Artificial Intelligence
(Ethical and Societal Implications of AI in Engineering

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Lecture #10

• Definition and examples (e.g., biased facial recognition, biased hiring algorithms).

• Implications for fairness and justice.

• *Case studies*: *Amazon's AI recruitment tool* (discriminatory against women) and *COMPAS algorithm* (bias in sentencing).

• Fairness and Transparency:

- Importance of fairness in AI decision-making processes.

- How transparency in algorithms helps improve trust and accountability.

- Techniques for ensuring fairness: diverse datasets, explainable AI (XAI).

• *Accountability and Privacy*:

- Who is responsible when AI systems make mistakes? (corporations, developers, governments).

- Privacy concerns related to AI in data collection and surveillance.

- Case study: *Google's Project Maven* and its ethical concerns.

AI Safety

• Ensuring Safe and Reliable AI Systems:

- Potential risks of AI systems (e.g., autonomous vehicles, industrial robots).

- AI safety research: robustness, verification, and validation.

- The need for safety standards in AI systems in engineering, like ISO 26262 for autonomous vehicles.

• Examples: *Tesla's Autopilot incidents* and safety concerns in healthcare AI.

• Impact on Society: Job Displacement:

- How AI automation affects jobs in manufacturing, healthcare, and other sectors.

- Potential solutions to mitigate displacement: upskilling, reskilling, and creating new jobs.

- Case studies: AI in the automotive industry (robotics replacing human workers) and AI in customer service (chatbots replacing call centers).

Sustainability

• AI for Good:

- Examples of AI applications benefiting society: healthcare (AI in diagnostics), climate change (AI in energy efficiency), and disaster response (AI in resource allocation).

- The role of engineers in designing AI systems with positive societal impacts.

- AI's potential to improve energy efficiency in engineering systems (smart grids, predictive maintenance).

- Challenges of AI's carbon footprint: the energy consumption of large AI models (e.g., GPT-3).

• AI Regulations:

• Legal and Regulatory Considerations:

-Overview of current AI regulations and guidelines (e.g., EU's *AI Act*, *GDPR*).

- Challenges in creating global AI regulations and ensuring compliance.

- The need for engineers to stay informed about regulatory frameworks to ensure AI development follows ethical and legal standards.

• Liability and Accountability:

- How can AI companies protect themselves legally while ensuring safety and fairness?

- Who is liable when AI systems malfunction or cause harm (e.g., autonomous vehicles causing accidents)?

• *Case Study*: *GDPR and data privacy concerns* in the context of AI and how engineers should handle personal data responsibly.

• The importance of ethical AI, balancing innovation with societal responsibility, and the role engineers play in shaping AI's future.