Human Computer Interaction and Design

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1. Introduction

In today's generation the technology is advancing exponentially. Computer science and technology are being used in most of the part of the society. Due to this the industries have change at huge rate. Many technologies at small scales have made the life much easier. In this report we have discussed a similar example of technology. Here we will see how the smart gym has made the lifestyle easy and convenient.

2. Background

In this report, the human-computer interaction is shown. Here the gym is computerized, where the users can interact with the system while working out. The system will provide the sequence of different exercises which will be followed by the users. The system consists of a large screen that will display the sequence of the exercise that needs to be performed. The sequences will be time monitored. Users will have to perform the exercise with a given amount of time. This system is implemented in the companies to have a better health environment to create good ethics within the companies.

Here we have basically discussed the prototype of the smart gym application. This smart gym can be installed at homes. This system will be connected to the server where users can perform live classes. This application contains the data tracking which helps user to have the idea of the initial and final stage of their goals. Users can take help of the live sessions that are connected to the server. These live sessions are conducted by the trained instructors'.

2.1 Processes and Frameworks for Interaction Design

There are different frameworks and procedures which are formulated only for effective and accurate interaction designing. Here in this case, for making this smart gym application it is highly recommended and important for following a specific and significant process and frameworks regarding the interaction design. The main reason behind incorporation of these items is to have effective medium of communication among the application as well as the user Her in this case, three different interaction designing frameworks have been utilized, such as the user centered design, goal-oriented design as well as participatory design; all of these are discussed briefly in the following section:

User Centered Design

In design process of the application there is several process in which it is important to understand the actual need of the user (Lyon, 2016). In User Centered Design framework the designer's main focus is on the basic need of the user. Each design process considers the need of the user and different strategies are planned to fulfill the need. This design process generates highly efficient user interface which makes the product more accessible for the users. The User Centered Design process is an iterative process which makes it more efficient. The most important part of the design process is to understand the user in more effective way. There are many ways in which the proper understanding can be achieved. The User Centered Design uses iterative methods to find and understand the user need in order to design the application interface. The process of the user centered design is divided into different phases. And each iteration process in design is further divided into different phases. In first phase the need of using the application is understood i.e. for what purpose the users are using the application. Then the requirement of the user is specified. After this process the designing start that focuses on developing the solution of the user's problems and requirement. After the designing the evaluation phase comes. This phase asses the outcome of the design processes. These phases are then followed repeatedly until there is a satisfactory result to the requirement.

Goal-oriented Design

This design process is mainly centered to the analysis of the large amount of user satisfaction from same application interface (Fischer, 2017). It helps when the interface is going to be used on a large scale. The Goal-oriented Design process involves six different step or process to design a required interface. The process of the Goal-oriented Design involves research data from the users, analysis of the requirements of the user, etc. The Goal-oriented Design involves three primary steps that are Investigation Phase, Framework Phase, and Design & Development Phase. The investigation phase are further divided into three different phase i.e. research, modeling, and requirement analysis. In research phase the users are interviewed according to their requirement. These research analyses are used to create a model. Then after this the requirement analysis is done. The analysis includes the need of the user and which functionality is required by the users. The second phase of design is the framework phase in which the layout of the application is

designed. This helps in overall development of the application and the also helps in formulating the future plan. The framework design is responsible in depicting the relation between the elements which are designed in the application. The next phase is of design and development phase. In designing the application, all the details are required for the development of the interface. For the development process the coding is required. These coding is done on the basis of the specification provided.

Participatory Design

The Participatory Design process involves the users in the designing process. This process of designing is also termed as cooperative design process (Duque*et al.*, 2019). This process focuses both on the initial phase of the design process as well as the further development of the application. The Participatory Design process involves all the stakeholders such as customers, employees, partners, citizens, consumers, etc. The involvements of the stakeholder help the designers to understand and to have better idea about the application that is being developed.

Here in this case, the user centered design has been selected, for its usefulness and benefits. For instance, it will support for increasing the sales, as the customers tend to purchase that kind of product or service, which is having the capability of fulfilling their requirements. In addition, this is also crucial for formulating positive experience of the users (nibusinessinfo.co.uk, 2020). Moreover, utilization of this design scheme allows boosting the competitiveness. It is also belong from an innovative nature, which allows innovation. Apart from these, another reason behind choosing this design approach is that this consumes less time and cost both.

2.2 Cognitive Psychology

There should be many theories that need to be taken under consideration (Islam, 2019). Theories such as cognitive psychology can be should be considered to help business developers to understand people more deeply as well as act according to it. Cognitive psychology focuses on individual's idea as well as thoughts. These theories can be used to explain person's metal processes. This theory can help in problem solving as it is goal oriented. This can help business industries to understand the people actual needs so that they can manufacture the product

accordingly. The cognitive psychology helps in understanding the demands as well as it relies on the scientific techniques for the analysis of the individual's behavior.

- **Attention:** It refers to a cognitive as well as behavioral procedure concerning selectively focusing upon a specific and significant discrete stimulus, when neglecting further perceivable stimuli (Zagoruyko and Komodakis, 2016). This has been considered as a vital section concerning the research into neuroscience, psychology, along with the education as well.
- **Perception and recognition:** Perception has been considered as that thing, which is much required for our brain for categorizing as well as interpreting whatever sensed by us (Fuhrmann *et al*., 2016). On the other hand the Recognition refers to the capability of interpreting as well as giving meaning toward the specific and significant object.
- **Memory:**It generally consists of different steps such as retrieving knowledge, storing as well as encoding. It is impossible for us to remember all things, for which memory invokes processing and filtering towards that, which is on demand of attending (Holland, 2019). On contrary, context is also important in case of memory, which deals with the framing of event rather word.
- **Learning reading, speaking and listening:** These three things are the most major foundational expertise concerning the language learning (Söderqvist, 2018). It is quite impossible to construct a house or giving a proper speech in front of many people or attaining a vital meeting without having these skills.
- **Problem-solving, planning, reasoning and decision making:** Problem-solving, this word deals with the procedure concerning investigation of an accurate technique solution of the complex and difficult problems (Adair, 2019). It includes different skills, such as, the skill of team-building, decision-making, dependability, communication, creativity, research, analysis, and the active listening skill as well.Furthermore, planning refers to a specific and significant procedure, which supports in formulation of new strategies, in addition, it has been considered as much vital for accomplishing further operations for an organization. Moreover, reasoning refers to that action, which tends to think regarding something, through following a sensible and logical path (Forbus and Hinrichs, 2018). Finally, decision making refers to a significant procedure, which deals with the formulation of such important

decisions that consists of different individual and vital steps, such as identification of the decision, gathering information which are related, examining alters, evidence weighing, selecting from the alters, taking action, along with that finally reviewing the decisions too.

- Here in case of this HCI design memory, recognition, perception and attention has high importance, for having an great success.

2.3 Interaction Design Theory

While designing the interface of the system various theories can be taken under consideration. Theories such as interaction design theories are very helpful (Suzuki and Canedo, 2018). This interaction design theory helps in human-computer interactions. Theories such as interaction design theories are very helpful. The interaction design theory also has major role in software development. There are five different proportions of the interactive design. It is different than UX design because UX design helps in user research, creating the user condition under which they will be using the products. While designing the interface of the system various theories can be taken under consideration.

Here in this smart gym application, there are various modes of interaction that help use to perform task. The smart gym application is equipped with the sound sensors, motion sensors, etc. It has touch screens display so have efficient work process. The smart gym is also equipped with voice recognition that helps user to perform without any disturbance. This interaction helps user to achieve their target more accurately. Here in this case, this model there is two main sections one, the admin portal and the other one is user portal. In the admin portal the admin will have the ability to check all of the activity regarding the user inside the gymnasium, and the other option for which the admin is authorized is that he or she can check and modify the updates. On the other hand, in the user portal the users can also access different features, such as proper diet-plan, course plan and so forth. This model is a savvy exercise center that is introduced in the work environment. This exercise center resembles the ordinary gym which is progressively effective just as helpful to utilize. Clients can utilize it in the work environment, at home or in some other neighborhood. This offers numerous advantages identified with medical problems. This is additionally cost-effective. The equipments of Gym center can use requiring little to no effort. This is extremely useful for the individuals who have a feverish work routine just as can't

oversee time for the exercise center. These projects give a gigantic assortment of wellness schedules. These schedules can be picked by the client as indicated by their capacities.

3. Design Process

3.1 Interaction Design Research

The interaction design has helped in the development of the smart gym application. The process of the development requires the design process (García-Peñalvo, 2017). This design process may or may not involve the user for which the interaction is done. The design process also involves the research that is used in analyzing the collected data from the users. These data are used in initial stage as well as the further development of the application. Apart from the designing, the developers are also involved in Cognitive Psychological theory. This theory helps in better understanding of the users' requirement. This helps in better development of the application interface. For the further development the interaction design is used for making better and more accessible interface. In smart gym the interface should be made more interactive. From the analysis, it has been observed that, the user-centered design is the most beneficial in this case, for formulation of the process of designing regarding this project. Moreover, from the research it has been observed that the cognitive psychology is much essential in this case, whether several things should be in concern, such as attention, perception and recognition, memory, learning reading, speaking and listening, along with the problem-solving, planning, reasoning and decision making as well. Along with that, the interaction theory is also analyzed in the literature review section.

3.2 Conceptual Design

Here the user has the option to check their last updates on the fitness programs. This application will also notify the user of the upcoming activities. The interface design plays very important role for the human-computer interaction. This helps in development of the application. This application also provides the user to give feedbacks (Yang *et al.*, 2018). These feedbacks help in development of the application. The smart gym app has the interface to provide the user to have the interactive gym session for the users. The user will have a separate section where they can track there fitness routine. This track record will help user to gain improvement. This application

also has activity status. Here user will have the option to check the upcoming activity they have to perform.

The design of the smart gym is based on the user's methods of using the technology. The design is in such a way that the users are using the application efficiently. The design interface contains the friendly user interface that helps the connected users. During the design process there are many theories that have been involved such as interaction design theory, graphical design, application development, etc. The smart gym application contains data tracking system that help user to track their data. These systems also provide the exercise routine that has to follow by the users. Along with the daily routine the application also provides the diet plan to every user. The application also provides the online tutorials for the user.

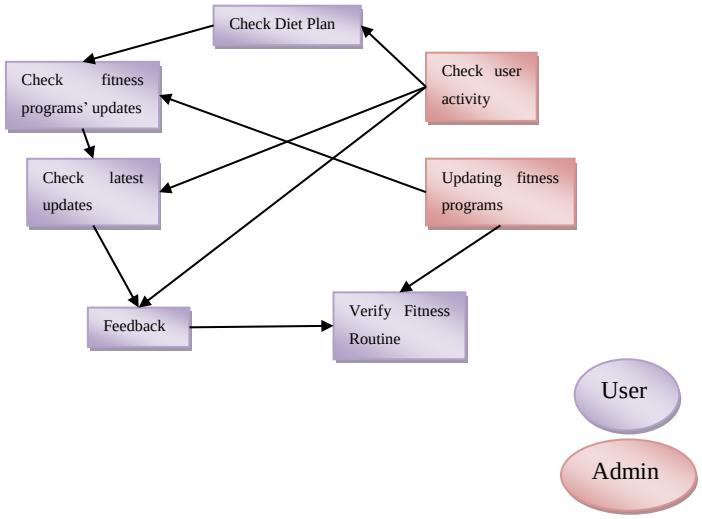

Fig: Conceptual Model

(Source: Created by author**)**

4. Prototype

In this prototype basically, the interaction between humans as well as computers is shown. This prototype is a smart gym that is installed in the workplace. This gym is like the normal gym which is more efficient as well as convenient to use. Users can use it in the workplace, at home or in any other residential area. This offers many benefits related to health issues. This is also cost-efficient. Gym equipment can use at a very low cost. This is very helpful for the people who have a hectic work schedule as well as are unable to manage time for the gym. These programs provide a huge variety of fitness routines. These routines can be chosen by the user according to their capabilities. The problem with the conventional gym is that there are a limited number of fitness programs that can be followed by the people. People also had to face the gym environment as there are huge numbers of people present at a time which may lead to demotivation. This may not help the user to attain their fitness goals. This program will act as a personal trainer. It keeps track of your body data such as the heart rates, running distance, as well as calories burned. These data are recorded in every workout session the user performs. This

helps the user to check for improvement in their health. The smart gym will consist of a large wall-mounted screen. This screen is to be controlled by the Smartphone application by the user. This will help people to take part in gym classes.

This prototype has many specifications that are used accordingly by the users. This helps people to plan their fitness routines as well as arrange a schedule. This makes the program more flexible. This is the benefit of business information technology. It makes the business cost-efficient. This program is the best example of business information technology. It makes human-computer interaction possible. With the help of this application, there are many benefits. The prototype model has various specifications that are discussed.

4.1 User personalization

Commented [NZ1]: Where is the prototype for this function?

The problem with a normal gym is the environment, which is not suitable for the individuals. This program provides the user with personalizes workout routines (Liu*et al., 2019)*. This can be installed at homes. This eliminates the problem of time management. User can have their own space for the workout routine. At the initial stage of the program, a user is asked to fill up some information such as age, sex, weight, height, blood type, number of meals per day, etc. this helps smart gym to build the fitness routine more efficiently. Users are also asked about their body type. After giving this information to the program users can choose the required fitness routine. The body type is required during the diet plan. Different body type requires a different diet for the proper result. Since the program provides personalize space, the user can set their goals accordingly.

4.2 Data tracking

Commented [NZ2]: Where is the prototype for this function?

This is the most important feature of this prototype model. This is directly linked with the users' health benefits. User can track their fitness goals every day. All the data which are given at the initial stage by the user are recorded with every workout they perform. Each workout tracks the calories burned, heart rate while running, as well as pre-workout diets. The program also tracks the calories that are present in pre work out diet. This tracking method helps the user to monitor their progress. People can compare their initial as well as final stages to check the improvement

in their body. This also provides a diet plan that has to be followed by every workout routine they perform. This eliminates the problem of electing the diet.

4.3 Performance data

Commented [NZ3]: Where is the prototype for this function?

Users can track performance according to their needs (Girnale *et al.*, 2017). Each fitness routine can be tracked as well as is recorded for a further workout schedule. This prototype can schedule the workout routine according to the users' provided at the initial stage. This routine created by this program to help the user to save time in creating the workout routine. This routine is then followed by the user to achieve their goals. Users also have options for the live fitness classes conducted by trained professionals. These are interactive sessions where users can interact with professionals. Users can discuss the doubt about their health issues or fitness routine from professionals. These facilities are provided at a very low cost as compared to the other medium.

4.4 Diet planning

Commented [NZ4]: Where is the prototype for this function?

Apart from the workout routine this program also plans the diet which will be needed for health improvement (Collins, 2019). This is the most important part which makes the fitness routine more efficient. Diet is the most important part to build the muscles. It helps in health improvement. Diet should be planned according to the individual's body type. Different body type needs a different amount as well as type of diet. Diet should also be chosen according to the fitness plan that has been opted by the user. Weight gain as well as loss will have a different diet plan. Users are also provided with an interactive session with trained professionals.

5. Research Study

This report is about the human system interaction to make the lifestyle more convenient. This report has explained the necessity of business information technology (Tadayon *et al., 2018).* It shows the interactions for a new piece of smart gym equipment. This smart gym can be installed in the company's workplaces, homes, recreational clubs, etc. This will help in making society a better as well as healthy working environment. With the help of this system, the company's working surroundings can be made better. This will raise health awareness in the society.

The smart gym system will have a large screen that will display the contents related to the workout. This content can be followed by the users during the workout sessions (Ahmed and Nayeem, 2016). This helps in working out more efficiently. The smart gym application can be downloaded through the internet. This mobile application can be used to control the big screen that is installed in the room. The fitness instructors are always available to answer the question as well as clarify the doubts of the clients making it much more efficient. This also provides equipment such as cardio equipment, strength training equipment, as well as free weights for free. Users can choose the fitness routine they want.

Since various routine are available in the application the users will have the option to create their program according to their requirement (Hippocrate *et al.,* 2017). Here users can also get the information related to every exercise routine. This helps the user to have complete knowledge about the routine. Users are given timers according to which they have to perform. This also provides the rest time during the exercise. The rest time is very necessary during the fitness routine. This increases the specification of the program. In this program, users will have access to the workout history. Users will have a previous history list from which they can track their workout sessions. This helps in improving the workout quality of the people who are involved in these sessions. This will also provide body measures like blood pressures, several steps walked, the running speed, calorie counts, etc. This system also provides the wrist band which is much more convenient in handling. It provides a high-intensity fitness program that is joined with high-quality health clubs.

In this prototype application apart from various workout routines, there is also a fitness program that is related to the Bio-mass Index. The clients can keep their weight in the regular check-up. This will help the client to keep their weight in control. Installing it in the workplace will improve the health of the workers. This will lead to an overall increase in the efficiency of the organization. This prototype also provides a diet plan for customers who are using the fitness program. Each fitness routine has a diet plan. This helps the user to choose the routine according to which they can plan their diet. This also provides the health benefit of each product as well as when it should be consumed. In fitness, program diet is much more important than the daily exercise routine. Users can't attain their fitness goals without having any diet plan. Diet plays a

very important role in helping the body to improve. To achieve the specific target diet should include all the essentials.

For running this study, the user-centered design approach has been chosen. For this application, main participants are users, admin and new consumers as well. For analyzing the data for proceeding in this project, the existing literature on this topic has been analyzed.

Summary

Alongside the day by day schedule the application additionally gives the eating regimen plan to each client. Aside from the exercise schedule this program likewise designs the eating regimen which will be required for wellbeing improvement. This model can plan the exercise routine as per the clients' details given at the underlying stage. Subsequent to giving this data to the program clients can pick the necessary wellness schedule. This routine made by this program to assist the client with saving time in making the exercise schedule. At the underlying phase of the program, a client is approached to top off some data, for example, age, sex, weight, stature, blood classification, number of suppers every day, and so on. This additionally gives an eating regimen plan that must be trailed by each exercise routine they perform. Diet ought to likewise be picked by the wellness plan that has been selected by the client. Clients can talk about the uncertainty about their medical problems or wellness routine from experts. The plan interface contains the cordial UI that helps the associated clients. This program furnishes the client with customizes exercise schedules.

6. Results and Conclusion

This program is based on business information technology. This program helps the user in making a more efficient fitness routine. This prototype shows that hoe time management is done effectively. Apart from time management this application also offers low cost as well as more efficient results. Apart from designing the application it also helps in detecting the error as well as labeling the reason of its occurrence. This also helps in developing the appearance of the website, application or any digital products. With the appearance the developer can customize the color, shape, size, etc. This can also help in sending the feedback from the system to the user after an action is performed. An interaction designer can design strategies, create the wireframes

as well as prototypes, etc. This program provides every basic detail about the fitness routine and the diet plan that is needed. This program is very convenient to use. This program tracks the workout routine which helps in the further record. Each workout routine can be monitored as well as kept track of. This program will mostly help the people that are busy with their working schedules as well as cannot manage time for fitness.

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