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Introduction

For those of us who are studying a subject like Computing and Software Engineering, professional practice knowledge is a very important knowledge to master this subject in a responsible and ethical manner. Special attention is paid to skills and attitudes. And the quality of software products can have a profound effect on our personal well-being and social harmony. Therefore, anyone engaged in this profession needs to be aware of proper knowledge skills, training and professional practical experience as well as correct ethics, professional aspects, legal aspects, and social aspects. This will give it a new face.

Accordingly, here we will study intellectual properties extensively and introduce them by giving a clear explanation. Then we have given ¹the ethical justification of protection of software as a kind of intellectual property and its arguments. We will also introduce proprietary software. And mainly, we will introduce the effect of modern technology in the current society through IOT.

TASK 01

1. Intellectual property Laws and Acts.

Intellectual property refers to creations made by humans from their minds. These can be termed as intangible property such as artistic works, literary works, designs and logos. Nowadays intellectual property must be protected. As a result, they are protected by law acts. Disobey the intellectual property protected by these acts is called intellectual property infringement.

The following are some examples of intellectual property types and the law and acts to protect them.

1. Copyrights ©

Copyright refers to the right to change and modify mind creations created by a person. It can be transferred to other persons or other organizations. In the computer industry databases, diagrams, programs, and specific programming codes are copyrighted by the person who created them. Copyrights include law acts, treaties, and international conventions.

Acts

- The copyrights, design and patent act 1988 (UK). (Legislation, n.d.)
- Intellectual property Act, No.36 of 2003 (Sri Lanka). (Nipo, n.d.)

Conventions

- Berne convention (1971).

Treaties

- Article 9 (TRIPS agreement).
- Article 10 Computer programs and compilation of data (TRIPS agreement).
- Article 11 Rental rights (TRIPS agreement).
- Article 12 Term of protection (TRIPS agreement).
- Article 13 Limitation and exceptions (TRIPS agreement).
- Article 14 Protection of performers, producers of phonograms (sound recordings) and broadcasting organization. (TRIPS agreement). (WTO, n.d.)

2. ⁹ Patents

A patent is exclusive right to new innovation. That right is reserved for such as inventions or new technological solutions. This patent should be a document to the public about who own it and creator. There several acts and conventions to protect patent rights.

Acts

- Intellectual property Act 2014 (UK). (Legislation, n.d.)
- Chapters 6, 7 Intellectual property Act, No.36 of 2003 (Sri Lanka).

Conventions

- Paris convention. (Wipo, n.d.)

Treaties

- Patient cooperation treaty (PCT) 2001.
- Strasbourg agreement (1979).
- Patient law treaty (2000).
- Budapest treaty (1980).
- Articles 27, 28, 29, 30, 31, 32, 33, 34 TRIPS agreement. (WTO, 2022)

3. Trademarks TM

A trademark is a sign used to differentiate one company from others. It is also possible to identify the product or services provided by an organization. It is important to protect these trademark because they differ from one company to another company. There are several Acts and conventions to protect trademarks.

Acts, Conventions and treaties

- Paris convention (1979).
- Madrid agreement (1979).
- Madrid protocol (2007).
- ⁵ Nice agreement (1979).
- Vienna agreement (1985).

- Singapore treaty (2006).
- Trademark law treaty (1994).
- Nairobi treaty (1981).
- Trade marks Act 1994 (UK). (Legislation, 2022)
- Articles 15, 16, 17, 18, 19, 20, 21 TRIPS agreement. (WTO, 2022)

4. Trade secrets

Trade secrets are defined as proprietary knowledge that an individual or group of people can sell or license. Trade secrets can be obtained and modified by someone else and therefore the secrets can be a threat to the concerned organization. Therefore, to prevent it, trade secrets must be protected. There are several Acts and conventions to protect trade secrets.

Acts, Conventions and treaties

- Paris convention (1979).
- Computer misuse Act (1990). (GOV, 2022)
- TRIPS agreements.

2. Problems that arise in the computer industry even when intellectual property regulations exist.

Some organization and parties modify proprietary software and distribute it to other parties. Users using proprietary software sometimes switch to software provided by other parties due to profit. In such case, the revenue of the company is reduced. It affects the income of the owner of that company. Sometimes it is difficult to find people who responsible to this kind of modifications. That means this pirate software violates intellectual property laws. But this proprietary software is protected by copyrights and trade secrets law. But in practically it is challenge to protect these software. As an example Microsoft office is cracked by some organizations and distribute to the torrent sites.

The functionality, features, interfaces and concepts are not protected by copyright law. Therefore copyright law does not consider these functionality of the software. It is critical problem in computer industry. Another competitor company or developer cannot take legal action regarding the creation of a program based on those concepts. The reason is that although the concept in the same but source code is different. But computer software is protected by copyright law.

Developers and company owners in the organization should always check whether their products, such as their proprietary software, diagrams, and databases are protected by intellectual property laws. It has ability to reduce and prevent damage to their organization.

A company must own a trademark to obtain copyright and licenses. Licensing of copyright to a foreign company does not require registration. But if you distribute your software in a foreign country, you have to register the trademark. In such cases, one should have updated knowledge about copyright, trademarks, trade secrets and patent laws. Legal assistance should be obtained for that.

Keeping the source code confidential. The source code of the software must be protected after it is no longer needed after the commercial distribution of the computer software. To prevent other unauthorized access. Source code protection means software is protected under trade secret laws.

The availability of open source software is reducing demand for proprietary software. That is, some open source software is both efficient and adaptable. Existing intellectual property laws do not cover this circumstance.

3. Ethical justification for protection of software.

Software intellectual property, commonly known as software IP, refers to computer code or programs that are legally protected from infringement, theft, and other uses. Software intellectual property of the company that wrote the code or owns the software. It is illegal for anyone else to use it without that company's permission. How can a software vendor protect the code they create and ensure that no one steals their product or uses it without permission? Let's consider here, so from this kind of illegal activities to protect the software,

1. Awareness of legal aspects

By hiring a good lawyer or legal team, we can get a good understanding of our rights and how to properly protect the software. Keeping track of safety rules is important. In addition, it is important to keep the knowledge base of well-written software security regulations up-to-date. Ensuring that one's own process is in place can help keep software secure.

2. Filing for patent and registration of trademarks

And also, software can also be protected by filing for patents and registering trademarks whenever possible.

3. Awareness, training and checking users before working

Employees and independent contractors can also be protected by carefully vetting and signing non-disclosure agreements before working with us. Additionally, detection and prevention of social engineering attacks by providing security training, simulators such as phishing tests can help staff. Security awareness training should be provided to all employees, including developers. Software engineers training on safety codes should be obtain.

4. Monitoring employees' activities

Auditing can improve software security by keeping an eye on trusted user behaviour. Allow screening of working crowns. Untrusted such as high privilege usage and customization.

5. Disconnect the network more

When disconnecting the network, the principle of least privilege applies. Attackers' mobility is limited by adequate network interception, location of critical data storage, and enforcement of appropriate security regulations.

6. Working to keep the software secure

For this data must be stored and worked on secure devices and best practices for data security can be followed. And also, maintain current software and systems also helps protect these. Many attackers exploit well-known bugs in old or outdated software. Including, stopping common exploits requires patching the latest software to ensure all computers are patched, which is the most convenient software security measures.

7. Automate common tasks

Automatic port opening detection, security attackers exploit anomalies and other issues. Software security team can focus on more important security projects by automating routine tasks. Daily security operations such as firewall upgrades and device security configurations are completely manual processes. Be automated rather than dependent.

4. Arguments for the above justification.

In protecting the software as mentioned above, users using the software may be disadvantaged or inconvenienced in some cases. If employees and independent contractors are carefully vetted and signed non-disclosure agreements before working with us, the employee's details should be collected. Here, as employees they have to agree to the agreements against their will. Their privacy may sometimes be affected when searching for their information. And also, personal data may be passed on to others without user permission.

Therefore, according to the Data Protection Act in 1998 (DPA), personal data must be sufficiently relevant and not excessive for the necessary purpose. Without this, if personal data is misused unnecessarily, it may be unfair on the part of the employees.

And by constantly checking employees, their trust in the organization decreases, and stress, environment affect privacy. Then the employees are not satisfied and they may be under a lot of pressure. On the other hand, the staff has to spend additional time as well as additional cost for this. There is also a legal risk.

5. Proprietary software.

Software that is legally owned by the company, team, or person that produced it is known as proprietary software. It is sometimes known as closed-source or non-free software. This software, retaining certain licensing rights to use, alter, make modifications, or distribute that software with just a publisher or other party, restricts the customer's flexibility with the programs they lease. In rare circumstances, non-free software may include patent rights.

Alternatives for proprietary software

The most suitable and only alternative solution to proprietary software is Open-source software. The Open-source software directory's goal is to highlight the most excellent and forward-thinking Open-source software that is currently available online. There are more than 25 Open-source software directory alternatives, which include websites and programs for a variety of operating systems, including MAC, Windows, Linux, and SaaS.

The following table shows the proprietary software and the open-source alternatives that can be used for them.

Table 1 Proprietary software and open source software

Proprietary software	Open-source alternatives
Microsoft Word, Excel, PowerPoint	OpenOffice, LibreOffice
Microsoft Outlook	Thunderbird
Microsoft Visio, Smart Draw	Día
Microsoft Media Player, RealPlayer, Win amp, iTunes	VLC
Adobe Photoshop	GIMP
Adobe Illustrator	Inkscape
Adobe InDesign, Microsoft Publisher	Scribus
Adobe Premiere	OpenShot, Handbrake
AutoCAD	Free CAD
Apple Logic Pro, FL Studio	Audacity

6. How computer professionals work without proprietary software.

Software that is proprietary provides a lot of benefits Such as good customer service, good user interface, revenue, and stability. The item needs to be bug-free. The program frequently offers feature upgrades that increase its capabilities, but generally at a fee. Support for proprietary software that's also widely used is frequently offered by a variety of sources.

¹ Without proprietary software, computer professionals can sustain themselves. Some of the examples of using Open-source software are cost effectiveness/vendor lock-in and security. In this way, computer experts can sustain themselves using proprietary software.

¹ Computer professionals can support themselves without using proprietary software. Still, the IT sector offers help without proprietary software. Here are some examples to prove that.

❖ Ubuntu

The finest illustration is Ubuntu, which does not by default install any proprietary software.

- Operating systems

The proprietary software that is most noticeable is without a doubt Windows. After six months of idleness, the desktop's XP partition is still operational. Older games can also be played on a virtual box-based Windows system.

It uses both Windows systems sparingly, so getting rid of anyone would have little impact. It is conceivable that it might fully function without Windows.

- Hardware drives

Hardware drivers from Intel that are open-source are fully functioning. Two significant assumptions are a proprietary HAL-based Atheros wireless card within the desktop and a closed-source software-required Broadcom chip inside the laptop.

An Atheros card would only work with ath5k drivers loaded if it were an Atheros card because we are presently using madwifi, which would be standard in Ubuntu 8.10. Ath5k may simply transition to becoming proprietary-free due to its open HAL.

TASK 02

1. IOT devices and functions.

3 IOT has the ability to create an endless future. Greater network flexibility, integrated artificial intelligence (AI), and the capability to implement, automate, manage, and secure a variety of use cases at hyper scale will expedite the development of the industrial internet. The ability is not just in concurrently enabling billions of devices, but also in using the large amounts of useful data that may automate a number of organizational processes. Service providers will continue to intrude into the IT and web scale industries as networks and IOT platforms evolve to address these hurdles, opening up entirely new revenue streams.

2 An exciting wave of future IOT applications will emerge, brought to life through intuitive human to machine interactivity. Human 4.0 will allow humans to interact in real time over great distances – both with each other and with machines – and have similar sensory experiences to those that they experience locally. This will enable new opportunities within remote learning, surgery and repair. Immersive mixed reality applications have the potential to become the next platform after mobile – realized through 3D audio and haptic sensations and becoming our main interface to the real world. Bringing future IOT to life will require close synergy between the IOT- and network platforms. This continues to be a key focus area of Ericsson research.

2. Benefits and drawbacks of IOT

1. Advantages of IOT

- Better use of resources – When we know the functionality and how devices work. It'll be much more efficient in using resources and monitoring resources
- Lowering human efforts – When devices communicate and interact. It does lots of tasks for us. It minimizes the human efforts.
- Security Improvement – When we have a system which is interconnected with each other it makes the system more secure
- Better time management – We can go online shopping and purchase our needs and wants without having to go to shops. Can check news from our fingertips.

- Automation and Control – Since every device and object is interconnected with each other through wireless technology structure. There is a huge amount of automation and control in the process.

2. Drawbacks of IOT

- Security flaws – Despite the fact that it has many security measures. It'll still be attacked from various networks
- Complexity – When developing to implementing. It is complicated to enable a large technology to IOT. It can be very fatal and could lead to many accidents if not operated properly. For example if an error code occurs in a water dam software it could lead a disastrous flood.
- Privacy – Without even the participation of the user. Confidential information can still be accessed.
- Dependence on Technology - In order for IOT to operate it is fully functioned with the Internet. It cannot be used when there is none. Since we are used to IOT in our day-to-day life it has been very tough for us to not be around it.
- Technology takes control of life – The younger generations will be vastly affected with a physicality which will lead to an obese life and many physical failures due to the fact that we are willing to be controlled by technology.

3. **Human security and privacy-related inter-communication with devices.**

Inter-communication with devices is the communication of data and information with two or more devices.

Several related concepts can be mentioned for this. Such as:

IOT concept (smart fridge, smart watch, smart tv and smartphones)

Cloud-based network (cloud computing)

Mobile-based network (computer network)

First, let's describe how human security and privacy are violated.

1. Methods for breaching human security

Hackers attack on devices.

A hacker can gain access to the devices and obtain the data on it, modify data and communicate with other device as he wants.

Ex: a hacker comes into smart home system and turn on and off light bulbs as he wants.

Communicating personal sensitive data with devices.

This may have an impact on human security as people communicate sensitive data (ex: ATM pin number) between devices and devices. So this is a great opportunity for hackers.

2. Privacy-invading techniques

Exchange of sensitive data of people.

Providing personal sensitive data in one device to another device or web pages without the user's content.

Devices are listening

In particular, smart devices check out what people are talking about by listening. People's privacy may be disturbed.

Studying human activities from smart phone camera and web camera.

This is mostly done in company, so even if this method is used to study the activities of the employees of the company, this will damage privacy.

There are several methods used to protect human security and privacy while communicating with multiple devices.

When giving sensitive data, give it differently and give it through OTP password.

In any case, when providing our sensitive data, we will encrypt it or provide a strong password.

Using network methods to mitigate hacker attacks.

Connecting a fire wall to devices to minimize access to hackers.

Devices should stop listening and browsing.

Only the user can prevent this, so he should not accept the cookies on websites.

Prevent sharing of sensitive data.

Setting up the device to enable the device to work under the knowledge of the user.

4. Social, ethical, and legal aspects of IOT

With the popularity of the internet, people have tried to build human relationships. And two people who are geographically in two different places have received the ability to communicate and exchange information through the internet. Now the ability of not only humans but also devices to connect to the internet and communicate with another device is called the concept of IOT.

Social aspect

Here social, ethical and legal issues arising in concept of IOT will be discussed.

Social aspects are mentioned for the concept of IOT. The concepts of IOT have both positive and negative implications for society.

The concept of IOT can be divided into several areas of society. Such as:

Medical field

Agriculture field

Educational field

Beneficial impact on society in general.

Creating medical devices using AI technology and IOT.

Using these to diagnose diseases, perform surgeries, administer medicines.

Using smart board and smart class room.

By using these, students can do educational work remotely and well.

Agriculture works can be done using smart drones and soil sensors.

Due to use of these, it is possible to provide the necessary fertilizers for the crops and to know the condition of the soil.

Also, using the concept of IOT is also likely to cause social issues.

Loss of employment opportunities for people.

Where there are people instead of machines, several people do the same work, but in computerized system, one person does a lot of work and other people lose job opportunities.

Machines can control people.

People are starting to use machines more and more, especially smart devices to control them.

Loss of privacy in society.

The privacy of society is lost by the sharing of sensitive data in the society.

Lack of security of data.

Ethical aspect

In fact, there are several ethical principles in IOT. Among them:

Information security

Privacy

Physical safety

Trust

Also, ethics is essential for IOT.

Information security

Information security plays an important role. It also secures important information.

When a smart phone is taken as an IOT device, it can communicate with remote data receivers. It can also receive and send information without the user's knowledge and consent. Here information security is misused.

Ex: several devices such as smart fridge, video recorder and etc. have been attacked by DDOS in 2016.

Some IOT devices have implications for national security. That means uploading users' data into open website of IOT devices.

Privacy

It means the freedom of people to live think and work.

For example, by using a smart camera and monitoring the activities of the employees using a smart web camera, the privacy of employees is disturbed. Damage to privacy can be taken as an ethical issue.

Physical safety

This means that people are protected from new technology. This enables the device to detect and prevent unexpected behaviour.

An insurance system can be introduced for smart devices.

Unnecessary operation of a smart blender may result in personal injury.

It also provides formal security codes for smart devices. In this way, no other person can enter smart home system without permission.

Legal aspect

We have to talk about legal aspects of IOT. (Here we refer to the draft laws relating to UK.)

Law and acts have been introduced here for IOT concept.

Product Security and Telecommunications Infrastructure (PSTI) Bill

It has cyber security standards in place for customer privacy and security. This is important for manufactures and sellers of IOT devices.

This will help to fix security flaws, create a good public reporting system, ban internet pre-made passwords and communicate with customers.

If this is breached the government can impose a fine of 10 UK pounds.

The product cannot be sold or supplied to a person or company that cannot meet the security requirements here. Also, if devices contain new security requirements. Such as: smart phone, connected cameras, TV and speakers, connected children's toys and so one.

There is an importance of learning about the social, ethical and legal concepts of IOT. So, we can talk about the positive and negative effects of IOT on social, ethical principles and legal aspects about breaking it. Then we can know about social, ethical and legal issues.

Conclusion

In this module, we studied ethics and gained an understanding of ethical principles. Accordingly, as software engineering undergraduates, we gained an understanding of ethics in the computer industry. Later on, we learned about the British Computing Society and its code of conduct. An understanding of how to behave in society according to career was gained. As a result, we learned how to work professionally from this module in accordance with an organization's code of conduct.

The computer industry's ⁷ laws and regulations (computer misuse Act and data protection Act) were studied. As a result, we gained an awareness of the mistakes we make as well as the regulations governing how to protect our computer programs. In addition, an understanding of social acceptance was gained.

According to this scenario, we studied what intellectual property is, the laws and Acts related to it and the aspects that are not protected by those laws. How software is protected by those laws and proprietary software was mentioned. In the second task, the Internet of Things was mentioned and the problems arising from it were discussed.

Finally, the things we have learned and this module are very important for us in our future field of computing.

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