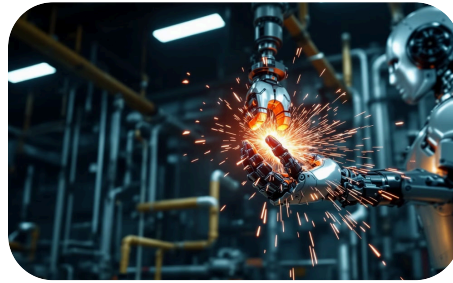# Opportunities & Challenges
# of Artificial Intelligence

AI in the Workplace: Opportunities for the Future 🌟

Increased Productivity

AI can analyze large amounts of information faster and automate repetitive tasks.

Hazardous Activities

AI-powered machines can take over risky jobs, such as in factories or emergency response, and relieve people from monotonous work.

Personalized Assistance

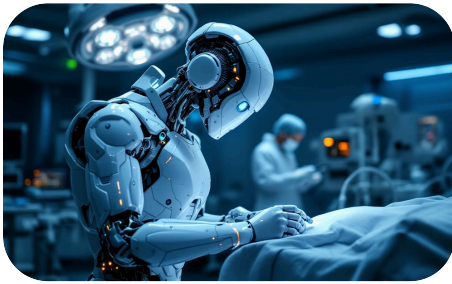AI-based assistants help with organization, communication, and decision-making.

Fostering Innovation

AI technologies enable new business models, creative solutions, and faster research progress.

🚀 Conclusion:

AI facilitates many work processes, increases efficiency, and creates new opportunities!

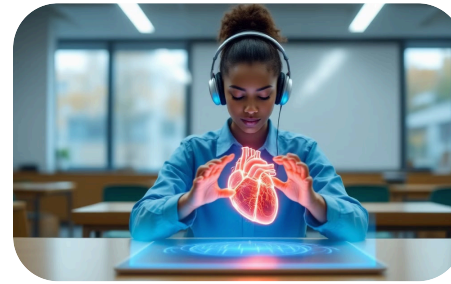# Examples of Practical Applications of AI

Medicine

AI supports diagnosis, personalizes treatments, and improves the accuracy of operations.

Transportation

Autonomous driving, intelligent traffic control, and optimized route planning.

Education

AI supports personalized learning, better presentation of complex content, and facilitates access to education.

Everyday Technology

Smartphones, voice assistants, smart home appliances, and social media use AI for personalized services.

AI in Medicine

🦠 Detection of diseases (e.g. on X-ray images)

🩺 Personalized treatment plans

💊 Medication development with AI

AI in Transportation
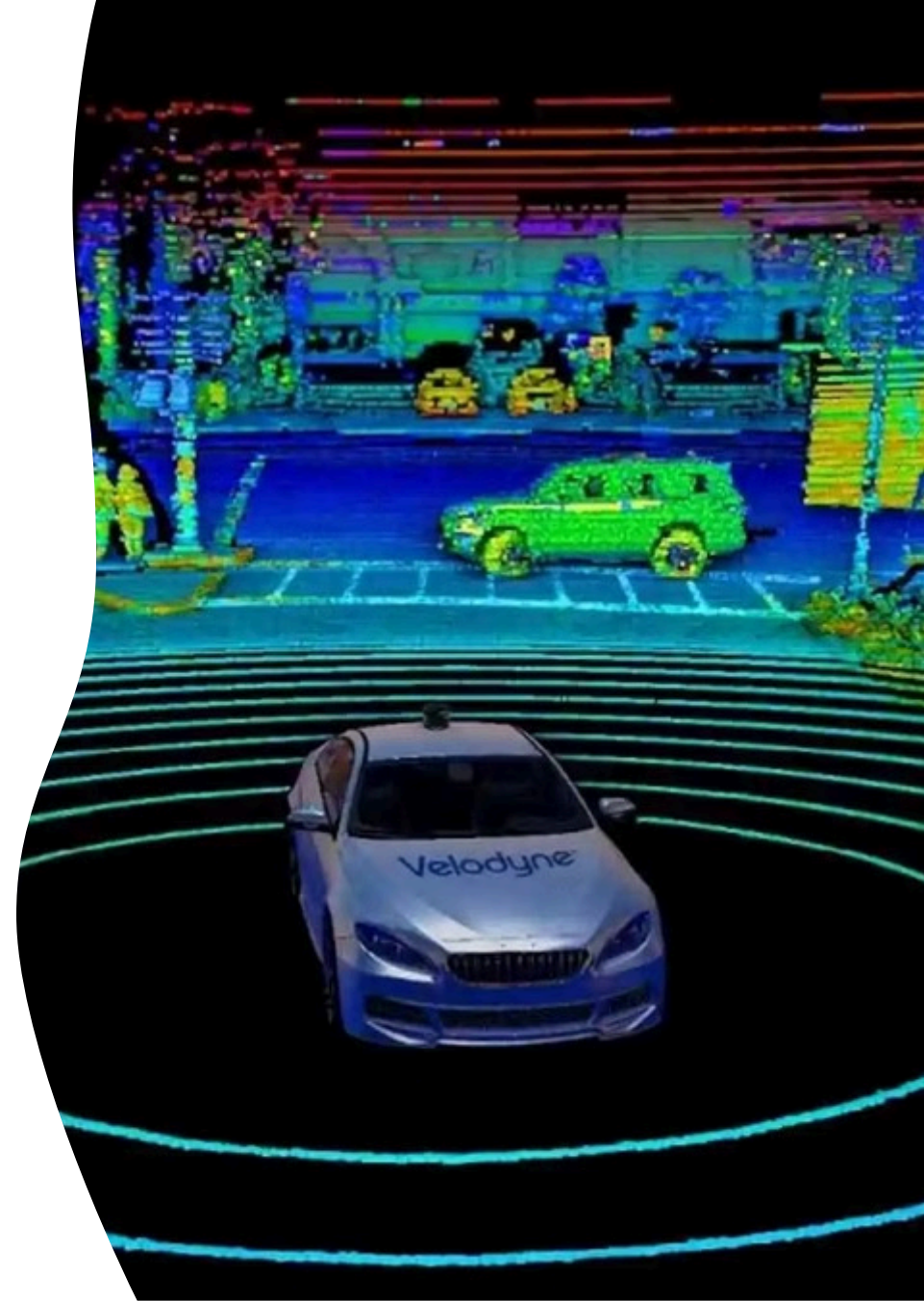
🚗 **Self-driving cars**

AI controls brakes, steering, and navigation.

🚦 **AI-optimized traffic lights**

AI adjusts green phases and avoids congestion

🧭 **AI in navigation devices**

Traffic forecasts & best route

AI in Education

🔢 Personalized learning programs (e.g. adapting math exercises based on skills)

📱 AI-powered learning apps like Duolingo that adapt to the user

🏆 Automated test grading & assessment

🏗️ Large Language Models and other generative AI tools

AI in Everyday Life

📱 AI in Smartphones (Camera Optimization, Voice Control)

🏠 Smart Homes (Heating, Lighting Control)

💡 Spam Filters, Smart Washing Machines, etc.

AI in Industry & Environment

🏭 **Quality Control in Factories**

AI inspects products

🌱 **Agriculture**

AI drones for harvest planning, fertilizer optimization

🌍 **AI in Environmental Protection**

Satellite analysis of forests

Discussion 💬

AI and Automation in the Job Market

🤔 What new jobs will be created?

What jobs will disappear?

🤔 What skills will be more important in the future?

Discuss with your class! 🚀

Future Skills

⚠️ Challenges and Ethical Questions

🟠 **AI is fascinating, but not perfect!**

AI is a powerful tool, but it also has its limitations.

🟠 **Risks & Challenges**

There are important ethical questions we need to consider when using AI.

🟠 **Key Issues**

In the next slides, we will take a closer look at the most important challenges.
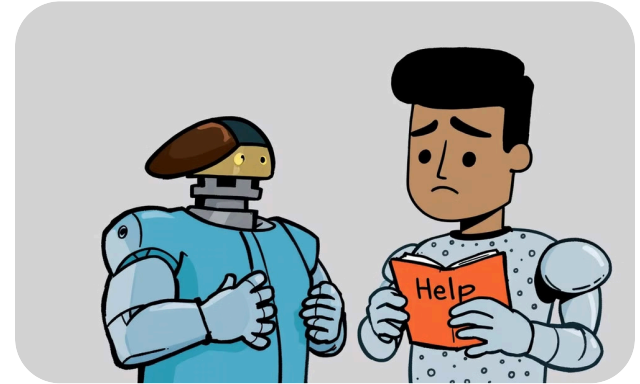
Important Ethical Questions 🤔

Data Privacy & Control

How do we protect our data from misuse by AI?

Hallucinations

LLMs hallucinate because they generate words based on probabilities.

Discrimination & Fairness

How fair are AI systems really?

Data Privacy & Control ⚠️

Understanding Data Collection

AI systems analyze large amounts of personal data for personalized content. As a "Black Box", it is often unclear how they actually use this data. **Be careful about what information you share online.**

Practicing Data Privacy

Actively use privacy settings and critically question which apps and services really need access to your data. Protect yourself from targeted advertising and behavioral manipulation.

Knowing Your Rights

The GDPR and other data protection laws protect your personal data. Inform yourself about your rights and how to enforce them to preserve your privacy.

AI Challenges ⚠️

Artificial Intelligence (AI) brings ethical challenges that must be carefully addressed.

Bias & Fairness

AI systems can reflect and amplify existing biases in training data.
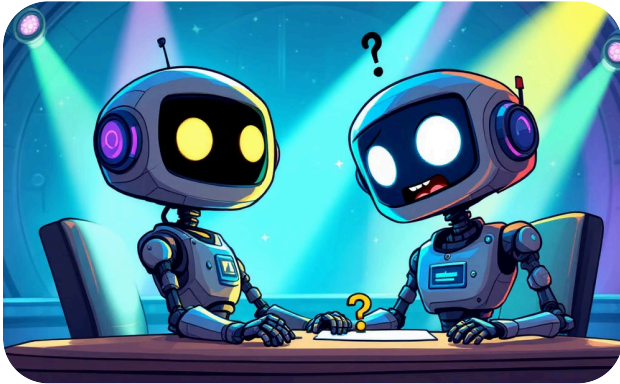
Hallucinations

LLMs hallucinate because they generate words based on probabilities without verifying the sources.
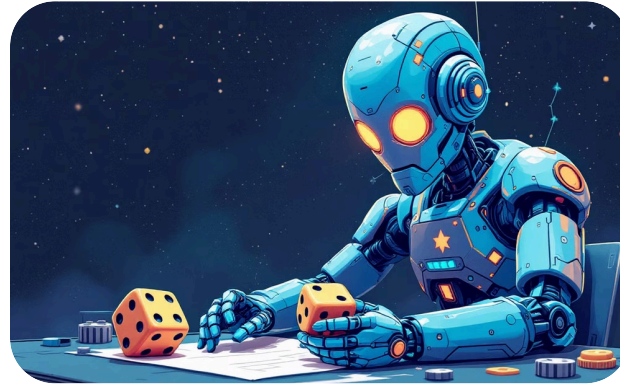
Transparency & Explainability

To trust AI systems and take responsibility for their decisions, we need to understand how they arrive at their results.

Hallucinations - When AI Invents Things

Convincing Misinformation

AI can provide false answers and sound very convincing.

Blind Guessing

Often it "guesses" when it doesn't know something - but without real knowledge!

Risk of Misinformation

This can lead to false information or decisions.

❌ When AI hallucinates

👉 ✅ Fact check!

Example:

Question: "What is the largest lake in Austria?"

AI answer: "The Wörthersee." (Incorrect!)

✔️ Correct answer: The Attersee (or Neusiedlersee, partially in Hungary).

Why does this happen?

- AI only calculates probabilities - it doesn't understand like a human.
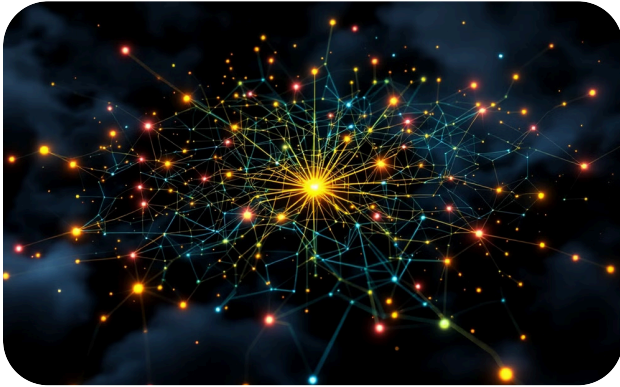- When information is missing or contradictory, it invents an answer.

What can be done?

Always verify AI statements!

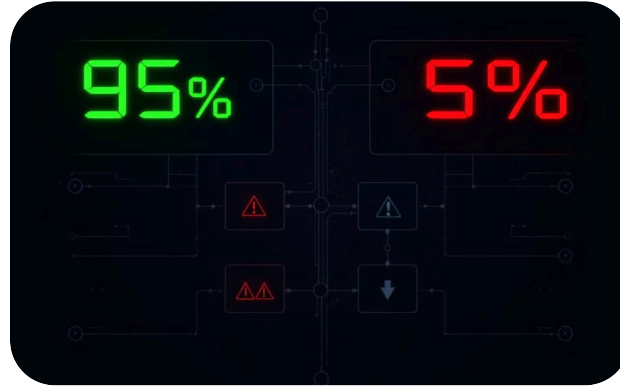Compare multiple sources/use specific prompting ✍️

✔️ Ask clear questions, provide additional information (e.g. texts from reliable sources)

Errors & Control - Why AI Must Be Monitored!

The "Black Box" Problem

AI is often so complex that even experts don't know why it makes a particular decision.

Risk of Errors

AI can be right in very many cases, but in some situations it can also answer completely wrong.

Solution:

Human-in-the-loop

Humans should always have the final say.

AI should be explainable & verifiable.

Bias in AI - When AI Learns Prejudices

What is Bias?

Bias means **prejudice** or **distortion** in AI systems. AI learns from existing data - but this data can contain prejudices that the AI then adopts.

Examples of Bias:

⚠️ **Job applications:** If AI was trained on old data, it can disadvantage women in professions that were traditionally male-dominated.

Facial recognition: Often works better for light-skinned people if the training data is unbalanced.

Discrimination: AI can unconsciously disadvantage people based on gender, origin or skin color - especially problematic in justice, banking or law enforcement.

Why is this a problem?

❌ AI is not automatically neutral - it reflects the flaws and prejudices of the data. Incorrect or one-sided decisions can be unfair and discriminatory.

❌ Clear rules are needed to identify and minimize bias.

What can be done to reduce bias?

1 Diverse data

Training data should fairly represent all groups and offset biases.

2 Testing for bias

Check results for different groups:

Are all treated fairly?

3 Bias detection tools

Use tools like AI Fairness 360 (IBM) or Google's What-If Tool to uncover biases.

4 Transparency and control

Disclose how the AI makes decisions - regular audits are important.

5 Laws and guidelines

Create rules for fair AI use, especially in sensitive areas.

Ecological Impact

Energy

Training one LLM

- uses ~1,000 MWh
- powering 100 US homes for a year

Water

Data centers use

- millions of liters of water annually
- equivalent to 8 Olympic-sized pools for cooling

How do we now deal with AI?

🌟 AI is super useful, but not perfect.

⚠️ We need to critically question and control it.

✅ Always verify information, NEVER rely blindly on AI!

Discussion 💬

AI: Curse or Blessing?

🤔 How does AI influence our lives in areas like **healthcare, transportation, and education**?

What are the ethical challenges involved – e.g. **bias, data privacy, and accountability**?

🤔 **Should we use AI in sensitive areas without restrictions or do we need clear rules?**

Discuss with your class! 🚀