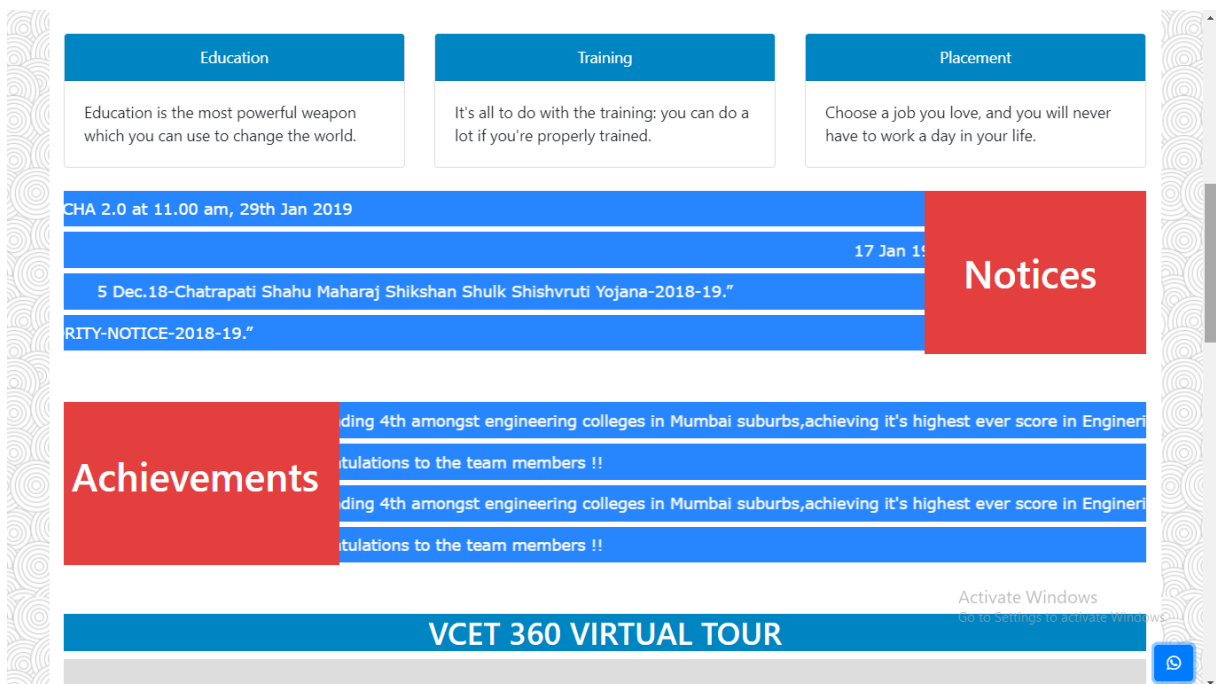


Fig 6.2 : The objective and other importants

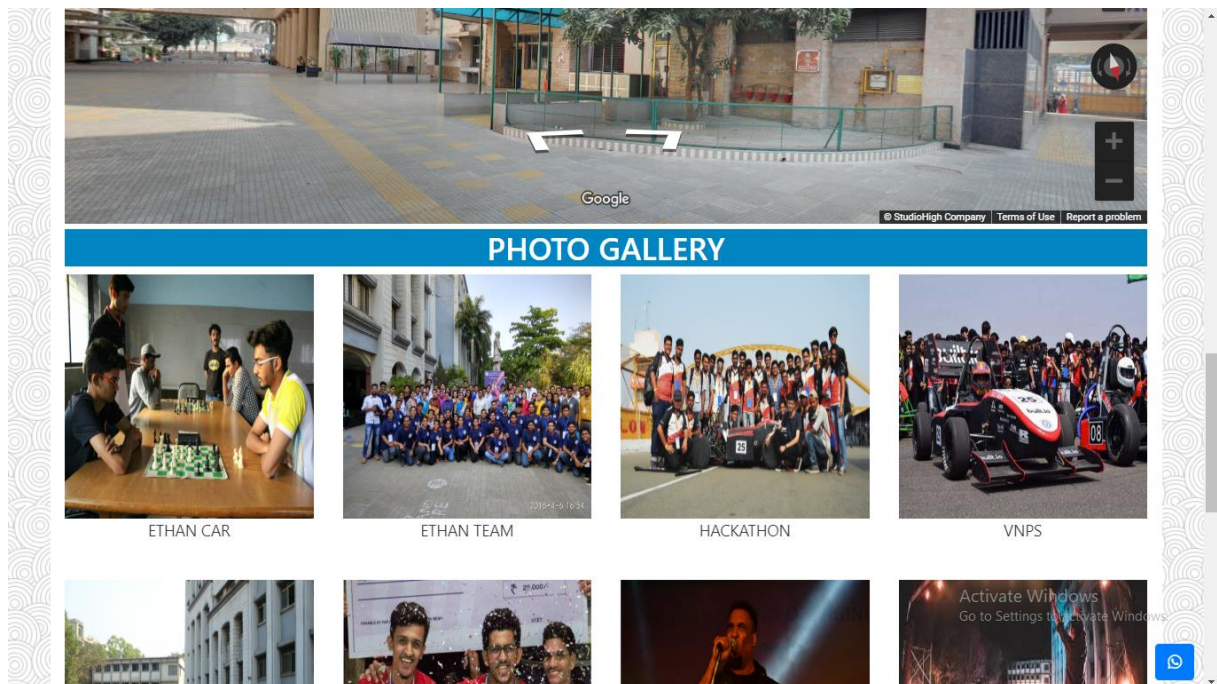


Fig 6.3 : The virtual tour and gallery

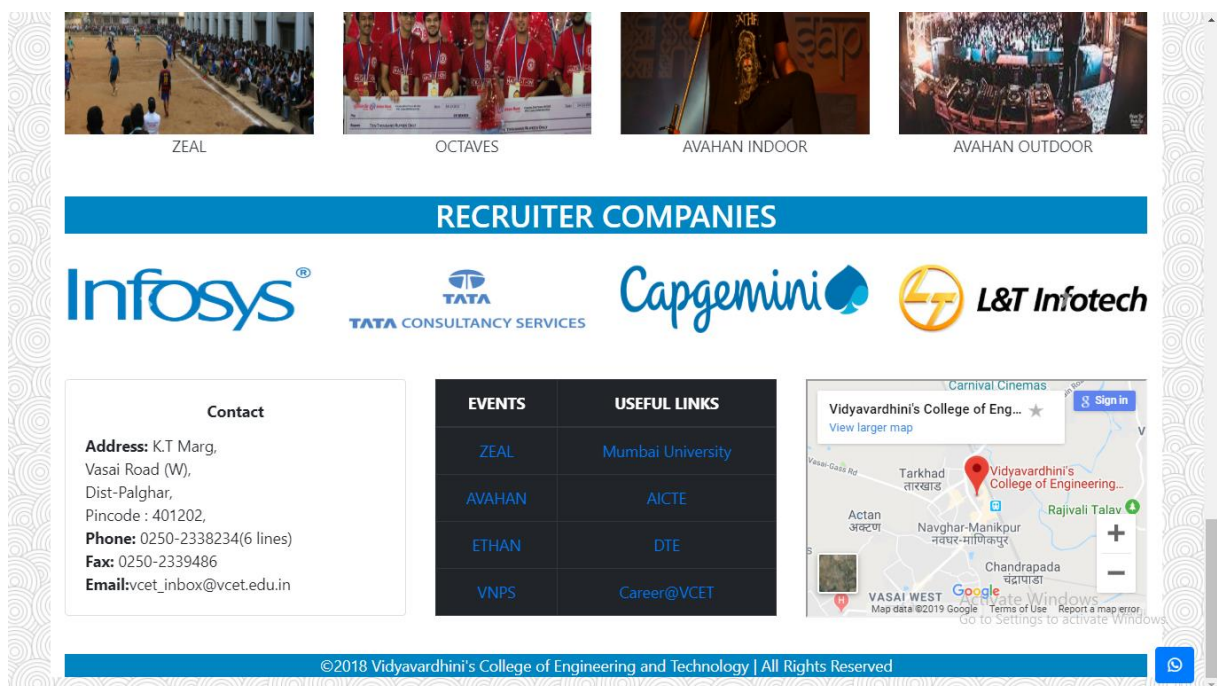


Fig 6.4 : The companies and footer

# **Chapter 7**

## **CONCLUSION**

### **7.1 Conclusion**

This system presents the website for the institute, Vidyavardhini's College of Engineering and Technology. It was taken up to rectify the discrepancies of the already existing system. This system has successfully eliminated all of those, and thereby improving the system to a great extent. It has dealt with the problem of screen resolution, made it responsive to various devices and more interactive than earlier. It now follows most of the GUI guidelines and is very appealing, for the matter of improving traffic. It can now be used by the users for reducing their time wasted on the website for searching through the hundreds of topics and finding their desired one. The final Chabot implemented after the study carried out, is now able of responding to the legit questions of the users visiting our webpage,. They could ask anything related to the website's content or the institute (about which the website is developed), and expect a legit response too. It can also be used to update the notices through voice chat. This makes communication more effective and interactive, thus drawing more traffic to the website.

### **7.2 Future Scope**

This project can be further expanded in the interest of the users, if the institution wishes to do so. They can bring about a lot many updates after this stage, like the chatbot can be trained further to pick up data from all the Mumbai university websites and update the students about the results and other notifications from the university itself. Such, is the future scope of this system.

# Chapter 8

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