CONVERSATIONAL AI AGENTS IN ENHANCING CONSUMER RESPONSE IN THE ONLINE RETAIL PLATFORM

OLLI Fall 2024

Dr. Swagata Chakraborty

HUMAN-COMPUTER INTERACTIONS (HCI)

- **Interaction or exchange of information** between a machine and a human user
  - In **human-computer interaction**, computer refers to **machines or technology broadly**, rather than computers only.
  - **Computer-mediated communication** (CMC)
  - E.g., interaction with
    - Computers, laptops, tablets
    - Mobile phones
    - Robots
    - Apps
    - Digital displays and signages
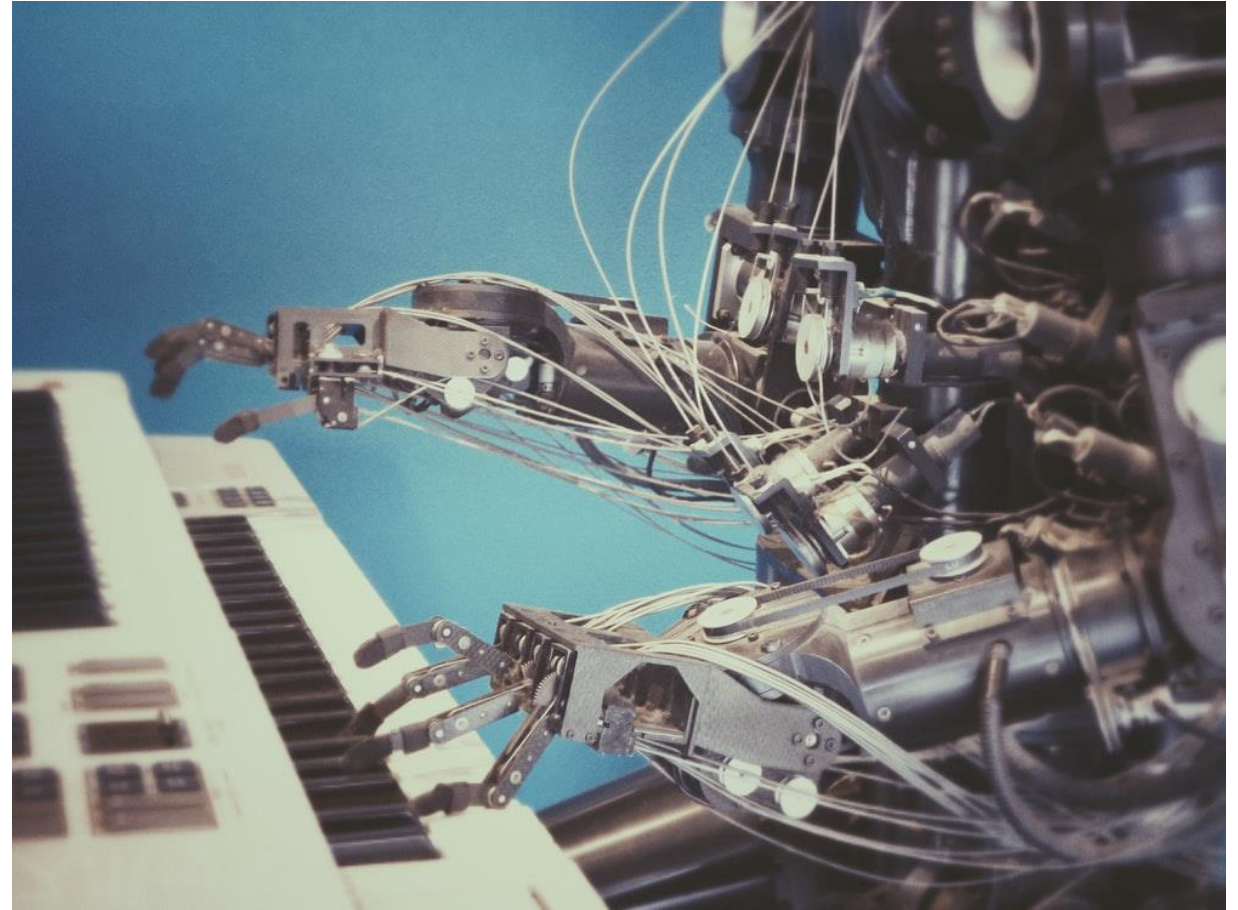 - Interaction with **Artificially Intelligent (AI) agents**

COMPUTER MEDIATED COMMUNICATION (CMC)

- **Computer mediated communication** in the context of **human-computer interaction** refers to exchange of information between machines and human and machines to complete a task
  - Machines could be programmed to **generate and detect social cues**
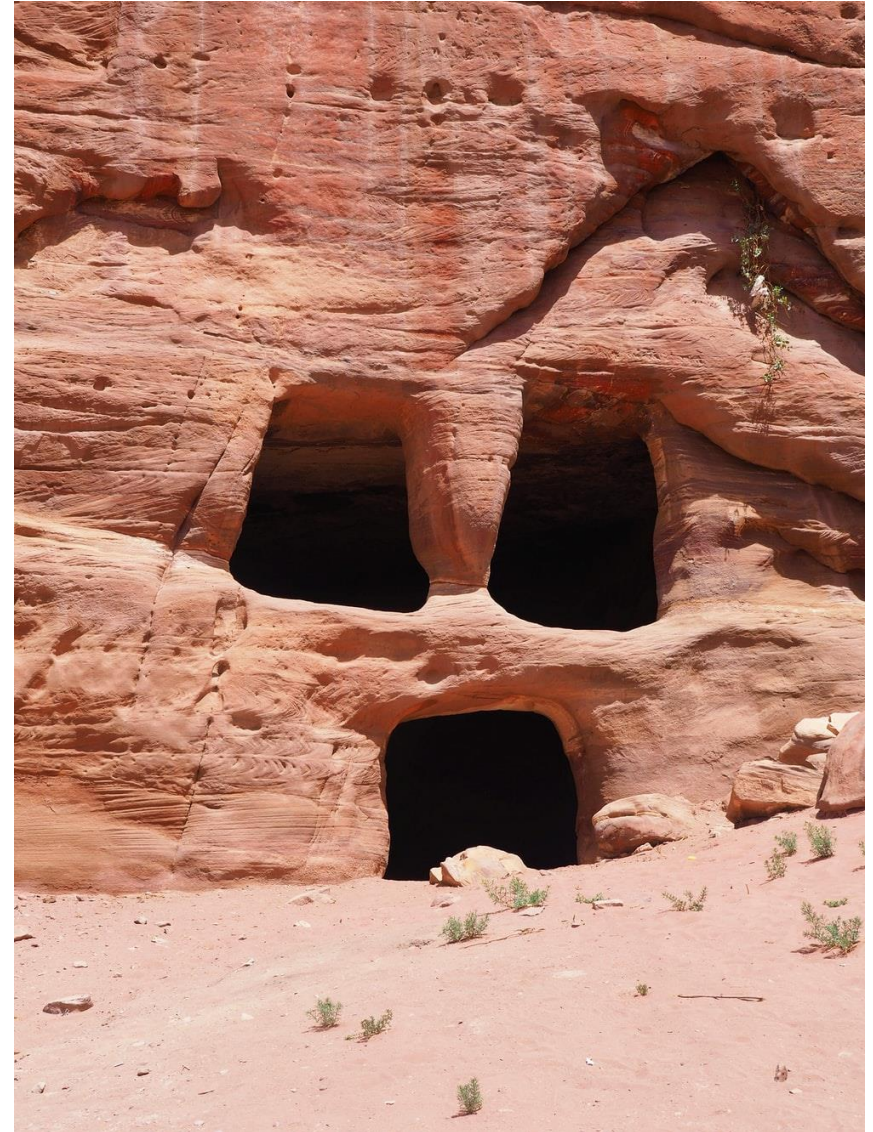 - Humans can detect and communicate with the machines with social cues

ARTIFICIALLY INTELLIGENT (AI) ASSISTANTS

- **Artificial** = man-made

- **Intelligence** = ability to think or process information

- Machines or robots that are **programmed to perform** certain specified **tasks.**

- Also known as AI agents, virtual agents, robots, virtual assistants

- E.g.,
  - Chatbots
  - Robots

- E.g.,
  - Assistance in finding relevant products and product information
  - Assistance in tracking a product delivery status
  - Assistance in filing complaints
  - Assistance in placing an order

ANTHROPOMORPHISM

- *Anthropomorphism* is **imparting human-like traits** in **non-human** entities
  - Human nature of **mind perception**
  - Anthropomorphism **strengthens the sense of understanding** the *unobservable* characteristics of the target
  - Imparting human traits in geometric figures, animals, and abstract shapes.

AI ASSISTANTS AND ANTHROPOMORPHISM

- ***Anthropomorphism in AI assistants*** imparts human-like traits in robots/machines

- **Enhances satisfaction** in the user-assistant interaction

- **Enhances the intention to use** the AI assistance frequently
  - Gives a feeling of "***talking to a person***"
    - Sense of intimacy
    - Sense of involvement
    - Sense of understanding
    - Sense of co-presence
    - Sense of enjoyability
    - Sense of having social support

MACHINE LEARNING IN AI ASSISTANTS

- The process of **training and programming** a machine or a robot to perform certain specific tasks.
  - **Ability to identify** user's needs (i.e., intent)
  - **Ability to process** information to give relevant response to the user
  - **Ability to respond** to the user (i.e., response or dialog)
  - **Ability to identify** situations beyond the scope of the assistant to respond
- Need to **continuously update and upgrade** the system to evolve and respond to the specified tasks in a better way

NATURAL LANGUAGE PROCESSING (NLP) IN AI ASSISTANTS

- **Natural language processing** in human-computer interactions uses language **simulating a normal human-human conversation** instead of using language where it feels like the user is conversing with a machine.
  - **Natural Language Understanding (NLU)**
  - **Natural Language Generation (NLG)**
- The machine/robot is programmed to be able to understand **user inputs from complex sentences or phrases.**
- E.g.,
  - Conversing in sentences instead of using clickable options
  - Expressing emotions
  - Using emojis

TASK ORIENTED AI ASSISTANTS

- *Task-oriented* AI assistants
  - **Primarily** focused on **completing a task**
  - **Social cues are minimal** or entirely absent
  - Often **clickable options are preferred** over natural language processing.
  - Often more user friendly

SOCIALLY ORIENTED AI ASSISTANTS

- *Socially-oriented* AI assistants
  - **Task is completed while developing a social connection** with the user
  - **Social cues are used frequently** (e.g., offering greetings to the user, asking user's names, etc.) to communicate that the assistant is paying attention to the user.
  - **Often natural language processing is preferred over clickable options** to anthropomorphize the AI assistant and enhance the para-social presence of the assistant.
  - **May take longer to complete a task** than a task-oriented AI assistant.

BACKCHANNELING CUES

- **Back-channeling** cues
  - indicators of a listener's attentiveness to a speaker
- E.g.,
  - **Repetitions:** marks active active listenership
  - **Interjections:** marks to acknowledge or express certain emotions
  - **linguistic responses:** marks for expressing agreement
  - **Complement:** completing an incomplete sentence
  - **Assessments:** evaluation of the speaker's words

PARA-LINGUISTIC CUES

- *Nonverbal* signals used to express one's emotions
  - E.g.,
    - tone of voice
    - words emphasis
    - use of ellipses
    - repetition of exclamation marks
    - capitalization of certain words

BODY LANGUAGE CUES

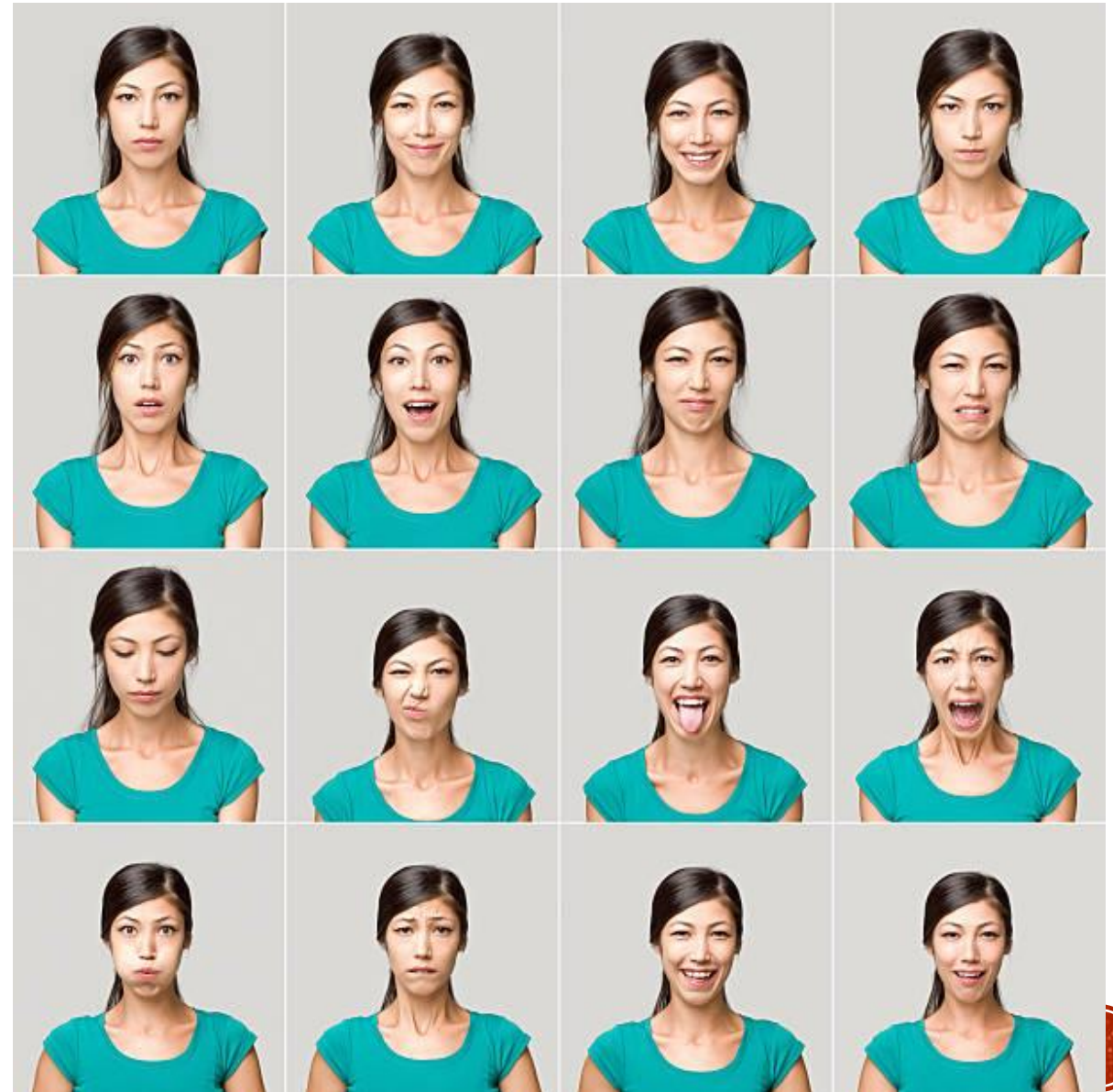- *Facial expressions* conveying emotions
  - E.g.,
    - **Eyebrows**: Raised eyebrows conveying happiness, amazement, surprise, confusion; contracted eyebrows conveying worriedness, sadness, anger, disappointment,
    - **Lips**: Lips with upward curve conveying positive emotions; lips with downward curve conveying negative emotions
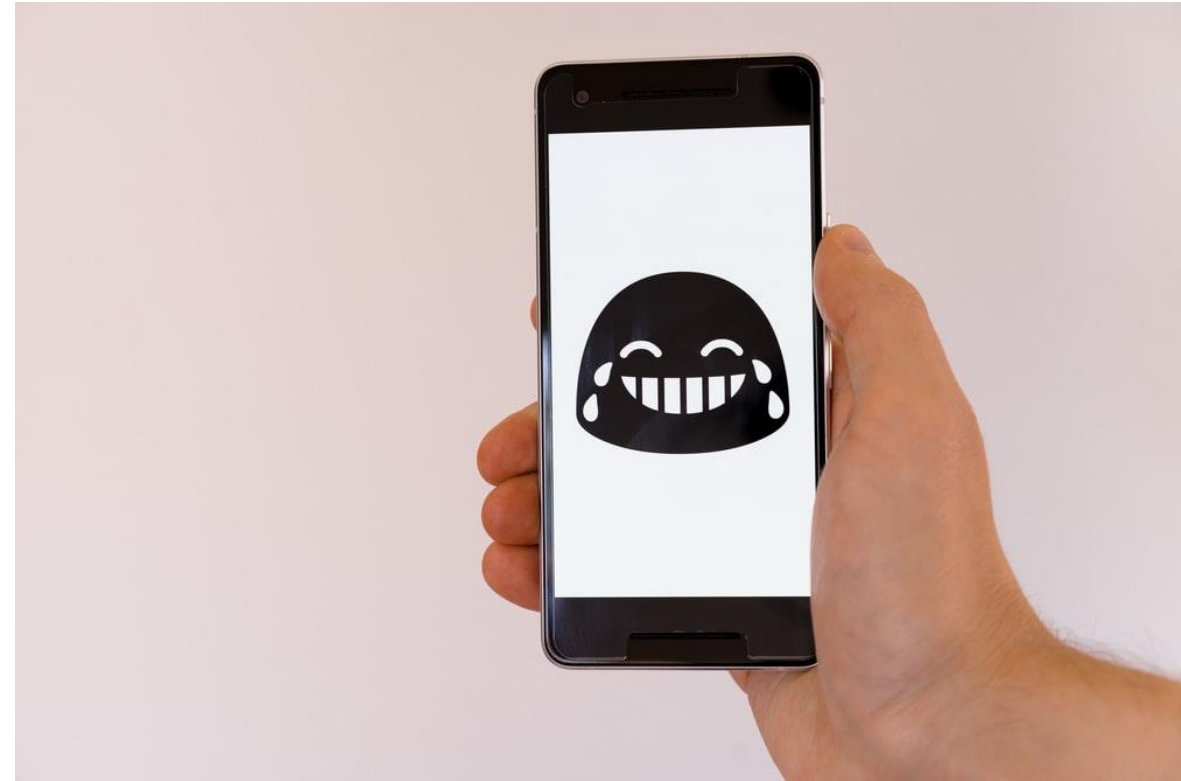
- *Body gestures*
  - E.g.,
    - **Head nodes:** Up-down head nodes conveying agreement/approval; side-wise head movement conveying disagreement/ disapproval
    - **Hand gestures:** Gestures for greetings and farewell; gestures for pointing at a specific product/option
    - **Direction of facing the user:** Assistant facing toward the user conveying the assistant is paying attention to the user.

USE OF HUMOR AS SOCIAL CUE IN HUMAN COMPUTER INTERACTION (HCI)

- **Humor using technology**
  - more *engaging*
  - contributes to its *personification*
  - enhances the *user experience* with the system
    - **Humor generation**
      - is a machine's ability to identify aspects of humor and algorithmically replicate them for users
      - E.g., Puns: relatively simple structure
    - **Humor recognition**
      - develop algorithms to recognize human-generated humor
        - Basic: Predictable; E.g., joke with punchline
        - Complex: linguistic/ psychological/behavioral cognition. E.g., Irony, sarcasm
- **Humor in HCI**
  - Display extroverted personality
  - Using humor and a high-pitched voice improves users' perception of the system and the overall task enjoyment
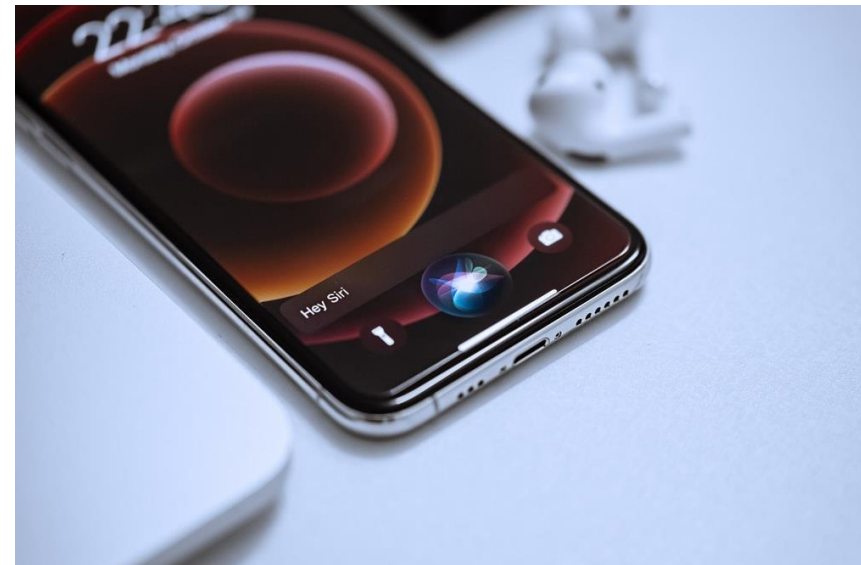 - Deprecation humor: defuse situations when the AI assistant is unable to find answers.

CHATBOT

- **Chatbot = *Chat + Bot***
  - i.e., robots or machines that can converse
  - Also known as
    - Chatterbots
    - conversational agents
    - Interactive personal assistants (IPA)
  - ***Voice-based*** chatbots
    - E.g., Alexa, Cortana, Google Assistant, etc.
  - ***Text-based*** chatbots
    - E.g., chatbots in the online stores of Sephora, H&M, Amazon, Tommy Hilfiger, etc.
  - ***Humanoid*** chatbots
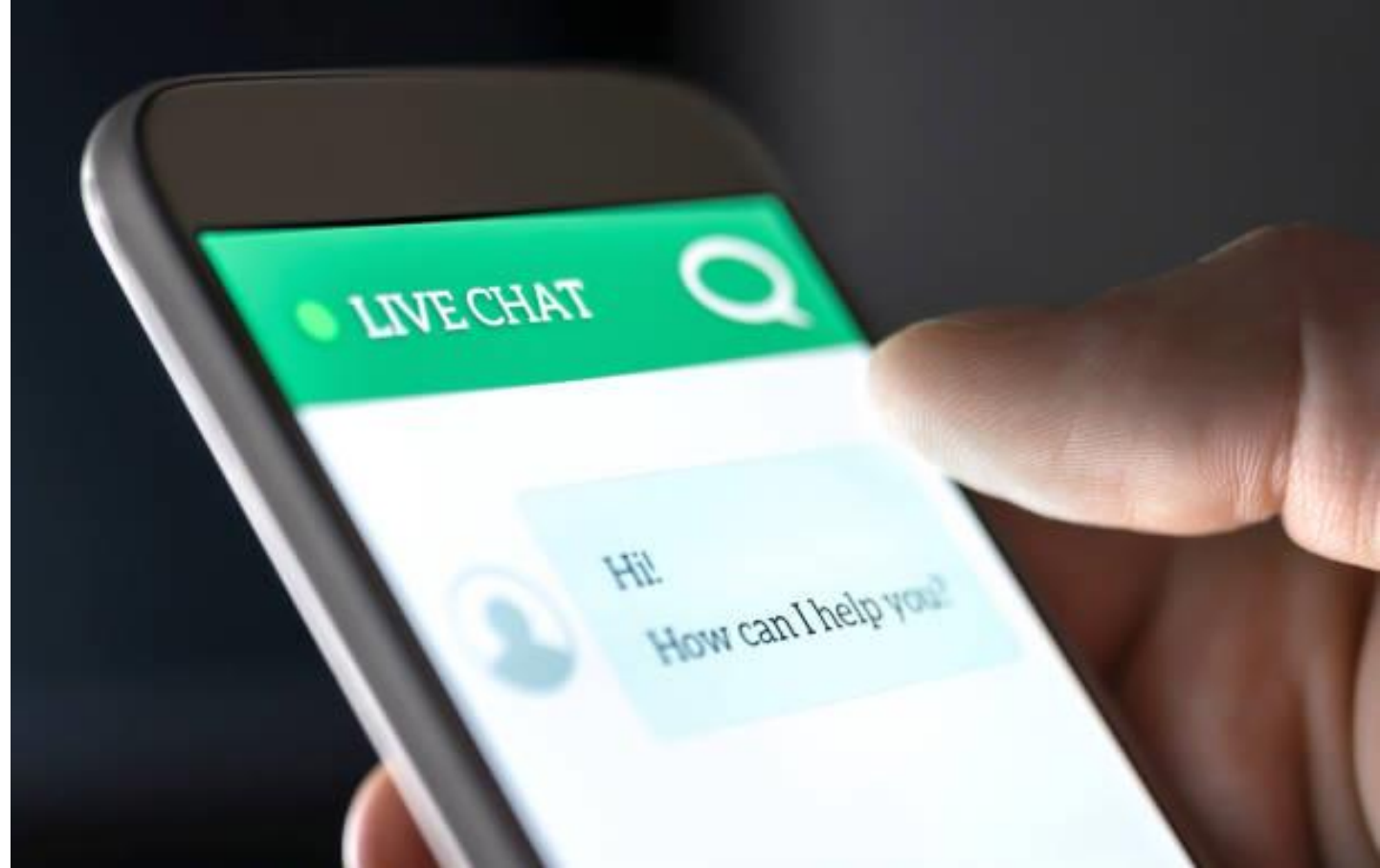   - E.g., human-like in-store assistants

VOICE-BASED CHATBOT

- Can **detect** user input and **respond** in **voice**.

- Voice-based chatbots are often programmed with the following strategies to impart a more human-like effect
  - **Voice modulation**
  - **Gender of the virtual agent**
  - **Empathetic tone**
  - **Personality**

- *Wake words*
  - Words or phrases that are used to activate or start the conversation with the voice-based chatbot.
  - E.g.,
    - "Alexa" is the wake word to activate Alexa

TEXT-BASED CHATBOT

- Can **detect** user input and **respond** in **text**.

- Text-based chatbots are often programmed with the following strategies to impart a more human-like effect
  - Frequent usage of exclamation marks, emojis, and capitalized words/phrases
  - Asking and remembering user's name throughout the conversation
  - Using empathetic phrases
  - Using words expressing emotions

HUMANOID CHATBOT

- A chatbot **looking like a human**
  - Virtual humanoid **avatar** chatbots
  - **Physical** humanoid chatbots

- Humanoid chatbots are often programmed with the following strategies to impart a more human-like effect
  - **backchanneling** and **paralinguistic** cues in the conversation
  - **Human-like body language** with social cues
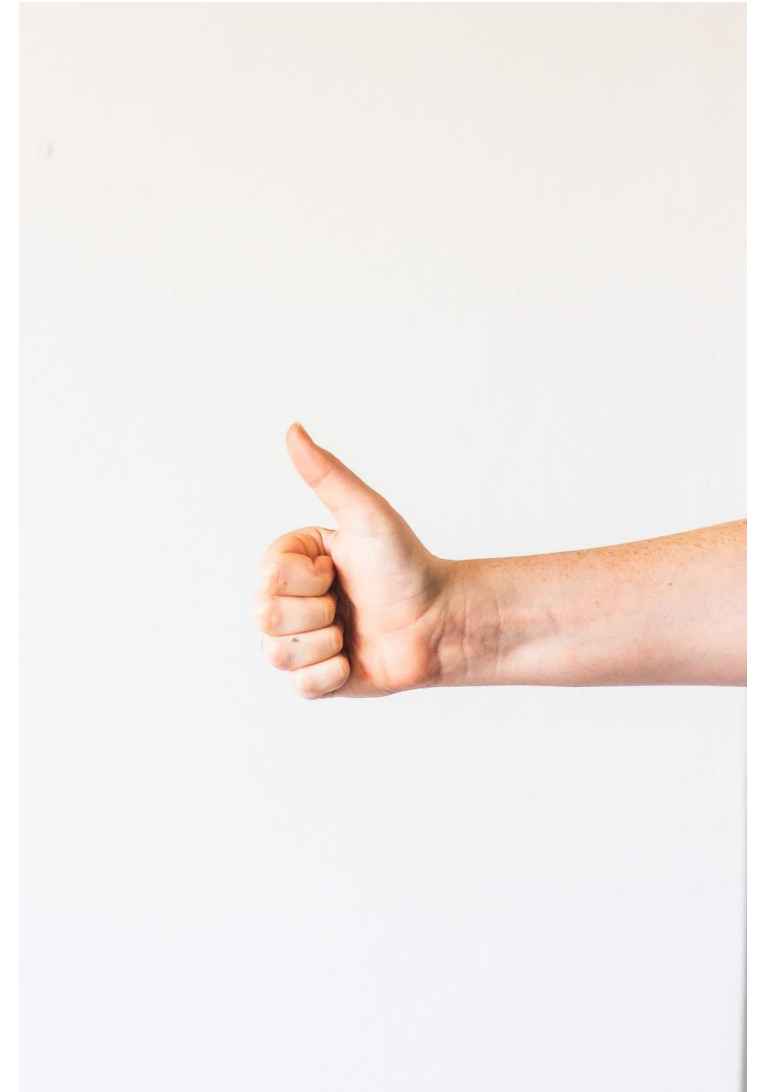
CONCIERGE CHATBOT

- Personal assistant customizing the search results according to the user's needs.

- E.g.,
  - Personal shopping assistant who can recommend products based on consumers' age, gender, size, color and style preferences.

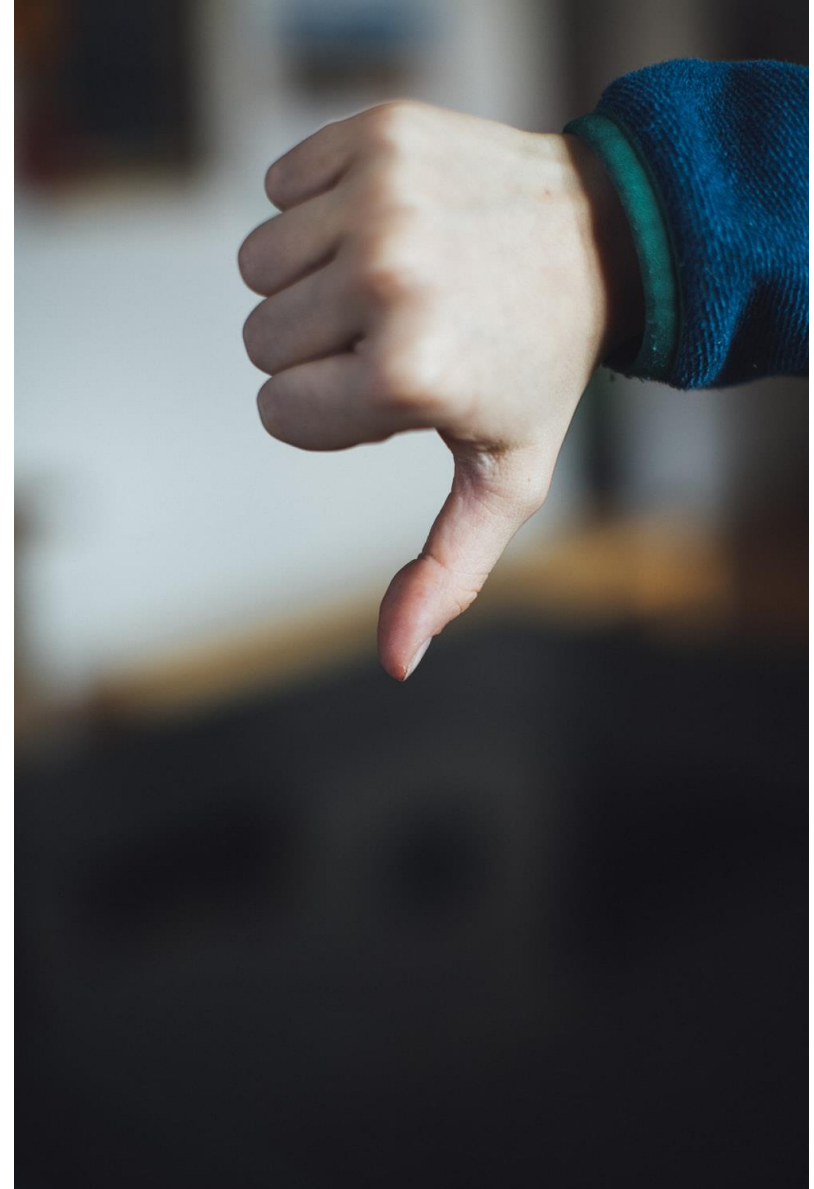[Watch the Video Showing an Example of Concierge Chatbot](#)

ADVANTAGES OF CHATBOTS

- Relatively cheaper to build

- Can lead to long-term financial gains

- Can increase sales

- Automated assistance available 24/7

- No wait time for getting a response compared to frequent long wait times to talk to a human agent

- Can attend multiple users at the same time

- Can customize results according to specific user needs

- Makes it easier to find information within a website/online store.

- Minimizes the need for human assistants

- Enables using human resource for other meaningful tasks

- When needed, can connect to a human agent

- Makes the communication between a brand and its user less stressful for those who do not like to talk to people (strangers)

- Seamless connections with online stores and apps. Especially helpful for the tech savvy Gen Y and Gen Z

- Can store relevant data for machine learning to understand and meet consumers' needs in a better way
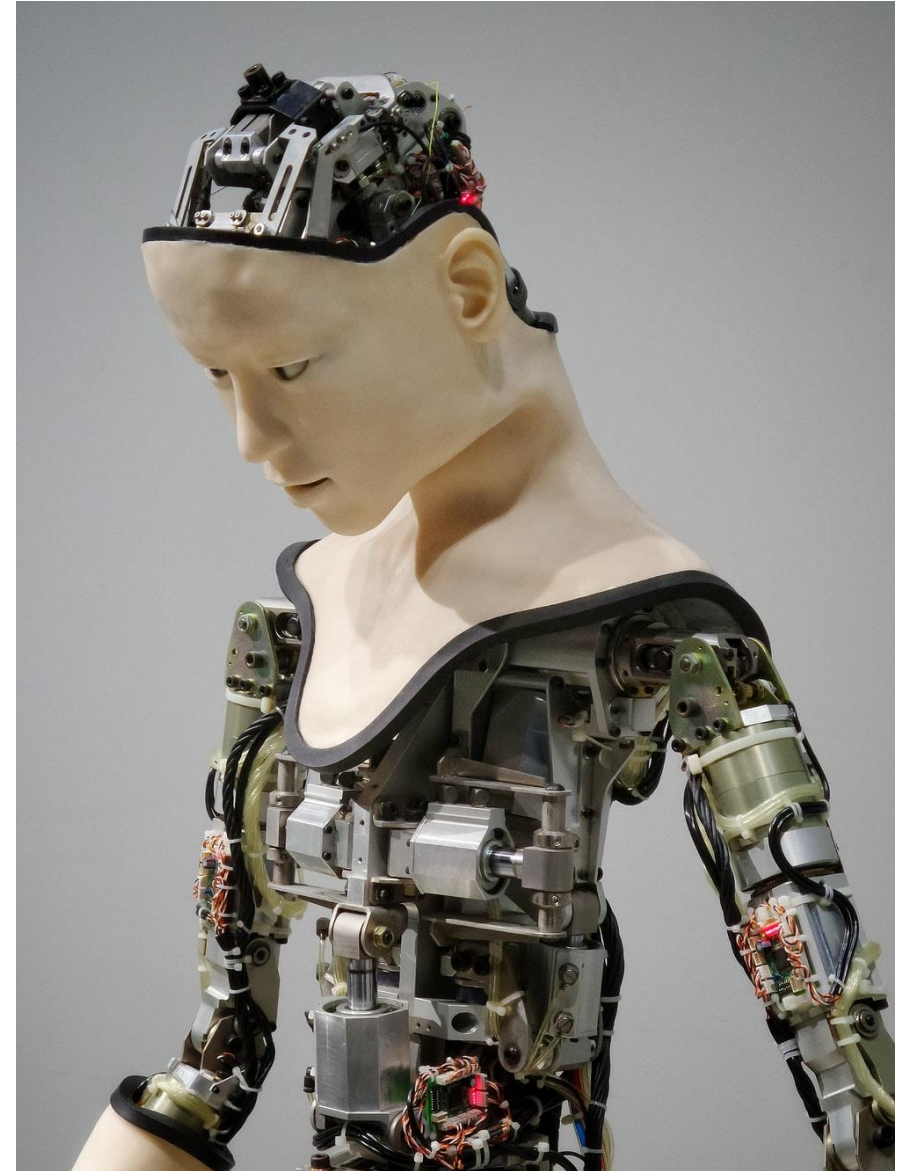
DISADVANTAGES OF CHATBOTS

- Needs continuous updates and upgrades for machine learning

- Needs experts who can build and maintain the system in the backend.

- Could be frustrating for users who are not tech savvy

- Feelings of perceived risks among the users in terms of security and privacy

- In the absence of proper Natural Language Processing and social cues in the conversation, interaction with chatbots could be too mechanical and boring.

- Chatbots with less developed programing are not equipped in handling complex questions and user inputs

- Highly complex chatbots require specially trained experts to build and maintain which could be expensive and irrelevant for small businesses

- Chatbots may be not able to take care of angry or disappointed customers without the intervention of human agents

- Voice-based chatbots can give wrong, confusing, and misleading responses or fail to recognize a user input when there is high background noise.

Ethical Issues in Chatbots

- Privacy and security
- Display of unintentional racist, sexist, or ageist behavior
- Display of *cold* emotions
- Unemployment of human workers
- Inequality

THEORIES TO UNDERSTAND CONSUMER EXPERIENCE WITH AI ASSISTANCE

- Computers are Social Actors (CASA) paradigm
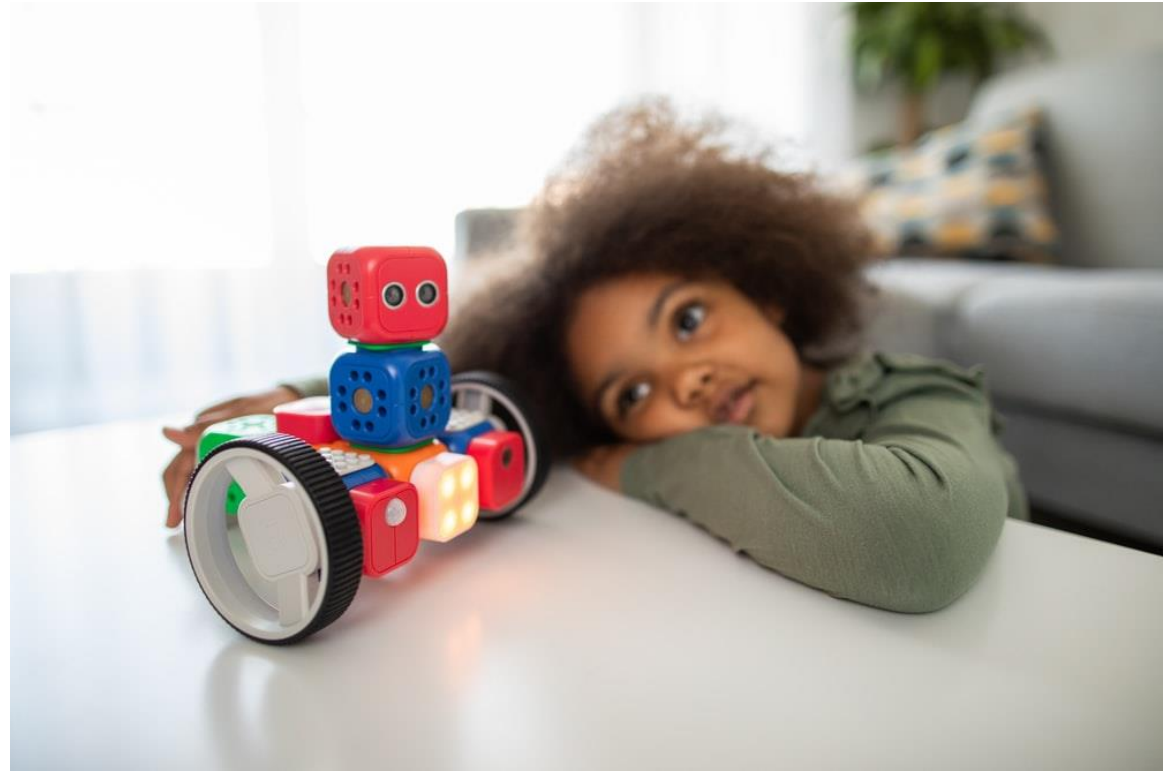- Para-Social Presence

COMPUTERS ARE SOCIAL ACTORS (CASA) PARADIGM

- People respond to a computer similar to the way they respond to real people when the computer presents social cues, such as language output, interactivity, and playing a human role.

PARA-SOCIAL PRESENCE

- ***Para** = Near*

- The extent to which a communication medium (e.g., computer) conveys a sense of psychological connection to its users
  - Identifying social cues from online medium
  - Website facilitates a sense of understanding, connection and involvement with users
    - **Intimacy**
    - **Sense of understanding**
    - **Enjoyability**
    - **Involvement**

- **Stickiness intention**
  - Intention to use the technology frequency due to a higher perceived social presence with it

CASE STUDY

- **Human-computer interaction with an AI personal assistant**
  - Natural language processing + clickable options
- *Socially-oriented* **AI assistant**
  - Concierge chatbot
  - Text-based cues
  - Informal tone in the conversation
  - Backchanneling cues (e.g., agreeing with the user's style)
  - Para-linguistic cues (e.g., expressing modulation by using exclamation marks and capitalizing words)
- **CASA paradigm**
  - Anthropomorphism of the AI assistant
  - Extraverted, agreeable, and open personality
  - Using terms and phrases that the users' demographic would typically use
  - Complimenting the user for enhancing user satisfaction
- **Para-social presence**
  - Chatbot remembers user's personal style and recommends products accordingly

Watch Video of Case Study 1

EXAMPLES OF CHATBOTS DEVELOPED BY STUDENTS

1. [Chatbot designed for Levi's for product recommendation](#)
2. [Chatbot designed for Lush for providing information on products and store locations](#)
3. [Chatbot designed for Coca-Cola for providing information about multiple topics](#)
4. [Chatbot designed for IKEA for customer service](#)
5. [Chatbot for a start-up café for products recommendation](#)

REFERENCES

- Carroll, J. M. (1997). Human–computer interaction: Psychology as a science of design. *International Journal of Human-computer Studies*, *46*(4), 501-522.

- Kumar, N., & Benbasat, I. (2002). Para-social presence and communication capabilities of a web site: a theoretical perspective. *e-Service*, *1*(3), 5-24.

- Nass, C., Moon, Y., Fogg, B. J., Reeves, B., & Dryer, D. C. (1995). Can computer personalities be human personalities?. *International Journal of Human-Computer Studies*, *43*(2), 223-239.

THANK YOU!
QUESTIONS? ☺
SWAGATA.CHAKRABORTY@UNT.EDU