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Recent trends in computing & information technology

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Abstract

This document presents the recent trends in computing and information technology and their expected development in the next period. The following trends are covered: artificial intelligence and machine learning, quantum computing, blockchain, cybersecurity, edge computing, robotic process automation (RPA), virtual reality and augmented reality and internet of things. The general idea is to describe each of the trends and highlight the predictions for the coming period. The aim of the work is to highlight the expected trends in the development of computing and information technology, their mutual relationships and the impact on different spheres of development and people's lives. We live in a rapidly changing time, and it is not easy to predict what awaits us, and what are the possible directions of development, but it is certain that it will be very exciting.
Keywords: *IT trends, computer trends, computing trends, technology trends.*

1. Introduction

This document presents selected trends in computing and information technology and their expected development in the coming period, although there are some other trends that have not been covered. Those trends that are the most representative for computing and information technology and for which the fastest development is expected in the coming period are covered. The following trends are presented: artificial intelligence and machine learning, quantum computing, blockchain, cybersecurity, edge computing, robotic process automation (RPA), virtual reality and augmented reality and internet of things.

Each chapter describes the meaning of each of the trends, the technology it uses and the relationships with other technologies and trends. At the end, the expectations of future development as well as potential difficulties or obstacles are presented. A trend is a general direction in which something is developing or changing, and the purpose of the document is to analyze trends in computing and information technology with the idea of trying to predict the direction in which future development is going and what the expectations are in each of the trends.

Not every trend can be isolated and observed separately from the others, therefore the final chapter will present the joint effect of all observed trends in computing and information technology, whereby an additional synergistic effect is often achieved.

2. Artificial Intelligence (AI) and Machine Learning (ML)

Artificial intelligence (AI) is the perceptive, synthesizing, and reasoning intelligence exhibited by computers or machines, as opposed to the intelligence exhibited by animals and humans. Examples of tasks where this is done include speech recognition, computer vision, translation between (natural) languages, driverless car control, robotic vacuum cleaners and chatbots.

Artificial intelligence is based on the principle that human intelligence can be defined in such a way that a machine can easily imitate it and perform tasks, from the simplest to the more complex ones. The goals of artificial intelligence include mimicking human cognitive activity.

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Two important issues will determine the further development of artificial intelligence: ethical dilemma and legislation. Example of ethical dilemmas can be found with autonomous vehicles in the case of a fatal incident, who is to blame for the accident (Dilmegani, 2023). Most countries do not yet have developed legislation that deals with such cases. There have been discussions about the ethics of using artificial intelligence in weaponry in the military, especially in the use of drones. From an ethical and legislative perspective, the important question is whether governments or private companies are misusing AI technology or using it legally. Surveillance methods that threaten human rights and privacy must not be allowed.

Image 1. Introducing ChatGPT

Source: Unplash (n.d.). Introducing ChatGPT. *Unplash*. https://unsplash.com/s/photos/introducing-chatgpt

AI is not sufficiently transparent and neutral, and decisions are not always understandable to humans. Decisions based on artificial intelligence are susceptible to inaccuracies, discriminatory outcomes, built-in or embedded biases.

Artificial intelligence defines a machine that can mimic human intelligence while machine learning aims to teach a machine how to perform a specific task and produce accurate results by identifying patterns. Machine learning is a branch of the broader field of artificial intelligence that uses statistical models to develop predictions. It is traditionally defined as the ability of a computer to learn without being explicitly programmed to do so. Examples of machine learnings domains included weather forecasting, medical diagnosis, aerospace, facial recognition, stock market, social media, signature verification, forensics, robotics, electronics hardware, defense, and seismic data gathering (Goell et al., 2022). Conversational AI Systems will become more advanced, for example chatbots are yet to become as efficient as needed to answer beyond simple queries requiring a set pattern. A most recent example is ChatGPT. "ChatGPT is an AI chatbot that uses natural language processing to create humanlike conversational dialogue. The language model can respond to questions and compose various written content, including articles, social media posts, essays, code and emails." (Hetler, 2023).

ChatGPT uses deep learning, part of machine learning, to generate human text through transformative neural networks. It predicts the text, including the next word, sentence or paragraph, based on the typical sequence of data it has learned earlier during the preparatory learning process.

There is already an impact of ChatGPT on the job market and jobs that require programming and writing skills are at risk. Jobs such as web and digital interface designers, software developers, journalists, tax preparers, writers, mathematicians and blockchain engineers are most at risk of being replaced by artificial intelligence.

More and more enterprises are considering merging predictive analytics with artificial intelligence trends in 2023. This will help them achieve more accurate and timely forecasting of business decisions. AI and IOT may be separate concepts, but we are expecting a trend of combining both technologies to change almost everything in the way we live, including the way we do business. Fewer incidents of security breaches are expected with the increasing use of artificial intelligence in cybersecurity. The need to process huge amounts of complex databases in quantum computing will result in the merging of quantum computing and AI. RPA (robot process automation) technology increasingly uses advanced artificial intelligence skills in the form of machine learning, natural language processing and image recognition, which will make it more powerful in terms of handling the cognitive processes of various applications.

3. Quantum Computing

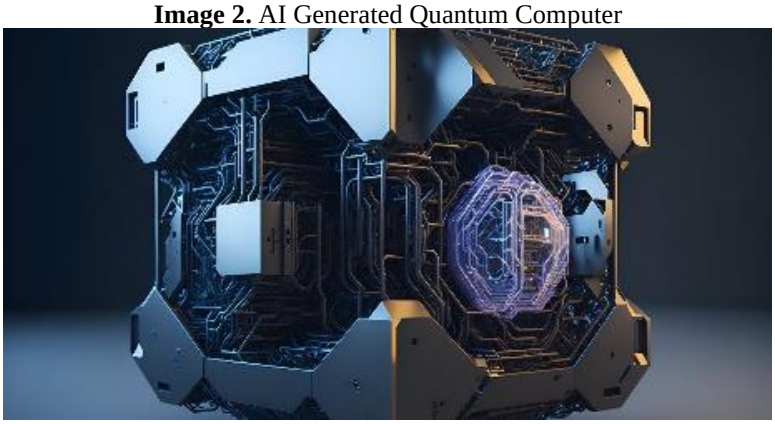
"Quantum computing is a rapidly emerging technology that harnesses the laws of quantum mechanics to solve problems too complex for classical computers" (IBM, 2023). Quantum computers are very different from classical computers that have existed for more than half a century and are used in situations of high complexity that classical computers cannot solve. These computers with specific quantum algorithms take a new approach to solve complex problems — creating multidimensional computational spaces.

Their processors must be very cold - close to absolute zero - to maintain their quantum states. To achieve this, supercooled superfluids are used. At ultra-low temperatures, some materials show an important quantum-mechanical effect: electrons move through them without resistance, and we call such materials superconductors. In practice, it is not easy to ensure temperatures close to absolute, and therefore quantum computers require special hardware design.

In classical computers, bits can be in two states (which are usually denoted by 0 and 1), while in quantum computers we have qubits that can be in both states at the same time. This mode of operation enables much higher speeds than today's computers. Quantum computers are a new step forward and even greater progress is expected in the next few years, as large amounts of money are invested in the discovery of new superconducting materials.

Discoveries in quantum physics provide a wide range of new theoretical hardware capabilities that fuel optimism about quantum computing, but a growing understanding of quantum computing limitations such as quantum errors and loss of qubit content due to the slightest environmental changes, balances this optimism.

Image 2. AI Generated Quantum Computer



Source: Pixabay (n.d.). AI Generated Quantum Computer. *Pixabay*. https://pixabay.com/images/search/ai%20generated%20quantum%20computer/

4. Blockchain

Blockchain is a decentralized, distributed and public digital ledger that allows transactions to be recorded on a large number of computers so that the record cannot be retroactively changed without changing all subsequent blocks and network consensus (Hayes, 2023).

This technology enables the existence of cryptocurrencies by providing the fundamental principles by which cryptocurrencies function in the first place. Without the concept of blockchain, there would be no bitcoin cryptocurrency, and no other newer cryptocurrency. With the help of this technology, the problem of creating a distributed database is solved, without the need to use a special entity that will monitor transactions.

In classic banking transactions between two users, the bank plays the role of supervisor and recorder of transactions and ensures that one user will not deliberately defraud the other. Blockchain provides an alternative to such a classical system by eliminating the bank as a centralized institution to be trusted and replacing it with a decentralized network of computers that confirm transactions based on a specific algorithm. Anyone who wants to earn, be rewarded, or "mine" bitcoins or some other cryptocurrency that is "mined" can be included in this decentralized network.

Image 3. Bitcoin

Source: Unplash (n.d.). Bitcon. *Unplash*. https://unsplash.com/s/photos/bitcoin

Blockchain network for the bitcoin cryptocurrency is made up of users and "miners". Users need miners to confirm or record transactions, and miners rely on users because they create transactions at which they can earn cryptocurrencies.

Transaction confirmation system performs demanding mathematical calculations, which is done by miners, using a system such as the Proof of Work (POW) or Proof of Stake (POS).

POW is an original principle that initially resolved the problem of credibility of a distributed record ledger. The lack of POW system is that it consumes extremely much energy and resources due to competition in the speed of solving a crypto logical task. POS, on the other hand, works on the principle of investing existing cryptocurrencies, making the user a chance to participate in the verification of transactions. Customers who have invested cryptocurrencies participate in the maintenance of the network and earn from collecting a transaction fee paid by users who initiate transfer to the other user. One of Blockchain's biggest trends in the near future is the growth of business operations used by blockchain. The decentralized Blockchain structure offers better safety, transparency, and protection against cyber-attacks, which is why more and more companies will use this technology to their advantage.

As we enter the third decade of blockchain, it is no longer a question of whether this technology will be adopted - it is a question of how soon. Today we see tokenization of assets, bitcoin ATMs, acceptance of bitcoins as an official currency in some countries and more and more cryptocurrency transactions. As a result, the next decades will prove to be a significant growth period for blockchain.

5. Cybersecurity

Cybersecurity includes the application of various technologies to protect systems, computer networks, programs, devices and data from threats and attacks that come via the Internet, or the so-called cyber space. We are trying to protect ourselves from attacks by criminals who try to compromise our systems, networks and data in order to take control or steal data.

“The multi-billion-dollar information and communication technologies (ICT) security market is one of the fastest growing in the world. The ICT security field is a highly complex cross-disciplinary domain that includes computer science, management science, software engineering, information systems, network management, policy making, and management of infrastructures” (Ahgar et al., 2014).

We store data on computers and other devices connected to the Internet, and a large amount of this data is sensitive data such as passwords or financial data. If cybercriminals get access to this data, they can use it to share sensitive information, use passwords to steal financial resources, or change data to their advantage. Cybersecurity is very important to companies in order to protect their data, systems and intellectual property. Some of the threats are DDOS attack, malware, adware, botnets, ransomware, spyware, trojan horse, phishing, social engineering and SQL Injection.

Image 4. Protect your computer from cyber attacks

Source: Unplash (n.d.). Protect your computer from cyber attacks. *Unplash*. https://unsplash.com/s/photos/Protect-your-computer-from-cyber-attacks

“Networks have become highly vulnerable to cyberattacks with a rapid increase in technology reliance, global connectivity and cloud usage. Additionally, the COVID-19 pandemic has caused a paradigm shift to online infrastructure and remote working, resulting in more cybercrimes.” (Das, 2023).

There are several cybersecurity trends that organizations and individuals need to watch out for, such as ransomware attacks, threats to the healthcare sector, artificial intelligence (AI)-assisted cyberattacks, exploiting IoT vulnerabilities, focusing on users as an attack surface, attacks against cloud services, multi-factor authentication, and quantum cryptography threats (Khawaja, 2023).

Cybercriminals are already using AI and machine learning tools to attack and investigate the networks of small businesses and organizations that cannot afford significant investments in defensive cybersecurity technology. Extortion by hackers using ransomware and demanding payment in cryptocurrencies is becoming a growing threat.

Monitoring these trends in cybersecurity will help companies and individuals find new methods to build security measures into their products. In order to adapt to these trends and keep pace, it is necessary to choose the right solution and understand all the necessary cyber security measures that need to be taken to implement that solution.

6. Edge Computing

The idea is to bring computing resources as close as possible to the place where they are used. In this way, communication is accelerated, the response time becomes significantly shorter, and the bandwidth of the rest of the network is not affected, but only the part of the network between computer resources and the place of actual use. Edge computing is not a special technology but is more related to optimizing the architecture and topology and the way of using the computer network.

Some examples are the security monitoring of oil platforms, the use of drones in agriculture for dusting and field monitoring, autonomous vehicles (driverless vehicles) and the optimization of video streaming from the point of transmission to reduce the load on the channel during transmission. In all these examples, it is important to process information as quickly as possible and make decisions in real time, otherwise they are useless. The disadvantages of edge computing are limited scalability and less processing power and storage capacity than cloud servers.

Image 5. Monitoring oil platforms as example of Edge Computing

Source: Unplash (n.d.). Monitoring oil platforms as example of Edge Computing. *Unplash*. https://unsplash.com/s/photos/Monitoring-oil-platforms-as-example-of-Edge-Computing

Edge computing and internet of things are often confused, the difference is that with edge computing, data is processed on-site, while with internet of things, data is sent to the cloud for processing. IOT devices must be connected to the internet to work, while edge computing is optional. We can think of edge technology as an extension of the cloud.

“In conclusion, the future of edge computing is bright, with increased adoption, improved performance, IoT integration, and increased security. Edge computing will continue to play a crucial role in processing and analyzing data, allowing businesses to make informed decisions in real-time.” (Kirstel, 2023).

It is predicted that by 2025, 75% of data will be created outside of large data centers, which will put even greater demands on data processing at the edge of the network and the increasing use of edge computing.

Edge solutions will require many vendors and increasing network complexity. Every new network connection, smart device, edge server or micro data center becomes a site for hackers to attack, which will require a higher level of cyber security. Edge computing could create sustainability issues due to more and more hardware at the edge of the network, leading to the need for more power, more heat dissipation, and more electronic waste.

This technology has already been adopted by a variety of industries, including retail, mining, agriculture, education, and healthcare. In the near future, it is expected that the adoption of edge computing will increase even more, with its potential being recognized in more and more areas of human development. This will lead to greater demand for edge computing solutions and the development of new, more sophisticated technologies.

7. Robotic Process Automation (RPA)

Robotic process automation (RPA) is not actually a physical or mechanical robot, in fact there are no robots involved in this technology. RPA is a form of business process automation that allows defining a set of instructions that a robot or "bot" should perform. RPA bots can mimic human-computer interactions to perform defined tasks error-free, with high accuracy and speed (Casey, 2023).

RPA deals with the automation of some of the most common and repetitive computer tasks and processes in a business environment. A simple example is the task of copying, pasting and moving files from one folder to another. This is

advanced software that can record a series of instructions performed by a human on a computer, and then execute those same instructions fully automatically without human supervision.

An assessment of internal work processes is required to determine which would be good candidates for RPA. The basic criteria for a business process that could be automated by software are: that the process is based on rules, that it repeats at regular intervals, that the inputs and outputs are defined and that it has sufficient volume. Typical examples are website scrapping (extract data and content from websites), credit card applications, call center operations, compliance reporting, appointment scheduling in healthcare system, customer order processing, employee onboarding, automation the scheduling of classes, exams, and events in education and more.

Image 6. Credit card applications as example of Robotic Process Automation

Source: Unplash (n.d.). Credit card applications as example of Robotic Process Automation. *Unplash*. https://unsplash.com/s/photos/Credit-card-applications-as-example-of-Robotic-Process-Automation.

RPA has similarities with artificial intelligence (AI), but unlike AI, it does not learn while going through defined process steps, and in the event that something changes, it will not be able to continue the process or independently learn how to adapt to a change. It is to be expected that these two technologies will intertwine in the future so that the RPA automated process uses AI to solve unforeseen situations. "By combining RPA with AI and ML, businesses can automate more complex tasks and processes that require decision-making and cognitive abilities. AI and ML can help RPA systems learn from data and improve their performance over time." (LinkedIn, 2023)

This technology will become more intuitive, intelligent and smarter and is expected to enable automation of more complex tasks than just rule-based task automation. Cognitive automation will be able to efficiently solve new situations and manage the entire decision-making process. RPA is only compatible with structured databases and is expected to support unstructured databases as well.

Transforming business operations through RPA will enable companies to streamline processes and increase efficiency by automating repetitive and mundane tasks. This allows employees to focus on more strategic and creative work, which ultimately leads to increased productivity and profitability. Some occupations where simple repetitive tasks are performed will be threatened, but completely new occupations will open up. In addition, it will help companies reduce errors and improve data accuracy, leading to better decision-making and customer satisfaction.

8. Virtual Reality (VR) and Augmented Reality (AR)

The virtual world or virtual reality is a form of computer simulation of reality, in which the participant moves in an artificial environment and has the ability to interact with objects.

To enter the "virtual world" a person needs to use special glasses containing two monitors (one for each eye) or wear a special helmet with monitors. Sensors detect the movement of the head or the position of the body, which causes a change in the virtual observation of the position. Special gloves equipped with sensors that allow lifting or moving a virtual object in a simulated environment can also be worn.

The technology is still under development, but it is expected to be widely used, in areas such as: tele surgical procedures, military exercises, architecture 3D designs and presentations and for the purpose of entertainment.

Augmented reality is defined as a technology that allows inserting objects and environments from the real world with 3D virtual objects using AR devices and enables virtual interaction with real objects.

Image 7. Explore Virtual Reality

Source: Unplash (n.d.). Explore Virtual Reality. *Unplash*. https://unsplash.com/s/photos/Explore-Virtual-Reality

Challenges for this industry are affordability because high price is discouraging regular and ordinary usage, there is no demand from customer side, technology is still unproven with small number of applications and VR platforms and small number of systems and headsets. There are also health concerns on long usage related with temporary side-effects such as blurred vision, nausea, headache, and queasiness (Tao et al., 2021).

The use of mixed reality (VR and AM) is growing in healthcare, education, shopping and tourism. In healthcare it is used in virtual home therapy and surgery with the help of other technologies such as video, sensors and monitors. Recent advances in VR technology have made it a very exciting and emerging field today. "In June 2020, neurosurgeons at Johns Hopkins University performed their very first AR surgery on a living patient." (Bhugaonkar et al., 2022).

It is envisaged that virtual reality will be used in the treatment of patients with phobias and anxiety disorders as well as in therapy for people with autism to help them develop social and communication skills. Eye tracking technology with the help of AR and VR is being adopted in the diagnosis of patients with visual impairments or cognitive abilities. Remote VR and AR training systems will be increasingly used in education, training and tourism. The fusion of artificial intelligence, augmented reality and virtual reality will enhance the customization of VR and AR content. Use of these technologies is becoming common in virtual shopping, product reviews, and virtual retail tours. It will enable businesses and users to create comprehensive and better experiences than traditional video campaigns. Meetings in a virtual environment will become common place with VR applications.

VR and AR mobile technologies are expected to grow in popularity. Major trends for VR and AR mobile apps include augmented reality apps becoming more popular than VR apps and the growth of 3D audio technology.

9. Internet of Things (IoT)

Internet of things (IoT) means the connection (most often wirelessly) of various devices via the Internet. Connecting devices allows mutual interactions and brings new possibilities for their control, monitoring and provision of advanced services.

IoT devices can cover a wide spectrum, from wearable devices (smart bracelets and watches) to various devices in the household (washing machines, refrigerators, air conditioners, smart light bulbs, coffee machines). These devices contain sensors that are constantly collecting and responding to data, and this vast level of data can be used for a variety of purposes.

Image 8. Smartwatch as IoT device

Source: Unplash (n.d.). Smartwatch as IoT device. *Unplash*. https://unsplash.com/s/photos/Smartwatch-as-IoT-device

"IoT implementation comes with a number of challenges, the most important of which are: security, privacy, data protection, increasing trust and consumer acceptance in IoT. Some of the challenges are due to the increased scale and

scope of IoT with billions of devices potentially connected to the Internet. This number may pose a commensurate number of security risks." (*Vermesan* et al., 2020).

IoT has a very bright future ahead of it. The advancement of the industrial internet will be accelerated by increased network agility, integrated artificial intelligence (AI), and the capacity to deploy, automate, orchestrate, and secure different scenarios. It will be possible to connect billions of devices at the same time, which will exchange huge amounts of useful data for the purpose of automating various business processes. Computing networks and IoT platforms must rapidly evolve using AI to enable increased capacity and the need for faster data processing (Ericsson.com, 2023).

With development of 5G cellular IoT devices will advance in next areas: enhanced mobile broadband, ultra-reliable low latency communications, much faster data in cities, urban areas and local networks, improved energy saving functions for devices used indoor, connectivity for the internet in rural areas because older technologies will be replaced with modern 5G.

The IoT application will enable intuitive real-time human-machine interaction over long distances as well as sensory experiences similar to those experienced locally. New opportunities for distance learning, remote surgical procedures or repairs of various machines will open up.

10. Conclusion

Conclusions per chapter have already shown that the trends are intertwined, so if we look at the future development of edge computing, it requires improved cyber security measures and the advancement of IoT devices. Edge and IoT technology will facilitate new applications with use cases that were previously impractical by combining the power of connected devices with localized computing resources. Edge computing will enable IoT devices to analyze data locally and make decisions on the spot, which will reduce latency and improve security.

It is similar with robotic process automation (RPA), which requires greater integration of artificial intelligence (AI) and machine learning (ML) for further progress. Furthermore, the advancement of blockchain technology will result in a higher level of security and better protection against cyber-attacks, as well as secure data and interaction between IoT devices. The fusion of virtual reality (VR), augmented reality (AM) and artificial intelligence (AI) will enable the future development of more advanced VR applications. Mixed reality applications using IoT devices, 3D audio, video and other sensors will become the main interface for the virtual reality world. Bringing the future IoT to life will also require a close synergy between IoT, AI and network platforms. One of the latest trends in the internet of things (IoT) is the increased adoption of blockchain technology, which will help secure data in IoT devices, secure interaction between different network nodes, and secure record keeping. Blockchain is great for IoT applications because they are also distributed in nature.

The rapid progress of technology also hides numerous dangers that we should be aware of and do everything to avoid. As we increasingly rely on technology, critical infrastructure disruptions or cyber-attacks can have cascading effects on various aspects of society, including communications, transportation and healthcare.

The progress of each of the trends enables the other trends to progress, supporting each other and achieving a synergistic effect, and all together actually enable the progress in computing & information technology.

References

Ahgar, B., & Arabnia, H.R. (2014). *Emerging trends in IT Security* (1st Edition). Morgan Kaufmann.

Bhugaonkar, K., Bhugaonkar, R., & Masne, N. (2022). The Trend of Metaverse and Augmented & Virtual Reality Extending to the Healthcare System. *Cureus*, 14(9), 1-7. doi:10.7759/cureus.29071

Casey, K. (2023, July 27). *How to explain Robotic Process Automation (RPA) in plain English*. The Enterprisers Project. https://enterprisersproject.com/article/2019/5/rpa-robotic-process-automation-how-explain

Das, T. (2023, July 24). *Top 15 Trends in Cyber Security for 2023*. SelectHub Confidence in Software. https://www.selecthub.com/endpoint-security/cyber-security-trends/

Dilmegani, C. (2023, August 10). *Top 9 Ethical Dilemmas of AI and How to Navigate Them in 2023*. AIMultiple. https://research.aimultiple.com/ai-ethics/#what-are-the-ethical-dilemmas-of-artificial-intelligence

Ericsson.com. (2023, August 14). *Future IoT*. Ericsson. https://www.ericsson.com/en/future-technologies/future-iot

Goell, A., Goell, A.K., Kumar, A. (2022). The role of artificial neural network and machine learning in utilizing spatial information. *Spatial Information Research, 31*, 275–285. https://doi.org/10.1007/s41324-022-00494-x

Hayes, A. (2023, August 3). *Blockchain Facts: What Is it, How It Works, and How it Can Be Used*. Investopedia. https://www.investopedia.com/terms/b/blockchain.asp

Hetler, A. (2023, August 14). *ChatGPT*. Whatls.com. https://www.techtarget.com/whatis/definition/ChatGPT#:~:text=ChatGPT%20is%20an%20AI%20chatbot,%2C%20essays%2C%20code%20and%20emails.

IBM. (2023, August 6). *What is quantum computing?*. IBM. https://www.ibm.com/topics/quantum-computing#:~:text=Quantum%20computing%20is%20a%20rapidly,hundreds%20of%20thousands%20of%20developers

Khawaja, R. (2023, August 4). *Top 6 cybersecurity trends to keep an eye on in 2023*. Data Science Dojo. https://datasciencedojo.com/blog/top-cybersecurity-trends-2023/

Kirstel, K. (2023, July 28). *The Future of Computing: How Edge Computing is Revolutionizing the Tech Industry*. Technology Reseller News. https://telecomreseller.com/2023/02/12/the-future-of-computing-how-edge-computing-is-revolutionizing-the-tech-industry/#:~:text=In%20conclusion%2C%20the%20future%20of,informed%20decisions%20in%20real%2Dtime

LinkedIn. (2023, August 10). *Why Robotic Process Automation is the Future of Business Operations*. LinkedIn. https://www.linkedin.com/pulse/why-robotic-process-automation-future#:~:text=Future%20of%20Robotic%20Process%20Automation&text=By%20combining%20RPA%20with%20AI,improve%20their%20performance%20over%20time.

Pixabay (n.d.). AI Generated Quantum Computer. *Pixabay*. https://pixabay.com/images/search/ai%20generated%20quantum%20computer/

Tao, G., Garrett, B., Taverner, T., Cordingley, E., & Sun, C. (2021). Immersive virtual reality health games: a narrative review of game design. *Journal of NeuroEngineering and Rehabilitation*, *18*, 1-21. https://doi.org/10.1186/s12984-020-00801-3

Unplash (n.d.). Bitcon. *Unplash*. https://unsplash.com/s/photos/bitcoin

Unplash (n.d.). Credit card applications as example of Robotic Process Automation. *Unplash*. https://unsplash.com/s/photos/Credit-card-applications-as-example-of-Robotic-Process-Automation.

Unplash (n.d.). Explore Virtual Reality. *Unplash*. https://unsplash.com/s/photos/Explore-Virtual-Reality

Unplash (n.d.). Introducing ChatGPT. *Unplash.* https://unsplash.com/s/photos/introducing-chatgpt

Unplash (n.d.). Monitoring oil platforms as example of Edge Computing. *Unplash*. https://unsplash.com/s/photos/Monitoring-oil-platforms-as-example-of-Edge-Computing

Unplash (n.d.). Protect your computer from cyber attacks. *Unplash*. https://unsplash.com/s/photos/Protect-your-computer-from-cyber-attacks

Unplash (n.d.). Smartwatch as IoT device. *Unplash*. https://unsplash.com/s/photos/Smartwatch-as-IoT-device

Vermesan, O., & Bacquest, J. (2020). *Internet of things - The Call of the Edge*. River Publishers.