USER INTERFACE FOR A TRAVEL WEBSITE

REPORT

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR

Six Weeks Industrial Training

at

CDAC, MOHALI

(from 03/06/2019 to 12/07/2019)

SUBMITTED BY

Supriyam Singh Awal
I.T.
1721086
1706898

Information Technology Department

GURU NANAK DEV ENGINEERING COLLEGE

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LUDHIANA, INDIA

Sr. No.: 17551

Certificate No.: C-DAC (M)/ 19-20 /ST- UID/ 16348

सी डैक
CDAC

An ISO 9001:2015 Certified Institute

CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

A Scientific Society of the Ministry of Electronics and Information Technology, Government of India

CERTIFICATE

This Certificate is awarded to Sh/Smt/Kumari **SUPRIYAM SINGH AWAL**

Son/Daughter of Smt **AMANPREET KAUR AWAL** and Sh **KAMALJEET SINGH AWAL**

for having successfully completed **SIX** week(s) Summer/Industrial Training on

UI DESIGNING (BOOTSTRAP FRAMEWORK)

conducted from **JUNE 03, 2019** to **JULY 12, 2019** at C-DAC, Mohali.

Place: Mohali (Punjab)

Dated: 12.07.2019

(Dr PK Khosla)
EXECUTIVE DIRECTOR

C-DAC/QSP/9.1.1./01 Fr 05

प्रगत संगणन विकास केंद्र
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

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इलेक्ट्रॉनिकी एवं सूचना प्रौद्योगिकी मंत्रालय की वैज्ञानिक संस्था, भारत सरकार
A Scientific Society of the Ministry of Electronics and Information Technology, Government of India

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Ref No: CDAC/TRG/ST/19- 323
Dated: 11.7.19

To

Prof. G.S. Sodhi,
Training & Placement Officer
Guru Nanak Dev Engineering College,
Ludhiana

Sub: Six Weeks Summer Training

Dear Sir/Madam,

This is with reference to your letter regarding Summer Training of B.E/ B.Tech. students during May-June-July 2019.

We would like to inform you that following students are allowed to do the training in our Centre.

S. No.	NAME	COURSE	DATE/ DURATION
1	Supriyam Singh Awal	UI Des igning	03.06.19 – 12.07.19
	Roll No. 1706898		2.30 - 5.30 pm

She/ He/has joined the above said training on 03.06.19.

Regards

Asha 11/7/19

TRAINING COUNSELLOR

स्वच्छ भारत
एक कदम स्वच्छता की ओर

ABSTRACT

The aim of this project is to create a user interface design for a web-based project management portal for a travel-based website. This implies creating a website template using Adobe Photoshop, creating a site map, functionality specification based on the targeted audience, and the coding of the website using Bootstrap Framework.

Before any visible results can be seen in a web production project, a range of preparation steps need to be taken. Planning is essential, and extensive research related to various tourist spots and vacation destinations was done. Various factors were used for determining what kind of user interface would be most suitable like targeted audience, age-group, devices, visual-aids, light-weight website and many more.

The key requirements for the project portal turned out to be speed and effectiveness. The user interface was designed to be intuitive and shallow, which means user shall be able to perform any task with least no. of clicks. The website was also designed to be device independent, as it was responsive according to device.

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA

TO WHOM IT MAY CONCERN

I hereby certify that "SUPRIYAM SINGH AWAL" Roll No 1706989 of Guru Nanak Dev Engineering College Ludhiana, has undergone six weeks industrial training from 3rd June 2019 to 12th July,2019 at our organization to fulfill the requirements for the award of degree of B.Tech. (Branch).He/She works on USER INTERFACE FOR A TRAVEL WEBSITE project during the training under the supervision of by Mr Jasvinder Singh and Mr. Gurpreet Singh. During his tenure with us we found him sincere and hard working. Wishing him a great success in the future.

Signature of the Student

(Seal of Organization)

ACKNOWLEDGEMENT

I am highly grateful to the Dr. Sehijpal Singh, Principal, Guru Nanak Dev Engineering College (GNDEC), Ludhiana, for providing this opportunity to carry out the six-weeks industrial training at **CDAC, MOHALI**.

The constant guidance and encouragement received from Prof. G.S. SODHI Dean T&P, GNDEC Ludhiana has been of great help in carrying out the project work and is acknowledged with reverential thanks.

I would like to express a deep sense of gratitude and thanks profusely to **Dr. Hemant Darbari**, Director General of Company. Without the wise counsel and able guidance, it would have been impossible to complete the report in this manner.

The help rendered by Mr Jasvinder Singh and Mr. Gurpreet Singh Designation (Project Assistant, Department "Computer Interface Design") for experimentation is greatly acknowledged.

I express gratitude to other faculty members of Information Technology department of GNDEC for their intellectual support throughout the course of this work.

Finally, I indebted to all whosoever have contributed in this report work and friendly stay at **CDAC, Mohali**.

Supriyam Singh Awal

STUDENT'S DECLARATION

I hereby certify that the work which is being presented in the training report with the project entitled "USER INTERFACE FOR A TRAVEL WEBSITE" by **Supriyam Singh Awal**, University Roll No. 1706898 in partial fulfillment of requirements for the award of degree of B.Tech. (Information Technology) submitted in the Department of Information Technology at **GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA under I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY** is an authentic record of my own work carried out under the supervision of Mr Jasvinder Singh and Mr. Gurpreet Singh , Project Assistant, Department "Computer Interface Design" of CDAC, MOHALI. The matter presented has not been submitted by me in any other University / Institute for the award of B.Tech. Degree.

Student Name: Supriyam Singh Awal

Univ. Roll No. 1706898

(Signature of Student)

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Signature of Internal Examiner

The External Viva-Voce Examination of the student has been held on _____.

Signature of External Examiner

Signature of HOD

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION TO COMPANY

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, Electronics and associated areas. Different areas of C-DAC, had originated at different times, many of which came out as a result of identification of opportunities.

- The setting up of C-DAC in 1988 itself was to built Supercomputers in context of denial of import of Supercomputers by USA. Since then C-DAC has been undertaking building of multiple generations of Supercomputer starting from PARAM with 1 GF in 1988.
- Almost at the same time, C-DAC started building Indian Language Computing Solutions with setting up of GIST group (Graphics and Intelligence based Script Technology); National Centre for Software Technology (NCST) set up in 1985 had also initiated work in Indian Language Computing around the same period.
- Electronic Research and Development Centre of India (ER&DCI) with various constituents starting as adjunct entities of various State Electronic Corporations, had been brought under the hold of Department of Electronics and Telecommunications (now MeitY) in around 1988. They were focusing on various aspects of applied electronics, technology and applications.
- With the passage of time as a result of creative ecosystem that got set up in C-DAC, more areas such as Health Informatics, etc., got created; while right from the beginning the focus of NCST was on Software Technologies; similarly C-DAC started its education & training activities in 1994 as a spin-off with the passage of time, it grew to a large efforts to meet the growing needs of Indian Industry for finishing schools.

C-DAC has today emerged as a premier R&D organization in IT&E (Information Technologies and Electronics) in the country working on strengthening national technological capabilities in the context of global developments in the field and responding to change in the market need in selected foundation areas. In that process, C-DAC represents a unique facet working in close junction with MeitY to realize nation's policy and pragmatic interventions and initiatives in Information Technology. As an institution for high-end Research and Development (R&D), C-DAC has been at

the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging/enabling technologies and innovating and leveraging its expertise, calibre, skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the Ministry of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India and other stakeholders including funding agencies, collaborators, users and the market-place.

1.2 INTRODUCTION TO PROJECT

In this modern era of Internet, where most of the work is done online with websites, people would prefer a work being done online rather than going to that place. In order to get more customers and easy access to their services, a user- friendly website is required. Human psychology and Color combinations play a very important role in it. The website must meet the standards of modern world advancements and globally acceptable content. The fonts and elements must be eye catching and must not be too much gaudy. The basic wireframe / template will be created using Photoshop. Research and appropriate application of the content with good visual and light-weight and performance combination will result in an excellent front-end of website.

1.3 PROJECT CATEGORY

This project is based on Internet Based/Website Development which makes it portable for the users to access their services easily. The user of website will not have to spend time and effort to physically visit the office of the travel company. This makes it more efficient for use.

1.4 PROJECT OBJECTIVES

The objectives of the project USER INTERFACE FOR A TRAVEL WEBSITE are:

1. To create a user-friendly experience for website users
2. To implement various designing strategies and approach for getting more no. of users and more outcome
3. To get business online
4. To reduce manual work and easy and portable access to services

1.5 IDENTIFICATION/REORGANIZATION OF NEED

The most important tasks of the system analysis are to identify the problem because without having an idea of the problem it is impossible to specify the requirement for a new project with any accuracy.

The main problems faced in today's bone age analysis are:

- The designing of the system is complex
- Can lead to ambiguity in some case
- Manual customer dealing requires a lot of expertise
- No website is available for the organization.

It was identified that the WEBSITE needs the following:

- A great User interface to attract more customers
- This will eliminate some of the manual work.
- A good and responsive design that is portable and easily accessible

It was analyzed that all these needs of the user are being fulfilled by this system, so this system will be appropriate to introduce.

1.6 PROPOSED SYSTEM

The aim of the proposed system is to develop a system of online facilities. The proposed system can overcome all the limitations of the manual dealing system. The system provides good interface and reduces the manual work. The existing system does not exist and needs to be created from scratch. The proposed system tries to eliminate or reduce these difficulties up to some extent. The proposed system will help the user to sustain in market.

1.7 UNIQUE FEATUES OF THE SYSTEM

The system is very simple in design and to implement. The system requires very low system resources and the system will work in almost all configurations and is responsive in all devices.

The features are:

- Get more and more customers to access their services

- Interface that is user friendly
- Provides accurate information to the users
- Ensures precision
- Minimum Time needed for various processing
- Greater efficiency
- Reduces work load

CHAPTER 2: REQUIREMENT ANALYSIS AND SYSTEM SPECIFICATION

2.1 FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase to put forth a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are:

1. Technical Feasibility
2. Economic Feasibility
3. Operational Feasibility

A feasibility study aims to objectively and rationally uncover the strengths and weaknesses of an existing business or proposed venture, opportunities and threats present in the natural environment, the resources required to carry through, and ultimately the prospects for success. In this project, we will look into all the possibilities and analyze whether it is profitable to work onto it or not.

2.1.1 TECHNICAL FEASIBILITY

This assessment is based on an outline design of system requirements, to determine whether the store has the technical expertise to handle completion of the project. When writing the report, the following were under consideration:

- A brief description of the framework to assess more possible factors which could affect the study
- The part of the business being examined (marketing, economical)
- The human and economic factor
- The possible solutions to the problem within minimum time

The technical feasibility assessment is focused on gaining an understanding of the present technical resources of the store and their applicability to the expected needs of the proposed system. It is an evaluation of the hardware and software and how it meets the need of the proposed system.

After the above analysis, it was concluded that the system is technically feasible.

2.1.2 ECONOMICAL FEASIBILITY

The purpose of an **economic feasibility** study is to demonstrate the net benefit of a proposed project for accepting or disbursing electronic funds/benefits, taking into consideration the benefits and costs to the agency, other state agencies, and the general public as a whole.

The following costs were estimated:

- One-time development cost
- One-time H/W cost (if the user does not have a computer system)
- Benefits in reduced cost, error and saving will be made by reduction of present system expenses, time saving and increased accuracy

Once the application is developed, it would yield the user results if it is used effectively. If the offers are sent strategically, it will surely be profitable for the user. After the above analysis, it was concluded that the system is economically feasible.

2.1.3 OPERATIONAL FEASIBILITY

Operational feasibility is the measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development.

The operational feasibility assessment focuses on the degree to which the proposed development project fits in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture and existing business processes.

To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters as reliability, maintainability, supportability, usability, reducibility, disposability, sustainability, affordability and others.

Clients Supports: Client support for present system in the proposed system, as the current procedure used takes more time and effort than proposed system. No major training and new skills are required as it is based on DBMS model. It will help in the time saving and fast processing and dispersal of user request and application. New product will provide all the benefits of present system with better performance such as improved information, better management and collection of the reports. After the above analysis, it was concluded that the system is operationally feasible.

2.2 SOFTWARE REQUIREMENT SPECIFICATION

A **software requirements specification** (SRS) is a detailed description of a software system to be developed with its functional and non-functional requirements. The SRS is developed based the agreement between customer and contractors. It may include the use cases of how user is going to interact with software system. The software requirement specification document consistent of all necessary requirements required for project development. To develop the software system we should have clear understanding of Software system. To achieve this we need to continuous communication with customers to gather all requirements.

A good SRS defines the how Software System will interact with all internal modules, hardware, communication with other programs and human user interactions with wide range of real life scenarios. Using the *Software requirements specification* (SRS) document on QA lead, managers creates test plan. It is very important that testers must be cleared with every detail specified in this document in order to avoid faults in test cases and its expected results.

It is highly recommended to review or test SRS documents before start writing test cases and making any plan for testing. Let’s see how to test SRS and the important point to keep in mind while testing it.

2.2.1 SOFTWARE REQUIREMENTS

The technical specifications of requirements for the software are as follows:

- About Operating System: Windows XP or Later.
- Windows 7 or later

- Linux / Ubuntu
- Bootstrap Framework
- Adobe Photoshop

2.2.2 HARDWARE REQUIREMENTS

Hardware requirements include that hardware which is required for its working. It includes:

- Pentium 4 Computer (Minimum)
- 512 MB RAM (Minimum)
- Hard Disk - 40GB (Minimum)
- Network Interface (For Communication)

2.2.3 FUNCTIONAL REQUIREMENTS

A functional requirement defines a function of a system or its component. A function is described as a set of inputs, the behaviour, and outputs.

Functional requirements may be calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioural requirements describing all cases where the system uses the functional requirements are captured in use cases. Functional requirements are supported by non-functional requirements (also known as quality requirements), which impose constraints on the design or implementation (such as performance requirements, security, or reliability).

As defined in requirements engineering, functional requirements specify particular results of a system. This should be contrasted with non-functional requirements which specify overall characteristics such as cost and reliability. Functional requirements drive the application architecture of a system, while non-functional requirements drive the technical architecture of a system.

The functional requirements are defined below:

1. Keeping in mind views of different users.

2. Keeping records of all the features required for development.
3. Keeping the record of content to be implemented.
4. Keeping details about different screen size of users.
5. Keeping in mind bandwidth of users.

2.2.4 NON-FUNCTIONAL REQUIREMENTS

1. **Performance requirement:** All data used shall be up to mark and no flaws shall be there for the performance to be 100% and the webpage created must be light weighted
2. **Platform constraints:** The main target is to generate a platform independent, browser openable, responsive, intuitive website
3. **Accuracy and Precision**: Requirements are accuracy and precision of the website
4. **Modifiability:** Requirements about the effort required to make changes in the website. Often, the measurement is personnel effort (trips/users/locations).
5. **Portability:** Since mobile phone is handy so it is portable and can be carried and used whenever required.
6. **Reliability**: Requirements about how often the software fails. The definition of a failure must be clear. Also, don't confuse reliability with availability which is quite a different kind of requirement. Be sure to specify the consequences of software failure, how to protect from failure, a strategy for error detection, and a strategy for correction.
7. **Security**: One or more requirements about protection of your system and its database
8. **Usability:** Requirements about how difficult it will be to learn and operate the system. The requirements are often expressed in learning time or similar metrics.

2.2.5 INTENDED AUDIENCE AND READING SUGGESTIONS

The intended audience for the website is off all age groups, taking in mind their visual aids, ease of using internet. The design approach must be made in mind that everyone can access it easily and find it attractive. The structure must not be complex and must be easy to understand otherwise user will leave the website.

2.3 SDLC MODEL

We chose Iterative Waterfall model as our systems development life cycle (SDLC), also referred to as the application development life-cycle. In the Iterative model, iterative process starts with a simple implementation of a small set of the software requirements and iteratively enhances the evolving versions until the complete system is implemented and ready to be deployed.

An iterative life cycle model does not attempt to start with a full specification of requirements. Instead, development begins by specifying and implementing just part of the software, which is then reviewed to identify further requirements. This process is then repeated, producing a new version of the software at the end of each iteration of the model.

Iterative process starts with a simple implementation of a subset of the software requirements and iteratively enhances the evolving versions until the full system is implemented. After each iteration, design modifications are made and new functional capabilities are added. The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental).

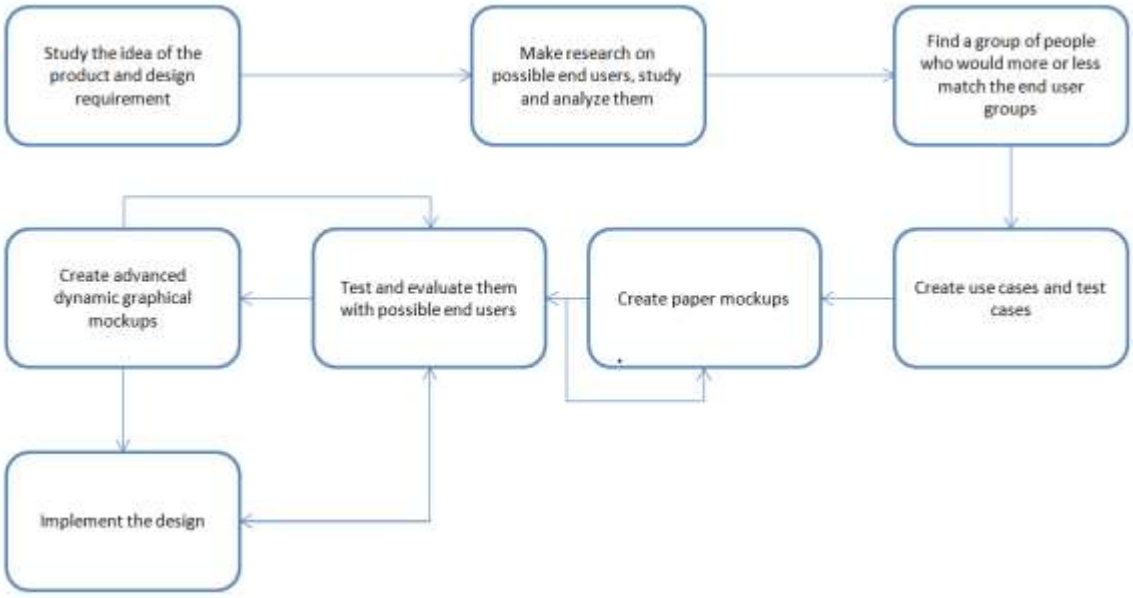


Figure 1 SDLC MODEL

The figure above mentions the basic procedural steps of user interface design. The steps are described briefly below as a process. Descriptive information on most of the topics can be found under Elements of Interface Design and Testing.

1. **Study the idea of the products and design requirement:** The main thing to do when designing an application or a system with specific product is to understand the product itself, what it is and what its logic is, why people would need it. At the same time it is very important to understand the concept of the requirement, what it suggests, what it means and what it demands. It is important to understand why designing for particular system is important. If the basic concept is not clear, the whole process will be a mess difficult to clean up.
2. **Make research on possible end users, study and analyze them:** Next step is to understand who the end user is. This information is needed because the design is done for the particular group of people and their interest is what keeps the design ongoing. Finding what end users want is very important. It gives us idea and taste on what kind of features do the end users want, what kind of layout do they like, what colors do they prefer, what is the level of their computer / internet knowledge and so on. Information on such little things helps designers to match the expectation of the end users. This will help to get a direction and not get lost in the design process. 11 (61) It is important to know what users expect from a system. To understand user's inner thoughts and ideas, it is best to analyze what they do by observing them or questioning them . The user group can range from children to old people, computer pro user to basic tasks performers, people with different personalities, people with disabilities, people from different cultures. All of them should be taken into account during the designing process. Conducting interviews with them is a way to get a whole lot of required information. The only thing to be noted while making interviews is questions should be short and meaningful so that end users do not get bored. For carrying out interviews and testing purpose, end users are needed, that is what next step deals with.
3. **Find a group of people matching end users**: After successfully finding out what kind of people are using the system or application, close analysis is required to understand what they really want. A group of potential end users 5-10 (more or less in numbers) depending upon the size of the application should be found and requested to give some

time to take part in end user analysis process and to help evaluate the design work. Approach to potential end users should be made and number of meetings should be stated beforehand to keep things clean and clear. For this, planning should be done before asking the potential end users. People do not like to be bugged, so meetings should be kept short and consistent. Questions should not be asked that could bother them or harm them mentally. Promise users some kind of reward for participating in the process and of course keep the promise after the task has been done. This will help in motivating the users to participate and remain motivated to pass the whole process.

4. **Create use cases and test cases**: It is essential to create use cases for the application and based on that create test cases. This will help in creating test information for the end users to test later after the design has started. Creating unnecessary cases is waste of time so only needed exact and well-defined cases should be created, good enough to make the application bug proof. Cases can be added or reduced in time according to need.
5. **Create paper mockups**: After the design need is well understood, end users representatives are set, they are observed and analyzed and required use cases and test cases are written, it is time to create a first version of mockup, paper mockups. Basic idea of application is drawn on a paper. Advanced idea is drawn. More features are added and asked for end users view.
6. **Test and evaluate them with possible end users:** After the mockups are ready, end users are asked to go through the basic idea of the application. If they understand it, step 5 is repeated for advanced paper mockups with more features put and more navigation put in there. Simple direction like go to products page are suggested to end users and it is observed if they manage to get there. With more advanced designs, more complex tests should be done. Test cases should be brought into use to test complex scenarios which describes what to do and what is the expected result. It is always better to confirm with end users if some changes is needed to be done than to throw away all the work if users find it very complicated or do not like it at all. Questionnaire or video recordings can be used to save the collected information. No user is smaller than the other so, all users' feedbacks and comments are equally valuable, be the user in minority or majority
7. **Create advanced dynamic graphical mockups:** After green lights to the paper mockups, mockup design should take better forms. Mockups can be created in graphical

format example in Photoshop to give the real feel of the end product. They can also be created in mockups creating software such as Balsamiq to get the functional feel of the application. Tests should be carried out after each main design. Designs should be improved based on the comments and feedback and tested again. Iterative designs are mostly successful.

8. **Implement the design**: After the final design has passed all the tests, implementation begins. It can be broken down into smaller pieces / level / version to test and move to the next level. Step 6 should be repeated along with improvements in step 8 until desired result is obtained.

Figure 2 Gantt chart for design process

CHAPTER 3: SYSTEM DESIGN

3.1 DESIGN CONSIDERATIONS

For making user experience enjoyable there are some things that should be considered before jumping into the development process. This will save developer's time and also designer's work will go smoothly. The end result will be usable.

3.1.1 CONSISTENCY

Users do not like inconsistent pages. Inconsistency makes things complex while consistency provides clarity. Some basic elements of an application user interface that designer should be consistent with are color scheme, style, borders, type and fonts, size, background images and effects.

Wise choices should be made matching the theme of one's to be designed interfaces. For example, if we are designing pages for a coffee shop, use of coffee brown color in the background might be a good choice instead of using unnecessary bright pink which would be more favorable in soft toys selling site for little girls. Choices of these elements are very subjective but can be measured and defined by getting enough information on end users will give an idea on what UI patterns to use and how to.

3.1.2 RESPONSIVENESS

The user might find it very annoying to keep waiting in a site and wonder how to react to a certain situation. For example, when user submits his information via registration form, he expects some kind of response from the site that says registration failed or was successful and navigates to you to a certain page. Instead if he receives a blank html page with no going back option or no any information of the registration process, it will have a negative impact on the user's future usage of the site.

The basic idea of the site being responsive is the site responding to user's actions. It also means giving the users the feeling that we are listening to them. Nobody likes to talk to a tree. If the page is taking time to load, one can provide some visual graphical representation or any plain text that suggests that the page is loading or telling them the progress status. Use of heavy graphics can add to the response time of a web page. Therefore, minimizing sizes and use of them as little as possible

can help minimize the problem. Using alternatives also help, for example, if an image has not loaded for some reason, alternative text stating what image it is, helps the user to at least understand the idea behind the problem.

3.1.3 FAMILIAR METAPHORS

Use of terms already familiar to users from other existing internet sites helps them to familiarize with the website faster. For example, words such as products, home (or desktop in operating systems) and shopping cart are very common to ecommerce sites. At the same time, in general sites, words such as share, signup and login are very common, so using them to the newly designed pages will help users to skip understanding these parts of the site which will help in minimizing the learning process . One should always be sure to use metaphors taking cultural boundaries into account. It is easy to get people offended when cultural differences are not well understood. Background research and consult with respective representative should be made to avoid possible tension and misunderstandings.

3.1.4 STREAMLINING THE EXPERIENCE

Streamlining the experience is about improving the navigation of a site, making navigation more consistent and enjoyable. Use of unnecessary pages or navigation paths should be avoided. The site should be kept simple and navigation clear. Top level navigation flow should be predefined. Every page could for instance have a banner that on clicking takes the user to the first page or commonly known as home page. Also, all pages should contain link to company's contact information.

3.1.5 ANTICIPATING USABILITY ISSUES

There is no proof that users will follow a straight path when using a site. Even if they do, they might come across many issues that will leave them angry and frustrated at the site design. One very common example would be filling up shipping information or registering for a site and accidentally navigating to some wrong page and having to enter all details again when coming back to the page. This is really frustrating as the forms will have many fields to fill in. This particular issue can be controlled by for example alerting users that they are leaving the form or prompting them to save their details before leaving the form. Also saving user details for a short period of time (as there might be security issues for saving the data for longer time) and providing auto fill option might be

helpful. Designers and developers might come across many reported usability issues after the site launch if the home work is not done properly. If the design work is being done for certain target group, research on the targeted users will help solve this problem and if the design work is being done for general users, research on the products will help. The goal of the design should never be forgotten and focus should always be kept on target. Users should always be able to undo the operation. They might just mistakenly perform a task. They should be given a chance and should be allowed to cancel their operation. For example, the users might accidentally add a product to their shopping cart or after putting the product to the cart decide they do not want it anymore. The users should be able to delete the product from the cart. This helps them feel secure and not forced to buy any product if they do not want to.

3.1.6 LIMITING THE CHOICES

Users do not like to think on how to do things, designers should help them choose. The design should be created so that people understand right away what they are supposed to do with the button or search field or any other option. Having a lot of options to go through will only de-motivate users to use the application or site as they cause distraction. A lot of information is not needed to make a good design, the less the better. Things should always be kept simple and unnecessary things should always be omitted. Hiding is another option to keep the necessary feature there yet making the interface simple for users to use it. One good example is the synonyms suggestion feature by MS - Word. It is available but it does not interfere to the users' work every time by prompting suggestions. Whenever user wants, he can use the feature according to his requirement.

3.2 SYSTEM DESIGN USING VARIOUS STRUCTURED ANALYSIS AND DESIGN TOOLS

The following factors are used for creating a website design:

3.2.1 APPLICATION/SITE NAVIGATION

It is very necessary to understand the idea of application. What are you doing and what is the expected result are two very important questions designer might come up with during application design phase. So, it is a must to have answers of these questions throughout the design process. It is very easy to get lost when doing bigger tasks. It is therefore relevant to get some techniques that

help us to maintain the connectivity and flow of the work all the time. Navigation designing is a way to plan the application with sequence of actions for example if you click button1, picture1 will open. Flow chart is one of the ways to plan sitemap. Figure 3 Flowchart shows an example of a flowchart with a simple navigation of a website.

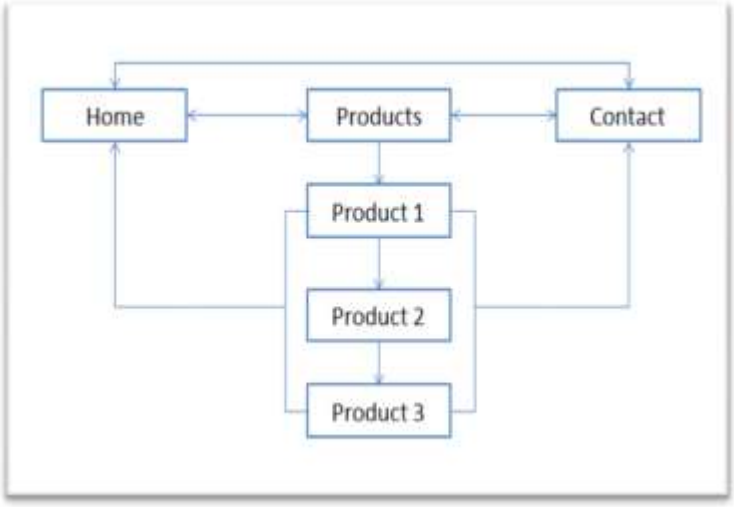


Figure 3 Flowchart for Website

3.2.2 LAYOUT DESIGN

The other important factor to be considered for usability is layouts and how they are designed. When the idea of the application is well understood and sitemap is ready, rapid prototyping is started. The layouts give the feel of the application/site with navigation logic. Prototyping or layout designing process should always be broken down to many pieces. This gives clarity to the divided tasks. A deadline should always be followed that was assigned during UI design process in Gantt chart. The steps to be followed for a good layout design are presented below:

Get started with paper and pen

- **Put all the thoughts on paper** It is very much likely to mess things up when starting the design work directly on computer with Photoshop or other software. We should not start running before we can walk, we will fall. The same logic applies here. We need to first use those resources to get started which we can throw away if we do not like them, i.e., it should not take much of our time.

- **Sketch top level wireframes** Brainstormed ideas and thoughts can be large in numbers. Some of the best ones should be chosen and top-level framework should be sketched for them just giving the general idea of the application. Sketching gives clarity on system logic and on how to proceed next. Below is an example figure; Figure 4 Top level wireframe for a website:

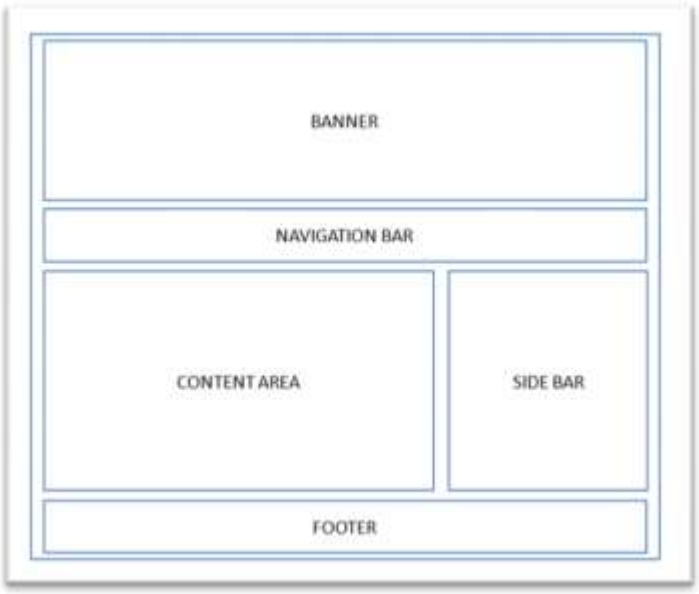


Figure 4 top level wireframe

- **Sketch advanced wireframes** The top level wireframes do not include all the logic of system. Advanced sketching is required. The new sketch should contain detailed information on each page. It should give the full idea of to be created application. It should overcome all the flaws and shortcomings of basic or the top level wireframe sketching

3.2.3 ACCESSIBILITY

Accessibility Designs are not made only for the biggest user group or users with high-tech resources. Not everyone is able to access the system for various reasons. When designing, all kinds of users must be considered and taken care of as much as possible. All those who do not have as much knowledge on computer as others should also be considered. Those with slow connections should also be considered during design work. Those with disabilities should also be considered. This needs to be done so that some kind of alternative is provided to them so that specific users can still enjoy the content as much as others. There are certain ways how accessibility can be achieved. Below is a list of users for who are benefitted by accessible system:

- Visual impaired people, Hearing and speech impaired people
- People with temporary or permanent injury preventing them use of mouse
- Touch screen users
- PDA and web-enabled phones users
- People with problems like dexterity and cognitive

3.3 USER INTERFACE DESIGN

Elements of Interface Design:

3.3.1 USABILITY

Usability is the key element of interface design. Asking simple questions can help in making the application usable. Usability is influenced by several factors and something might go wrong. There is no guarantee that the users will stick by the designs all the time. If they do not like something, they might never visit the site again. It is difficult to please them. It is better to try and assure that there are ideally no usability issues or practically minimal and unnoticeable issues. Usability can be divided into five sub quality components: 'Learnability', 'Efficiency', 'Memorability', 'Errors' and 'Satisfaction'.

LEARNABILITY

Learnability is measured by the learning curve. The basic tasks performance should be easy in a usable design. Learnability is an important factor. Quicker the user can learn, better the design is considered which is beneficial for the application or site owner Learnability defines how easy it is to learn a system when coming across it for the first time The learning curve or learnability relies on following components:

- **Familiarity:** It means how familiar the terms used in a system are. Use of familiar metaphors is a good example for this which has been explained in chapter 2.1 User Interface design considerations.
- **Consistency**: The components in a usable system should be consistent. Consistent design results to familiarity which makes the design usable.

- **Generalizability:** It is the mixture of consistency and familiarity (not only in terms but navigation / path) in global level. It is important because people can relate the new system with the old and navigate well which increases the usability of the design. This does not mean the designed system should be a copy of the existing systems or applications.
- **Predictability:** Having familiarity, consistency and generalizability does not make a design usable. The system should be predictable. The users should be able to predict what a certain button will do or what a certain link will do or what a certain term means. For example, if there is a link that says help, users expect it to have some user manual or provide some kind of help. If instead of providing help, it takes users to products or home page, it will upset them. The designer might have come up with his own meaning of help, but this should be avoided because this will scare off the users.
- **Simplicity:** Simplicity is the key to all successful and usable designs. It is easy to make complex design but is difficult to use it and it is difficult to create a simple design but easy to use it. It is always better to have fewer features and usable application that loading it with hundreds of features too complex to use. To accomplish a simple design, focus on end users should be maintained. All users should be able to use the application at least at the basic level.

EFFICIENCY

Efficiency measures the quickness of task performance after the learning phase is completed successfully for certain features. Users should be able to accomplish the tasks they want to and get the result they expect to. It then shows if the design is usable or not.

MEMORABILITY

The ability of the design that can make user remember the features memorable after the first visit and first use is known as memorability. The frequency of use of certain system by a user might not be high; this results into forgetting how the system is used, how to navigate to desired pages. There are some simple ways of making a user remember the system.

ERRORS

Users tend to make mistakes easily but that is not important. The important part is how the errors are handled and responded. The system should address the errors and the users with a lot of patience and politeness. They tend to make mistakes because of difficult usability. If things are well predefined, people happen to make fewer mistakes. Even in case they make errors, system should gracefully handle them.

SATISFACTION

Users should not drive the system, system should drive the users. If the flow of navigation is smooth, if users get results as they expect, the use of design is pleasant and interesting. This means the site / system is usable. Users are satisfied with the design or in other words, the design is satisfactory.

3.3.2 VISUALIZATION

There are numerous numbers of websites and web applications in use today. An individual himself uses a lot and different of them in a day. Making a workable application is not enough if one wants its application's usability to increase. It is there where need for visualization comes in to work. Visualization is used to make the data and content of an application/system/site clear and presentable. Visualization does not just mean making an application or a site fancy but also making its content readable and data understandable easily. We can consider reading a big list of numbers; this might be sometimes annoying and sometimes difficult to understand. A simple graph might ease the difficulty.

3.3.3 COLORS

The use of colors in design works is a very subjective choice. The right choice of colors makes the end result look very elegant whereas a poor choice makes it look miserable. Potential end users should always be kept in mind while choosing the colors for the site/application. Human minds react to colors and thus colors are an effective story telling tools. Depending on the end users and what the selling product is, colors can be chosen. For instance, if there is an ecommerce site that sells toys and kids wear, the theme of the site can be very colorful. Even though consistency is required, mixed colors can be used in a consistent way. Bright colors such as green, pink, blue and yellow can be used. If we are considering colors for a banking site, we cannot have a wide choice of colors. The site should have very simple and neat colors. In this case, color combinations if needed, must consist only of calm colors such as blue and white, green and white, green white and black.

3.3.4 TYPOGRAPHY

Typography has almost as same effect on human perception as colors. It has power of making things strong/more important or less important. Typography includes typeface, font size, font weight, line height and spacing between letters, words and paragraphs. Typefaces carry different importance. Some are designed to have high priority such as headings and some suitable for body content. Bold letters signify importance while normal text with no styling signifies normality.

3.3.5 STRUCTURE

Structuring the pages and content boxes are as important as other styling aspects. An asymmetrical yet neat structure might represent a modern design while well and symmetric structure might be suitable for traditional users. A well-structured page layout can be obtained using margins and position of the content holder. A neat and simple structure is always appreciated. Users should always be considered when making unusual design choices.

CHAPTER 4: IMPLEMENTATION, TESTING AND MAINTENANCE

4.1 INTRODUCTION TO LANGUAGES, TOOLS AND TECHNOLOGIES USED

4.1.1 ADOBE PHOTSHOP

Adobe Photoshop is a raster graphics editor developed and published by Adobe Inc. for Windows and macOS. It was originally created in 1988 by Thomas and John Knoll. Since then, this software has become the industry standard not only in raster graphics editing, but in digital art as a whole. The software's name has thus become a generic trademark, leading to its usage as a verb (e.g. "to photoshop an image", "photoshopping", and "photoshop contest") although Adobe discourages such use. Photoshop can edit and compose raster images in multiple layers and supports masks, alpha compositing, and several color models including RGB, CMYK, CIELAB, spot color, and duotone. Photoshop uses its own PSD and PSB file formats to support these features. In addition to raster graphics, this software has limited abilities to edit or render text and vector graphics (especially through clipping path for the latter), as well as 3D graphics and video. Its feature set can be expanded by plug-ins; programs developed and distributed independently of Photoshop that run inside it and offer new or enhanced features.

Photoshop's naming scheme was initially based on version numbers. However, in October 2002 (following the introduction of Creative Suite branding), each new version of Photoshop was designated with "CS" plus a number; e.g., the eighth major version of Photoshop was Photoshop CS and the ninth was Photoshop CS2. Photoshop CS3 through CS6 were also distributed in two different editions: Standard and Extended. With the introduction of the Creative Cloud branding in June 2013 (and in turn, the change of the "CS" suffix to "CC"), Photoshop's licensing scheme was changed to that of software as a service rental model. Historically, Photoshop was bundled with additional software such as Adobe ImageReady, Adobe Fireworks, Adobe Bridge, Adobe Device Central and Adobe Camera RAW.

Alongside Photoshop, Adobe also develops and publishes Photoshop Elements, Photoshop Lightroom, Photoshop Express, Photoshop Fix, Photoshop Sketch and Photoshop Mix. Adobe also

plans to launch a full version of Photoshop for the iPad in 2019. Collectively, they are branded as "The Adobe Photoshop Family".

PHOTOSHOP TOOLS:

Upon loading Photoshop, a sidebar with a variety of tools with multiple image-editing functions appears to the left of the screen. These tools typically fall under the categories of drawing; painting; measuring and navigation; selection; typing; and retouching. Some tools contain a small triangle in the bottom right of the toolbox icon. These can be expanded to reveal similar tools.While newer versions of Photoshop are updated to include new tools and features, several recur.

- **Pen tool**: Photoshop includes a few versions of the pen tool. The pen tool creates precise paths that can be manipulated using anchor points. The free form pen tool allows the user to draw paths freehand, and with the magnetic pen tool, the drawn path attaches closely to outlines of objects in an image, which is useful for isolating them from a background.
- **Clone stamp tool:** The Clone Stamp tool duplicates one part of an image to another part of the same image by way of a brush. The duplication is either in full or in part depending on the mode. The user can also clone part of one layer to another layer. The Clone Stamp tool is useful for duplicating objects or removing a defect in an image.
- **Shape tools:** Photoshop provides an array of shape tools including rectangles, rounded rectangles, ellipses, polygons and lines. These shapes can be manipulated by the pen tool, direct selection tool etc. to make vector graphics. In addition, Photoshop provides its own shapes like animals, signs and plants.
- **Measuring and navigation:** The eyedropper tool selects a color from an area of the image that is clicked, and samples it for future use. The hand tool navigates an image by moving it in any direction, and the zoom tool enlarges the part of an image that is clicked on, allowing for a closer view.
- **Selection tools:** Selection tools are used to select all or any part of a picture to perform cut, copy, edit, or retouching operations.
- **Cropping**: The crop tool can be used to select a particular area of an image and discard the portions outside the chosen section. This tool assists in creating a focus point on an image and unnecessary or excess space. Cropping allows enhancement of a photo's composition while decreasing the file size. The "crop" tool is in the tool’s palette, which is located on the

right side of the document. By placing the cursor over the image, the user can drag the cursor to the desired area. Once the Enter key is pressed, the area outside the rectangle will be cropped. The area outside the rectangle is the discarded data, which allows for the file size to be decreased. The "crop" tool can alternatively be used to extend the canvas size by clicking and dragging outside the existing image borders.

- **Slicing:** The "slice" and slice select tools, like the crop tool, are used in isolating parts of images. The slice tool can be used to divide an image into different sections, and these separate parts can be used as pieces of a web page design once HTML and CSS are applied. The slice select tool allows sliced sections of an image to be adjusted and shifted.
- **Moving:** The move tool can be used to drag the entirety of a single layer or more if they are selected. Alternatively, once an area of an image is highlighted, the move tool can be used to manually relocate the selected piece to anywhere on the canvas.
- **Marquee: T**he marquee is a tool that can make selections that are single row, single column, rectangular and elliptical. An area that has been selected can be edited without affecting the rest of the image. This tool can also crop an image; it allows for better control. In contrast to the crop tool, the "marquee" tool allows for more adjustments to the selected area before cropping. The only marquee tool that does not allow cropping is the elliptical. Although the single row and column marquee tools allow for cropping, they are not ideal, because they only crop a line. The rectangular marquee tool is the preferred option. Once the tool has been selected, dragging the tool across the desired area will select it. The selected area will be outlined by dotted lines, referred to as "marching ants". To set a specific size or ratio, the tool option bar provides these settings. Before selecting an area, the desired size or ratio must be set by adjusting the width and height. Any changes such as color, filters, location, etc. should be made before cropping. To crop the selection, the user must go to image tab and select crop.
- **Lasso**: The lasso tool is similar to the "marquee" tool; however, the user can make a custom selection by drawing it freehand. There are three options for the "lasso" tool – regular, polygonal, and magnetic. The regular "lasso" tool allows the user to have drawing capabilities. Photoshop will complete the selection once the mouse button is released. The user may also complete the selection by connecting the end point to the starting point. The "marching ants" will indicate if a selection has been made. The "polygonal lasso" tool will

draw only straight lines, which makes it an ideal choice for images with many straight lines. Unlike the regular "lasso" tool, the user must continually click around the image to outline the shape. To complete the selection, the user must connect the end point to the starting point just like the regular lasso tool. "Magnetic lasso" tool is considered the smart tool. It can do the same as the other two, but it can also detect the edges of an image once the user selects a starting point. It detects by examining the color pixels as the cursor move over the desired area. Closing the selection is the same as the other two, which should also should display the "marching ants" once the selection has been closed.

- **Quick selection:** The quick selection tool selects areas based on edges, similarly to the magnetic lasso tool. The difference between this tool and the lasso tool is that there is no starting and ending point. For this reason, the selected area can be added onto as much as possible without starting over. By dragging the cursor over the desired area, the quick selection tool detects the edges of the image. The "marching ants" allow the user to know what is currently being selected. Once the user is done, the selected area can be edited without affecting the rest of the image. One of the features that makes this tool especially user friendly is that the SHIFT key is not needed to add more to the selection; by default, extra mouse clicks will be added to the selection rather than creating a new selection.
- **Magic wand:** The magic wand tool selects areas based on pixels of similar values. One click will select all neighboring pixels of similar value within a tolerance level set by the user. If the eyedropper tool is selected in the options bar, then the magic wand can determine the value needed to evaluate the pixels; this is based on the sample size setting in the eyedropper tool. This tool is inferior to the quick selection tool which works much the same but with much better results and more intuitive controls. The user must decide what settings to use or if the image is right for this tool.
- **Eraser:** The Eraser tool erases content based on the active layer. If the user is on the text layer, then any text across which the tool is dragged will be erased. The eraser will convert the pixels to transparent, unless the background layer is selected. The size and style of the eraser can be selected in the options bar. This tool is unique in that it can take the form of the paintbrush and pencil tools. In addition to the straight eraser tool, there are two more available options – background eraser and magic eraser. The background eraser deletes any part of the image that is on the edge of an object. This tool is often used to extract objects

from the background. The magic eraser tool deletes based on similar colored pixels. It is very similar to the magic wand tool. This tool is ideal for deleting areas with the same color or tone that contrasts with the rest of the image.

4.1.2 BOOTSRAP

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation and other interface components.

Bootstrap is the third-most-starred project on GitHub, with more than 131,000 stars, behind only freeCodeCamp (almost 300,000 stars) and marginally behind Vue.js framework. According to Alexa Rank, Bootstrap getbootstrap.com is in the top-2000 in US while vuejs.org is in top-7000 in US.

FEATURES:

Bootstrap is a web framework that focuses on simplifying the development of informative web pages (as opposed to web apps). The primary purpose of adding it to a web project is to apply Bootstrap's choices of color, size, font and layout to that project. As such, the primary factor is whether the developers in charge find those choices to their liking. Once added to a project, Bootstrap provides basic style definitions for all HTML elements. The end is a uniform appearance for prose, tables and form elements across web browsers. In addition, developers can take advantage of CSS classes defined in Bootstrap to further customize the appearance of their contents. For example, Bootstrap has provisioned for light- and dark-colored tables, page headings, more prominent pull quotes, and text with a highlight.

Bootstrap also comes with several JavaScript components in the form of jQuery plugins. They provide additional user interface elements such as dialog boxes, tooltips, and carousels. Each Bootstrap component consists of an HTML structure, CSS declarations, and in some cases accompanying JavaScript code. They also extend the functionality of some existing interface elements, including for example an auto-complete function for input fields.

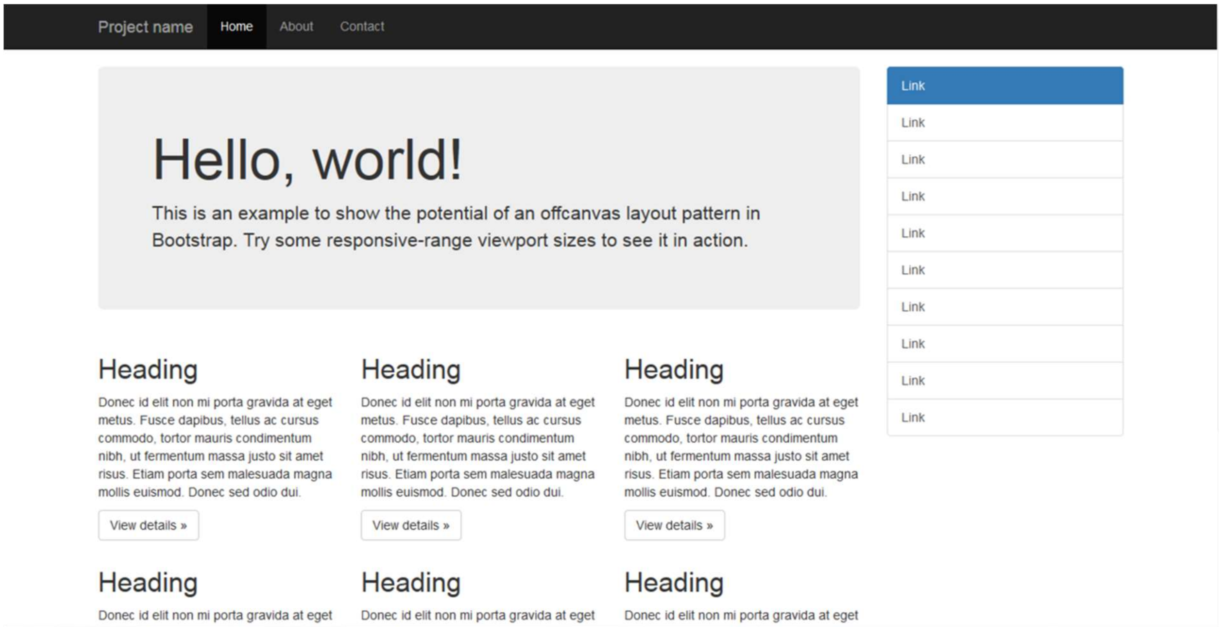


Figure 5 Bootstrap Rendered Webpage Example

The most prominent components of Bootstrap are its layout components, as they affect an entire web page. The basic layout component is called "Container", as every other element in the page is placed in it. Developers can choose between a fixed-width container and a fluid-width container. While the latter always fills the width of the web page, the former uses one of the four predefined fixed widths, depending on the size of the screen showing the page:

- Smaller than 576 pixels
- 576–768 pixels
- 768–992 pixels
- 992–1200 pixels
- Larger than 1200 pixels

Once a container is in place, other Bootstrap layout components implement a CSS grid layout through defining rows and columns.

A precompiled version of Bootstrap is available in the form of one CSS file and three JavaScript files that can be readily added to any project. The raw form of Bootstrap, however, enables developers to implement further customization and size optimizations. This raw form is modular, meaning that the developer can remove unneeded components, apply a theme and modify the uncompiled Sass files.

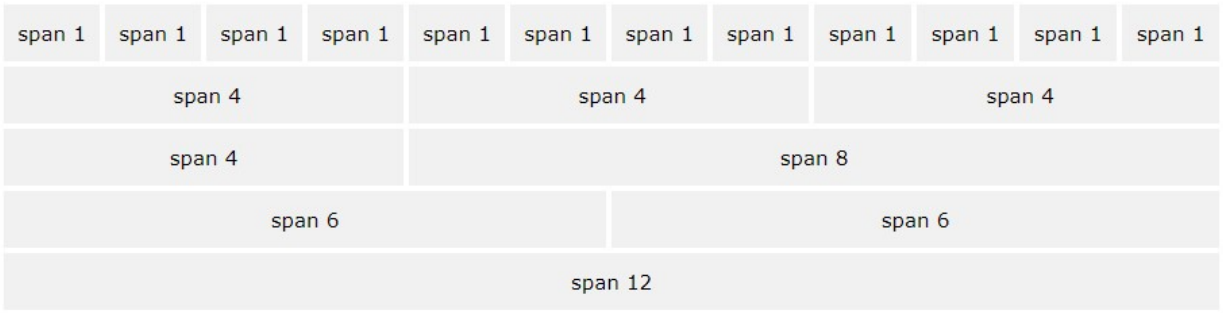


Figure 6 Grid Layout

4.2 TESTING TECHNIQUES AND TEST PLANS

Testing is one of the most important parts of any application design and implementation. It can be divided into two main sections: User Interface Testing and Functionality Testing. But before going through them, it is very important to know the main need for testing and what kind of tests do we need to carry out in order to assure the quality. The main aim of testing is quality assurance for a bug and usability issue free application/system. The other need of testing an application before it is in use for all is to be cost effective. The issues found in application untested in early phases are expensive to resolve than those found and resolved before publishing. A tested solution with known issues is always better than untested ones without problems. Untested solution will eventually come up with issues that were unknown earlier. To carry out successful testing, a proper test plan is needed. Some sort of process is needed to make sure all components have been tested and tested effectively.

4.2.1 USER INTERFACE TESTING

User interface testing is about testing the application interface via user's point of view. User interface testing mainly includes testing the overall appearance (look and feel) and the sequential navigational flow of the system. There is still some detailed testing that should be done to assure not broken and issue proof interface. The main aspects that should be minutely tested are navigation, browsers compatibility and layout and content. They are described below:

- **Navigation Testing**: During navigation testing, all links of the design layout must be clicked and checked that no page is orphaned (page which does not have links in other pages to be redirected to it). It is of no point to have information in a page which cannot be accessed by any links of the entire system. Thus, it should be checked many times by the designer and

representative users that there is no such things found. It should also be checked that there is no dead end (dead end - no option to go back to previous page or any other page). If this happens, this might irritate the users and there are chances that they will never revisit or use the system.

- **Layout and Content Testing:** The other important thing to test is that designed layout fits in well with the functional logic of the system. After unit tests have been passed, integrated tests should be run to make sure all the functional logic just fits right with layout and content. In layout tests, the things needed to be tested are page structure – margins and position, color and font compatibility, color combinations, general appearance and all other similar aspects. No attribute should be left untested.
- **Browsers and Device Compatibility Testing**: A web solution should always be working in different environments particularly in different browsers and different devices. Application should be tested in different browsers available and it should be made sure that it works in all of them. It should be tested in the browser which only supports minimum new features. In any case if the test fails, alternative pages for the web document, with minimal features in them as well, should be made available. The user should not be made disappointed but an alternative should be given.

4.2.2 FUNCTIONALITY TESTING

Functionality testing shows how well the logic of the application works. Developing an application is not enough. We need to know how well it works already before the real users start to use the application. It is more of a quality assurance process. It checks of it meets all the specified functional requirements in the Specification/Requirement document. There is a list of tests to be done in order to confirm that the application works perfectly. They are Links Accessibility Testing, Forms Field Validation Testing, Cookies and Session Testing, Server Communication Testing, Security Testing, Database Testing and Performance and Stress Handling Testing. They all are described below:

- **Links Accessibility Testing:** All links available in the application should be tested thoroughly. It should be tested that there is no dead end, no orphan page and no broken links [35]. All hyperlinks, buttons, image links, map links, links within the system and all external links if used any should be tested. No links should be left untested. All of them should be accessible.

- **Forms Field Validation and Features Testing**: Forms like registration form and login form should be validated so that user does not input harmful or wrong inputs. Example email addresses during registration can be validated using regular expression. The idea is to avoid all possible troubles that can be caused by possible user error.
- **Server Communication Testing**: Application is uploaded to the server and published. When user performs a task on the interface, it should get response to it i.e. user interface, application server and database server are communicating. If not, there must be some connection issues which must be checked and fixed.
- **Performance and Stress Handling Testing**: Performance testing includes tests which checks how a system or an application performs at the time of load [35;33]. This can be tested by running the applications with different connection speeds and see if it works well on all of them. If not, modifications should be made such that it works on both high and low extreme situations usually creating alternative solution. It can also be tested using a lot of users to work on the application/site at the same time and see how results come out to be like.

4.2.3 TESTING PROCESS DESIGN

There are several ways and to test an application. The basic idea remains the same; how to test all aspects of the application. Following the simple steps can make the testing process smooth and successful. Testing process does not go one after another; there can be parallel tests ongoing along with development and other tests. Testing process design is a well-documented design plan containing way on how to proceed with testing or in other ways how to test the created solution. Main steps are described below:

- **Planning:** Planning is a very important step in testing process. It determines how much in flow the whole process goes. Test process design with improper planning lead to failing applications. There are certain elements which should be planned before moving to actual tests
    - use cases
    - user representative
    - user observation
    - questionnaires

    - interviews
    - surveys
- **Unit testing**: Unit testing includes testing the features and functional logic of application usually during development process. Smallest block of functionalities and features of the application are isolated from other functionalities and features and tested separately and seen how they work individually. They should be able to perform alone to pass the tests.
- **Interface testing**: This testing includes testing the user interface of the application.
- **Integration testing**: Features and functionality of the application are combined together. All blocks tested in unit testing are put together to see if they merge well. The integration of the elements should work as well as they did alone. User Interface design is also merged with logical aspect and checked if they work. Integration testing helps confirm the working wholeness of the application.
- **Documenting and analyzing:** It is equally important to document and analyze the result as it is to test the application's usability and study user's behavior. The documented reports help not to forget what the results were and to analyze them and use in issues solving. The documents can also be used for future referencing as a base for design improvement. There are different ways of keeping the record of user studies and test results. User observation and interviews can be either audio recorded or audio and video recorded. It is also possible to use simple paper and pen (or electronic notebooks) to take notes. The questionnaires and surveys can be saved as they are received.
- **Issues Fixing**: Issues fixing is not directly part of testing process but is indirectly related to it. When tests are done, results might have some bugs or implementation issues which should be fixed in order to get the application fault proof. After the fix, tests are iterated. This kind of forms a connected cycle. Issues fixing is thus considered as an indirectly connected part of test process as without it, testing cannot get the right pace.

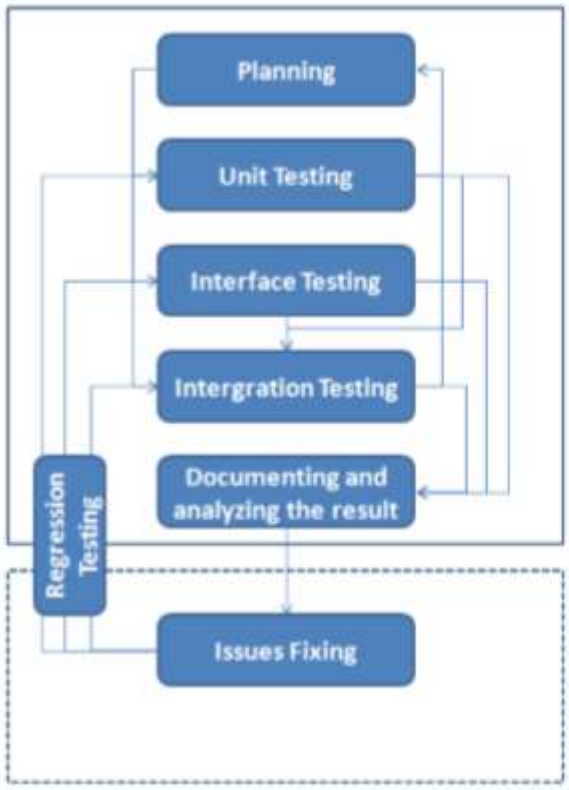


Figure 7 Testing processes

4.2.4 TESTING TOOLS

Testing is a complicated, stressing and time-consuming process. It is easier to test a web application for different components using some automated tools that will make things simpler. There are different kinds of options available. They are also classified into different categories according to test needs. Some of important tools with examples of available tools in market are as follow:

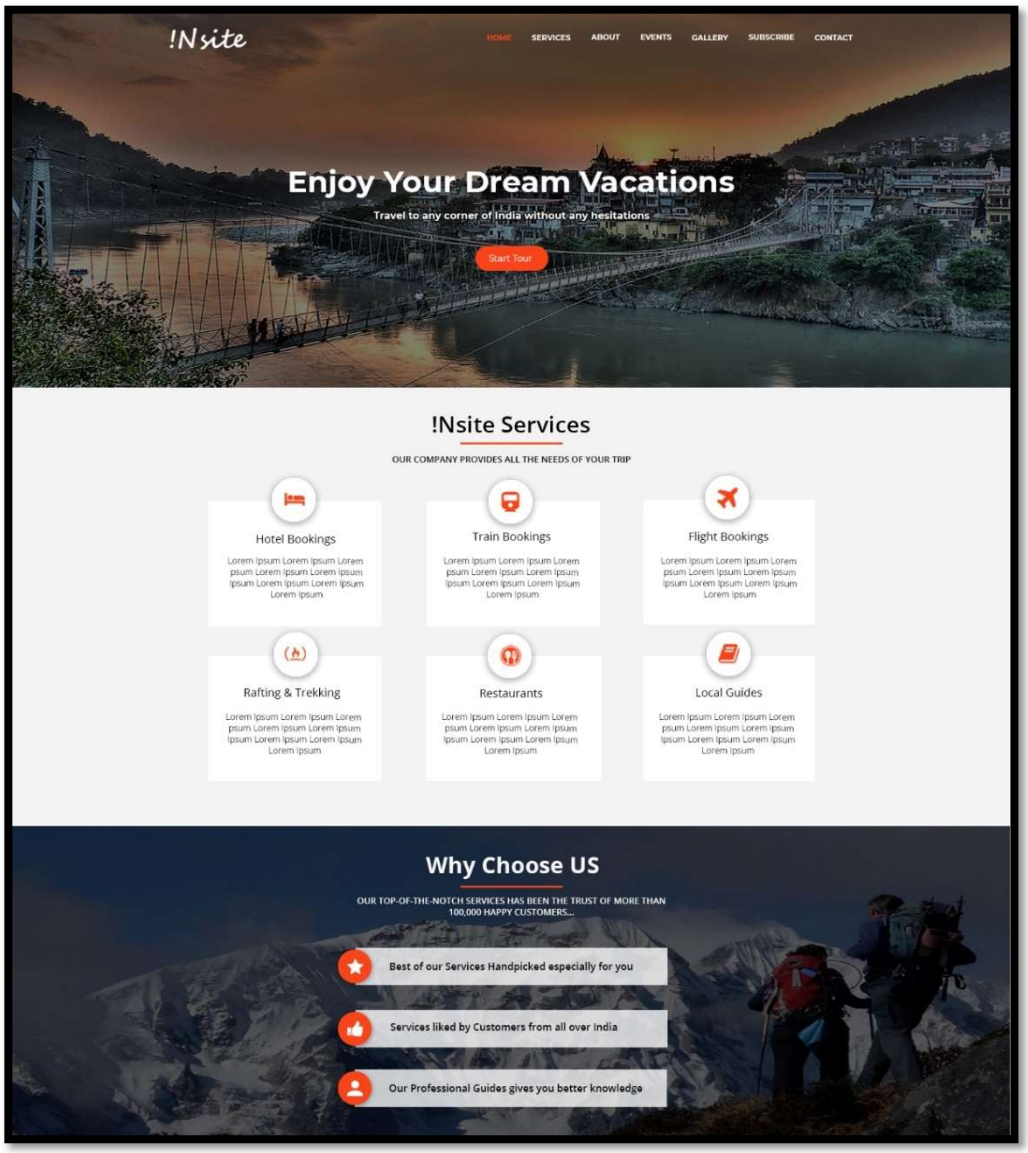
- Load and Performance Test Tools – This tool tests load handling and performance of the application. Example tools in market: Telerik Test Studio, HttpRider, Loadtracer, AppViewWeb.
- Link Checkers – This tool checks that there are no orphan pages in the application. Example tools in market: W3C Link Checker, LinkScan.
- HTML Validators – It validates html tags and CSS. Example tools in market: W3C Markup validator, Site Check, Html Validator, WDG HTML Validator.

- Cross-browser Testing Tools – It checks browser compatibility. Example tools in market: CrossBrowserTesting, TestingBot.
- Web Functional/Regression Test Tools – It helps in functional aspects testing and in regression testing as suggested by its name. Example tools in market: Jubala, FuncUnit.
- Web Site Security Test Tools – It tests security issues. Example tools in market: Vega, Seeker.

CHAPTER 5: RESULTS AND DISCUSSIONS

5.1 USER INTERFACE REPRESENTATION

The user interface representation of the project is described as follows. The Template/ wireframe for the website has been designed using Adobe Photoshop CC 2019. Various elements and sources has been used for designing it. Appropriate color scheme and visually nice typography has been used to enhance look and improve the overall user-experience of the website.



First Half of the Template Designed Using Adobe Photoshop

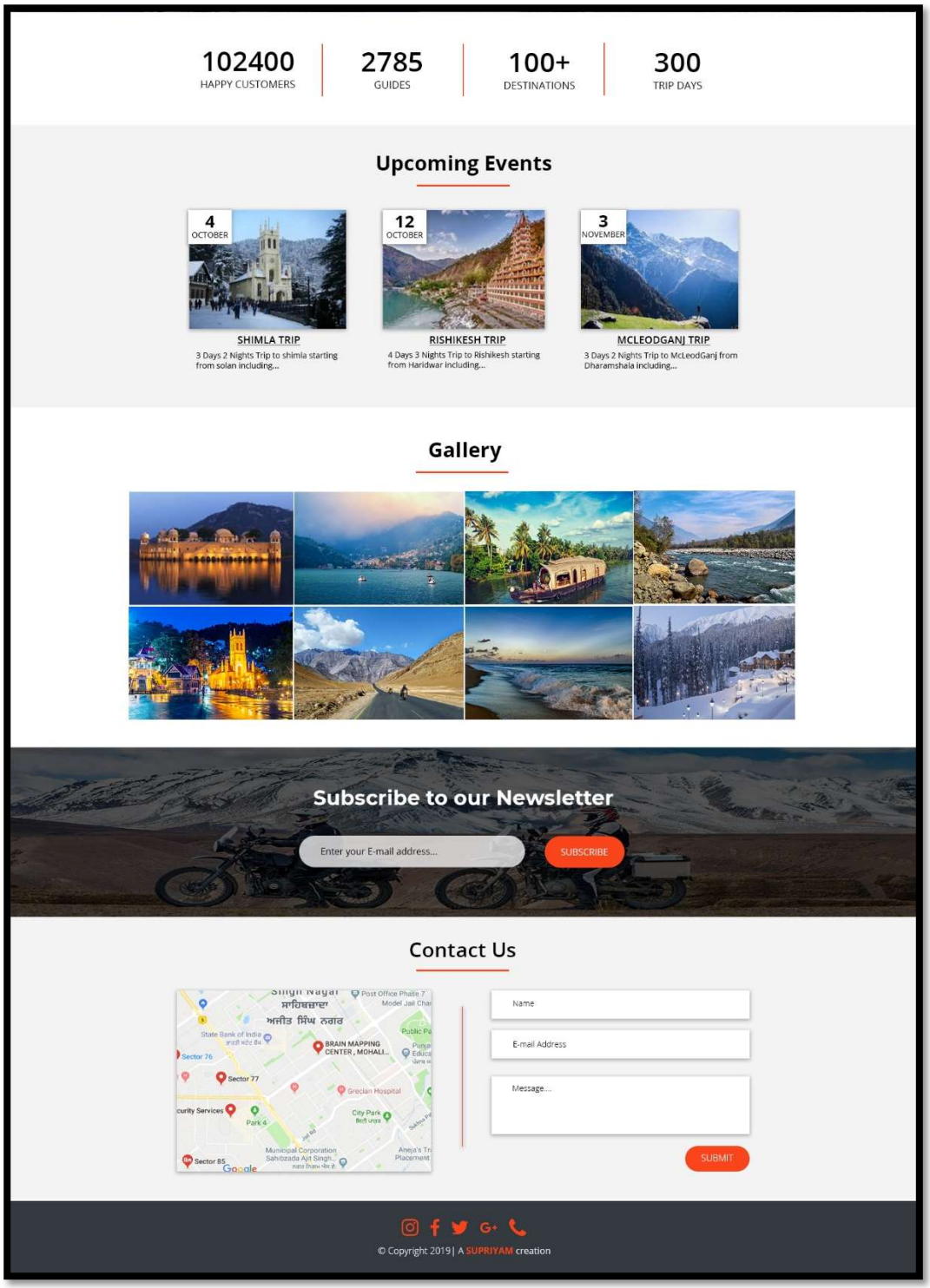


Figure 8 Website Final Template

Second Half of the Template Designed Using Adobe Photoshop

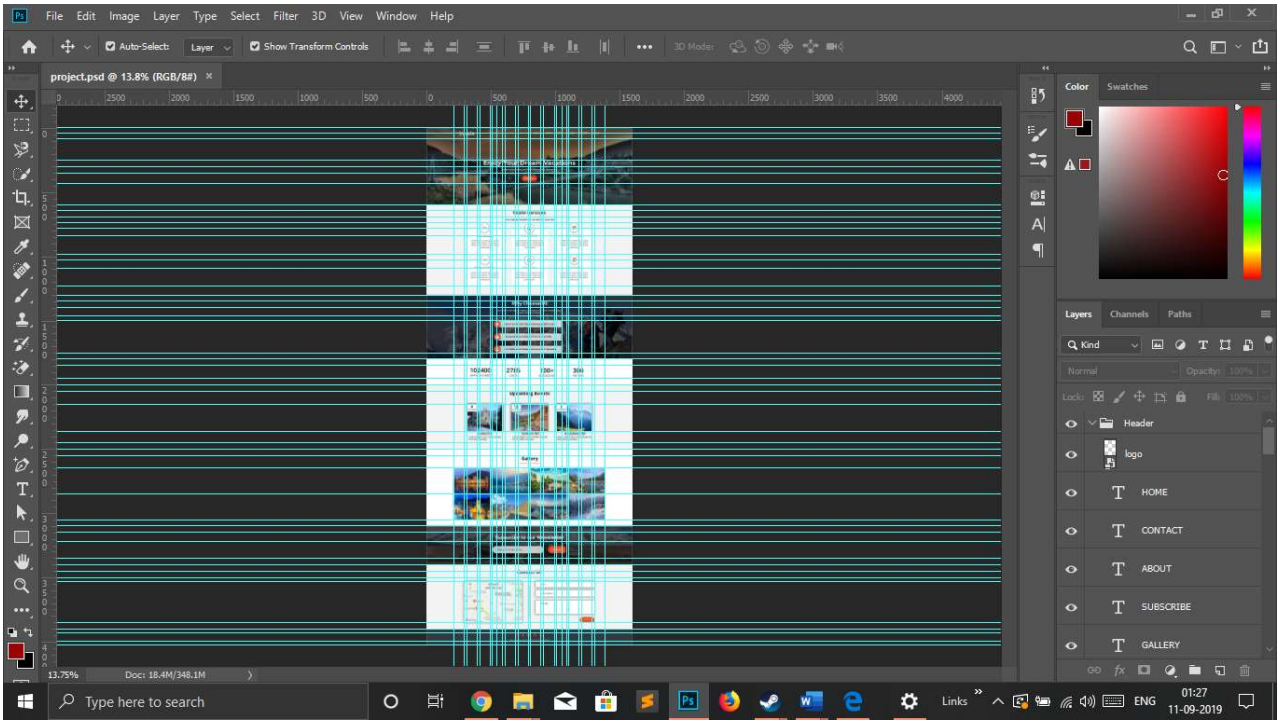


Figure 9 Adobe Photoshop

A snapshot of the Adobe Photoshop Interface Made using Adobe Photoshop along with all the Guidelines and display of tools used.

5.1.1 BRIEF DESCRIPTION OF VARIOUS MODULES OF THE SYSTEM

A brief description of various modules of the system has already been done in chapter 4.1.1 of this report.

5.2 SNAPSHOTS OF SYSTEM WITH BRIEF DETAIL OF EACH

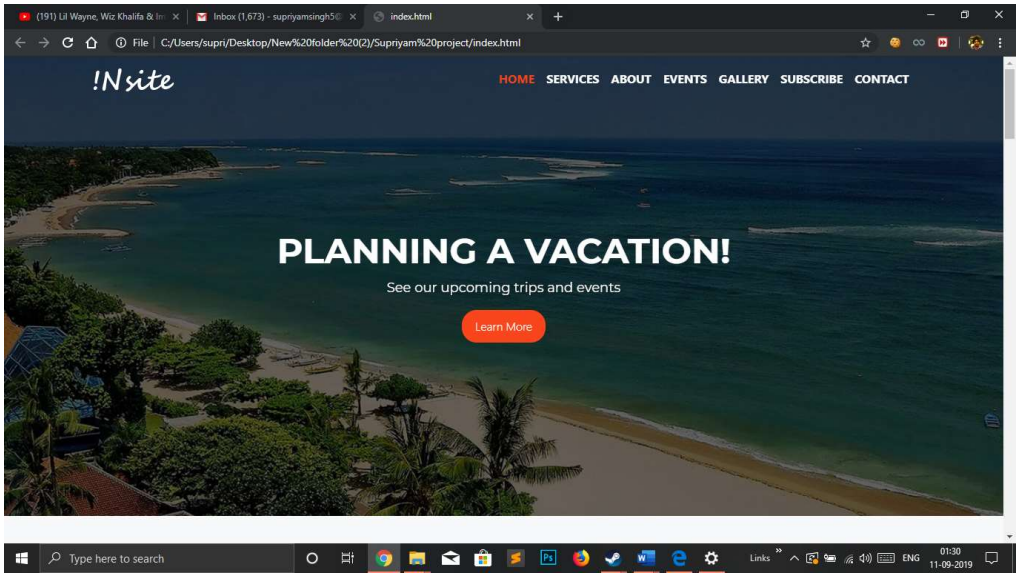
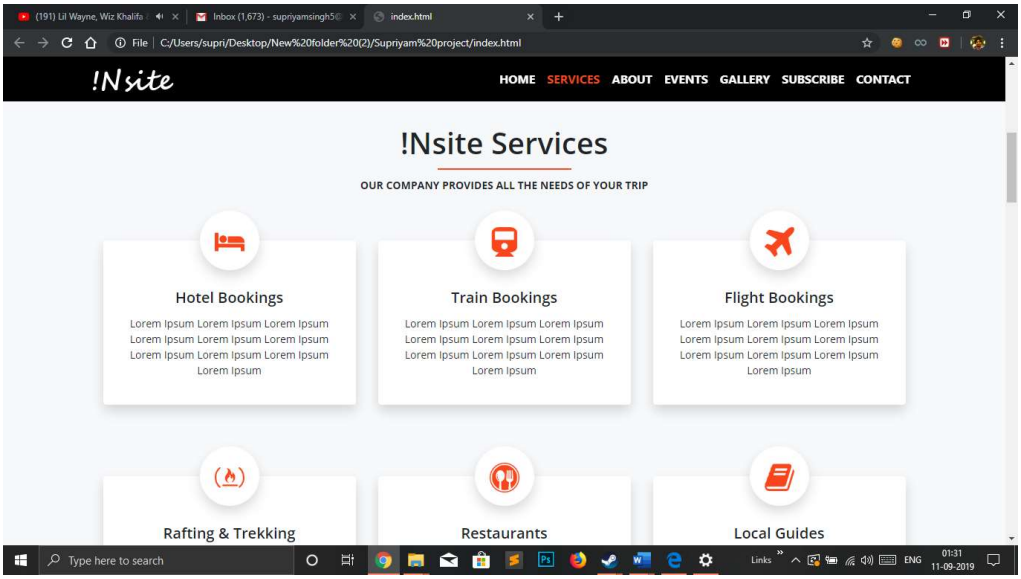
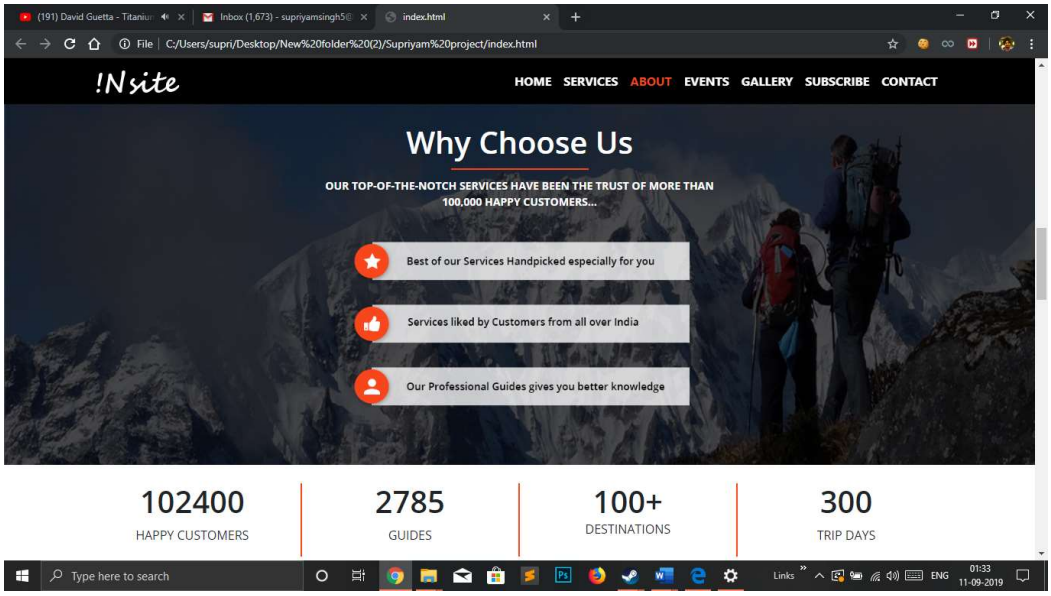


Figure 10.1 Website Implemented in browser

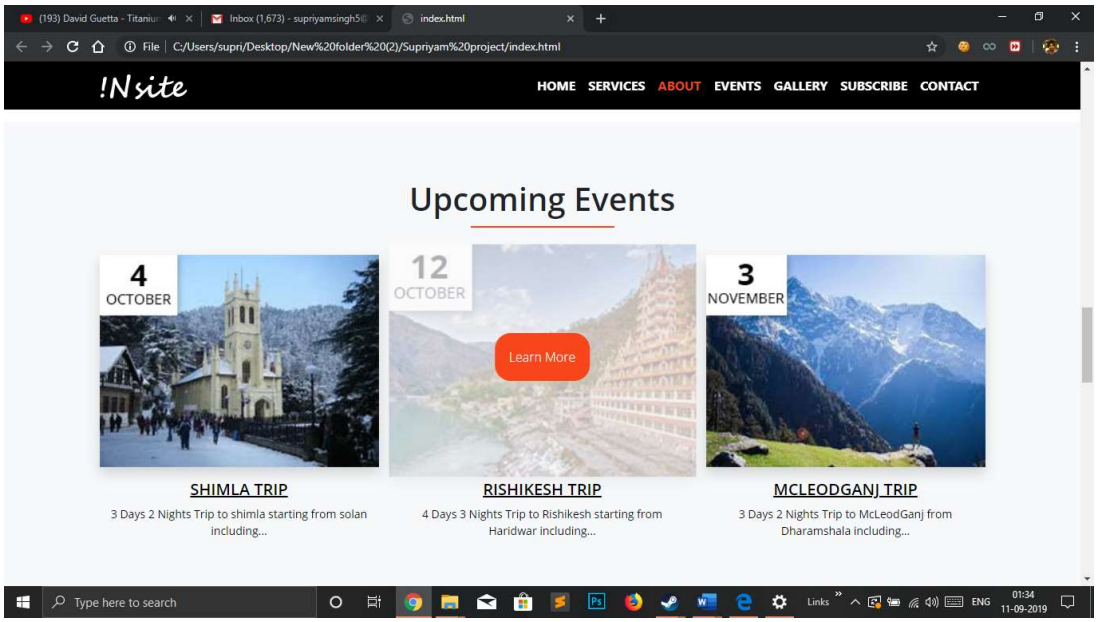
This the home page of our designed website. It has used various bootstrap elements like carousel, scrollspy buttons. The navbar changes its color to black as soon as it leaves top position. Also there is orange color for font which indicates active portion of the screen.



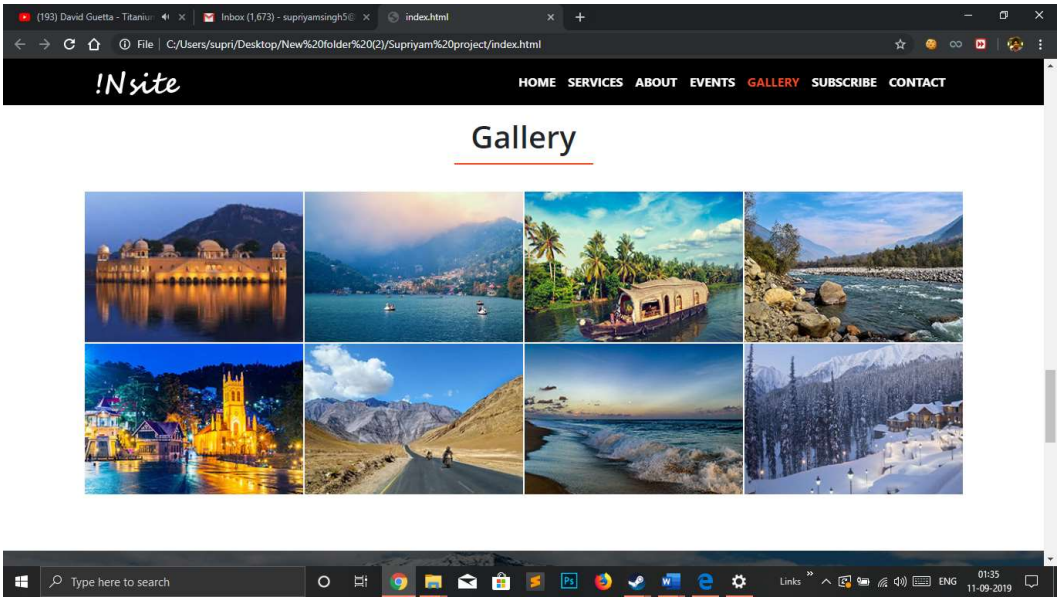
This is the Services section of our website. It has used elements like cards and various custom css. The icons used has been embedded using html and is pure responsive.



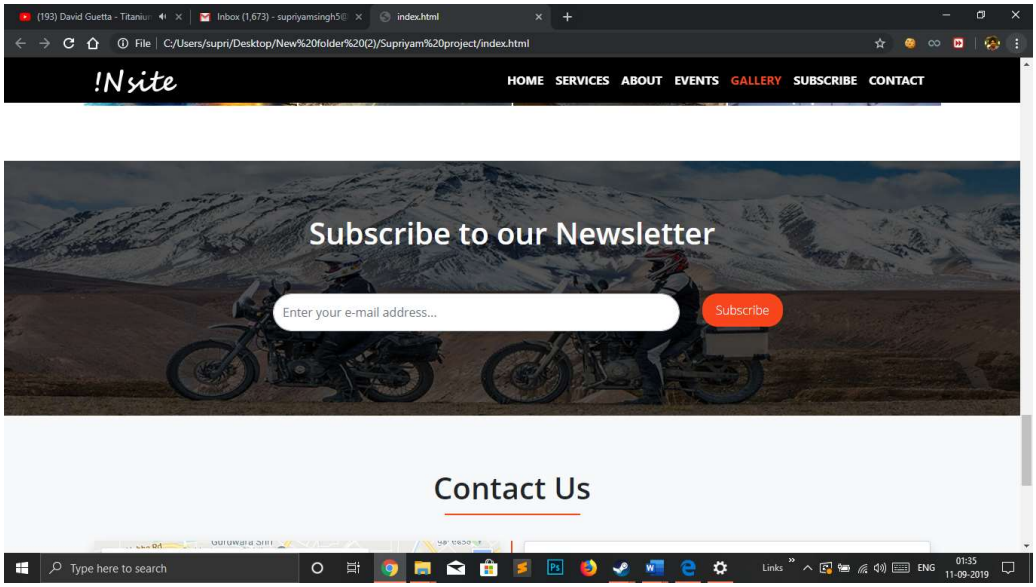
This is the About section of my website. It has elements like cards, background jumbotron. The about in navbar has been turned to orange because it is current active section. Also the Stats portion is Dynamic and Counter has been created with the use of basic jQuery.



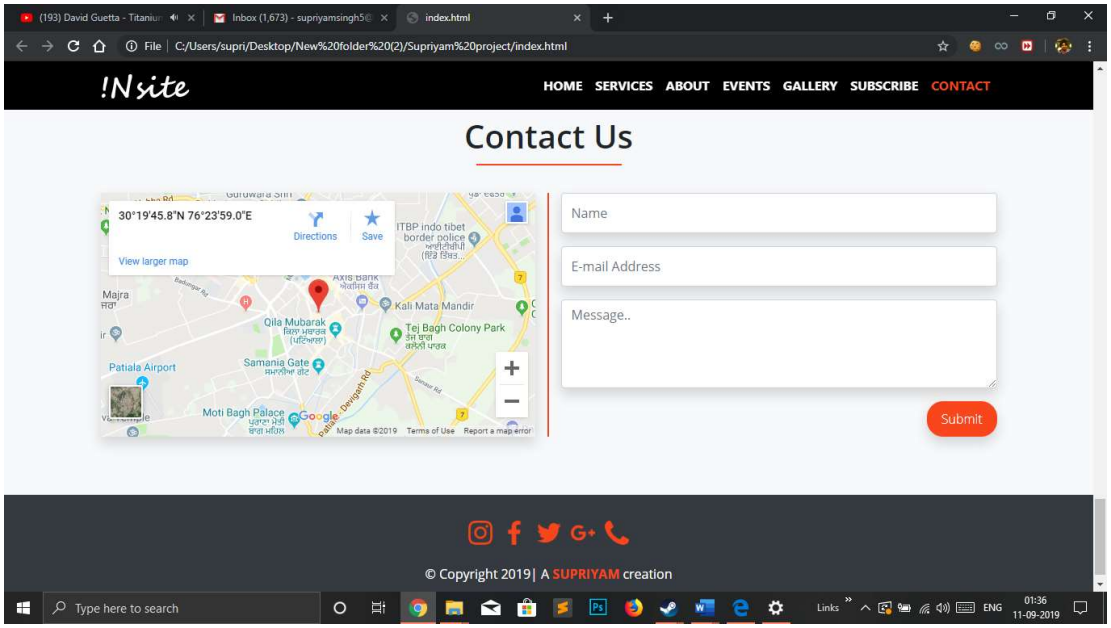
This is the Event Section of my website of my website. It has Hyperlinks to different portions of website and it has hover to zoom attribute that highlights the current active portion.



The Gallery Section of my website. It contains different images from different sources and made to look immersive. It is completely responsive and is optimized for smaller screens.

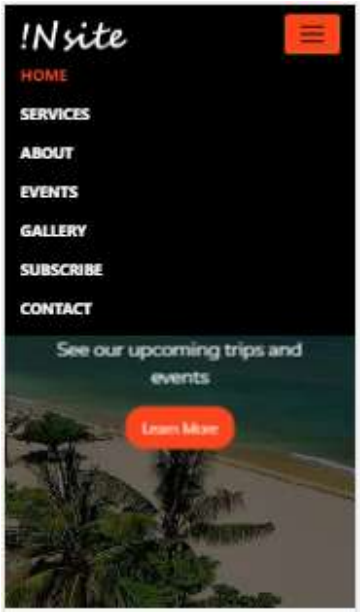


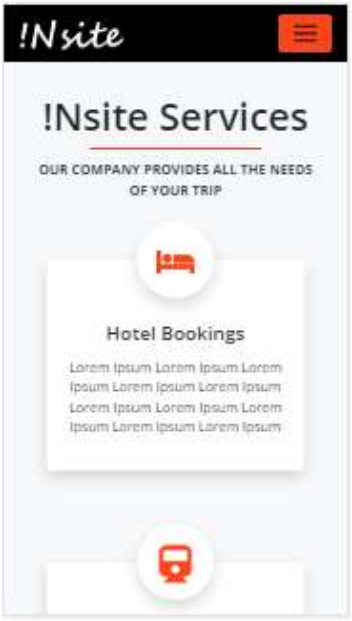
This is the Subscribe portion of our website. Here user can enter his email and submit to get regular updates about our website. This field is validated and cannot be empty.



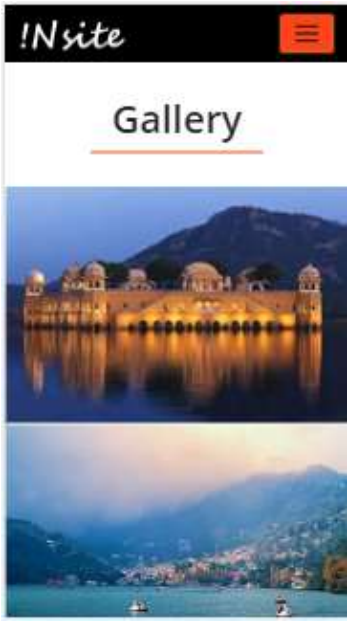
This is the Contact portion of my website. This has a map on left side which is embedded using iframe and works easily. User can directly click on get directions and it will give the shortest route to our office. The right portion is a question forum. Here user can enter his contact details and leave his message and submit his query. And we can contact using his email id.

Responsive mode of website (Mobile Mode):





This is the mobile version of our website. It is fully responsive and adjusts its elements perfectly according to the screen width. The carousel slideshow has been fitted accordingly toadjust center view. The navbar has been converted into an intuitive menu. The various services card has broken into multiple lines and similarly events and gallery has been optimized.



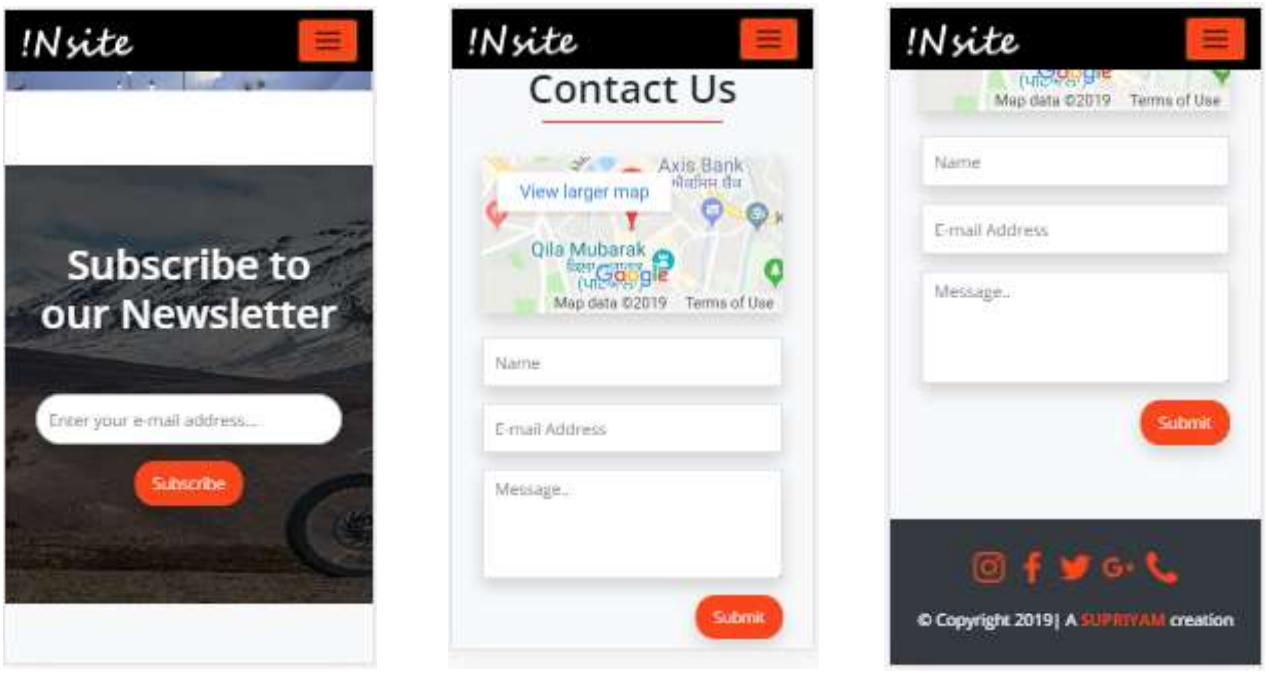


Figure 11 Responsive Website

The contact form has been optimized so as the map so that it fits screen perfectly. The footer of our website directly takes you to respective app that is installed in your website.

CHAPTER 6: CONCLUSION AND FUTURE SCOPE

10.1 CONCLUSION

The project work was done to see how user interface design and implementation process can be benefitted to create a usable design. For web aspects, BOOTSTRAP framework was used with Adobe Photoshop and other sources for ideas and inspirations.

The use of Bootstrap Framework and Adobe Photoshop for main application made it easier to build the application with its inbuilt functions. The process became smooth after understanding the Framework and its elements. During the application development, use of Bootstrap framework was also studied and so was Adobe Photoshop. Help for using these elements was provided by company personnel and.

The final product for the thesis was not the final product of the website. The other versions will be done in the future and they are ongoing at the moment. The thesis provides the users with the idea of how the final application and functionality will be like. The application possesses business value for the company.

Using the interface design elements helped much in accomplishing the goals decided for the project. It broke down tasks in small pieces making it easier to read and do. The overall project was successful. Designing interface is not an easy job but not as difficult when right processes and methods are used.

10.2 FUTURE SCOPE

As no website is perfect so there are certain amendments in every website with passage of time, so there is a big need for the updates in it. Certain modules and features which are to be added are

- Better User Interface Designs will be introduced, which will enhance the performance of the application.
- Generalized version can be formed in which services will not be limited to a single Filling station.
- Programmers are successfully working with a virtual Document Object Model (DOM) that increases performance and makes the user experience better.

- Tools like GitHub, TypeScript, and Grunt enhance and automate the web development workflow.
- Developers can use flexible and declarative JavaScript library to build a hierarchy of interactive user interface components.
- Angular JS, Backbone, Foundation, and Bootstrap offer responsive HTML, grid, and CSS UI elements, code snippets, and templates that ensure the interface of any website looks great, irrespective of device type.

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5. https://www.cdac.in/
6. https://www.w3schools.com/bootstrap4/default.asp
7. https://coolors.co/
8. https://dribbble.com/