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HUMAN COMPUTER INTERACTION – ITE1004

(J COMPONENT PROJECT)

REVIEW : 3

COMPUTER BASED SYSTEM : SMART FRIDGE / REFRIGERATOR

1. Evaluate your interface with Nielsen's Heuristics or Cognitive walkthrough. (Follow the unit 4 uploaded material)

ANS :

Evaluation of interface with **Nielsen's Heuristics** :

A. Visibility of system status

Concept : The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Response : The application installed in the users' mobile phones and the inbuilt display of the fridge , makes the user aware about when to go to shopping for veggies , fruits , and other eatables. It will also make the user alert about the food quality stored , much before they get spoiled. The application and device display have also the ability to

remind the user about a number of things – from birthdays to important meetings – once linked with an online calendar. It shall also make the user aware about what all things have been added into the freezer to avoid unnecessary piling up of food products.\

B. Match between system and real world

Concept : The system should speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

Response : The application when get installed and opens up , at first it asks for language preference – from local languages to foreign languages. Thus , making the user comfortable to see the features and easy interaction. The same happens on the device display , when it is booted up for the first time. If a user chooses 'English' as the applications' default language , all the expressions and options will be written in simple and understandable English language (relevant to a school kid – at least). If it shows a process to follow , the flow diagram showed , shall be in a proper order so that the user doesn't have to do much adventure. The options need not be always labelled , rather , a pictorial representation shall be shown , which should be easily recognizable by the user.

C. User Control and Freedom

Concept : Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Response : In the mobile application , on the top left corner , users should see an arrow option , which will then and there close all the ongoing process on one page , and take the user back to the previous

page , without any app reloading. Other than that , user should also see a home button , which , when clicked , will take the user to the main entry page of the application. Also , at the top right corner , a menu button shall be visible – which will take the user to any other desired page. While filling any form (specially while logging in) , people make mistakes while entering the credentials. The 'Clear' button shall do the work of Undo. The list of food items has to be updated after keeping new items into the freezer. Thus , the refresh button (also acts as a Redo button) , updates the list.

D. Consistency and standards

Concept : Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Response : Every button in the application / device display serves a unique feature. There is only one option , by that particular name , doing only one single distinguished task. The list of food items stored in the freezer only tells the food quality , quantity and give shopping alerts. No other options do the same thing. There is only one menu button , which will open up to show numerous other pages – not embedded to any other visible button. While inputting credentials , it will only let you log into the application – thus , one unique action at a time occurs without duplicity. The application platform makes sure every action , button has to do OR show only one single unique task.

E. Error Prevention

Concept : Even better than good error messages is a careful design that prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Response : While manually entering food items into the list , the application makes sure that all the information is relevant (from names to quantity) and not vague. This will avoid the chances of local database errors. Even when logging in , it will simply accept OR unable to recognize the entered credentials. If the user wants to change his / her password for login , the system shall make pop-up message float for the confirmation of the users' action. If the application is taking a lot of time to perform an action , for example , updating the food items list , after a certain amount of time , the application itself will ask for exiting OR waiting for response.

F. Recognition rather than recall

Concept : Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Response : If after updating the food item list , the user goes to the shopping list , the application will automatically put on the necessary food items to be brought OR which are in need. Thus , the user doesn't have to enter manually all the required items. Moreover , the application shall use Cookies and Sessions (like those in websites to store user credentials locally and Server levels) to store the user credentials , such that if they log out and think of log in after some time , they don't have to type in the username and mobile number to access the application. At the first starting of the App. , it will show a small tour of all the useful options – preventing the adventuring time of the user with the application. Once the users start using the application , they gradually become familiar with the features as everything is placed in a step-by-step manner.

G. Flexibility and Efficiency of use

Concept : Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Response : As said earlier , first time users shall be shown a tour of the application , thus knowing much of the software in small span of time without much hunting. But not all things are covered in that time span. Expert users OR long time users get to know more of the application with time. Novice users may feel it a little difficult to enter the exact name of the food item while expert users shall add the exact OR near exact names to be entered in the list using the filter option. And with relevant quantity. Novice users shall go to shopping and open up the list via the application only – while expert users shall save it locally anywhere in the device , thus , the list can be accessible more easily. The Novice user shall be dependent to the existing catalog of food items , searching exact names while the Expert users , shall use the filter option to see a wide range of products to choose from.

H. Aesthetic and minimalist design

Concept : Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Response : If an alert comes for going to marketing , it will not show simultaneously , any kind of advertisements which seems quite irritating at times. Similarly , if the user is entering food items to the list , at same time , it won't show how is the weather. The information shown to the user shall be limited to the action / request they have made to the application.

I. Help users recognize, diagnose, and recover from errors

Concept : Error messages should be expressed in plain language (no error codes), precisely indicate the problem, and constructively suggest a solution.

Response : If the application shows an error , it will show a pop-up message asking the user to 'Wait' OR 'Exit' the application. Everything shall be written in plain English text , without any mentioning of hexadecimal addresses OR Codes. If an error occurs without exiting option , the application shall also provide an alternative way to address the situation – rather than just a pop-up and a hanged device. If a person could not able to log in to the system – the application itself will suggest for re-creating new credentials. There is a 'FAQ' section which shall address all the common problems.

J. Help and documentation

Concept : Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, be focused on the user's task, list concrete steps to be carried out, and not be too large.

Response : Though application has many terms and licenses agreements , that the user just put a tick in the agreement box a resume with the installation procedure – After installation , the application itself will provide a link to download the detailed documentation of the App. Usage. Along with that , the Contacts option shall provide Email ID and contact number to the required helpdesk / service center in case of any issue. Moreover , the documentation shall be small enough with appropriate font size , so that users of any age can easily go through the steps of operations via contents. And as mentioned earlier , 'FAQ' section shall also serve as a guide to an issue.

SMART FRIDGE / REFRIGERATOR

By Soubhik Sinha (19BIT0303) , Rishabh Gauba (19BIT0313)

Guided by Dr. (Prof.) Rajeswari C | School of Information Technology and Engineering (SITE)

INTRODUCTION

The Smart Fridge / Refrigerator is quite a complex device internally – embedded with numerous sensors to monitor and tracking the quality of the food kept inside , controlling the humidity factor and as well as temperature according to the food item stored.

The user will be able to input the details of the food items stored inside the fridge – details shall include name , date , and expected expiry of the food item. Due to the usage of AI (Artificial Intelligence) and IoT (Internet of Things) technological equipment like IR camera and sensors to detect the inside condition and also , alerts the user to go to shopping.

SCOPE OF THE PROJECT

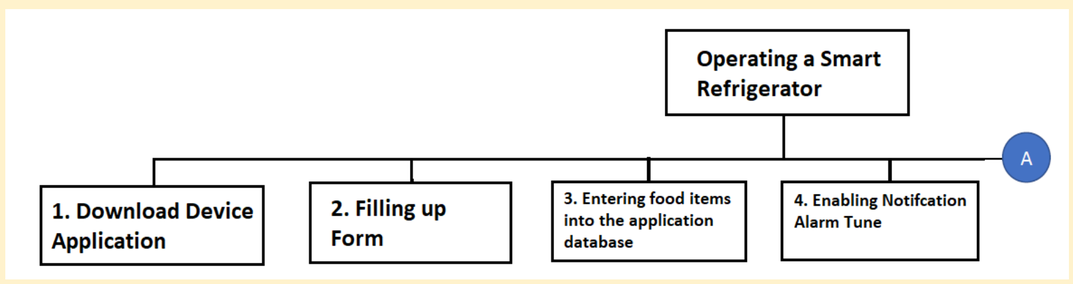
The Scope of this project is to gain in depth knowledge / detailed information about Smart Refrigerator and also obtain its Advantages and Disadvantages. Also the project shall also discuss about the requirements and needs of the target user community. It shall also show how easy and user-friendly the application / device interface is by conducting deep task analysis.

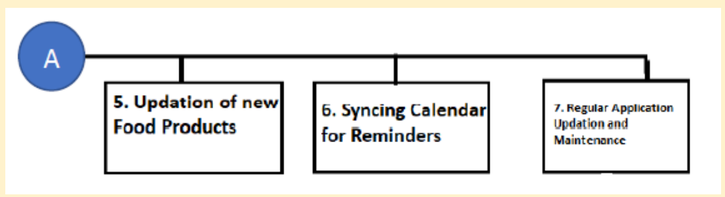
PROBLEM STATEMENT

There are a very few limitations with the current interface , but among all , the point which sits on the top of the issue-list is about security. Though the application / device display software are made and checked with rigorous testing – still, bugs and vague behavior do exist. Because bugs are a great threat to the system – which makes the system security weak , allowing the hackers to gain access , even to the users' mobile device via unprotected network. Thus , leaking vital data.

Checking of bugs in the software is a laborious job as well as both time expensive. Thus , maintenance cost is high.

FLOW CHART





REQUIREMENTS

As the device discussed here is Smart Fridge , its all about maintaining food quality by regulating temperature and moisture content (humidity) inside the freezer. On regular basis , the sensors shall send information to the user about the status of the food items.

Detailed documentation and quick tour is also provided to the user by the application – which reduces the time of adventure by the user. The interface built is user-friendly and easy to handle. Thus , very less chances of issues will occur.

As the application provides a number of buttons and actions and forms , on every page they visit , will find navigation buttons (like arrows OR menu buttons) to relocate to another page.

The network shall be secured enough to prevent hacking. Even AI may also detect any unusual behavior in the application due to bugs and make the user aware of it. Thus , in this way , bugs and issues can easily be identified.

FEATURES

As the application is made for Smart Fridge , it has a lot of features to provide. But as we cannot discuss all of them here , we shall come up with some prominent and useful ones. Below are there explanations :

1. Humidity Controller : We all know that food spoiling is mostly done by surface bacteria , which grows due to heat and moisture. By controlling the moisture content in the freezer , the food items shall be kept dry and fresh. The application installed in the phone may also show the amount of moisture content inside the freezer.

2. Storing food item details : The application also offers a list to store all the food items kept in the freezer. It also provides the user with a catalog where one can just choose the exact food item and details will be automatically stored along with the content due to the inbuilt sensors. The application has to be connected via Bluetooth OR Wi-fi to the freezer for inputting.

3. Automatic Software Updates : Bugs are normal for any application. Thus , the application keeps on updating on regular basis , whenever the server sends the signal / allowance to proceed.

4. Alerting : The application shall also make the user aware about the food quality and their expected expiry date and also when they need to do shopping , according the consumption recorded.

PERSONA

User Characteristic	Teenagers and Adults	Middle aged People	Senior Citizens (age>=60)
Age	16 to 30 Years	30 to 60 years	Above 60 years
Sex / Gender	Male and Female	Male and Female	Male and Female
Limitations faced	The device shall not include any voice activated interface (that can be seen via Google assistant OR Alexa) which shall work by hearing users' voice and commence actions	The device shall not include any voice activated interface (that can be seen via Google assistant OR Alexa) which shall work by hearing users' voice and commence actions	The device shall not include any voice activated interface (that can be seen via Google assistant OR Alexa) which shall work by hearing users' voice and commence actions
Knowledge Standard	Different categories shall prevail	Different categories shall prevail	Different categories shall prevail
Technical perception	Max. knowledge in the desired age group	Some knowledge in the desired age group	A little or no knowledge to handle any technology

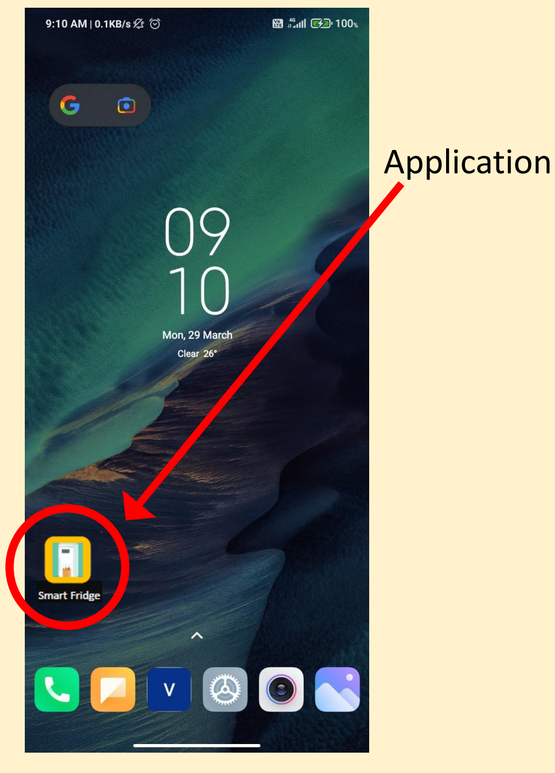
PERSONA (Contd..)

User Characteristic	Teenagers and Adults	Middle aged People	Senior Citizens (age>=60)
Motivation	Exploring and adventure to squeeze maximum benefit of the application	Will see to the minimum or relevant features which are useful and active.	Will not show much interest in this technology – but quite satisfied using a traditional freezer.
Attitude	Will be satisfied enough due to the ease-of-use and attractive interface.	Some might be satisfied while others may seem facing some difficulties to operate as the technology is very new to them – very different from the traditional freezers.	As they are not very much tech savvy , they will still prefer to use the traditional freezers. For them , even mobile devices can become complex , thus it will not dominate.

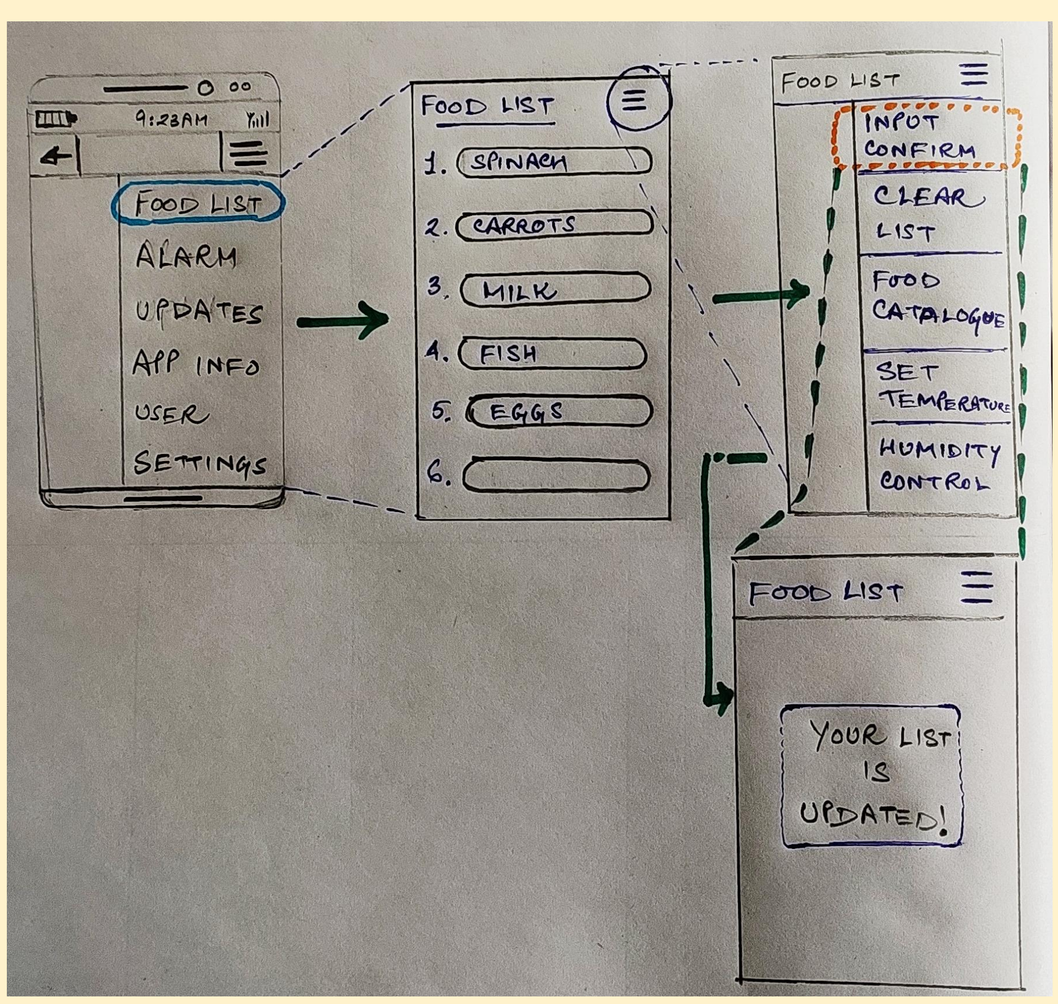
TASK ANALYSIS (KEPPING FOOD INSIDE)

Goal / Output	Inputting Food details kept inside
Inputting device	Smart Phones , Tables , Display embedded to the freezer. Connectivity can be done via Bluetooth and Wi-fi using the installed application.
Premise	1. Users shall able to operate Smart Phones / Tablets / touch display. 2. Should have an experience to handle any mobile application. 3. Should know how to enable connectivity among devices.
Steps	1. Open the installed application via Smart Phone / Tablet. Alternatively one can open the embedded display on the freezer to operate. 2. Open food items list and start inputting food items . One can also use the catalog to select the relevant food items name – incase the user forgets but know how it looks. 3. Select expected date of expiry OR date of buying. 4. Tap the Confirm button to freeze the list. 5. The user then shall able to see the stored items in the list.
Time to get Experienced	2-4 times of usage is enough in a day for 2-3 days.
User Instructions	Application should be updated regularly if automatic updating is not enabled. Connection shall be secured to the freezer while list operation.
Notes	Do a regular physical food item inspection to check the food quality.

PROTOTYPE



Application



RESULT - CONCLUSION

Smart Freezers are a trending technology these days due to the introduction of AI and IoT enabled sensors and cameras inside to keep a check over the food quality. The application itself is very user friendly , and can be well accessed in a very short time span by the Novice Users. But its just the beginning , the technology may also include voice activated engines (Like Google Assistant , Alexa or Bixby) so that users don't even have to take there Smart Phones into use – making a direct interaction.

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REFERENCE(S)

[1] Mukesh P. Mahajan , Rohit R. Nikam , Vivek P. Patil , Rahul D. Dond (2017) , Smart Refrigerator Using IOT

[2] Helen Sharp, Jenny Preece, and Yvonne Rogers (2019) , Interaction Design – Beyond Human Computer Interaction.