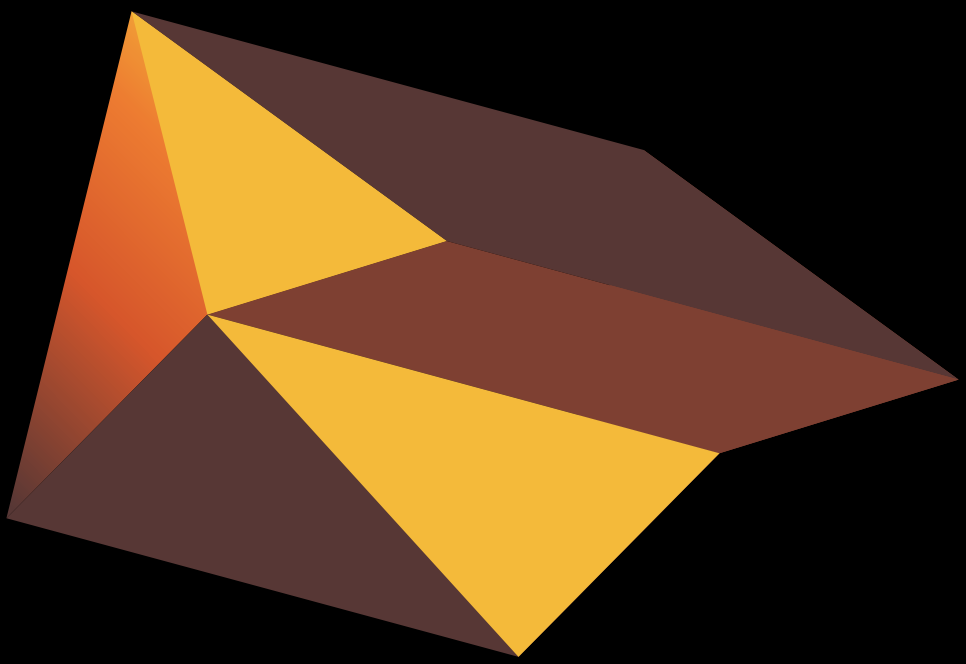
HUMMINGBIRDSDAY

Designing Natural User Interfaces

How to create user interfaces for sensation modalities



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HUMMINGBIRDSDAY

Creating immersive experiences

Hummingbirdsday is a design studio specializing in augmented reality (AR), virtual reality (VR), and mixed reality (MR) to create engaging, immersive experiences for brands. We craft innovative solutions using the latest AR/VR/MR technology to help companies revolutionize their customer experience.

What We Do

- AR/VR Creation
- Web/App Design
- Product Strategy
- Digital Transformation

Our mission is to innovate, defy, and emerge. The future of interaction is extended reality and Hummingbirdsday is here to bring your user experience to that next level.

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CHAPTER 1

What is Natural User Interface (NUI)?

Do you consider GUI and NUI the same thing? If yes — this article is going to help you learn the difference quite easily. GUI, which stands for Graphical User Interface, is such a user interface (UI) that permits the users to operate the electronic devices through graphical icons. Some of the best important and commonly used GUI elements are as follows:

- Windows
- Icons
- Menus
- Pointer, etc

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If we consider NUI, it stands for Natural User Interface. However, it is a misnomer that NUI and GUI are often used interchangeably in many situations. GUI is everything that interprets visual interfaces. But NUI is a user interface that helps users interact with sensation modalities such as touch, voice, handwriting, motion, cognition, explorations, and gestures to interact with the machines.

A one-line definition for NUI will go perfectly with this statement, “Content is the interface” — Daniel J. Wigdor, co-author of several books such as Brave NUI World (2011)

The examples will make things crisp and clear for you very soon! Some of the most common NUI elements that we all are aware of are the following:

- Touch Screen
- Speech Recognition
- Gesture Recognition
- Gaze Tracking, etc.

Attributes of a NUI

While designing a NUI, the first thing that crosses any developer’s mind is that the user using the device must be able to interact with the content as directly and easily as possible. NUI is helping people bring something new to their lives after replacing a couple of buttons with something as easy as to touch the device by itself.

“Until now, we have always had to adapt to the limits of technology and conform the way we work with computers to a set of arbitrary conventions and procedures. With NUI, computing devices will adapt to our needs and preferences for the first time and humans will begin to use technology in whatever way is most comfortable and natural for us.” — Bill Gates, co-founder of the multinational technology company Microsoft

For example, let’s consider that you have a group of items, and you browse through them by utilizing the “next” and “previous” buttons. With the introduction of the mouse, you can easily hover over your choices and games that you don’t want. Similarly, NUI focuses on employing our natural sensations such as touch, motions, cognition, and gestures, etc., on sending

signals to the machines or devices.

Here are the 4 most common attributes of a NUI described below:

Enhance Already Existing Capabilities

When you design a NUI, the most basic thing to keep under consideration is that it should, by no means, go against natural human extinction. The NUI should be able to make use of the existing human capabilities.

"[NUIs] exploit skills that we have acquired through a lifetime of living in the world, which minimizes the cognitive load and therefore minimizes the distraction" — Bill Buxton, Principal Researcher at Microsoft

It might sound difficult, but it isn't. All you have to do is to choose a common skill set present in almost all — or at least the majority of the humans and incorporate it in your NUI designing. This will not only help you in designing your NUI but will also increase your target audience due to the common human skillset.

Keep the Learning Process Progressive

It is quite important in part of your NUI that it is not very difficult or hard for the novices to learn. You should be able to devise a mechanism that will take really small baby steps, starting from the first and basic steps to getting more and more advanced progressively.

At the same time, the NUI must provide ways for the experts to avoid the basic steps and reach the right point according to their skill set. Something that's too basic for the experts and veterans will make them frustrated, that you surely don't want.

Action-Reaction Correlation

The action-reaction we talk about here is not essentially the same Newton's law that we have been running from ever since we started studying physics. This action-reaction correlation is with respect to the Natural User Interface or NUI.

The NUI must be physically accessible to the user directly. Both of them should be able to interact with each other in the best possible way. The NUI and User actions should correlate, and their reactions should come accordingly. The NUI must imitate the exact same reactions from the physical environment and give out the best results.

Minimum Cognitive Load

Are you wondering how cognitive abilities are concerned with the Natural User Interface? To answer the most anticipated question, we have a whole lot of stuff to support the claim. If the NUI is too difficult and hard to understand, the cognitive load gets very high — which is not very desirable. Hence, the key is to develop such a NUI that is simple and straightforward.

Speaking of NUI, we have come across different ways in which NUI is operational and is providing its services. Some of the NUIs are quite attractive, while others are invisible and, in fact, more unobtrusive and modest. Hence, the ultimate goal of a Natural User Interface is to create a smooth and seamless interaction between the user and machine — it is as if the interface does not even exist in between.

Applications of NUIs

5 most common applications that are employing the technology and phenomenon of Natural User interface or NUI are as follows:

Touch Screen

The touch screen interface is an interface allowing users to interact with the machine or device — simply by the touch of the finger. It's pretty simple and exciting, right? It means that you no longer have to use buttons or a mouse to hover over the graphical user interface.

You can take examples of Smartphones, tablets, and other devices that employ the use of the "skinput." Additionally, the touch systems are being evolved to rule out this requirement of having a "skinput." Instead, some companies like Microsoft are striving to make the interaction possible simply on their own skin. Hence, there is no better and more seamless way to manage your machines and devices.

Speech Recognition

When we speak of Natural User Interface (NUI), it's a must that we discuss speech recognition as well. It is also an example of NUI that allows the users to interact with the devices and machines through spoken commands. Have you ever come across the term "Spoken Command"?

As the name indicates, the spoken command is such a command that relies on our voices. When we speak, the system within the devices identifies the words uttered from our mouths and converts them into a kinda "robotic" or "machine-readable" language.

Speech recognition examples include call routing, speech to text, and handsfree computer and mobile operations. It allows its user to interact with the system and produce responses accordingly. Hence, Speech recognition is one of the best examples of a Natural User Interface using natural modalities for professional reasons.

Gesture Recognition

Tracking user motions and then making use of them to send instructions to the system or device is what we call Gesture Recognition. It is mostly employed in Nintendo Wii and PlayStations in which the gesture recognition allows the controllers to have accelerometers and gyroscopes. The main purpose of this equipment is to sense the rotation, acceleration, and tilting.

In addition to this, more advanced versions of NUI involve cameras and supporting software. It works by recognizing specific human-body gestures and then translating them into actions.

In this regard, Microsoft's Kinect is top of the list that allows the gamers to interact through their gestures, body motions, and speech commands.

Gaze Tracking

Ever wondered that something or someone legit — follows the movements and motions of your eyes and particularly the eyeball?

Well, in this case, everyone is quite lucky! Gaze tracking interface is such a NUI that allows users to control the system or device through its eye movements. Some of the companies, such as Lenovo, have been working tirelessly to produce a laptop or device that provides and operates the functions through an eye gaze?

Thus, whenever you are not looking at the screen, it will turn off your device on its own. Moreover, some of the devices are providing locking and unlocking mechanisms based on gaze tracking, such as Face Recognition, to lock or unlock a mobile or device.

Brain-machine Interface

The brain-machine interfaces are something extraordinary as they are able to read your neural signals and literally make use of them. They generally work by using different programs that translate the signals into action.

Brain-computer interfacing (BCI) has many applications, particularly in the health sector. It allows the paralyzed patients to operate their wheelchair or even the limb merely by the power of the thought!

The Verdict

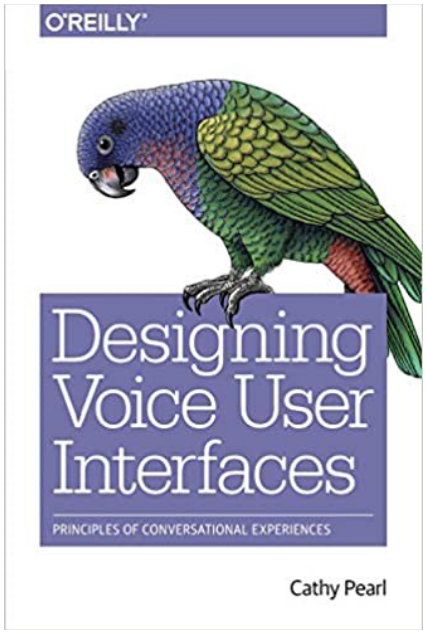
The Natural User Interface (NUI) is definitely something beyond the comprehension of a normal human mind. However, it has made our lives easier and enjoyable. Different NUI applications such as speech recognition, gazing, gesture recognition, and the brain-machine interface are things that we are using in our daily lives but haven't done the research about it.

The NUI has found its applications in many areas of life — such as in the health sector, in offices, and in everyday lives. Therefore, it is important to have a little insight into all of these — for who knows, this is going to be our future, and we have to keep the things in mind.

CHAPTER 2

Designing Voice User Interface

This article is the reading notes for Designing Voice User Interfaces with some of my personal experience.



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NUI: Designing Voice User Interface

An important part of the Natural User Interface (NUI) that functions by interacting with different modalities of sensation such as touch, hear, sight — Voice User Interface (VUI) is a way to interact with your computer or phone through voice or speech commands.

Some practical applications of VUI are as follows:

- Siri
- Google Assistant
- Alexa
- Smart Televisions
- Smart Homes

Although there are a lot of advantages of Voice User Interface, the biggest of them all is that it allows for a more remote, eyes-free, and hands-free solution to interact with different devices. Since there are no visual audiences in a VUI, the design is quite different from a graphical user interface.

'I'm a user experience designer, I design websites, or 'I design apps.' […] and they think the experience is that simple device, the website, or the app, or who knows what. No! It's everything — it's the way you experience the world, it's the way you experience your life, it's the way you experience the service. Or, yeah, an app or a computer system. But it's a system that's everything."

— Don Norman, pioneer and inventor of the term "user experience," in an interview with NNGroup

A large majority of people are unable to understand the complexity of VUI, as what they normally consider voice is for interpersonal communication — not something that might allow for person-technology communication.

Reasons of Popularity of VUIs

There are quite a few reasons that account for the prevalence of Voice User Interfaces despite the presence of a Graphical User Interface. Some of these reasons are as follows:

Voice commands and speaking is more instinctive than typing.

You all would agree on this that we find speaking a lot easier and effortless than typing. This is quite evident from the fact that most of the users prefer sending voice notes instead of typed messages. Since technology is striving to make things easier for people, the voice-command applications are facilitating things for the users, which is one great advantage of VUI.

Making Technology More Accessible to Humans

Apart from making phone calls to answer a few messages, technology has swept across the boundaries. As it has made its way into our homes, it is important that we allow VUIs to accompany these newer advances as well. Hence, we can design VUIs to make them open garage doors, make an appointment, order food, and even start your car. All you have to do is, speak to the voice assistant, and your work will be done right there and then!

"...improvements in natural language processing have set the stage for a revolution in how we interact with tech; more and more, we're bypassing screens altogether through the medium of voice." — CES 2017 Key Trends, J.W. Intelligence*

More Practical Approach for specially-abled individuals

The adamancy of the industries to extend out their mobile developments to the demographics that have long been neglected is allowing for voice interaction to become common. Voice technology is the ultimate solution

for many blind or visually impaired people who are unable to use their devices properly. The VUIs are enabling them to access different stuff with the help of their voice-commands.

What makes Voice User Interface more special?

Being provided with different types of interfaces, if we understand their different aspects, we might be able to grasp the knowledge in a better and more organized way. Let's talk about some of the specialties of different types of UIs.

Speed

In terms of speed, the Visual interfaces might lag a little behind than Voice User Interfaces. The reason is people who are very good at typing also find typing a bit hard subject. Therefore, VUIs tend to give more speedy responses, and hence the response time decreases.

Gestures

Visuals have long been the best part of gesturing. However, they were primitive stages of interface determination. Now the world is moving to better and more easy-to-access alternatives — such as voice-based and gesture-based interfaces.

Privacy

As far as privacy is concerned, VUIs are least private as compared to any other interface. For instance, you can not only expect but can definitely make the gesture-based, text-based, and touch-based interface more private. Hence, they might be a better option for quite a lot of people out there.

What Makes VUI Execution Unpreferable?

In certain scenarios, it so happens that Voice User Interface is not an effective solution. Moreover, its efficiency is impaired, and it is unable to provide the best results. Some of these circumstances are as follows:

Noisy Environments

A lot of people speaking to different computers or devices makes it almost impossible for the bots to listen and focus on one particular voice. It might get pretty confusing, and the computer might end up showing irrelevant results.

Privacy Concerns and Awkward Talks

We can't expect everyone to be able to talk and command the bot. Some people are more concerned with privacy and do not wish to speak to a computer. It might sound unnatural and unrealistic to many people. Hence, they might still prefer texting and feel more comfortable that way.

Hearing or Speech Impairments

VUIs are beneficial and accommodating for quite a lot of people. But it is not meant for individuals who have problems with hearing or speaking. They might not be able to command the bot as effectively as normal people would do. Hence, this way, we can't make it a generalized solution for all people.

Creating a VUI Design

First things first, you'll need a tool to create your VUI app. If you want to start creating some basic dialogues and graphics for the VUI app, here are some flow tools to consider:

- yEd
- Omnigraffle
- Google Draw
- Visio

In order to build or develop the software prototypes or incomplete versions of the software programs, you need to employ different methods such as:

- Tincan.AI
- PullString
- Wit.ai
- Nuance Mix

Conversation Design

The purpose of conversation design is to develop a voice command that integrates with the machine or computer. For instance, AR Tesla Showroom App employed Wit.ai and Unity to develop the software prototype.

The voice commands are integrated to open the door, turn on the engine, and change the color of the car. It is quite important and rather critical to train the bot to learn different versions of these commands. For instance, the command “turn on the engine” can be said in different ways such as:

“Engine on”

“Please turn on the engine.”

“Switch on the engine.”

“Can you turn on the engine?”

“Turn on the engine, please.”

Although these sentences or phrases have the same meaning, the bot has to know all versions of them. It is quite important and essential to type as many variants as you can possibly think of. In this way, you will have things covered in all ways!

Training the Bot for Efficient Results

Training is a challenging part, but if you know how to do it, you'll pretty much be an expert in it. The key is to talk to your bot as much as you can. The bot typically recognizes your voice and stores it in the system. In this way, it understands the command and validates the meaning.

Moreover, you can train the bot in different scenarios, situations, and environments. For instance, in noisy backgrounds, quiet backgrounds, and at different times of the day. Such vigorous training will allow your bot to be as perfect as you wish or desire it to be.

Essential Points to Keep in Mind for VUI Designing

None of the user interfaces come without small glitches or issues. You can address them quite conveniently. However, if we talk about the Visual User Interface, it is actually a bit of a bigger mess. If your voice assistant fails, it will not be given enough chances to prove itself.

Never wait for the audience to mess around.

Unlike the visual or graphical user interface, coming into terms with the voice user interface (VUI) would be quite challenging. You can't expect the users to understand the interface on their own. Therefore, you have to give the instructions and how to get started on it.

Keep the action list short and concise.

The key to keeping people from being overwhelmed, make sure to provide the basic and the necessary information only. The verbal content must be concise, full of meaning, and must be one that is immediately responded to. Make sure that the voice assistant is able to understand the commands easily.

Make sure to notify the user that they were heard.

No response or sign of activity when you open a webpage or website is pretty much sufficient to leave you baffled and agitated. Now imagine this is the case, VUI. Therefore, it is important that the users get notified when they are being heard or responded to.

Confirm if the task at hand is done

To determine and ensure the accomplishment of a task, make sure that your VUI gives a confirmation. Without confirmation, all of it will be in vain, and there would be no way to know if the task has been completed. For instance, if a user commands the VUI to “switch off the oven,” the assistant must be able to respond like, “oven switched off.” This will eliminate the need to check the completion of the tasks in person.

The Final Take

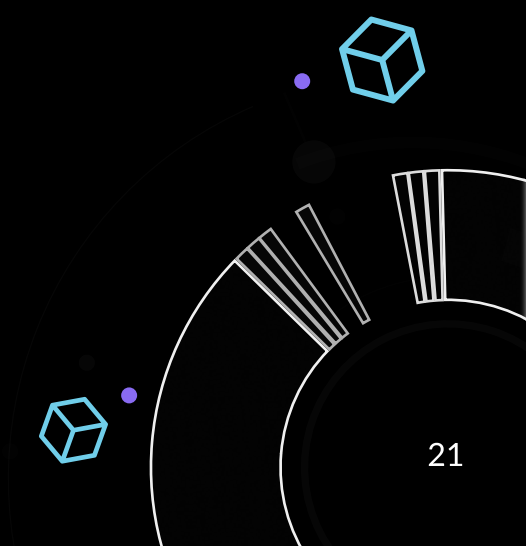
The design and way of building Voice User Interface are undoubtedly quite challenging. However, if you utilize it the right, you might not find it that complex as people claim it to be. As of now, the voice commands or VUI are its initial stages of development. However, there shall be more refined voice search results.

It is the designer's foremost duty to present users with something that is adorable, elegant, and yet excellent in quality. Additionally, human communication and tech-voice interactions are quite different. Therefore, it is important that you give the users proper instructions as to when and how to use it.

Thanks for reading!

Don't forget to check out the Hummingbirdsday website for blogs, podcasts, and more e-books on creating immersive experiences with VR, AR, and MR.

Visit website



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