



# Digital Ethics and Data Privacy

Topic 6: Human Computer Interaction Design





# RWD (Topic 6: Human-Computer Interaction Design)

Self-Regulated Learning



# Topic Objectives

- Learn the concepts of ***human computer interaction*** and ***user experience design***.
- Understand the importance of ***user-centric design***.
- Discuss ethical considerations in HCI design such as ***inclusivity*** and ***accessibility***.
- Identify the definitions of and differentiation between ***automation*** and ***autonomy***.
- Evaluate the use cases of ***brain computer interfaces*** that are ***beneficial*** and ***detrimental*** to people and society.
- Explore ***new advancements*** and associated ***ethical issues*** of HCI and UX design implementations.

# Human Computer Interaction

- **Human-Computer Interaction (HCI)** is the study of designing, implementing, and evaluating the interactive interfaces used by people and computers.



# Human and Computer



**Sight**



**Hearing**



**Touch**



**Taste**



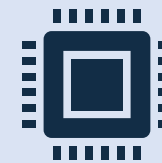
**Smell**



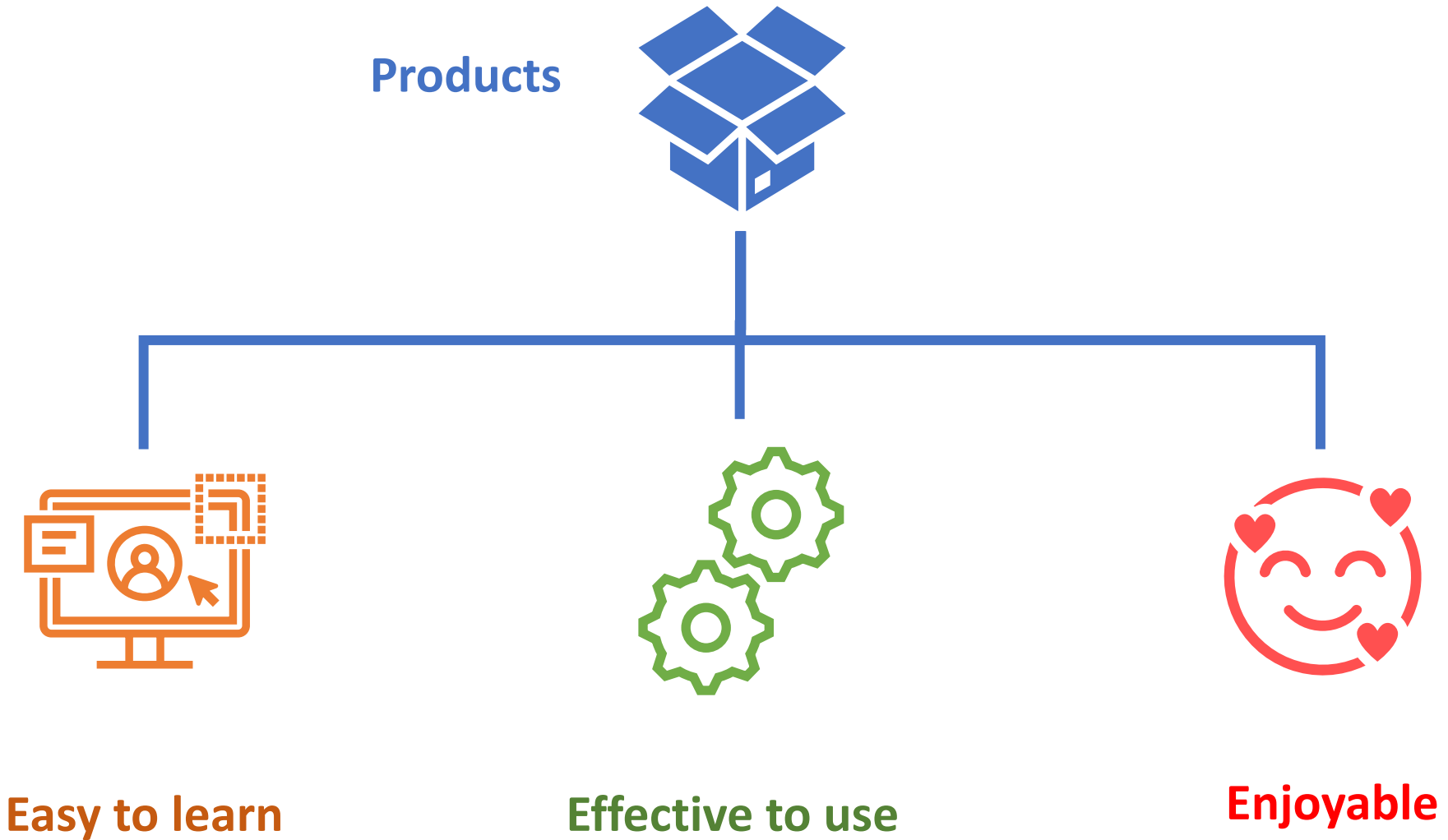
**Electrons**



**Components**



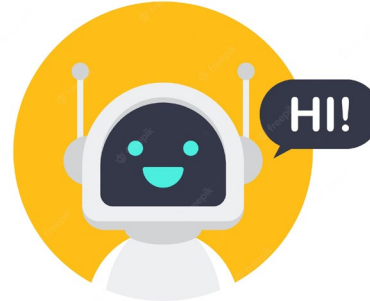
# Goal of HCI



# HCI in Everyday Life and Work



Amazon Alexa / Google Home



Chatbots



Parking@HBD

# HCI and User Experience Design

- HCI revolves around the study of how humans use technology.
- User Experience (UX) Design focuses on how a human as a user experiences their interaction with technology.
- Goal of UX Design is to provide ***great interactive experiences*** that keep users and customers ***loyal*** to the product or brand.

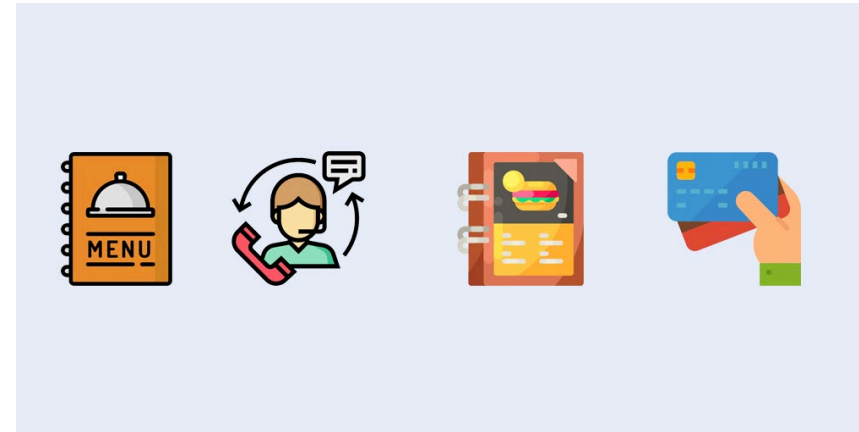


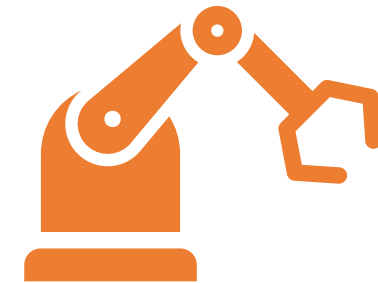
Image Source: [rsigeeks.com](https://rsigeeks.com)



# Autonomy Vs Human Control

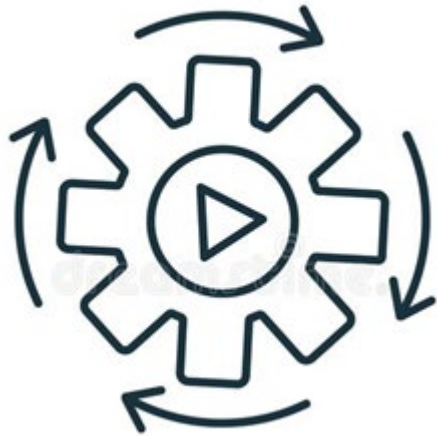


High Human  
Control Level

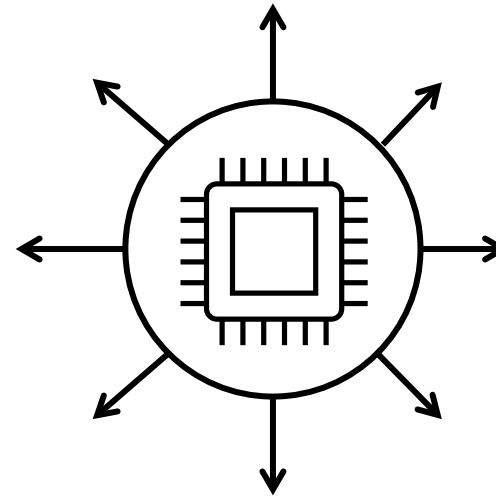


High Computer  
Automation /  
Autonomy

# Automation and Autonomy



Automation



Autonomy

# Autonomy Levels of Machines

High

10	The computer decides everything and acts autonomously, ignoring the human.
9	The computer informs the human only if it, the computer, decides to.
8	The computer informs the human only if asked, or
7	The computer executes automatically, then necessarily informs the human, and
6	The computer allows the human a restricted time to veto before automatic execution, or
5	The computer executes that suggestion if the human approves, or
4	The computer suggests one alternative, or
3	The computer narrows the selection down to a few, or
2	The computer offers a complete set of decision/action alternatives, or
1	The computer offers no assistance; the human must take all decisions and actions.

Low

1-dimensional Sheridan-Verplank levels of automation/autonomy

# Automation Levels of Autonomous Cars

## LEVEL 0



There are no autonomous features.

## LEVEL 1



These cars can handle one task at a time, like automatic braking.

## LEVEL 2



These cars would have at least two automated functions.

## LEVEL 3



These cars handle “dynamic driving tasks” but might still need intervention.

## LEVEL 4



These cars are officially driverless in certain environments.

## LEVEL 5

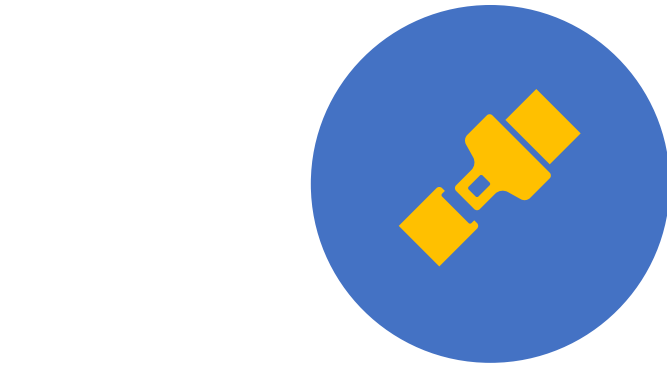


These cars can operate entirely on their own without any driver presence.

Image Source: [Geospatialworld.net](https://www.geospatialworld.net)

# Supervised Autonomy

- Building Reliable, Safe & Trustworthy Systems



Safe



Reliable

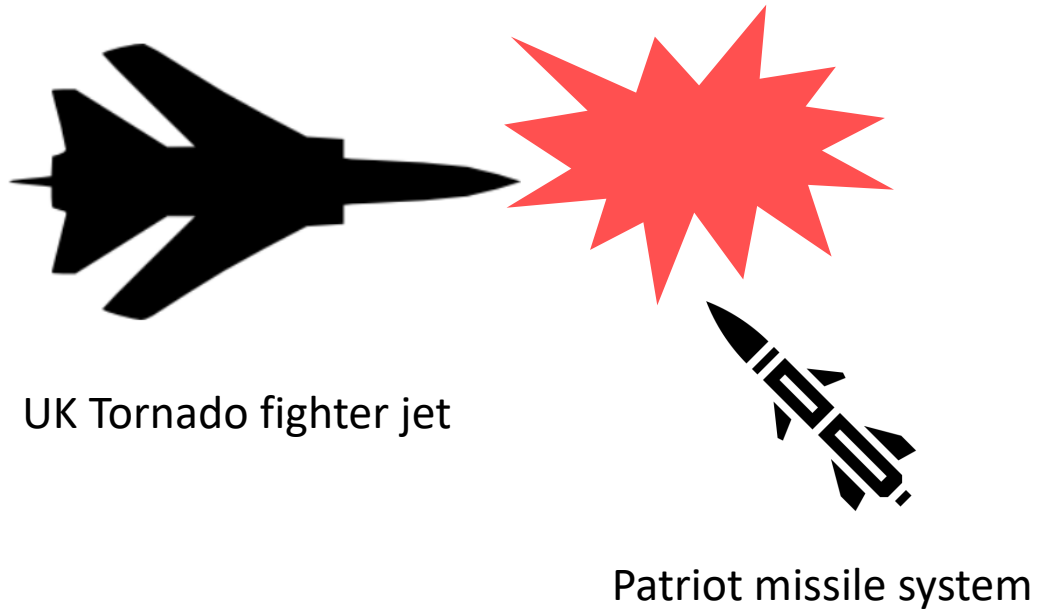


Trustworthy

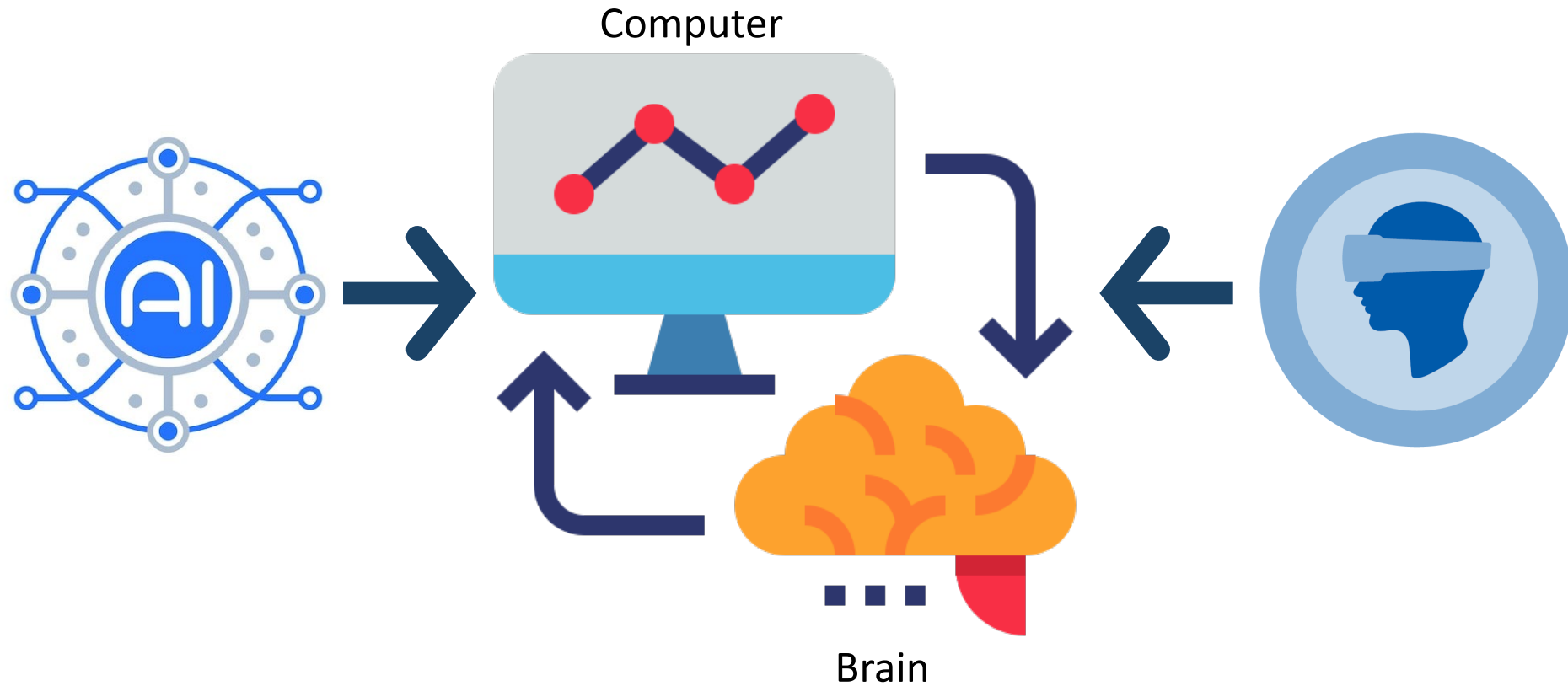


Human-Controlled/Supervised Autonomy

# Excessive Autonomy



# Brain Computer Interfaces (BCI)



# Brain Data

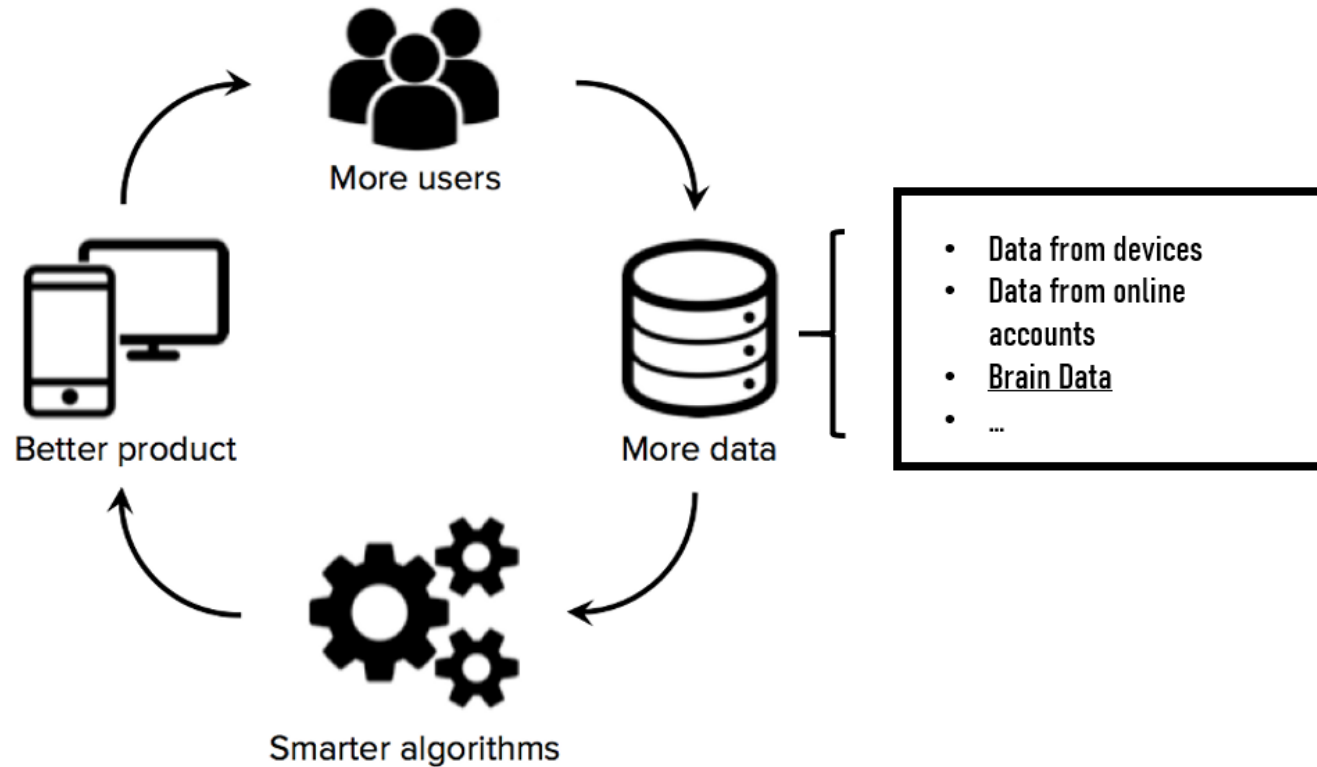
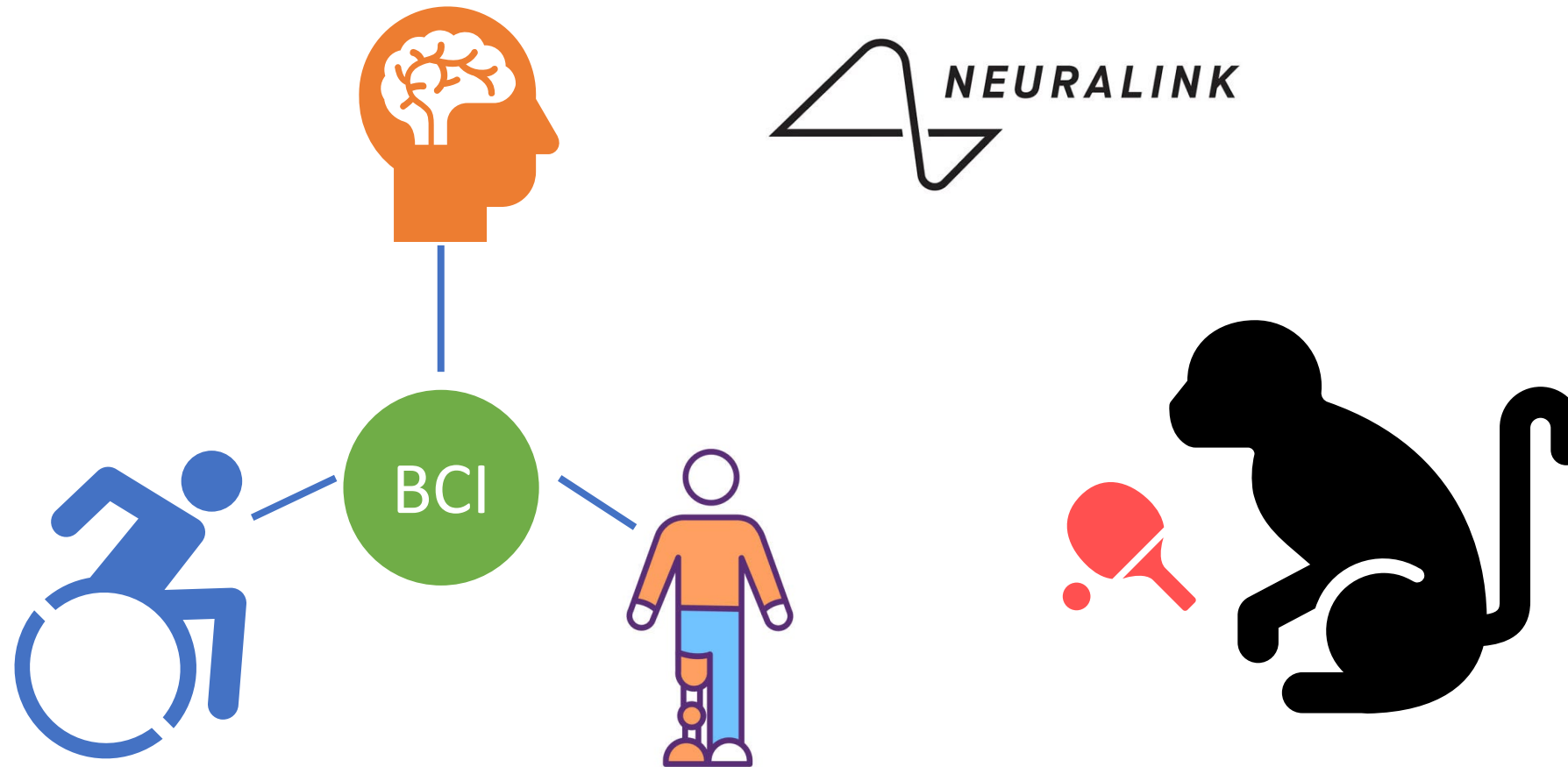


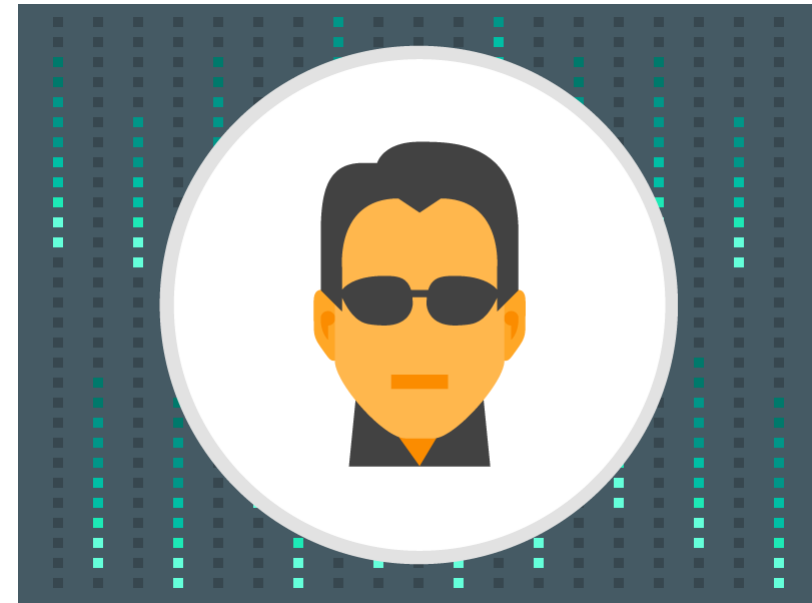
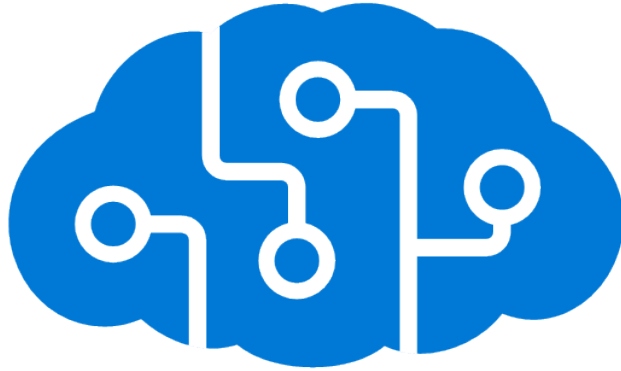
Image Source: [Towardsdatascience.com](https://towardsdatascience.com)



# Neuralink



# Brain and AI Cloud Connectivity

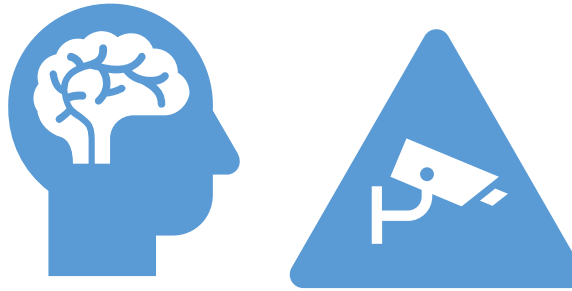


Consent and Transparency

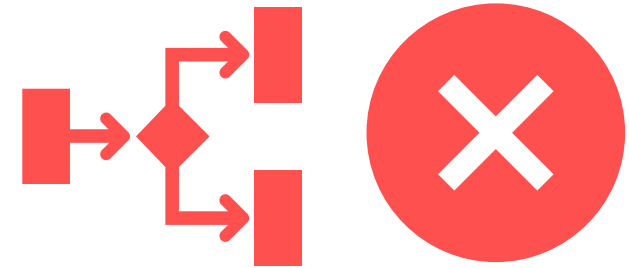
# Ethical Issues



Responsibility

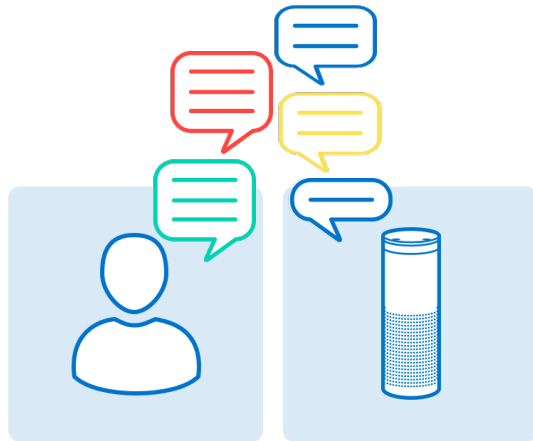


Privacy



Outcome

# What The Future Holds



Voice-Guided User  
Interfaces



Virtual/Augmented  
Reality



Wearable  
Computing

# HCI Ethical Considerations



System  
Vulnerabilities



Data Privacy  
Issues



Data  
Transparency



Hacker  
Risks



Accident  
Liability



**NUS**  
National University  
of Singapore

School of  
Computing