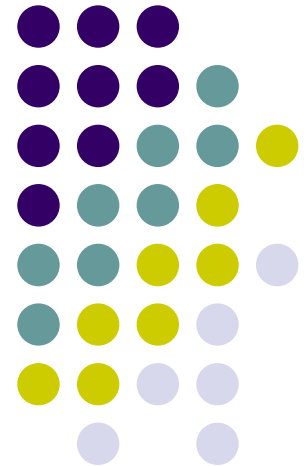


# 4COSC003W Trends in Computer Science

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## Lecture 4

Ethical, professional and legal concerns  
Dr Maria Chondrogianni

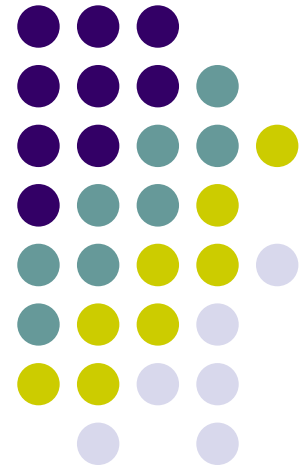


# Trends in Computer Science

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**This lecture focuses on:**

- Social and Ethical Issues in Computer Science
- Professional Codes of Practice
- Legal issues and privacy



# Computer Science and society

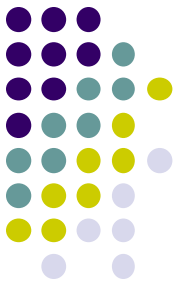


Computer based applications have a series of social, ethical, legal and moral implications for businesses, governments and individuals alike.

Some of you are currently researching such issues as part of your CW1.

Can you identify for example any ethical, social or legal issues related to self-driven vehicles?

# Self-driven vehicles (SDVs): a brief case study



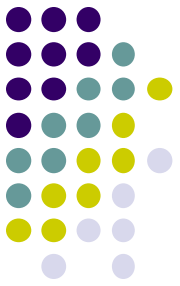
Based on Ryan (2020)

Ethical, Legal, Social and Economic Impacts of  
SDVs

## **Ethical Impacts**

- Safety and prevention of harm  
e.g. decision making in crush-avoidance  
situations.

# Self-driven vehicles (SDVs): a brief case study- Ethical Impacts



- Moral algorithms

i.e. algorithms which predict the statistical likelihood that certain groups of people would be more likely to die in a collision

- Autonomy

‘programmed responses remove control from the human being in driving circumstances’

# Self-driven vehicles- a brief case study -Ethical impacts



- Responsibility

‘concerns that SDVs are threatening our free will and moral responsibility

- Rights

Opportunity for more people, such as elderly or disabled, to use a car, which raises the question on who should be denied such right.

# Self-driven vehicles- a brief case study- Ethical Impact



- Insurance and discrimination

Data accessible by insurance companies can potentially be used positively (e.g. to reduce insurance premium) but also against drivers. Constant monitoring of drivers.

- Privacy

Immense amount of data retrieved



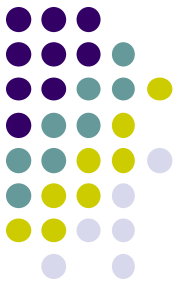
# What are Ethics

- Ethics can be understood in a variety of ways:
  - Ethics: “a set of moral principles or values” that guide our behaviour

This is a general definition of ethics that can be applied to any field of human behaviour – e.g. is it always wrong to steal?
  - Computing ethics: a set of questions and issues regarding the ethics of using computers

For example, is it ethical to develop hardware and software systems to monitor and keep track of individuals in a society?
  - Professional ethics





# Ethical concerns

- Computer applications have the potential to do good or cause harm.

# Taking the Ethics definition further



- Ethics involves the study of how to decide whether something is morally right or wrong (Schneider and Gersting 2016). It is important to be able to measure the rightness or wrongness of a particular act (e.g. measuring of an act's consequences).

Some additional reading: This section is partly based on Schneider, G.M. and Gersting, J.L. (2016) *Invitation to Computer Science*, London: Thompson.

You might find particularly useful chapter 17, entitled 'Making decisions about computers, information and society'.

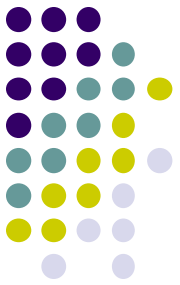
# An example of a well known ethical case



- The case of PGP (Pretty Good Privacy, or the U.S. Government v. Phil Zimmerman')

When using the internet (for example for e-commerce purposes) security of private data (through encryption) is paramount. In the early 1990's, the US government tried to restrict the use of encryption for private electronic communication. At that time, the PGP algorithm became available on the internet. The US government attempted to prevent its dissemination.

The question was whether the majority of people should be prevented from using PGP just because some might misuse it to cover criminal acts.



# The use of analogies

- To answer an ethical question, you might find it useful to form an argument both for as well as against a certain practice (a *utilitarian* approach).
- Similarly, it might help to compare them to similar situations we are more familiar with, creating an *analogy*.
- For example, email communications can be compared to other forms of communication such as private conversations or telephone conversations.



# Taking analogies further

- A private conversation cannot be expected to be recorded  
A telephone conversation might be recorded (intercepted) following a court order.  
However, both analogies exhibit a series of differences, apart from similarities, when compared to emails.
- Should bodies have the opportunity to intercept emails?
  - concerns of privacy as opposed to security, both accepted as important by (parts of) society.



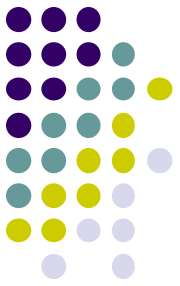
# Privacy v. Security

- Now do watch Zimmerman himself explain his position on privacy (2015)

<https://www.youtube.com/watch?v=WcIBJ9ODLUo>

- Interestingly on 10/2/21 on a BBC article regarding a convicted paedophile, Facebook plans on encryption were discussed as problematic. Do consider both sides' arguments (see also extracts on the following slide).

# Privacy v. Security



“The mother of one of X victims spoke of her concern over Facebook's plan to bring in [end-to-end encryption of messages](#) on the platform.

"I think that if it becomes too difficult for law enforcement agencies to track these people then we won't be able to protect our children and people like him will be able to get away with it."

A spokeswoman for Facebook said: "Child exploitation and grooming have no place on our platform. Facebook has led the industry in developing new ways to prevent, detect, and respond to abuse and we will continue to work with law enforcement to combat criminal activity."

# And what about AI applications?



- Let's discuss 😊





# Professional Ethics

- Professional ethics are summarised through a professional **code of conduct** which governs how members of a profession deal with each other and with third parties
- Following a standard of professional ethics, in the form of a code of conduct, means that other people in the profession (or coming into contact with the profession) know what kind of behaviour to expect from you
- Many professional bodies – and large organizations - have a code of ethics that members can/must sign up to.

# Why should we have a Professional Code of Ethics?



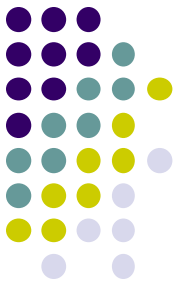
- A Professional Code of Ethics serves several functions:
  - Symbolises the professionalism of the group.
  - Defines and promotes a standard for external relations with clients and employers.
  - Protects the group's interests.
  - Codifies members' rights.
  - Expresses ideals to aspire to.
  - Offers guidelines in “gray areas”.

# Why have a Professional Code of Practice (often called code of Ethics) in Computing



- Software has the potential to do good or cause harm, or to enable or influence others to do good or cause harm.
- We have pride in our work and want the work that we do to be given recognition and respect.
- We want to protect our livelihood!

# Some example Codes of Conduct



- ACM Code of Ethics and Professional Conduct.  
<https://www.acm.org/code-of-ethics>
- British Computer Society Code of Conduct  
<https://www.bcs.org/membership/become-a-member/bcs-code-of-conduct/>
- IEEE-CS/ACM Software Engineering Code of Ethics and Professional Practice  
<https://ethics.acm.org/code-of-ethics/software-engineering-code/>



# BCS Code- examples

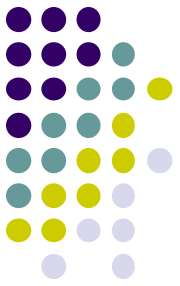
- “You shall carry out work or study with due care and diligence in accordance with the relevant authority's requirements, and the interests of system users. If your professional judgement is overruled, you shall indicate the likely risks and consequences.”
- “You shall have regard to the legitimate rights of third parties.”
- “You shall not claim any level of competence that you do not possess. You shall only offer to do work or provide a service that is within your professional competence.”

# Characteristics of a Code of Ethics



- They are not simple ethical algorithms that generate ethical decisions.
- Sometimes elements of the code may be in tension with each other or other sources.
  - Requires the computer scientist/software engineer to use ethical judgement to act in the spirit of the code of ethics.
- A good code of ethics will enunciate fundamental principles that require thought rather than blind allegiance.

# Joint IEEE-CS/ACM Code of Ethics and Professional Practice



- Built on 8 principles
  - Public Interest
  - Client and Employer
  - Product
  - Judgement
  - Management
  - Profession
  - Colleagues
  - Self
- The principle of Public Interest is central to the code.



# Public Interest

- Computer Scientists/Software engineers shall act consistently with the public interest.
  - Approve software only if they have a well-founded belief that it is safe, meets standards, passes tests and does not diminish quality of life, privacy or harm the environment.
  - Disclose any actual or potential danger to the user.
  - Be fair and avoid deception in all statements concerning software.





# Client and Employer

- Computer Scientists/Software engineers shall act in a manner that is in the best interests of their client and employer, consistent with the public interest.
  - Be honest about any limitation of their experience and education.
  - Keep private any confidential information consistent with the public interest and the law.
  - Not knowingly use software that is obtained or retained either illegally or unethically.



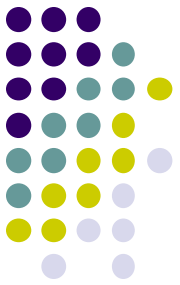
# Product

- Computer Scientists/Software Engineers shall ensure that their products and related modifications meet the highest professional standards possible.
  - Strive for high quality, acceptable cost, and a reasonable schedule, ensuring significant tradeoffs are clear.
  - Ensure adequate testing, debugging, and review of software and related documents on which they work.
  - Treat all forms of software maintenance with the same professionalism as new development.

# Judgement



- Computer Scientists/Software engineers shall maintain integrity and independence in their professional judgment.
  - Not engage in deceptive financial practices.
  - Disclose to all concerned parties those conflicts of interest that cannot reasonably be avoided or escaped.



# Management

- Computer Science/Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
  - Ensure that software engineers are informed of standards before being held to them.
  - Offer fair and just remuneration.
  - Not punish anyone for expressing ethical concerns about a project.



# Profession

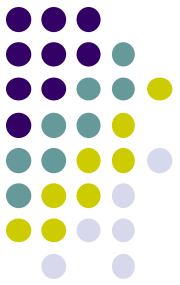
- Computer Scientists/Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
  - Promote public knowledge of computing.
  - Be accurate in stating the characteristics of software on which they work.
  - Take responsibility for detecting, correcting, and reporting errors in software and associated documents on which they work.



# Colleagues

- Computer Scientists/Software engineers shall be fair to and supportive of their colleagues.
  - Credit fully the work of others and refrain from taking undue credit.
  - Give a fair hearing to the opinions, concerns, or complaints of a colleague.
  - In situations outside of their own areas of competence, call upon the opinions of other professionals who have competence in that area.

# Self



- Computer Scientists/Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.
  - Further their knowledge
  - Improve their ability to create safe, reliable, and useful quality software
  - Improve their ability to produce accurate, informative, and well-written documentation.

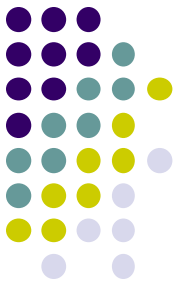
# Problems with codes of conduct



- They don't cover every case (nor should they!) – so there is room for interpretation in their meaning or application
- Can a list of rules actually define a behaviour that everyone considers right?
- Often little penalty for non-compliance
  - Perhaps suspension of membership?
  - Requires a Personal Code of Ethics that is broadly in line with the Professional Code.



# Question



- You work for a large corporation, developing its flagship commercial secure email product. You are given the task of developing a decoding algorithm for other developers to integrate into the product. After a few days, you tell your boss that you're finding it hard going and the deadline is slipping. They tell you that there is an open source version of the algorithm available and to use that code instead of writing your own.
- Discuss the ethical issues (if any) of this case. What would you do if you were the developer? What would you do if you were the developer's colleague?



# Examples of bad practice

- Forging results of experiments
  - South Korean professor in cloning experiments
  - MIT professor in nuclear physics
  - But also...*anyone* who claims results for which they haven't done the work ("but the results were obvious...")
- Plagiarism
  - Copying other people's work and passing it off as your own
  - UG student final year projects
  - Related topic: using copyrighted code/designs without attribution/using licensed code out-of-license...

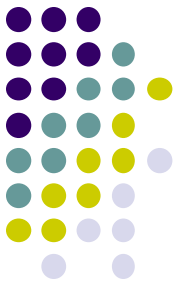
# Ethical Dilemma: Reverse Engineering



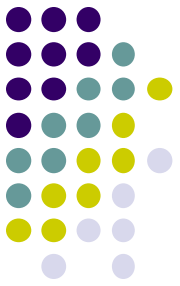
- When is reverse engineering ethical?

# Legal issues

- Intellectual Property
- Privacy



# What is intellectual property (“IP”)



A collective term for

- legally enforceable interests
- conferring on their owners
- the exclusive right to use and profit from inventions and fixed expressions of ideas



# How is IP protected

- by its owners through national legal systems.
- legal systems are organised means of settling disputes fairly and peacefully according to agreed sets of rules



# Where are the rules found

In England, the rules are found in

- **statutes** (Acts of Parliament)
- **Pro- Brexit\*: European Union regulations and directives** (directives were enacted into English law by statute; regulations were enforceable without further enactment)
- **case law** – verdicts delivered by the English courts in earlier legal actions on the same or similar questions

Case law is important in areas of law where

- there are **few statutes**, or where
- the law is **evolving rapidly**, or where
- the applicable **statutes lay down only a framework** for the courts to operate within

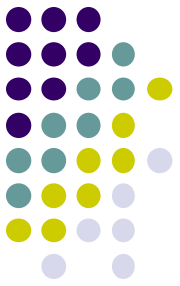


## **\*Post-Brexit**

- Information is provided by the Information Commissioners' Office, for example on data protection, after the end of the transition period
- <https://ico.org.uk/for-organisations/dp-at-the-end-of-the-transition-period/>



# Which instruments are used in England to protect IP



- patents
  - copyright
  - trademarks
  - design rights
  - semiconductor topography rights
  - plant variety rights
- 
- confidential information is viewed as a special category of information, but not an IP instrument.



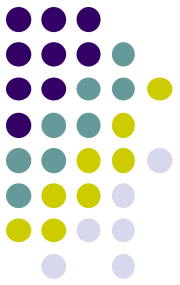
# What is “software” (UK)

- No single definition in statute or case law.

A possible definition:

- anything in or converted into digital form,
- generated, stored (even transiently), copied, modified, accessed, or transmitted electronically

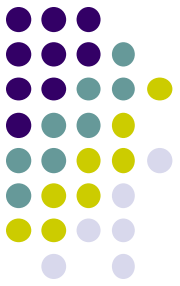
(see for example Bainbridge, D. (2008) *Legal protection of computer software*, 5<sup>th</sup> edition, London: Tottel, p1)



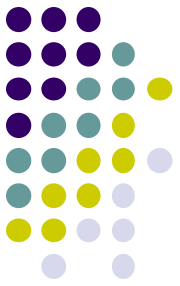
# What is “software” (US)

- “Computer software” is defined by 48 CFR 2.101 to mean (i) Computer programs that comprise a series of instructions, rules, routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations; and (ii) Recorded information comprising source code listings, design details, algorithms, processes, flow charts, formulas, and related material that would enable the computer program to be produced, created, or compiled.”

# Which instruments are used in England to protect software



- copyright
- design rights
- trademarks
- database rights
- patents
- confidential information



# Legal Issues

- Protection of Privacy

- Definition of Personal Data

<https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/personal-information-what-is-it/what-is-personal-data/what-is-personal-data/>

# UK GDPR- definition of Personal data



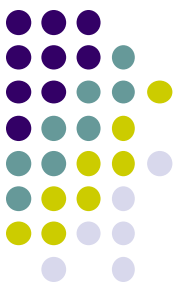
- “Personal data is information that relates to an identified or identifiable individual.
- What identifies an individual could be as simple as a name or a number or could include other identifiers such as an IP address or a cookie identifier, or other factors.” ibid

# UK GDPR- definition of Personal data



- “If it is possible to identify an individual directly from the information you are processing, then that information may be personal data.
- If you cannot directly identify an individual from that information, then you need to consider whether the individual is still identifiable. You should take into account the information you are processing together with all the means reasonably likely to be used by either you or any other person to identify that individual.” *ibid*

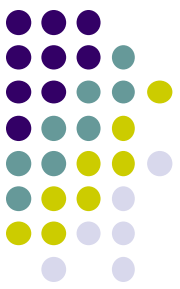
# The Data Protection (Fundamental Rights and Freedoms ) (Amendment) Regulations 2023



- <https://www.gov.uk/government/publications/the-data-protection-fundamental-rights-and-freedoms-amendment-regulations-2023>
- <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/principles/>
- New legislation to replace General Data Protection Regulation and Data Protection Act (2018)



# The Data Protection (Fundamental Rights and Freedoms ) (Amendment) Regulations 2023



This SI amends the UK's data protection legislation by amending 'fundamental rights and freedoms' so they refer to rights recognised under UK law, rather than retained EU law rights.

These retained EU law rights will not be recognised in UK law **after the end of December 2023** as a result of changes made by the Retained EU Law (Revocation and Reform) Act 2023.

# The Data Protection and Digital Information Bill

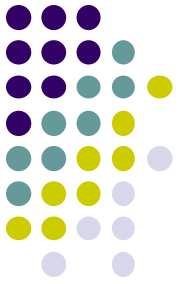


- The Data Protection and Digital Information Bill [[Bill 001 2023-24](#)] (PDF) was introduced in the House of Commons on 8 November 2023. It was first introduced during the 2022-23 session as the Data Protection and Digital Information (No. 2 Bill). The Bill has been carried over to the 2023-24 session. It had its [remaining stages in the Commons on 29 November 2023](#). A [House of Lords Library briefing summarises the amendments that were made](#) (PDF).

# UK GDPR key principles (until new Bill is introduced...)



- Accuracy
- Storage limitation
- Integrity and confidentiality (security)
- Accountability
- These principles should lie at the heart of any approach to processing personal data.



- Thank you!