

## **Human Computer Interaction (In English)**

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### **Conversational AI: Human-Centric Interaction through HCI and NLP**

Hello everyone, my name is Hemant Yadav and I work with Professor Rajiv Ratan Shah. Today I will be presenting you HCI and AI based conversational systems and their applications. I hope the lecture would be useful for you. What do we mean by conversational systems? It is a system or a machine that humans can interact with using natural language. For example, you have Alexa, you have Siri, and more recently you have the advanced voice mode from ChatGPT, that is from OpenAI. Today in the end, we will also be talking to Alexa for a demo.

Now let's start with the slides. To give you a brief overview of how the lecture will proceed, this is how we will go through the slides. So first, we will talk about the definition of conversational systems. Then we talk about how HCI is needed or is used while building conversational systems.

Next, the most important part is the key components that go inside when we build the conversational systems like Siri or Alexa. and then we proceed with their applications and then some examples and then in the end with a demo. Okay, so what is a conversational system? As you can see on the screen, it is a computer system that can communicate and interact with humans using natural language. these two things are more important because this is how we humans interact with each other we use natural language and this is something we want as a property in a conversational system that is we want to interact with machines using natural language for example as you can see here can you schedule an estimate for 7 pm tomorrow that is the user query by human Now, some natural language processing happens. That is, the words are converted to machine numbers.

Then some learning happens, like deep learning methodologies, to process that natural language, which is like part of machine learning. And then we have something else in the end. And now, this input, the natural language, can be understood by the machines. And then they reply back with something. Sure, an estimate for 7 PM has been scheduled for tomorrow.

So you see, We are now trying to talk to machine using natural language, and we expect

a response in natural language. And this is what makes it a conversational system. The examples include chatbots, such as ChatGPT. And then we have seen in the past decade, there are different examples of virtual assistants, for example, in your phone, Siri, and then your Alexa, which is a physical device that you can buy. And same goes for Google Assistants.

And the voice assistant part here means that you can talk to them. So I hope what is a conversational system is pretty much clear to you. Now let's move forward. So how HCI comes into the picture when we design conversational systems. So the importance of HCI.

And what are the key principles that researchers keep in mind when they design these conversational systems? So let's first talk about the key HCA principles. So the design should be user-centered. So it should be easy to use. For example, you say, hey, Alexa, or hey, Siri. And that's a user-centered design that is easy to start.

The second thing is accessibility and inclusivity. It should be accessible. by a lot of people with different accent and second it should be inclusive and not just for English it should also have different languages such as Hindi Marathi Tamil Spanish and so on And yeah, so and again now it's very easy to answer why it is more important as you can see It should ensure that these systems are user-friendly Intuitive and create engaging interactions to everyone and not just people who speak English Let's move to the next slide Yeah, the most important slide the key components that goes while designing these systems so you need a speech recognition which is optional if you are talking with voice assistants this is what is needed to convert speech into text then what you need is a natural language understanding it is step 2 to understand the text so that the machine can understand the text. Next thing is dialogue management. So what this component does is it keeps track of different things, who spoke when, like, okay, what the reply I gave, what exactly I did.

So it's like memory that can be used for future conversations. And then in the end, once the machine has understood everything, the machine has to output or generate natural language as output. So as you can see, these are the four systems or components that goes while designing a conversational system such as Alexa. Okay, so now let's talk about the applications. So we have introduced some applications earlier in the first slide.

Now we will talk about in detail. So customer service chatbots. Imagine a lot of customers have queries that can be sold easily. For example, customer call to the bank how much balance do I have instead of transferring the call to a human you could just simply ask the chatbot to process this query and then give output by looking at their bank

balance you see an application then you can schedule appointments educational chatbots very important now imagine every student can have personalized learning experience And then you have mental health chatbots. So there are things that people do not talk about openly, but they can talk to machines because they think that their data is secure.

And this is why we need one more thing while designing the conversational systems privacy. Very important. The user must feel secure while engaging with a conversation with the system. And these are some famous examples. So you have the one with Google.

Then you have the one with Alexa. And then very recently, what we have seen is that this ChatGPT, which was a conversational system without the voice, they have added Voice as input. So now you can talk to them. You see I introduced earlier different key components and this speak is what Automatic speech recognition part does so we have added a different a new component To the whole system and now we can talk to it instead of writing anything Yeah, so Finally these are the reading links that you could go back and read a lot about the systems in detail. I recommend go through all of them.

All of them are very important for you guys to understand or to have a brief picture of what are conversational AI systems. Next, we will do a demo using Alexa, where we will try to ask some questions and see how the conversational system, which is Alexa, responds to us. Let's start. Alexa, tell me about yourself.

Alexa, stop. So you see, instead of just giving us a bland answer, I am Alexa, now they have added this HCI component to make it more engaging. You see how HCI is playing an important role to keep the conversations engaging, just like we humans do, a personal touch to the chatbot. Now let's ask Alexa another question or another query. Hey, Alexa. Tell me about HCI, Human Computer Interaction.

From Coursera.org, Human Computer Interaction, HCI, combines computer science, psychology, and design with a focus on user experience. Alexa can go online and check your questions, which are fact-based also. Alexa, do you know about Pushpa Movie? Pushpa, The Rise, Part 1 is a 2021 action film starring Alu Arjun, Fahad Fasil and Rashmika Mandana. Alexa, tell me the most famous dialogue of this movie. Sorry, I don't know that one.

So you guys have seen that now Alexa has failed to answer a query. So these conversational systems are not that close to humans. They are still evolving and learning about how to answer, what to answer. Alexa, who is better, Siri or you? Sorry, I don't have an answer for that.

Okay, let's try again. Alexa, who is better, Siri or you? I like all AIs. That's a very diplomatic answer. Alexa, where do you live? I live in the cloud. I guess that makes me Cloudian. So with this, we will finish this session.

I hope all of you must have learned something from this lecture. Thank you.