

МІНІСТЕРСТВО ОСВІТИ ТА НАУКИ УКРАЇНИ

НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ

«Харківський політехнічний інститут»

SCIENCE LOOKS AHEAD

Наука – погляд у майбутнє

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English Section

EFFECT OF NEEM ON NODULATION, GROWTH AND YIELD OF COWPEA

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Cowpea (*Vigna unguiculata* L. Walp) is of major importance to the livelihood of millions of people in the tropics and other part of the developing world (Quin, 1997). Both the grain and haulm are valuable dietary proteins for the majority of the African human population and their livestock (Fatokun, 2002). Apart from its nutritional value, cowpea is a leguminous crop and through its symbioses with rhizobia, increases soil nitrogen contents and thus soil fertility.

The use of inorganic fertilizers for soil fertility maintenance is becoming increasingly difficult as the price of the commodity is far beyond the reach of most peasant farmers. This situation might have compelled most farmers in recent times to intensify the practice of the age-long cropping systems such as mixed cropping and crop rotation with high legume component to fix nitrogen into the soil. Some of the reasons advanced for the persistence adoption of these system of cropping, have been precautions against uncertainty and instability of income, and unstable soil fertility maintenance (Abalu, 1977). Additionally, nitrogen is an essential nutrient for plant growth and development but is unavailable in its most prevalent form as atmospheric nitrogen (Wagner, 2012). Biological nitrogen fixation (BNF), offers a natural means of providing nitrogen in available forms for plant without polluting the environment. Legumes play an important role in farming systems, fixing atmospheric nitrogen that contributes nitrogenous compounds to the soil. In Africa, little or no fertilizer is used and the integration of fast growing leguminous crops in farming systems will be essential for minimizing rapid decline in soil fertility and for providing food for humans and animals as well.

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**CONVENTIONAL AND INDIGENOUS BIODIVERSITY CONSERVATION: A
COMPARATIVE STUDY OF JACHIE SACRED GROVE AND NKRABEA
FOREST RESERVE**

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Forest resources play a key role in protecting the environment and are of tremendous importance to the sustainable development of every society (Boon *et al.*, 2009). Ghana is recognized as one of the most advanced tropical African countries in terms of established forest policy, legislation, forest inventory and management planning. Additionally, there is a National Forest Standard and principles, criteria and indicators for judging the quality of forest management and usage (Alexander and Nurudeen, 2013). The forest reserve system established is one of the most extensive in sub-Saharan Africa covering 11 per cent of the country. Ghana's long and distinguished tradition of formal forest management stretching back to 1909 is manifested by the existence of 283 forest reserves under the Ministry of Lands and natural resources. In Ghana, it has been reported that almost all the forest reserves have close links with sacred groves and/or socio-cultural ties with the local communities with an estimated 2000-3200 sacred groves of which about 80% of them are in the southern zone (Gordon, 1992; Amoako- Atta, 1998). The introduced forest management systems have been the exclusive function of state authorities and agencies mostly excluding the locals who are in close proximity with these resources.

This deficiency in this protection strategy normally result in stand offs between state authorities and forest fringe communities and calls for collaborative forest management although made in policy documents have made dawdling progress.

This among other factors such as the increasing rate of deforestation, illegal logging, population pressures and unsustainable agricultural practices has caused the once rich evergreen and lush forests of Ghana to dwindle significantly. Recent conservation strategies have come to realize that forest fringe communities are one of the major stakeholders in sustainable forest management and the development of new forest management strategies now ensure that the locals are consulted and also have an integral role to play according to their capacity and skill set by incorporating local

conservation strategies in scientific or conventional forest management since these traditional strategies have great impacts on biodiversity conservation.

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BIG DATA AND ADVERTISING

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Face recognition, identifying consumers' motives, high-precision profiling, user scoring, identifying relationships between people and agents of influence in groups – this is not all that Big Data is capable of.

What is Big Data in simple words? Big data is data that exceeds the processing capacity of conventional database systems. The data is too big, moves too fast, or does not fit the strictures of your database architectures.

Most users begin to open their profiles on social networks, for example, in Instagram, only 24% of private accounts. People cease to react sharply to the fact that someone learns about them too much. After all, a huge amount of information can be obtained by simply briefly analyzing a person's profile, posts, and friends list on social networks.

One can find out a lot from open sources: an HR agency can find out if a potential employee is swearing, whether likes are put under publications of some political party. Often open information refers to family values, property values, car search, etc. From

the marketing point of view, these metrics can be used to divide people into different groups for further communication.

Tazeros Global Systems collects data from 11 social networks (VK, Facebook, Instagram, etc.). This is 430 million users, 200 million of which are constantly active. Data includes profiles, groups, relationships between people, text content that they post, photos if they have faces.

Specialists try to connect each social network with another, the relevance of the data is constantly checked: it takes about two days to update the VK database, and about a week to Facebook. Thus, you can track what has changed for users and what remains the same. This is important, for example, if you want to find out who until recently there were people who come to the headquarters of a political party - suddenly they will transmit information to competitors.

In addition to search technologies, "big data" has been successfully used in display advertising. The RTB (Real Time Bidding) model is widely known, which provides the display of advertising banners only to interested users, based on an analysis of their behavior on the Internet. Thus, the largest advertising networks, in collaboration with Data Suppliers, help entrepreneurs find their target audience.

Big Data is the technology of the future that begins today. It is designed to change the quality of our lives for the better, to make it more convenient and safer. Today, working with "big data" is of great benefit in many areas. This helps the business to more effectively find customers and satisfy their needs, offering what they really need, HR agencies to find good employees.

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<https://www.youtube.com/watch?v=frLydE1UCvA>

PREDICTING THE FUTURE OF ARTIFICIAL INTELLIGENCE

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Nowadays we are witnessing fascinating inventions following each other. One can observe that the rate at which technology is advancing is increasing, as described by Moore's law. One of the most important subjects of today's research is artificial intelligence (AI).

AI will surely shape the future of humankind. Human brain uses neurons to process and communicate information while a man-made processor uses transistors for the same task. The difference is that a processing unit is able to handle information

faster than a human. In fact, a computer is able to do that so well that it is not a competition. In reality, many tasks which were originally performed by humans are now done by different machines which are much more efficient than ordinary workers. With the development of AI, more and more complex jobs will be done by computers instead of biological beings.

It is possible that computer scientists be able to create a “super-intelligence” which will outsmart the human brain. In this case we must consider that it will learn to replicate itself and be self-conscious. We must learn to somehow contain it and take control of it, otherwise we might construct something which could destroy the world as we know it.

On the other hand, we might never create a perfect algorithm. Machine learning is a complicated subject; some human input is necessary for AI to work the way we intend it to. We must be very careful when giving instructions to a new neural network because it might “do exactly what we tell it to do”, which is hardly ever the ideal scenario.

From R. S. Sutton’s article “The Bitter Lesson” one may conclude that machine learning is becoming more self-reliant and less requiring human maintenance. We may only speculate on what happens next.

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UNMANNED CAR

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Autopilot is divided into 6 levels from level zero to level five. The first 3 levels are not considered as autopilot. Level 0 is without automation, level 2 monitors speed limit and observes road signs. Level 3 is a more advanced system of assistance for a driver. Level 4 is already much more interesting, it is a real autopilot, but with limitations. SAE

says level 4 is “highly automated driving”: the system does not need a human interference at all if it is functioning within previously developed scenarios. In other words, the Level 4 system still has limits, but as long as it is within these limitations human intervention will not be needed. And last level which we strive for is level 5 – complete autonomy of the driving system independent of a human. Level 5 is unavailable now. It is possible that level 5 systems will result from a huge amount of testing of level 4 vehicle. It will face many different situations which will provide huge massive of data for deep learning which in its turn will result in ultimate level 5.

As for Google’s unmanned car, no single sensor is responsible for making Google's self-driving car work. GPS data, for example, is not accurate enough to keep the car on the road, let alone in the correct lane. Instead, the driverless car uses data from all eight sensors, interpreted by Google's software, to keep you safe and get you from A to B.

The data that Google's software receives is used to accurately identify other road users and their behaviour patterns, plus commonly used highway signals. For example, the Google car can successfully identify a bike and understand that if the cyclist extends an arm, they intend to make a manoeuvre. The car then knows to slow down and give the bike enough space to operate safely.

As with the adoption of any new revolutionary technology, there will be problems for businesses that do not adjust fast enough. Futurists estimate that hundreds of billions of dollars (if not trillions) will be lost by automakers, suppliers, dealers, insurers, parking companies, and many other car-related enterprises. And think of the lost revenue for governments via licensing fees, taxes and tolls, and by personal injury lawyers and health insurers.

Who needs a car made with heavier-gauge steel and eight airbags (not to mention a body shop) if accidents are so rare? Who needs a parking spot close to work if your car can drive you there, park itself miles away, only to pick you up later? Who needs to buy a flight from Boston to Cleveland when you can leave in the evening, sleep much of the way, and arrive in the morning?

Indeed, Google’s goal is to increase car utilization from 5-10% to 75% or more by facilitating sharing. That means fewer cars on the road. Who needs to own a car when you can just order a shared one and it will drive up minutes later, ready to take you wherever you want?

This has the potential to dramatically reduce the number of cars on the street, 80% of which have people driving alone in them.

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MODIFICATION OF THE ROBOTIC VACUUM CLEANER

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Science goes ahead and changes our life beyond recognition. For example, such a familiar device as a vacuum cleaner looked differently at the beginning. The first dust-collecting machine was a large device controlled by two adult men, and it did not collect, but blew dust in different directions. The vacuum cleaner was improved in 1901 by Cecil Booth – his “Puffing Billy” sucked dust through a special filter and worked on gasoline. But transportation was still hard: a horse-drawn cart with a team of 4 people was needed, and a hose 30 meters long was brought into the premises through windows. In 1908 Mr. Hoover released a compact version that weighed only 20 kg.

A fundamentally new step was the robotic vacuum cleaner that appeared in the late 90s of the last century. It is able to independently move around the room, find a charger, remove dust. And it does not crash into obstacles! Controlling robots is the hard work of a mathematician and engineer. Currently, robotic vacuum cleaners are moving in a straight line, turning and again moving in a straight line.

In this work, we consider the problem associated with the ability to avoid an obstacle on a plane when the robotic movement is specific.

Let there be a start point S on the plane XOY and a region N defined by a square $A < x < B, C < y < G$ or a circle with the center at the point (a, b) and radius $R \in N$.

There is also some area D (also a square or a circle), which should be avoided when moving from the starting point to the destination area. We call the area D “dangerous area”. The task is to build a path from the starting point to the destination area, avoiding the dangerous area and using the switch between the family of concentric circles (counterclockwise movement) and the parallel line family (movement in both directions is possible) as a motion law.

In the work, trajectories of motion were constructed, switching points were found, that is, points at which we change the family. For example, moving around a circle with the center at $[(x)_0, y_0) = (0,0)$ and a radius $R = 4$ at point $(2, \sqrt{12})$ we “switch” to the straight line $x = 2$ and move down to the point $(2, -\sqrt{12})$ that belongs to a circle with the center at $[(x)_0, y_0) = (0,0)$ and a radius of $R = 5$, along which we move further. Several examples were considered depending on the location of the start point, destination area and dangerous area. In the future it is planned to apply these theoretical results to program a robotic vacuum cleaner working in round rooms to effectively reach each floor area.

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REASONS FOR USING HOME AUTOMATION SYSTEM

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A while ago the concept of so-called smart home was considered to be something from the science-fiction field. But nowadays the home automation system is integrating in our lives very fast. According to IDC analytics, the European market size for the smart home appliances has reached the all-time high of 88,8 million items in 2018, which is 23,1% bigger than in 2017. This makes the topic relevant and up-to-date.

The objective of this paper is to report on the origin of the home automation system and its advantages.

According to Wikipedia, home automation or domotics is building automation for a home, called a smart home or smart house. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems [1].

Control can be performed by remote control, smartphone or voice commands. You ask the system to make coffee, reduce the air-conditioning or switch off the lighting, and the CPU processes the command and send it to the appliance.

Invention of the first domestic appliances can be considered as the beginning of home automation technologies. In 1966 James Sutherland made an Electronic Computer for Home Operation, or ECHO IV. It could change all the clocks for daylight savings, move the TV's antennas to the perfect angle to pick up different channels, and print recipes and notes that were input from a keyboard in the kitchen [2]. In 1975 Pico Electronics developed the first specialized protocol that controlled household appliances.

The breakthrough in home automation technologies was in the 2010s with the development of an iPhone and other smartphones. Several new drafts appeared and they were becoming more and more intelligent.

The use of the smart home system has the following advantages:

1) Saving. It seems that only the richest can afford home automation but in reality it will even help to save money. Of course, at first you will need a significant investment in installing the system, but it will be paid off quite fast. Smart home helps to save up electricity, since it uses it only when there is a need and as much as it needs. Also special sensors will report on a flood or a fire that is going to start, which will result in sufficient cost savings. Besides, do not forget about saving up time, since the system does all the household chores for you.

2) Security. As it has been stated, the home automation system informs residents about malfunctions which may lead to disasters. Moreover, the smart home controls switching on/off windows and doors, signals the breaking inside the house, has a CCTV for monitoring rooms and space around the house and even imitates human presence.

3) Sustainability. Today people use large amount of natural resources, which results in catastrophic consequences. Solution for the problem is reasonable energy consumption. This can be fulfilled due to the home automation system which automatically switches off light, water and heating when they are not being used.

4) Comfort. The system performs chores more efficiently than people. It learns about residents' habits, schedules and adjusts to their lifestyle. Besides, it can be controlled by voice or gestures. And with Multi-room system you can enjoy films or music in different parts of your house.

According to Strategy Analytics, at the end of 2018 there were more than 200 million homes globally with at least one smart home device; by 2023 there will be additional 100 million smart homes as the market reaches 30% of all broadband

households globally. By the end of 2023 there will be more than 6.4 billion smart home devices in use or an average of 21 per smart home [3].

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ENERGY PROBLEMS AND WAYS OF SOLVING THEM (ALTERNATIVE ENERGY RECOURSES AND PINCH-ANALYSIS)

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Recourses consumption in the world

Nowadays people consume 15 bn tons of fuel every year. The world recourses are: oil – 1500 bn tons, coal – 700 bn tons and gas – 200 bn tons. It makes in total 2400 bn tons every year. We have deposits of such recourses only for next 40-50 years.

Interaction between power industry and environment causes climate changes, atmosphere pollution, pollution of water and the earth surface. Carbon dioxide emissions (30 bn tons every year) bring the world to the global warming. Blowouts are 60 thousand tons in water each year.

Suppose you wanted to help our environment. How would you go about it?

The main idea is to save energy. It can be realized by reducing energy consuming or using more energy efficient manufacturing processes.

The second way is to use alternative recourses: solar energy, wind energy, river's energy, geothermal energy and others.

The development of alternative recourses is a priority for EU.

We consume 210-260 m tons every year. Ukraine itself provides only 52% of required recourses. Alternative recourses are: wind energy – 20-30 bn tons, solar energy – 400 m tones (technical accessibly only 1 m ton), hydropower – 1500 tons, biomass energy – 16.1 m tons, geothermal energy – 50 m tons, manufacture and consumption

refuses – 13-14 m tons. The number of total tons every year is 100. It is almost 50% of indispensable recourses.

One of the energy efficient methods is called Pinch-analysis. [1] In these days Pinch-engineering is obligatory for reconstruction projects, as well as for building new manufactories. Pinch-planning is spread in North America, countries of EU, also in countries in Near and Far East.

Thanks to pinch-analysis we can cope with the lack of world recourses by reducing amount of warm energy for heating the cold curve of different processes. It goes like this: cold curve must warm up. For this is warm energy essential. Hot curve cools down and brings warm energy. We do not need this energy, so it goes in environment.

It is better to integrate these components with each other. Warm energy from hot component applies for heating a cold component. Hot component cools down at the same time.

What is more, not so much energy goes in environment. Another words we stop increasing of global warming.

To sum up, that it is better to take care of energy problem now. When it is not too late. Pinch-analysis and alternative recourses can help us!

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THE INFLUENCE OF CHORAL SINGING ON PERSONALITY

DEVELOPMENT

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Creative self-expression is a necessary desire and a reason why performing arts are an important part of a well-rounded education. Playing and listening to music is interesting for all cultures and has surprising benefits not only for improving memory and focusing attention, but also for physical coordination and development. Moreover, scientists prove that singing affects both the psychological and the physiological components of human’s health.

Overall health and physical development

The singing is a complicated process, which engages a lot of systems and organs, their modes of operation are different from usual activity. First of all, during the process of singing the pleasure zones in the brain are excited. The endorphins (hormones of happiness) are secreted.

In addition, the experience of ancient Italian school proves that singing is an art of breathing. Proper singer's breathing helps to increase lung capacity, to develop muscles, to strengthen the press. As well as that, singing trains the lungs, enhances blood circulation and as a result promotes blood organ saturation.

Furthermore, the muscles involved in this process are strengthened. The skeleton must support the body in such way, that the muscles are free to move. It promotes posture formation, stimulates the proper functioning of the internal organs.

Mental and psychological development

Singing in choirs influences **psychological sphere**, too. It is a kind of **meditation** by sound and helps to abstract from unnecessary thoughts and to get rid of negative emotions.

Also, the choir improves **teamwork skills**. It teaches how to speak with other people in society. The rehearsal is a stage for laughter and fun and it provides a safe environment to try new stils. It gives an opportunity to learn how to listen and hear. This habit is important for personality in the modern world, because everybody must speak, express themselves, solve conflicts and negotiate with other people.

Person, who wants to sing solo, but is scared, can realize and unleash the potential in a choir. Each type of temperament (extrovert or introvert) has a great opportunity to show and to improve these skills.

Group singing requires focused concentration. The call for attention to watching the conductor, listening to the other voices in harmony, reading the music and/or remembering the words contribute to reaching this attentive and accepting state.

So, the singing has positive influence on physical and psychological development. It is one of the most efficient pedagogical ways to treat a harmonious personality.

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GAME DEVELOPMENT OF SPACE EXPLORATION

“SPACE UNIVERSE”

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Nowadays, most ordinary people do not think about the solution of difficult, global problem such as: How to stop global warming? Where to find a cure for incurable diseases? And what can help to protect the Earth from the large asteroids? They leave it for scientists and it is clear because of the complex of the questions.

Our goal is to engage people to start searching for the answers. We should show them – the science is not boring. It is not only endless number of books, difficult calculations and hundred failed experiments but it is a powerful tool which allows everyone to change the world.

Space is one of the most mysterious and unexplored branches of science. That is why we begin our research path from it. “Space universe” is an efficient way to attract both adults and young people to space exploration. We want to provide complex things elementary, so we make emphasis on the game form. Users have an opportunity to create a personal planetary system, design each star and planet, and regulate every parameter to see how his or her project will change. During the whole game story all players will have small tasks e.g. “Create a planet with the life conditions”, “Collapse some planet to get the resources for the new one” or “make a black hole”. These challenges were added to bring an entertaining part to our gameplay. To keep the attention of the user and generate motivation we also add a “modest” plot and the system of the achievements.

As a perspective we plan to involve the game in the school program to diversify the curriculum and make all space processes more interactive and visual.

MEMORY DEVELOPMENT

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Is it really possible to improve your memory? Obviously, utilizing some sort of reminder system can help. But what about all the important information that you need to actually cement into your long-term memory? There are a number of science-proven strategies you can implement to get more out of your memory.

- The methods are not universal. Some of them develop memorization (the ability to quickly write new information in memory), some - storage (the ability to hold information for a long time), others - reproduction (the ability to quickly find and use the necessary information)

- Techniques are mutually complementary with each other. Improving one ability, you stimulate the development of the whole area of the brain.

- They are individual. It is not possible to certainly determine which method will be the best for a particular person.

Technique Schulte Tables. Tables of various sizes (you can start with the 2x2 option) are randomly filled with numbers or letters without any logical sequence. To train the memory, you need to look carefully at the table for five minutes, then close it and try to reproduce the contents of the cells.

Technique named after Aivazovsky. According to biographers, the artist used this method to focus better on the details and reflect more accurately them in the paintings. You need to choose any landscape or interior, look at it carefully for 5 minutes, then close your eyes and try to reproduce mentally that picture in the smallest details. It is not necessary to go outside to use the method as you can remember people, how they look, what they are dressed in, what specific features they have.

Pronouncing words the other way around. This difficult task stimulates reproduction or the rapid receipt of the necessary information from memory. The faster the speed, the better. A version for beginners is to pronounce the alphabet (Russian, English) vice versa.

The smell of rosemary. Scientists at the University of Northumbria (Great Britain) found out that people remember new information much faster breathing in the smell of rosemary. And the volume of assimilation is increased by 75%.

Verbal counting. Solving arithmetic problems in the mind also stimulates reproduction.

Meditation. Scientists from universities in California and Ohio (USA) found out that the blood pressure decreases, a bad mood and even depression disappears and short-term memory is being boosted at the same time. The explanation is elementary: meditation trains the ability to concentrate on one thought and not pay attention to irritants. Actually, this is necessary for high-quality memorization. It is enough to meditate 8 minutes a day for a noticeable improvement in memory.

Turn into left-handed. Researchers at the University of Toledo (Spain) proved in 2001 that left-handed people have better memory than right-handed. They suggest that the part of the brain responsible for memory is in the right cerebral hemisphere, which is better developed in left-handed people. As a result, the researchers advised to develop

the other hand. Wash dishes or sweep, use the mouse with your left hand and thereby stimulate memory.

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PREVALENCE AND TYPES OF HORMONALLY ACTIVE PITUITARY GLAND ADENOMAS

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The pituitary gland is the central organ of the endocrine system. The pituitary gland is divided into anterior (adenohypophysis), middle and posterior lobes (neurohypophysis). The frequency of hormone-active adenomas: prolactinoma (40-60%), somatotropinoma (20%), mixed prolactin- and somatotropin-producing tumors (8%), adreno-corticotropinoma (8-10%), thyrotropinoma, gonadotropinoma, null cell adenomas, silent adenomas. Percentages are indicated on the number of all hormone-active tumors [1].

Prolactinomas consist of medium-sized cells with a chromophobic or moderately acidophilic cytoplasm. In the center there is an oval nucleus. In 10-20% of cases microcalcification occurs [1, 2]. The main symptoms are oligomenorrhea, amenorrhea, galactorrhea [1, 3].

Somatotropinomas are divided by nature of the granule arrangement into tightly and focal (scattered) placed ones. A feature of cells with tightly placed granules is the eosinophilicity or chromophobicity of the cytoplasm, presence of a central oval nucleus with an elongated nucleolus. Cells with a focal location are chromophobic small cells with a central nucleus. The main symptoms are acromegaly, gigantism [1, 2, 3].

There are prolactin- and somatotropin-producing tumors that combine the clinical picture of two types of adenoma mentioned above. They require the comprehensive treatment [1].

Adrenocorticotropinoma has a highly granular basophilic cytoplasm, a large nucleus with condensed chromatin and a elongated nucleolus. Clearly arranged

cytoplasmic boundaries between cells that often have corners. Adrenocorticotropinomas determine the pituitary form of Itsen-Cushing's disease [1, 2, 3].

Gonadotropinomas are formed by diffused chromophobic cells. There are papillary formations that appear in the form of cytoplasmic outgrowths around the blood vessels. Such tumors often do not have clinical manifestations, so they are clinically non-functional [1, 2].

Silent adenomas or clinically non-functional tumors are the tumors without clinical manifestations but are active according to immunohistochemistry. Due to their invisibility, they often reach large sizes, leading to severe clinical consequences. [1].

Zero-cell adenomas show neither clinical nor immunohistochemical activity and are called “null cellular adenomas”, but they destroy the pituitary gland mechanically and may become active any time. Histologically they are chromophobic, and can be located in several neuroendocrine structures, including trabecular, papillary, and diffuse structures [1].

Therefore, hormone-active pituitary tumors are a relatively common problem, some of them are difficult to diagnose, what leads to their proliferation and, as a consequence, damage to the diencephalon and surrounding structures.

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BIONIC CONTACT LENSES

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Bionic contact lenses are a virtual display that is being designed (being developed, but not brought to mass production), which can have many uses, from helping the visually impaired to the video game industry. The device will look like a normal contact lens with inclusions of bionic technology. Lenses will use functional electronic circuits and infrared light to create a virtual display. Bionic contact lenses are a revolutionary breakthrough in the field of ophthalmology.

Lenses require organic materials that are biologically safe, as well as inorganic materials for electronic circuits. Electronic circuits are built of metal layers several nanometers thick. LEDs are only one third of a millimeter thick, so they are sprinkled with “powder” on the lens.

Bionic contact lenses were developed by researchers at the University of Washington (University of Washington). They managed to combine elastic contact lenses with a printed electronic circuit. This invention helps the user to see the world, overlaying computerized pictures on top of his own vision. According to the inventors, bionic contact lenses can come in handy for drivers and pilots, showing them routes, weather information or vehicles.

In 2013, a team of scientists, led by Chiang Yun Pak of the South Korean National Institute of Science and Technology Ulsan, introduced a soft contact lens. A five-hour test showed that a live rabbit could wear lenses with a light emitting diode without any side effects.

In 2015, Canadian optometrist Dr. Gareth Webb invented tiny bionic lenses that improve vision. Visual acuity in them exceeds the normal indicator three times. It is hoped that the new development will revolutionize eye treatment.

Eight years of research and a \$ 3 million investment were spent on creating innovative lenses. The product uses the patented Ocumetics optical system. A tiny biomechanical camera is able to change quickly focal length, allowing you to instantly shift your eyes from close objects to those that are at a great distance.

The world has never seen such an improvement in vision. If you can't easily see the watch face from a distance of 10 feet, you can see it from 30 feet with bionic lenses.

According to Ocumetics Technology Corp, the technology implemented in the lenses allows you to reproduce images that do not cause eye strain and headache.

RELEVANT QUESTIONS OF A LABOR MIGRATION IN UKRAINE: LEGAL REGULATIONS OF MEDIATION SUPPORT FOR EMPLOYMENT ABROAD

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The most relevant worldwide tendency nowadays is processes of a large scale migration, especially labor migration. The processes of a large scale migration are thought to be the most relevant worldwide tendency nowadays, especially labor migration cycles. There are different types of labor migration, that differs according to

the structure and size. Although, there are common features, for instance: tasks and goals, that manifest themselves in a possibility to make more money or get better opportunities. The preconditions of going abroad for work became liberty of travelling while independency times, difficult economic conditions and low payment. Therefore, overseas jobs were the main strategy of survival and rising welfare for the Ukrainians and their families. They are powerful social shock absorbers, factors of poverty reduction, tense situation in the labor market and significant foreign exchange earnings. Although they cause huge losses for the development of labor and intellectual potential of a country.

Nowadays, Ukraine is one of the most active participants of the international migration processes [1].

International movement aims to go to the countries with higher standards of living, which European countries are.

The problem is that a significant part of Ukrainians decides to move abroad for work but not processes quasi-contract with an employer in a right way.

This means it has to be regulated and mediated through the laws and international agreements. A huge amount of people does not understand the differences between legal and illegal employment. Therefore realization of the right to employment through competent intermediary agencies is thought to be vitally important by the author.

According to the legislation of Ukraine, mediator activity in the employment sector is to be licensed. In this way there are established state guarantees and control of the current question. The licensing authority of the activity is set to be the Ministry of Social Policy of Ukraine.

License terms define mediation as a service provided by economic entities under the foreign economic treaties, which are concluded with foreign companies for the provision of employment mediation services abroad in order to promote the conclusion of a labour agreement according to the applications from foreign employers about vacant positions.[2]

A very relevant question is to keep going doing researches with the legal regulation of employment of the Ukrainian community abroad, taking into account modern migration policy and the position of Ukrainian president about new draft laws introduction.

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COMPUTER VIRUSES AS ONE OF THE PROBLEMS OF THE 21ST CENTURY

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Tim Berners-Lee invented the World Wide Web (WWW) when he discovered a way to jump to different files on his computer using the random or unplanned links between them. He also invented the world's first browser. This lets you locate and view Web pages and also navigate from one link to another.

The WWW became available to everyone in 1991 and the number of Internet users grew from 600,000 to 40 million in five years. Nowadays, that number is miles larger and there are now many browsers that provide Web pages, information and other services. You can also do research, download music files, play interactive games, shop, talk in chat rooms and send and receive e-mail on the WWW and what not.

The Internet offers instant access to information across national and cultural borders, but along with helpful information the Internet hosts a disturbing amount of unsavory and even dangerous material. Recent trends are leading many experts to worry that malicious code buried in infected computers or released in new generations of worms will spawn targeted criminal attacks against business and industry.

What is a «computer virus»? According to the scientific and technical encyclopedic dictionary: «a computer virus is a part of the code in a computer program that can copy and move from one computer to another, usually designed to interfere with the normal functioning of the computer».

The sources of computer viruses could be pirated (illegally copied or broken) games, putting flash cards in publicly available PCs, commercial software (rarely).

The first computer virus was harmless to computers, and had no purpose to damage the device; this application was named Creeper, and it was written in 1970 by Bob Thomas, an employee of BBN (Bolt Beranek and Newman). This program was able to transfer itself between servers. At its core, this program was not a full-fledged computer virus. Creeper did not perform any destructive or spyware actions.

At present computer viruses are classified into several types:

- Computer virus. It is the type of malware that spreads by embedding its copy into another program.

- Computer worms. This type is similar to a virus because worms copy functional copies of themselves and can cause the same type of damage. Unlike viruses that require the spread of an infected host file, worms are stand-alone software and do not require a host program or human help to propagate.

- Trojan (trojan) is the type of malware that looks legit. Damage from this malware varies from causing a little annoyance (for example, pop-ups in the browser) to stealing confidential information or money, destroying data, as well as damaging or completely destroying the system and network.

There are several ways to protect your PC from computer viruses:

- Never follow links sent by mail from strangers.
- Pay for your games, fair and square.
- Do not download dubious programs via the Internet, use only trusted sites with a license.

- Read carefully the conditions for installing programs, pay special attention to the checkmarks in the points of installation of additional software.

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WAYS TO IMPROVE PERFORMANCE IN MULTIPROCESSORS SOFTWARE

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The problems of computer systems are known for engineers of this area long enough. In multiprocessors' systems costs of losing the performance may be fairly high. The ways for improvements may be different, also suitable for single-processor's systems.

Nowadays, a problem of finding and removal any kind of bottlenecks in computer systems with large computing power is really urgent. A kind of such performance downgrades can be different, but one thing unites it, each of these problems can lead to

performance degradation with adverse effects to linked subsystems in a computer system. The question of profiling is acute enough.

Apply for single-processor's systems we can pick out a several methodologies for defining the average workload of CPU, for instance:

- Average workload of CPU while benchmark running
- Average workload of GPU
- Average load for single-computing core in a system
- The frequency of accessing different cache-levels of CPU and accessing other memory (Hard-drive, RAM)
- Dependence of calculations on each other

It is necessary to mention one of the main problems in multi-cores systems with several computation units (threads/cores/processors). It is the problem of cache coherence, when several data items can be loaded in two or more caches. When one of cores modifies a data in loaded cache- other computational units must be notified about and then reloads the invalid data chunk.

From Jonathan Müller's presentation, who is the author of the report about cache-friendly programs, we can find the explanation, what the cache-friendly program is and how it is implemented.

Cache-friendly programs are the kind of programs, which internal architecture solutions, optimized data structures and right data alignment and they minimize the access for far-stored data, thus they reduce the time for accessing a needed data chunk.

One of the most important ways for optimizing the data time access is alignment of stored data. As we know, modern processors can address unaligned data, but this access needs twice more time. There is a simple rule for data alignment – just use the power of 2 value, that can trigger a set of compiler optimizations for vectorized instructions.

Also, there is a problem of simultaneous access for recourse. The popular practice in programming is to use mutexes or semaphores (it is OS primitives). This problem can be solved with more optimized solutions, by using spinlocks (CPU's primitives) and lock-free based data structures. From benchmarks, a performance after replacing OS primitives to CPU's can increase performance 40 times more.

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ORGANISM CLONING AND THE HISTORY OF FAMOUS SHEEP

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Humanity has been obsessed with the idea of cloning, artificially creating an identical copy of a living organism, for a long time. The first experiments in this field began in the early twentieth.

For the last 50 years, many attempts have been made to clone animals. As early as 1979, scientists obtained the first genetically identical mice by dividing the mouse embryo at the initial stages of development, with the subsequent transfer of the resulting embryos into the uterus of adult females. A little later, the researchers created the first genetically identical cows, sheep and chickens by transferring a nucleus removed from the embryo in the early stages of its development to an "empty" egg.

The first animal to be successfully cloned was a sheep named Dolly, who was born in 1996.

Dolly became the first ever warm-blooded animal to emerge from another adult's body using somatic cell nuclear transplant technology.

Unlike its predecessors, created using the cells of their biological mother and father, Dolly was an identical copy of the original sheep. She de facto had three mothers.

The world learned about the sensational achievement seven months after the birth of the animal – February 22, 1997. Because Dolly's successful creation was preceded by a series of defeats, scientists decided to make sure that the sheep would survive for sure.

Almost immediately after she was introduced to the public, Dolly became the center of attention. In the first week, more than 3,000 calls from all over the world were received at the Roslin Institute. Everyone wanted to look at the sheep.

At first glance, Dolly seemed quite healthy. But a year after she was born, it turned out that the sheep's DNA had atypical changes for her actual age. The area known as telomeres has the ability to become shorter as the living organism ages. And in Dolly, it was much shorter than it should have been. That is, Dolly was older than her actual age.

In September 2000, scientists learned that Dolly had contracted a virus that caused lung cancer in sheep. And in 2001, she was diagnosed with arthritis. The sheep's quality of life remained normal until 2003 – when Dolly started coughing. An X-ray revealed the tumor in her lungs of. Scientists have put the animal to sleep to minimize its suffering. The sheep died on February 14, 2003 at the age of six. For example, the life span of these animals is usually 10-12 years.

After that scientists have come to the conclusion that reproductive cloning is still a very inefficient technology, because the vast majority of cloned embryos do not develop into an adult animal.

Reproductive cloning is still a very inefficient technology, and the vast majority of cloned embryos do not develop into an adult animal. In addition, cloned animals have health problems. They are often born too big, and they may have defects in vital organs and the immune system.

In fact, technology could help people create the tissues and organs they need for the sick and even slow down aging, and infertile parents would have a chance to raise their own children.

Through cloning, humanity could also bring to life species of animals that died out for one reason or another, or even dinosaurs.

In his book *Our Post-human Future*, Francis Fukuyama wrote that evolution was still going on and what the future would be like - the biotechnological revolution would determine. He considered cloning, along with genetic engineering, as an integral part of this revolution.

However, all this is just a hypothesis. On the other hand, once the cloning capability itself was nothing more than an assumption. However, with the help of technology, Dolly, Kopiket, Prometheus and two funny monkeys have already were born. So the trend is likely to continue.

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BLUE OCEAN STRATEGY AND ITS ADVANTAGES

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In today's overcrowded industries companies tend to engage in cutthroat competition in order to gain and retain customers. Blue Ocean Strategy is a tool that helps businesses to overcome existing market boundaries. Lasting success increasingly comes not from battling competitors, but from creating untapped new market spaces ripe for growth. According to the authors, the key to exceptional business success is to redefine the terms of competition and move into the «blue ocean», where you have the

water to yourself. The term «Blue Ocean» stands for the uncontested market space for an unknown industry or innovation.

Blue oceans are associated with high potential profits. Generating that kind of environment is the goal of blue ocean strategy. Blue oceans are opposed by red oceans. They denote all the industries in existence today.

Cutthroat competition turns the ocean bloody red. On the contrary, blue oceans are vast, deep and powerful – in terms of opportunity and profitable growth.

Blue ocean strategy does not aim to out-perform the competition. It aims to make the competition irrelevant by reconstructing industry boundaries. It is based on the simultaneous pursuit of differentiation and low cost. It is an ‘and-and,’ not an ‘either-or’ strategy.

First and foremost, the cornerstone of Blue Ocean Strategy is the concept of Value Innovation. Furthermore, Blue Ocean Strategy presupposes that businesses should focus less on their competitors and more on alternatives. To maximize the size of their blue oceans, companies should focus less on their customers, and more on non-customers, or potential new customers.

To draw the conclusion, one can say that creating blue oceans builds brands. A powerful blue ocean strategic move can create brand equity that lasts for decades. Blue Ocean Strategy was successfully implemented by such companies as Ford, Apple, Nintendo, Wikimedia Foundation and many others.

PROGRAMMATIC ADVERT: ARTIFICIAL INTELLIGENCE

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Programmatic advertising is the automated buying and selling of online advertising. Targeting tactics are used to segment audiences using data so that advertisers only pay for ads delivered to the right people at the right time, and depend less on the “spray and pray” method of digital advertising.

And the most interesting thing is how this advertising is automated. Artificial intelligence is directly used for finding places and pitting necessary advertising there. Two things are needed for that: data and templates. Collecting and processing data is the main task for artificial intelligence.

Collecting data about you can be particularly stopped.

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MODERN TECHNOLOGY DEVELOPMENT

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Logistics of freight rail transport is a comprehensive and interconnected solution of tasks related to the organization of cargo transportation by rail.

The object of logistics of freight rail traffic is freight rail transport. Freight rail transport due to its reliability, regularity, the ability to transport goods regardless of the season and weather conditions, a small degree of environmental impact (compared with other types of transport), low energy intensity of the transport work (energy consumption Rail transport is 6 times less than in aviation, and 3 times less than by road) is widely used for the transport of goods in both domestic and international relations. Freight rail transport provides the ability to deliver goods over long distances and allows regular transportation.

The subject of logistics of freight rail transportation is a set of tasks related to the organization of the carriage of goods by rail.

Logistics of freight rail transport:

- 1) selection of the type of rolling stock of freight rail transport;
- 2) creation of optimal (rational) delivery routes cargo;
- 3) minimization of transportation costs for freight transportation;
- 4) planning of transport processes on the railway freight transport.

Thus, efficient logistics of freight rail transport is the creation of optimal routes, on which it is possible to deliver cargo to the required stations in the shortest possible time with minimal costs.

However, often the quantity of goods presented for transportation can be transported by a smaller number of cars, the cars are in transit for a long time or stowed,

the empty run of wagons increases, which affects the competitiveness of rail freight traffic compared to other modes of transport, leads to loss-making this type of transport.

A modern vector for the development of logistics of rail freight transport - optimization of the transportation of goods by organizing the transportation of goods by accelerated container trains. An accelerated container train is a container train, the passage of which through the railway sections is provided for according to a special schedule, ensuring the lowest possible time spent on carrying out technological operations and going to the destination

The logistics center is the main structural and functional unit of transport logistics. It supports the processes of planning, organizing and implementing rational (optimal) criteria for the timing, cost, quality of delivery of goods. In the interests of clients, it also organizes railway and other types of transport in a single process; enterprises and organizations providing transportation of goods and the provision of related services. Transport consolidation centers should be created at the junction points of large traffic flows. They are general transport hubs that meet international standards - with telecommunications and cargo processing equipment, as well as information technology to organize a quality process for the physical distribution of products for end users in the regions.

TOP-5 INCREDIBLE ROBOTS THAT ACTUALLY EXIST

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Robots have permeated every part of modern life. From computerized cars to cell phones. We are living in the age of heightened technology, but while most people have become jaded with these everyday machines, there are some robots that still inspire all in wonder.

Sophia

Hanson Robotics’ most advanced human-like robot, Sophia, personifies our dreams for the future of AI. As a unique combination of science, engineering, and artistry, Sophia is simultaneously a human-crafted science fiction character depicting the future of AI and robotics, and a platform for advanced robotics and AI research.

The character of Sophia captures the imagination of global audiences. She is the world’s first robot citizen and the first robot Innovation Ambassador for the United Nations Development Programme. Sophia is now a household name, with appearances

on the Tonight Show and Good Morning Britain, in addition to speaking at hundreds of conferences around the world.

Moley

Moley Robotics, a London-based company that has developed a prototype robochef designed for the home. Unveiled at Germany's Hannover Messe technology fair, the machine consists of two remarkably dexterous robotic arms installed on the top of cooking area, complete with hobs, a sink, and an oven. The robot's sophisticated and fully articulated hands were created by Shadow Robot Company, another London-based firm whose products are used all over the world including by NASA.

The machine comes with a library of thousands of recipes, a dishwasher and a refrigerator. This means you not only won't have to cook your prep for yourself but you do not even need to wash up afterwards, you'll even be able to control it remotely using an app, which means you could order your dish to be ready for you when you get home.

Atlas

The world's most dynamic humanoid robot, Atlas is a research platform designed to push the limits of whole-body mobility. Atlas's advanced control system and state-of-the-art hardware give the robot the power and balance to demonstrate human-level agility. Atlas has one of the world's most compact mobile hydraulic systems. Custom motors, valves, and a compact hydraulic power unit enable Atlas to deliver high power to any of its 28 hydraulic joints for impressive feats of mobility. Atlas's advanced control system enables highly diverse and agile locomotion, while algorithms reason through complex dynamic interactions involving the whole body and environment to plan movements. Atlas uses 3D printed parts to give it the strength-to-weight ratio necessary for leaps and somersaults.

Spot

Robot from Boston Dynamics, Spot, is a small four-legged nimble robot that climbs stairs and traverses rough terrain with unprecedented ease, yet is small enough to use indoors. Built to be a rugged and customizable platform, Spot autonomously accomplishes your industrial sensing and remote operation needs. Spot can go where wheeled robots cannot, while carrying payloads with endurance far beyond aerial drones. Spot uses stereo cameras to avoid obstacles and people as it moves through dynamic work sites. Spot is built to withstand dusty and wet industrial environments. Crash protection keeps Spot safe. Spot's flexible payload interface and accessible API enable third parties to develop the next generation of robotic applications

Ekso GT

The Ekso GT is more than just a cool toy. It dramatically improves the quality of life for thousands of people around the world. Many people who suffer from a stroke or

spinal cord injury face a long road to recovery lasting months or years. The Ekso GT functions as a working set of legs completed with back and spinal support. For Ekso Bionics the challenge was providing real-time recovery data to users in every country it operated in.

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SIGNIFICANCE OF PHYSICAL REHABILITATION IN THE TREATMENT OF NERVOUS DISEASES

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Today, in the era of modern technologies, when the pace of life is increasing so fast, a person experiences great physical and emotional stress. Constant stress greatly affects our body causing different problems, and all this negatively influences our mental state and spiritual harmony. The study of the efficacy of physical rehabilitation techniques as a comprehensive measure in the fight against nervous diseases is becoming increasingly challenging.

The term "physical rehabilitation" means the use of physical exercises and natural factors for comprehensive restoration of the normal body condition and quick return of a patient to normal life. Physical exercises as a method of treatment were first used in the early XXth century for the patients affected by polio. [1]

Today, there are many types of stress prevention: psychotherapy, mechanotherapy, ergotherapy, massage, physiotherapy. Each of these techniques is used in the fight against certain consequences of diseases. Basic principles of rehabilitation include:

- 1) immediate beginning of rehabilitation.
- 2) the course of treatment should last without interruptions from the beginning to the end.
- 3) the technique is designed individually for each patient.
- 4) return of a patient to normal life. [2]

Physical exercises used for the diseases of the nervous system should be clearly structured. One should start from light loads and gradually increase them respectively, increasing the number of repetitions. Exercises are performed for all muscle groups, but in cases when a particular organ or a system is more affected (for example, the level of blood pressure increased or a headache or pains in the limbs appeared due to constant stress), the exercises should be focused on the restoration of a definite area.

Exercises should be performed at regular intervals, at a definite time of the day, taking into account biological rhythms of a patient. Massage is necessary as an additional and effective tool, as it is demonstrated by practice. The therapeutic effect of massage is expressed by three main mechanisms: neuroreflex, humoral, mechanical. Due to the targeted massage of a certain area of the body, it is possible to change the functional state of the cerebral cortex, regulate nervous excitability, restore lost reflexes, reduce pain and improve coordinating function of the nervous system. Massage prevents atrophy of muscles and some parts of the organs, which are extremely important for elderly patients and people with disabilities. After completion of the treatment cycle, a patient should consult the doctor, who will provide a control examination and administer further treatment. [3]

Physical rehabilitation plays an important role in the treatment of various diseases, especially nervous system disorders. Physical activity reduces the level of illness and fastens recovery. Definitely, it is difficult to treat severe diseases of the nervous system without the administration of drugs, but in combination with a course of physical rehabilitation, it is possible to reduce their amount and achieve better results during treatment.

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BODY LANGUAGE AS A FORM OF COMMUNICATION

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This abstract deals with body language as a form of communication.

Body language is a broad term for forms of communication using body movements or gestures instead of, or in addition to, sounds, verbal language, or other forms of communication. It forms part of the category of paralanguage, which describes all forms of human communication that are not verbal language.

Paralanguage, including body language, has been extensively studied in social psychology. In everyday speech and popular psychology, the term is most often applied to body language that is considered involuntary, even though the distinction between voluntary and involuntary body language is often controversial. For example, a smile may be produced either consciously or unconsciously.

Voluntary body language refers to movement, gestures and poses intentionally made by a person (i.e., conscious smiling, hand movements and imitation). It can apply to many types of soundless communication. Generally, movement made with full or partial intention and an understanding of what it communicates can be considered voluntary.

Involuntary body language quite often takes the form of facial expression, and has therefore been suggested as a means to identify the emotions of a person with whom one is communicating.

The relation of body language to animal communication has often been discussed. Human paralanguage may represent a continuation of forms of communication that our non-linguistic ancestors already used, or it may be that it has been changed by co-existing with language. Body language is a product of both genetic and environmental influences. Blind children will smile and laugh even though they have never seen a smile. Iraneus Eibl-Eibesfeldt claimed that a number of basic elements of body language were universal across cultures and must therefore be fixed action patterns under instinctive control.

Some forms of human body language show continuities with communicative gestures of other apes, though often with changes in meaning. More refined gestures, which vary between cultures (for example the gestures to indicate «yes» and «no»), must be learned or modified through learning, usually by unconscious observation of the environment.

It is specially noted that body language is important in one-on-one communications, and may be even more important in group communications. In group situations, often only one person at a time is speaking, while non-verbal communication is coming from each individual in the group. The larger the group, the more impact body language may have. This abstract is of interest to people Learners dealing with human paralanguage as a form communication.

PRINCIPLES OF SELF-MANAGEMENT THEORY

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The abstract touches upon the problem of self-management. Self-management is a consistent and purposeful use of proven working methods in everyday practice in order to optimally use your time to achieve success. The main goal of self-management is to make maximum use of one's own capabilities, to consciously control the course of one's life (self-determination) and to overcome external circumstances both at work and in one's personal life.

The main advantage that is achieved through work planning is that time planning brings gaining time. The general practical experience in production shows that increasing the time spent on planning ultimately leads to time saving in general.

It can be concluded that time management relates more to the organization of working time than its saving. The manager should strive for the correct distribution of time, based on the personal interests and interests of business. It is necessary to use time in such a way as to ensure the fulfillment of the maximum number of tasks, which in turn to determine the implementation of intermediate tasks leading to the realization of the main goal. The manager must coordinate his own time planning with subordinates and immediate supervisor planning in order to achieve maximum effect.

Achieving success is one of the basic human needs that applies to both the personal and professional spheres. However, when answering the question of what is personal success, everyone can express their own thoughts. Analyzing the main systems for achieving personal success, first of all, the following six success factors are distinguished:

- personal strategy and goals,
- effective self-organization,
- optimal use of information,
- use of skills,

- successful communication,
- orientation in the external environment

The conclusion according to these rules is quite simple. Good work organization is the key to success in the struggle for time. Each manager needs to think about how to be organized and to maintain this quality forever.

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MECHANICS LOOKS AHEAD

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Humanity permanently faces with new challenges that need modern approaches. Scientific and technical progress gave us many new directions (artificial intelligence, nanotechnologies, etc.), that is why one may think, that mechanics is not actual. Aim of this research is to explore contribution of mechanics in technical progress and its prospect.

Mechanics is one of the oldest sciences, but it is still topical. It solves huge number of applied problems. Take, for example, architecture. Everybody wants to feel safe. And mechanics solves more interesting task, than just designing a building that does not break. Let us look at skyscrapers. The most interesting thing here is system of damping fluctuations during earthquakes. For example, a building with an earthquake protector as if floats above the earthquake. It allows to save the skyscraper safe and sound, to save human lives.

Machinery is an essential part of industry therefore it is closely connected with our level of life. Improving of equipment on factories and on transport means increasing of efficiency, power and what is most important – more rational use of resources.

If we talk about aviation, rocket science or robotics the main point is to design optimally, not just reliably. Of course we can create a rocket with a big safety margin, but it is not a good idea, because the weight of construction will increase dramatically, therefore we will get a growth of fuel consumption. To reach maximal strength with minimal expenditure of resources is a task, which is solved by mechanical engineers. Also these industries need a complex approach from different areas: software engineering/artificial intelligence, electronics and mechanics. And each of these components is necessary for success of the whole industry.

Also using mechanics in medicine is interesting and important. Especially development of high-technology prosthetics. Even development of non-robotic prosthesis requires knowledge in chemistry and biology: not only construction of prosthesis is important, but also a selection of suitable material, which satisfies physical and biochemical properties.

All these areas are specific enough, but they are united by that fact, that final product must be reliable, strong and optimal, and resources must be used as rational as possible, and mechanics makes an important contribution in scientific and technological progress. This is our present, these are our advanced technologies, but they already exist.

We are interested in future of our technology. So here is a question. What can help us to develop more sophisticated technologies and mechanisms? One of the most important tasks of mechanics is to explore nature of destruction and to prevent it. Development of molecular dynamics will allow us to reach a new level of accuracy of our calculations. The main point is we perceive physical body as a set of molecules, which attract each other. Destruction occurs, when forces of repulsion become bigger than forces of attraction. This is a very effective approach, but it needs huge computing power, that is why it is not used universally.

DIGITALIZATION IN UKRAINE

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Here are some facts about digitalization development in Ukraine:

- Ukraine is No. 60 in IMD World Digital Competitiveness Ranking in 2019;
- Internet is the only media with the growing coverage (73%, 23 m);

- 90% of people aged 12-35 use Internet, when 45+ category demonstrates 80% rise;
- smartphone is No. 1 gadget for Internet-users, 30% of customers use it for purchasing;
- stable growing of e-commerce in cities (up to 34%);
- more and more people use online / offline card payment way instead of the cash one.

Top 5 most important digitalization spheres in Ukraine are Healthcare, Education, City, Building and Energetics.

Healthcare is important due to its major impact on country's demographics resources and it includes many complicated processes and services. Here are some solutions already used in Europe: digital appointments, telemedicine, remote body state monitoring, ambulance automation, online prescriptions issues.

Rapid technologies changes and development raises requirements to our skillful employees who are formed mainly by education. The EU has passed its own plan for digital education recently, which includes usage of digital technologies in tutoring and schooling, improvement of people digital competence and skills, education data analysis. Here are some solutions realized in foreign countries: online-courses, personal therapy for people with disorders etc.

Urbanization is the modern global trend; many smart city concepts (building and transport solutions, circular economy) are being adopted in a lot of countries nowadays. One solution example is the city online parking system.

Building sphere is one of the most profitable in Ukraine but it stumbles upon many bureaucratic obstacles. An effective ICT solution is data collection about construction site communications, i.e. no papers and preparations errors, as well as combining different government departments in one system.

Development of energetics is essential for Ukraine's geopolitical independence. Digitalization can offer such solution for its improvement: software to map fossils deposits and to monitor volumes of fuels extraction and storage. This will make the sphere transparent and will help to build effective business models on the market.

Ukraine government's plans and aims (by advanced scenario, 5-10 years perspective) in digitalization are:

- key spheres are healthcare, education, public security, public administration, ecology, digital ID, e-commerce and smart city;
- to legalize basic citizen digital rights (access to the Internet) and to lower hardware and software prices via modern ways of funding;

- national system of electronic data about health state of each patient and online interaction with doctors and health facilities;
- digital workspace for officials leading to citizens' comfort and corruption decrease;
- Bank ID, Mobile ID and digital voting;
- national system for monitoring water, air and soil states;
- E-baby: 10 services considered with baby birth could be received via filling in only one digital form without leaving the house since the beginning of 2020;
- 30.8 m UAH for current digital systems maintaining + expenses for each ministry separately are provided in 2020 budget for government strategy implementation.

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CULTURED MEAT

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With our human population expected to increase to 9 billion people by 2050, demand for meat is expected to go up significantly across the world. Do you think there will be enough meat for everyone? Unfortunately, with current technology this is

impossible. Unless vegetarianism, by some miracle, become very popular, we will need to find a way to solve this problem.

Scientists argue that artificially grown meat will help to solve global problems with ecology and quality of meat.

Cultured meat is the meat that is grown from a living cell, and is not obtained by killing an animal.

The concept of cultured meat was popularized by Jason Matheny in the early 2000s.

Production of natural chicken / beef/pork becomes more expensive and inefficient every year. Livestock farming takes up a huge amount of land and water and in terms of greenhouse emissions, is as bad as burning fossil fuels, according to the UN. In fact, synthetic meat generating only 4% greenhouse gas emissions, reducing the energy needs of meat generation by up to 45%, and requiring only 2% of the land that the global meat/livestock industry does. In addition, manufacturers often use antibiotics and hormones in their production, which destroy the benefit and safety of meat. This is not the final list of problems that will help to solve the lab-grown meat.

In 2008, the production of a piece of beef weighting 250 grams in the laboratory cost \$1 million. In 2013, a Burger grown in London for the experiment cost \$325 thousand. Now its price has fallen to \$11 for kilo. In the next few years, artificial meat is guaranteed to become cheaper than natural.

As for the taste, it is almost impossible to distinguish the difference between artificial steak and natural. Except that, the cultured meat is softer and tender.

As a result, cultured meat as a commodity will be more nutritious, safer for health, less harmful for the environment and more effective in production than traditional meat. Artificially grown meat is not fiction, but the near future of the food industry.

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EMPLOYMENT PROBLEMS AND THE POSSIBILITY OF THEIR INDIVIDUAL SOLUTION

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Employment problems are relevant to each of us, but especially to graduates who have to look for their first job. The urgency of finding a solution of employment problems is because all such trainings are expensive and never help at ones.

For several reasons, people often do not work according to their qualification. This is due to a number of factors, such as the lack of distribution by the State Department of students for internships in the country or practices outside the country. Laboratory workshops are in poor condition, so it affects the graduate's willingness to work in manufacturing, for example. At best, students receive a theoretical base and some surface knowledge.

Job search can be easier by following simple tips. Researching yourself is the key to finding the job that is right for you. The first thing you need to do when starting the job-hunting process is a self-assessment of your own strengths and weaknesses. This process will help you identify the skills and personal characteristics that employers are looking for.

For success of your CV you should:

- structure the contents;
- write eye-catching headings;
- highlight your work-experience;
- detail your education and qualifications;
- present the facts in the most positive way.

Your CV must be concise, honest and error-free.

Then you have to write an impressive cover letter. It should not duplicate your CV. The main purpose of a cover letter is to persuade the reader to read your CV and consider you for the vacant position. It is your earliest written contact with a potential employer, creating a critical first impression. A successful cover letter increases the chance of being interviewed.

At the interview, you should be calm and not afraid. You can get ready using our top 10 questions:

1. Why did you choose to study your degree subject?
2. What skills did you develop at university?
3. How will your degree help you in this position?
4. Why do you want this job?
5. What can you bring to this position?
6. What are your strengths and weaknesses?
7. What is your biggest achievement?
8. What do you know about our company?
9. In what environment do you work best?
10. How do you work in a team?

By following these principles, you will facilitate the employment process.

FLAT PLATE SOLAR COLLECTORS

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A typical flat-plate collector is a metal box with a glass or plastic cover (called glazing) on top and a dark-colored absorber plate on the bottom. The sides and bottom of the collector are usually insulated to minimize heat loss.

Sunlight passes through the glazing and strikes the absorber plate, which heats up, changing solar energy into heat energy. The heat is transferred to liquid passing through pipes attached to the absorber plate. Absorber plates are commonly painted with "selective coatings," which absorb and retain heat better than ordinary black paint. Absorber plates are usually made of metal—typically copper or aluminum – because the metal is a good heat conductor. Copper is more expensive, but is a better conductor and less prone to corrosion than aluminum. In locations with average available solar energy, flat plate collectors are sized approximately one-half- to one-square foot per gallon of one-day's hot water use.

Applications: The main use of this technology is in residential buildings where the demand for hot water has a large impact on energy bills. This generally means a situation with a large family, or a situation in which the hot water demand is excessive due to frequent laundry washing.

Commercial applications include laundromats, car washes, military laundry facilities and eating establishments. The technology can also be used for space heating

if the building is located off-grid or if utility power is subject to frequent outages. Solar water heating systems are most likely to be cost effective for facilities with water heating systems that are expensive to operate, or with operations such as laundries or kitchens that require large quantities of hot water. Unglazed liquid collectors are commonly used to heat water for swimming pools. Because these collectors need not withstand high temperatures, they can use less expensive materials such as plastic or rubber. They also do not require freeze-proofing because swimming pools are generally used only in warm weather or can be drained easily during cold weather.

While solar collectors are most cost-effective in sunny, temperate areas, they can be cost effective virtually anywhere in the country so should be considered.

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CALLING PRINCESS LEIA: HOW THE OUT-OF-THIS-GALAXY STAR WARS HOLOGRAM JUST BECAME A STEP CLOSER

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Science-fiction movies portray volumetric systems that provide not only visual but also tactile and audible three-dimensional (3D) content. Displays can create 3D visual content without the need for glasses or additional instrumentation. However, they are slow, have limited persistence-of-vision capabilities and, most importantly, rely on operating principles that cannot produce tactile and auditive content as well.

Scientists from the University of Sussex have created and presented the multimodal acoustic trap display (MATD): a levitating volumetric display that can simultaneously deliver visual, auditory and tactile content, using acoustophoresis as the single operating principle. This system traps a particle acoustically and illuminates it with red, green and blue light to control its colour as it quickly scans the display volume. Using time multiplexing with a secondary trap, amplitude modulation and phase minimization, the MATD delivers simultaneous auditive and tactile content. The system demonstrates particle speeds of up to 8.75 metres per second and 3.75 metres per second in the vertical and horizontal directions, respectively, offering particle

manipulation capabilities superior to those of other optical or acoustic approaches demonstrated until now. Sound can levitate objects of different sizes and materials through air. This allows us to manipulate cells, liquids, compounds or living things without touching or contaminating them. Acoustic waves can exert radiation forces and form acoustic traps at points where these forces converge permitting the levitation of particles of a wide range of materials and sizes through air. This is of paramount importance for crystallography, cell manipulation, lab-on-a-chip scenarios, biomaterials, containerless transportation and even the levitation of living things. Operating at frequencies higher than 40KHz will allow the use of smaller particles, increasing the resolution and precision of the visual content, while frequencies above 80KHz will result in optimum audio quality.

More powerful ultrasound speakers, more advanced control techniques or even the use of several particles, could allow for more complex, stronger tactile feedback and louder audio.

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THE MOST POWERFUL JET ENGINES IN THE WORLD

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This consideration deals with the future rocket engines. Thus it will be interesting to consider the following moments. How to compare rocket engines and find the best? First you need to decide what you need. The list of leaders in terms of efficiency (the rate of ejection of the working fluid from the engine) will be very different from the list of those developing the highest speeds. The later will include ionic and other electric rocket engines that run for years and accelerate interplanetary spacecraft to fantastic speeds, but they can't take even a chicken out of the atmosphere of the earth. Today we adhere to a simple principle: whoever is more powerful is the first. Five rocket engines creating the greatest thrust. Each of them is a rocket science legend.

SRB for Space Launch System

SRB side solid fuel boosters for Space Launch System. Designed to deliver goods to the planet closest to Earth, rocket launcher engine accelerators SLS NASA give more

traction than any other engine ever built: 16 00 tf. Each second, they burn 5 tons of fuel. If we transfer the thermal energy that each of them generates in 2 minutes of operation into electricity, we get 2.3 million kilowatt-hours. This is enough to fully provide electricity to the city of 92,000 houses during the day. Two SRB accelerators complete with an RS-25 engine will be able to lift almost 3,000 tons of cargo (this is about 9 Boeing-747s).

MTKK Space Shuttle Side Accelerator

MTKK Space Shuttle lateral accelerator - 14 00 tf of thrust. SLS accelerators are more powerful, but they have not yet flown, so Space Shuttle accelerators still hold the title of the most powerful engines that have traveled to space. They also own the title of the largest missile of those built for reuse. A pair of such boosters lifted Space Shuttle by 46 kilometers. Having flown another 20 kilometers by inertia, they separate from the shuttle and fall into the ocean, where a special vessel picks them up.

RD-170/171

The four-chamber RD-170 liquid-fuel engines developed at KB Energomash and their subsequent modifications are the most powerful liquid-fuel engines. Thrust in a vacuum - 806.4 tf. The engine of one of its modifications (RD-171M) turned out to be 5% more powerful. Since 1985, the RD-170 was used to launch the Zenit rocket, and then the Zenit-3SL.

RDM 171 M

F-1 The F-1 liquid-propellant rocket engine was designed and built by the American company Rocket dyne for the Saturn V booster rocket. To raise Saturn, you needed five F-1s / Each created 790 tons of thrust in a vacuum, and all five spent 12,710 liters' fuel per second. Before the three previous engines were developed, it remained the most powerful rocket engine in the world.

UA1207

Closes the top five most powerful is another American liquid-fuel rocket engine - UA1207 (7.116 t / s in vacuum. It was used to launch the fourth-generation Titan family rockets; it was UA1207 that launched the Cassini probe into the stratosphere, which then continued on its way to Saturn.

All these pieces of information only confirm that over the past decades the science of rocket science has made an impossible leap forward in progress, people are developing and the idea of colonization of other planets no longer seems like the plot of the science fiction film looking at modern rocket engines. The speciality associated with rocket science is starting to gain popularity, becoming more relevant due to the transition of man to no higher degree of development in the intellectual activity and the

space industry. At the given moment, there are quite numerous and very important questions behind rocket science that we can get answers in the next decades.

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FRANCHISING AS A WAY OF BUSINESS DEVELOPMENT

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It goes without saying that starting your own business is risky. Nevertheless, there is a way to eliminate some risks – that is what is called franchising. Using the well-known brand may lead a new venture to success. Of course the entrepreneur has to pay the franchisor for it. The report which is based on factor and sector analysis would be of interest to potential entrepreneurs as well as students specializing on business.

Franchising is not only about the law. Of course, law is important but the other thing that is essential is relationship. Franchisor supports franchisees, franchisee sticks to the rules and commits to the increase of the brand value. This interconnection requires mutual trust and respect. That is the reason why both the selection of franchisor by franchisee and franchisee by franchisor is very important. Sometimes a person is simply not the franchisee type – he is a real entrepreneur and wants to create his own rules instead of sticking to other ones.

The other pillar of franchising is the brand. It is practically the most important decision factor for consumer behavior. The more well-known the brand, the higher the chance that the consumer opts for the particular good or service. That is based on psychology: people are more likely to trust things their brain registers most of the time. While being the most valuable asset, brand is also the most vulnerable one. Reputation is gained over time by the franchisor but actions of irresponsible franchisees may simply ruin it.

Franchising business model helps eliminate some business risks, on the one hand, but provides certain restrictions for entrepreneur, on the other. Its three main pillars are law, brand and relationship.

In conclusion, choosing a franchise is a very responsible step. Potential franchisees should take both quantitative and qualitative criteria into account. Financial parameters such as profitability and payback period are insufficient because the figures franchisor

provides do not always reflect the reality. Information from current franchisees really matters as it shows franchisor's attitude towards the partners.

AUGMENTED REALITY

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Augmented reality is a medium in real time supplementing the physical world with digital data using any devices - tablets, smartphones or others, and the software part. For example, Google Glass or Iron Man's helmet. Aiming systems in modern combat aircraft are also augmented reality.

Augmented reality must be distinguished from virtual reality. In augmented reality, virtual objects are projected onto the real environment. Virtual reality is a world created by technical means, transmitted to humans through the senses. That is, virtual reality creates its own world, where a person can plunge, and augmented one adds virtual elements to the real world.

In modern combat aircraft and helicopters, an indication on the windshield or pilot helmet is often used. It allows the pilot to receive the most important information directly against the background of the situation he observes, without being distracted by the main dashboard. This allows, for example, saving precious seconds during maneuverable aerial combat. Many such systems allow targeting by turning the head or moving eyeballs.

How augmented reality is used in the armies of the countries of the world?

In the USA, a tactical system of augmented reality Tactical Augmented Reality is created. It highlights the targets, displays the location of the fighter on the map, works in conjunction with a laser range finder and shows the distance to the target, displays prompts. Augmented reality glasses do not completely cover the view, but only partially use the left eye with a transparency effect.

There are computer games that process the video signal from the camera and impose additional elements on the image of the surrounding world. In the modern world, augmented reality games are widely used on gadgets, as well as on game consoles. By mid-2016, the Pokémon Go gadget-based global multiplayer game for interactively catching Pokémon in a virtual augmented real world - at real objects all over the world - became the most widely spread around the world and seriously publicized. In 2019, Microsoft announced the imminent release of the new Minecraft series video game, which will use Augmented Reality technology.

Beauty industry is increasingly using the capabilities of augmented reality too. ModiFace, a leading Canadian company, helps try on makeup in real time, diagnose skin and retouch photos. They developed an augmented reality solution for eyebrow shaping, an imitation of anti-aging treatments. Launched on the market applications for changing manicure and changing hairstyles, and also created augmented reality -mirrors for cosmetics and clothes stores.

Augmented reality is actively used in printed products due to the spread of the so-called augmented reality browsers - in particular, Wikitude, JuliviAR, Layar, blippAR. Newspapers, booklets, prospectuses, magazines and even geographical maps contain images that serve as tags for the subsequent visualization of digital objects. The complementary information can be text, images, video, sound or three-dimensional objects, static or animated - in fact, absolutely any digital data. An example is the book "Alice in Wonderland", which has illustrations animated using an augmented reality application.

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MOBILE ANTI-SHIP CRUISE MISSILE (ASCM) SYSTEM 'NEPTUNE'

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The RK-360MTs 'Neptune' is a shore-based ASCM system optimized to fire the cruise missile R-360. The Neptune missile is intended to be used against surface combatants like cruisers, torpedo boat destroyers, frigates, and corvettes, as well as amphibious landing ships and transport vessels sailing in strike groups (convoys) or individually, and it would be effective also against radar-detectable targets on the shore. The RK-360MTs 'Neptune' is being designed as a day-night all-weather weapon system capable of operating in severe ECM environments and under heavy enemy counterfire. It would be able to engage targets at ranges from 7 to 280 km. The Neptune would be able to achieve its full capability if positioned no farther than 25 km from the coastline.

Full salvo – 24 missiles. The time lag between missiles launched in a salvo – 3...5 s. Time from the end of mission to ready-to-fire time for the next mission – ≤15 min. ASCM Neptune vehicle range – ≤1,000 km.

The Neptune ASCM Battery includes:

1. Command-and-control post vehicle equipped (1) for automatic control of the System's operation, (2) to ensure sustainable communication (over HF, UHF and satellite) with higher echelons and other Neptune vehicles. The five-member crew can emplace the command-and-control post and have it ready for mission in no longer than 10 minutes.

2. R-360 missile in the TPK-360 storage/transport/launch canister. Armed with a 150-kg warhead, the 870-kg, 380-mm diameter missile would skim over the sea at a height of 3...10 m. It will have a maximum range of 280 km.

3. Unified launcher system USPU-36 is equipped for temporary storage, transport, pre-launch preparation and launch of R-360 missiles.

4. Transporter/transloader vehicle T3M-360 carries TPK-360 canisters with R-360 rockets.

5. Ground support equipment kit KMO.

The composition of the Neptune Battery can be configured to meet specific Customer needs. A Neptune battalion would typically consist of: (1) mobile command and control post, (2) three launcher batteries consisting of two launchers USPU-360 each, (3) operational support battery consisting of six transporter/transloader vehicles each carrying one storage/transport/launch canister TPK-360, (4) logistical units.

The State Enterprise KB Luch R&D Company, Kyiv, is the primary contractor for the Neptune ASCM System. The Neptune Project is a collaboration involving domestic entities only, including but not limited to: Orizon-Navigation, Impulse, Visar, Arsenal TsKB, Radionix, Motor-Sich, and KrAZ.

The Neptune ASCM System technology offers a number of important competitive advantages in the following ways.

1. In terms of capabilities versus cost trade-offs, the R-360 rocket, while being cheaper to buy, exhibits performance capabilities roughly on a par with best international brands from the U.S., Sweden, PRC, and Russia.

2. The Neptune can be integrated with any of the existing foreign-produced ISTAR assets by networking the Neptune command-and-control post vehicle with Customer's systems.

3. The ASCM Neptune is unified for launch from land, sea and air platforms.

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Express Media & Consulting Company

TECHNOLOGY OF THE PRODUCTION OF POWDER COFFEE DRINKS. FOOD ADDITIVES WHICH ARE USED IN THE PRODUCT CREATION PROCESS

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Coffee is one of the oldest and most popular drinks in the world. Based on coffee, a whole culture has formed. For many people, this is not just a drink, but a way of life. This is such an important product for the humanity, that we even annually celebrate the International Coffee Day since October 1, 2015.

Among the advantages of instant coffee, it is worth noting the speed and ease of brewing a drink; largely it determines its popularity. In addition, there is a large assortment of instant coffee with various flavors and additives. Instant coffee can satisfy every taste and need. So, the main subject of the research is to evaluate the particular qualities of powder coffee and find out what food additives help to acquire these properties.

First, the information on the types, structure and nutritional value of raw coffee beans is examined in detail. The leading global manufacturers and consumers of this product are identified. Comparative characteristics of producers, consumers and the cost of instant coffee based on data from the International Coffee Organization (ICO) are provided as well. [4]

Then the market of production and consumption of instant coffee powder in Ukraine is investigated. The most popular instant coffee brands (such as Nescafe, Jacobs and MacCoffee) in Ukraine are also determined according to the results of the online survey portal favor.com.ua.

After that the main stages of the production of instant coffee powder are analysed. The working principle of the line for the production of instant coffee powder is considered. Particular attention is paid to the structure and operation principle of the main technological equipment. [2]

The composition and content of food additives in the range of products are determined. It is noted that the largest number of food additives is contained in instant 3-in-1 coffee drinks (coffee, cream and sugar). Next, the purpose, structure, physical and chemical properties, methods of obtaining and the effect on the human of these food additives are examined. Methods of making food additives in the technological scheme of production are also determined.

Components of instant coffee of the 3 in 1 type are considered. It turned out that a great number of food additives is contained in a vegetable-based cream substitute. As an alternative, the use of other vegetable milk substitutes, as well as natural milk powder cream, are proposed. [3]

Finally, the current Ukrainian regulatory documents are considered. Attention is also paid to world experience in determining the quality of both raw coffee beans and the finished product. Based on the requirements of state standard of Ukraine 4394:2005 “Natural instant coffee. General technical conditions” organoleptic and physical and chemical indicators of the quality of instant coffee are determined. [1]

At the end of the work, the most common methods of falsifying products are considered (adding other raw materials of plant origin to instant coffee for example roasted chicory, barley or other cereals, chestnut fruits, artificially saturating the finished product with caffeine and using cheaper raw materials (Robusta beans instead of Arabica beans) in the production). Recommendations on the determination of counterfeit at home are given.

The main conclusion of the work is that coffee is a drink that fully reveals its beneficial properties only with proper preparation and use. It is better to spend a little more time and money making real and tasty coffee than to create the illusion of a coffee drink from a coffee stick!

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DIGITAL WORLD AND ITS IMPACT ON RURAL TOURISM DEVELOPMENT

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Digital world is the latest high priority in tourism research nowadays and the social media marketing comes with low costs while reaching millions of future tourists. Even with a low key presence on the social media sites and without sophisticated content a specific region can gain an identity and recognition. Rural tourism operators do not dispose of a great budget allocated for such activities and in many cases they do not offer internet services, but with the help of tourism bloggers and reviews an increase in acknowledgment of the touristic destination is possible. Rural tourism destination image (TDI) represents a great influential criterion in the tourists' decision and the competition that arises between regions is understandable as a better image for a destination has stronger probabilities in being chosen. Traditionally the destination image it is projected in the eyes of tourists with the help of brochures, where pictures alongside descriptive texts is inserted, TV spots, television documentaries, books, newspaper articles, school lessons, stories of friends' experiences and nowadays on the internet.

Several authors highlighted that rural operators do not turn that often to the use of on-line promotion channels and the low spread in the on-line blogs or social media channels of the region analyzed confirm the previous studies [1; 2]. The on-line platforms offer the possibility of improving the image, the impact on decision making process and a particular trust and reputation is created with the help of on-line bloggers.

Even if the rural tourism is characterized as a conservative and change resisting the use of social media platforms and tourism blogs represents a new form of promotion the tourism which involves very low costs and no burdens for the tourism operators. One of the advantage that social media brings in front is a diminution of the uncertainty and strengthens the desire of changing information while the tourists can have the sense of belonging to a virtual travel community.

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HOW THE WORLD WILL LOOK LIKE IN 2050

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Bitcoin will be the main currency of the world

Some economists say that Bitcoin may take over FIAT after the next global economic crisis, which is predicted to happen in 1–3 years from now. Whether this will actually happen this fast or not, it will surely happen in 10–20 years, and by the year of 2050, people will think of government-issued money as something from 20th-century socialist era.

Along with Bitcoin few other cryptocurrencies that have some concrete advantages will survive, but their total use will be less than 10% of the use of Bitcoin.

People will achieve biological immortality

Simply this will mean that with specific medical treatment scientists will be able to prolong healthy human life spans until eternity. Of course, it will not mean that people will stop dying completely as this treatment will probably not be available to the poorest part of the world and our bodies will not become indestructible, and therefore people will still die in the result of accidents and other physical trauma.

Radical birth control will be implemented

Overpopulation is a huge problem, and the only cause of it is too high birth rate. In most Western countries birth rate has already dropped below natural preservation rate (which is 2 children per 2 adults) and will continue to do so. But in developing countries it is still too high and those countries are alone responsible for the overpopulation problem we have. In the future governments will either limit families in having only 1 child or forcefully sterilize people. Children are not the future, they are the past.

Robots will take over our jobs

In a couple of decades robots will be able to perform all physical tasks that we perform, starting from cutting our hair to serving us at the restaurant and cooking our food. Many jobs are already replaced by robots, so progress is inevitable.

Most part of physical interactions will be replaced by interaction with robots

By 2050 we will have advanced human-like assistant, servants and sex robots. They will resemble people so much that by interacting with them we will satisfy our social needs. And interacting with robots will be much easier. They will not have their own will (as their sole purpose will be in serving us), they will not have feelings, they will not get angry, annoyed or tired. Therefore they will be perfect companions as we will no longer have to take into account their needs or wishes and compromise with

them. Human-to-human interaction will be reduced to a minimum as dealing with other people is extremely hard and difficult.

Most human-to-human interactions will happen in Virtual Reality

Due to the growth and excellence of virtual reality more and more of our daily activities will move into the virtual world. We will not only play and watch movies there, but also spend our more and more of our free time thereby virtual travelling and meeting people using our avatars. Our lives will resemble the movie Surrogates a lot, with the only exception that we will not have secondary physical bodies, they will be purely virtual.

MANAGERIAL MIND AND ITS SUCCESSFUL DECISIONS

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Today people are so busy working out their problems at their jobs and nearly everyone seeks to be successful to be able to afford everything he or she truly wants. In such environment some people start building up certain type of thinking which helps to succeed in the world of business. This type of thinking is called managerial mind.

Majority of people are sure that it is the same with being a sole proprietor. Like in any other art it needs a specific type of mind which forces to create, but also being a manager means to be able to analyze past, current and future situations happening, thus the analytical mind. Scientists say that all the people are divided into two parts considering which part of their brain is developed – analytical or creative. To the managerial-minded people the point is to have both of the equally developed. Being a manager is a lifestyle, but as you succeed your mind needs something more serious to work upon, any successful manager will prove it.

While doing the research the author was asked a question – why are the most of successful managers male? It all comes from the type of thinking mentioned earlier – the combination of analytical and creative thinking. Regularly women have their left side of the brain less developed and often give priority to their emotions. All the most successful managers were building their paths themselves, facing tons of difficulties and thus having their character formed. They were born being leaders and their managerial mind is a result of their childhood, number of problems solved and the need to rule and manage. Therefore, it should be pointed out that this ability is acquired with the flowing of life. Psychological challenges form the need to be a leader, to risk and achieve one's

goals. Managerial-minded people are always eager to study and love self-education, because knowledge is a resource and all of those people do everything to multiply any of their resources.

In conclusion, it must be remembered that managers are those who have to be able to look at the world through a number of distinct lenses, synthesize the chaos of reality into a coherent image and then use leadership skills to move people to positive action.

RENEWABLE ENERGY

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How much do you know about renewable energy? What does it mean the sources of clean energy? I would like to open our eyes to 5 amazing facts about renewable energy that everyone should know.

Among the forms of renewable energy, there are: solar, wind, hydro, biofuel and geothermal and these sources are all continually replenished!

Renewable energy creates three times more jobs than fossil fuels. every dollar put into clean energy creates three times as many jobs as putting that same dollar into oil and gas.

If it could be properly harnessed, there’s enough sunlight that falls on the earth in just one hour to meet the world energy demands for a whole year! Our whole energy problem would be solved if we could somehow find a way to harness solar energy more efficiently.

Surveys show the world’s resource base for geothermal energy is larger than the resource base for coal, oil, gas and uranium combined. Let’s use this fact to raise awareness and action.

In some countries, renewable energy is cheaper than fossil fuels. Alternative energy is a much cheaper alternative in some countries because of their ability to harness sources of energy that are prevalent to their location.

Romans were the very first to use geothermal energy to heat their homes, with warm air moving under floors and inside walls.

A world record was set in 1990 when a solar-powered airplane flew across the United States in stages, using no fuel at all.

Tech giants, Google, Apple, and Facebook lead the pack in creating a ‘green internet’ – each are using increasingly green energy to power the web.

In 1921 Albert Einstein was awarded the Nobel Prize in Physics for his discovery of the photoelectric effect – and hence, solar panels. People are waking up to the fact that our large dependency on fossil fuels is causing huge problems, and not just because fossil fuels are depleting worldwide, but primarily because the health of our planet is deteriorating

People are waking up to the fact that our large dependency on fossil fuels is causing huge problems, and not just because fossil fuels are depleting worldwide, but primarily because the health of our planet is deteriorating

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ALTERNATIVE ENERGY IN HOUSEHOLD USE

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Alternative (renewable) energy is the type of energy fuelled in ways that do not use up the earth's natural resources or otherwise harm the environment, especially by avoiding the use of fossil fuels or nuclear power.

The environment can serve as a source of obtaining inexhaustible energy for maintaining stand-alone communications. Moreover, this resource is replenished daily without human input. Therefore, alternative energy is of great interest due to the

profitability of its application as well as low risk of harming the environment in the course of its production.

An alternative energy source is a renewable resource, it replaces conventional energy sources operating on oil, extractable natural gas and coal, which, when burning out, emit carbon dioxide into the atmosphere, contributing to an increase in the greenhouse effect and global warming.

At present time, the application of alternative energy sources tends to be increased both in the industrial buildings and residential houses. One of the most commonly used sources of energy in household use is the solar and wind energy.

Obtaining electrical wind energy is carried out by means of a wind power generator, i.e. a device for converting kinetic energy of a wind flow into mechanical energy of a rotor spinning with its subsequent conversion into electrical energy.

The most common and profitable source of renewable energy for the household use is the solar energy.

Solar energy is the branch of alternative energy based on the direct use of solar radiation.

Sun energy is obtained by means of solar panels. The principle of solar panel operation is as follows: the converter panel consists of two thin plates of pure silicon, folded together.

Boron is applied to one plate, and phosphorus is applied to the second one. Free electrons appear in the layers coated with phosphorus, and absent electrons appear in the boron coated layers. When exposed to the sunlight, the electrons begin particle motion and electric current appears between them. To de-energize the plates they are soldered with thin strips of specially treated copper. One silicon plate is enough to charge a small flashlight. Accordingly, the larger the area of a panel, the more energy it produces.

Soldered together plates that let UV rays in are laminated with a film and mounted on the glass. Tacked layers are enclosed in an aluminum frame.

Advantages of solar power plants (SPP): accessibility and inexhaustibility of the source.

Theoretically, there is complete safety for the environment, although there is a possibility that the widespread introduction of solar energy can change the albedo (characteristic of the reflectivity) of the earth's surface and lead to the climate change. However, under current conditions of energy consumption, this is extremely unlikely.

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TOBACCO MEETS TECHNOLOGY

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While the idea of heating tobacco (instead of burning it) has been around for more than two decades, it took years of research and development to create a product that is satisfying to adult consumers. Around 8.8 million consumers have already chosen to switch from cigarettes to this product.

What is IQOS? At the heart of IQOS there are sophisticated electronics that heat specially designed heated tobacco units. IQOS heats the tobacco just enough to release a flavorful nicotine-containing tobacco vapor but without burning the tobacco.

Here's the key point: the tobacco in a cigarette burns at temperatures in excess of 600°C, generating smoke that contains high levels of harmful chemicals. But IQOS heats tobacco to much lower temperatures, up to 350°C, without combustion, fire, ash, or smoke. The lower temperature heating releases the true taste of heated tobacco. Because the tobacco is heated and not burned, the levels of harmful chemicals are significantly reduced compared to cigarette smoke.

What is there? A nicotine-containing vapor – not smoke – that makes IQOS a smoke-free product that is appealing to smokers.

How does IQOS work? IQOS is a tobacco heating system available in two versions. The first has three main components which are a heated tobacco unit (called HEETS or HeatSticks), an IQOS holder, and a charger. The second is an integrated product that combines the holder and charger and allows multiple uses without recharging the battery.

Both work in the same way: a consumer inserts the heated tobacco unit into the IQOS holder, which contains an electronically controlled heater.

The consumer pushes a button to turn on the heater, and then draws on the heated tobacco unit to enjoy the real taste of heated tobacco. Once the heated tobacco unit is finished, the consumer removes it from the holder, and then it can be disposed of safely in a waste bin.

German Section

DIE KÜNSTLICHE INTELLIGENZ UND ÜBERSETZUNG

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Die Künstliche Intelligenz (KI) hat in den letzten Jahren zahlreiche Aspekte unseres Lebens infiltriert, dank der Verbesserungen im Bereich des maschinellen Lernens, in dem ein Computer selbst programmieren kann [1]. Diese Entwicklung in Richtung digitales Selbstlernen hat zu großen Durchbrüchen in unserer täglichen Interaktion mit Maschinen geführt, vor allem durch den Aufstieg von digitalen Heimassistenten wie Amazon Echo und dem kürzlich eingeführten Google Lens, die Objekte anhand visueller Signale von der Kamera Ihres Telefons identifizieren. Einer der an den häufigsten diskutierten Fortschritten ist die Verwendung von KI in der Übersetzung. Nicht anders als das Babel Fish Programm aus The Hitchhiker's Guide to the Galaxy, mit KI-Übersetzung, bietet "man kann sofort alles verstehen, was man in jeder beliebigen Form von Sprache sagt ". Die Technologie funktioniert, indem sie Wörter einzeln erkennt und "die Tatsache ausnutzt, dass die Beziehungen zwischen bestimmten Wörtern sprachübergreifend ähnlich sind", um ihre Übersetzungen zu erstellen [2].

WIE ÜBERWINDET KI DIE SPRACHBARRIERE

Es besteht die Möglichkeit, dass Sie die KI-Übersetzung bereits in Aktion gesehen haben, sei es auf Ihrem Facebook-Feed oder beim Durchsuchen internationaler Seiten in Google. Microsoft hat kürzlich eine eigene Translator-App entwickelt, die nicht nur Text, sondern auch Sprache, Bilder und Straßenschilder übersetzt [3]. Der große Durchbruch von Microsoft mit dieser App ist die Tatsache, dass Translator offline ausgeführt werden kann, was ideale reale Vorteile für diejenigen bietet, die in Gebieten mit eingeschränkter Konnektivität unterwegs sind. Das Übersetzungssystem von Facebook wurde im vergangenen Sommer grundlegend überarbeitet und führte die KI als Hauptmethode ein. Während das System zunächst mit der Übersetzung von Phrasen arbeitete, berücksichtigt die KI den Kontext eines ganzen Satzes und sorgt so für viel genauere Ergebnisse. Die Funktion "Diese Übersetzung in der Webseite bewerten" ermöglicht es auch, dass das neuronale Netzwerk durch Benutzereingaben in Echtzeit aktualisiert wird [2].

KI-ÜBERSETZUNG HAT IHRE GRENZEN

Ein Google-Forscher bemerkte: "Die Leute glauben naiv, dass ein neuronales Netz, wenn man tiefes Lernen und 1.000-mal mehr Daten nimmt, in der Lage sein wird, alles

zu tun, was ein Mensch tun kann, aber das ist einfach nicht wahr". Trotz seiner steigenden Popularität ist die KI-Übersetzung im Vergleich zu erfahrenen menschlichen Übersetzern noch nicht ganz da [3]. Ein kürzlich in Südkorea ausgetragener Wettbewerb stellte maschinelle Übersetzungswerkzeuge gegen ein Team von Fachleuten an, dass zwei Texte aus dem Koreanischen ins Englische und umgekehrt übersetzt. Laut VentureBeat zeigten die Ergebnisse des 50-minütigen Tests, dass "90 % des NMU-Textes [neuronale Maschine übersetzt] "grammatikalisch unangenehm" oder definitiv nie die Art von Übersetzung waren, die von einem ausgebildeten Muttersprachler erstellt wurde" [2].

GIBT ES EINE KÜNSTLICH INTELLIGENTE ZUKUNFT FÜR DIE ÜBERSETZUNG?

Nichts davon ist zu sagen, dass die KI-Übersetzung auf keinen Fall sinnlos ist, und einige Start-ups finden Wege, menschliche und maschinelle Übersetzungen zu kombinieren. Mit Hilfe von menschlichen Übersetzern, die sie nicht nur korrigieren, sondern auch so unterrichten können, dass Maschinen sich selbst nicht unterrichten können, könnte sich die KI-Übersetzung auf dem richtigen Weg befinden. Vorerst ist die Technologie aber wohl noch nicht für sich allein genommen einsatzfähig [2].

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MASCHINELLE UND ELEKTRONISCHE ÜBERSETZUNG

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Die Idee, ein Computergerät für die Übersetzung zu verwenden, entstand 1947. Aber ihre Implementierung war in jenen Jahren einfach unmöglich, da die Computertechnologie in den «Kinderschuh» steckte. Bereits 1954 wurde jedoch der erste maschinelle Übersetzungsversuch unternommen. Das allererste Wörterbuch enthielt nur 250 Wörter und die Grammatik war durch 6 Regeln erschöpft. Dies war jedoch ausreichend, um sicherzustellen, dass die Zukunft der maschinellen Übersetzung groß ist. In vielen Ländern begannen die Arbeiten in dieser Richtung, es entstanden die ersten maschinellen Übersetzungssysteme und spezielle Theorien.

Die Entwicklung der maschinellen Übersetzung wurde durch den Ausbau der internationalen Beziehungen erleichtert.

Trotz der Schaffung verschiedener Ansätze und der Lösung von Problemen mit der Rechenleistung ist die Qualität der maschinellen Übersetzung noch lange nicht ideal. Die Qualität der Übersetzung wird stark von der Sprachaffinität beeinflusst. Wenn Sie beispielsweise vom Polnischen ins Ukrainische übersetzen, ist das Ergebnis weitaus wertvoller als das vom Norwegischen ins Koreanische. Aus diesem Grund kann die maschinelle Übersetzung noch nicht ohne menschliches Eingreifen auskommen.

Bisher wurden die Arbeiten im Bereich der maschinellen Übersetzung in zwei Hauptbereiche unterteilt:

- Statistische maschinelle Übersetzung (SMÜ);
- Regelbasierte maschinelle Übersetzung (RMÜ).

Im ersten Fall haben wir selbstlernende Systeme. Die Übersetzung wird durch die ständige Analyse einer großen Anzahl von Texten desselben Inhalts in verschiedenen Sprachen möglich. Das System findet und verwendet immer vorhandene Muster. Beispiele für solche Systeme: *Google Translator, Yandex.Translator, Bing Translator*.

Bei regelbasierten maschinellen Übersetzungssystemen hängt die Qualität des Ergebnisses davon ab, wie gut die Linguisten in der Lage sind, die natürliche Sprache zu beschreiben, mit der sie arbeiten. Das Bedürfnis nach ständiger Unterstützung der erstellten Sprachdatenbank im aktuellen Zustand ist der Hauptnachteil der auf den Regeln basierenden maschinellen Übersetzungssysteme. Dies sind Systeme wie *Multillect, Linguatex und PROMT*.

Auch elektronische Übersetzer sind sehr beliebt. Es gibt ältere Modelle, bei denen man meistens Text manuell eingeben kann. Das neueste Modell im Moment ist *Pilot – der elektronische Übersetzer als Knopf im Ohr*. Das Funktionsprinzip ist recht einfach: Sie müssen eine Anwendung auf dem Telefon installieren, die mit den Kopfhörern synchronisiert wird. Dann sprechen Sie die Phrase in einer Sprache aus und Ihr Gesprächspartner hört die sofortige Übersetzung in seinem Ohrhörer und umgekehrt.

Abschließend, Technologien im Bereich der Übersetzung entwickeln sich sehr schnell. Aber sie sind irgendwie mehr geschaffen, um die Kommunikation zwischen Menschen zu vereinfachen. Technische und literarische Übersetzungen werden am besten von Menschen ausgeführt. Erwähnenswert ist auch die Simultanübersetzung, die die komplexeste Art der Übersetzung darstellt.

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VIRTUELLE REALITÄT: GESCHICHTE UND POTENTIAL

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Das Thema "Virtuelle Realität: Geschichte und Potential" gewinnt heutzutage eine immer größere Aufmerksamkeit. Filmemacher, Journalisten, Künstler und viele andere sehen virtuelle Realität als ein neues Feld mit vielen Chancen.

Viele Menschen interessieren sich für dieses Thema, weil es für sie eine ganz schöne Möglichkeit gibt, ganz neue einzigartige Welten zu schaffen.

Virtuelle Realität (engl: "*virtual reality*", kurz "VR") beschreibt die Darstellung einer künstlich erschaffenen Welt. Das, was man als "Realität" bezeichnet, ist ein Konstrukt in unserem Gehirn.

Mit Hilfe von Computern durch die Kombination von unterschiedlichen Sinneseindrücken wie Bild und Ton entsteht das Gefühl von neuer Wirklichkeit. Dieser Effekt heißt Immersion: in die virtuelle Realität eingetaucht, vergisst der Nutzer Raum und Zeit in der wirklichen Welt.

Es gibt ein Prinzip, auf dem alle heutigen VR-Brillen basieren. Der britische Physiker Charles Wheatstone fand 1838 heraus, dass das Gehirn aus zwei nebeneinander platzierten zweidimensionalen Bildern den Eindruck des räumlichen Sehens produziert. Dieses Phänomen wird als stereoskopisches Sehen bezeichnet.

Wodurch unterscheiden sich die Technologien der virtuellen, erweiterten und vermischten Realität? Virtuelle Realität lässt voll und ganz in eine virtuelle Welt eintauchen. Erweiterte Realität, oder "Augmented Reality", kurz "AR", bedeutet, dass die reale Welt mit virtuellen Inhalten bereichert wird. Vermischte Realität, oder "Mixed Reality" (MR), kombiniert die realen und virtuellen Elemente und arbeitet in Interaktion mit einem oder mehreren Nutzern.

Die Grundidee der virtuellen Realität stammt aus dem 19. Jahrhundert. Es gab 360-Grad-Panoramabilder, die dem Betrachter die Illusion vermitteln, mitten im Geschehen zu stehen.

Eine weitere Entwicklung waren stereoskopische Fotos und Bildbetrachter. In 1939 wurde der „View-Master“, eine stereoskopische Brille patentiert. 1962 ließ Morton Heilig das „Sensorama“ patentieren, das gleichzeitig mehrere Sinne stimulieren

konnte. In den 90er Jahren wurden zum ersten Mal VR-Headsets für Anwender produziert und verkauft. Erwähnenswert ist auch die Entwicklung des ersten sog. „cubic immersive room“ im Jahre 1991, genannt „The Cave“.

Heute entwickelt sich die virtuelle Realität nicht so schnell. Die Hauptursache ist das Fehlen von erfolgreichen Projekten. Virtuelle Realität kann nicht nur im Spiel, sondern auch in einige Berufe eingesetzt werden. Architekten können in VR Häuser erstellen und Inneneinrichtung planen, und nur dann das im echten Leben nachbauen. In gefährlichen Bereichen wie dem Militär oder der Luftfahrt hilft VR bei der Entwicklung und Weiterbildung. Im Simulator werden wichtige Manöver durchgespielt, um so in schwierigen Situationen schneller reagieren zu können.

Die Virtuelle Realität hat gute Perspektiven. Es kann sein, dass jeder in der Zukunft diese Technologie für die Arbeit und Unterhaltung nutzen wird.

MASCHINELLE ÜBERSETZUNG

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Maschinelle Übersetzung ist eine automatische Übersetzung, die Übersetzung von Texten von einer Sprache in eine andere durch den Einsatz spezieller Computerprogramme und intelligenter Systeme. Die Hauptschwierigkeit der maschinellen Übersetzung besteht darin, dass natürliche Sprachen schwer zu formalisieren sind. Dies erklärt die geringe Qualität des Textes, der von maschinellen Übersetzungssystemen produziert wird.

Der Einsatz von maschineller Übersetzung geht auf das Jahr 1954 zurück, als das Georgetown-Experiment in den Vereinigten Staaten durchgeführt wurde. Im Laufe dieses Experiments wurden sechzig Phrasen mit Hilfe eines Computers übersetzt. Dieser Erfolg hat viele Fachleute inspiriert, die zunächst eine große Datenbank mit Dictionaries für die Übersetzung erstellen sowie die Übersetzungsregeln organisieren und systematisieren mussten. Im Laufe der Arbeit wurde deutlich, dass das Problem nicht so einfach war, wie es auf den ersten Blick schien.

In der zweiten Hälfte der 1970er Jahre wurde diese Zwischensprache zu einem semantischen Modell, um die Bedeutung der zu übersetzenden Texte darzustellen. Und schließlich war eine wichtige Leistung das Verständnis, dass die Analyse von Texten in natürlicher Sprache aus vier Hauptphasen besteht: morphologische Analyse, syntaktische Analyse, semantische Analyse, pragmatische Analyse.

Trotz neuer Erfindungen und Forschungen auf dem Gebiet der maschinellen Übersetzung ist die schriftliche maschinelle Übersetzung heute so unvollkommen, dass man nur verstehen kann, was in einem bestimmten Text oder einer bestimmten Sprache gesagt wird, aber nicht mehr als das.

Das Problem der Mehrdeutigkeit kann nur interaktiv gelöst werden, da ein Wort zwei oder mehr Bedeutungen haben kann, was die Arbeit stark erschwert und die Qualität der Textübersetzung beeinträchtigen kann.

Die Lösung für das linguistische Problem der maschinellen Übersetzung besteht darin, ein System von Regeln zu entwickeln, die den Grad der Angemessenheit der Bedeutung eines Textes für einen anderen bestimmen. Daher sollten die Regeln sowohl die Regeln der Wortübersetzung als auch die Regeln der Übertragung grammatikalischer Mittel einer Sprache auf eine andere enthalten.

Maschinelle Übersetzungssysteme lassen sich in drei Ebenen unterteilen:

1. Die unterste Ebene - die einfachsten Modelle der Wort-für-Wort Übersetzung.
2. " Elektronische Übersetzer". Sie verwenden Kombinationen von syntaktischen und semantischen Modellen, um die Struktur des Input-Textes in die Struktur des Übersetzungstextes zu konvertieren.

3. Third-Level-Modelle nutzen Hintergrundwissen, um den Text der Übersetzung zusammen mit Grammatik und Semantik zu synthetisieren.

Heute ist es möglich, intelligente Systeme zur Lösung vieler Probleme einzusetzen, und die maschinelle Übersetzung ist ein gutes und nützliches Beispiel für ihren Einsatz. Allerdings wird es in den kommenden Jahrzehnten kaum möglich sein, sich ganz von der menschlichen Beteiligung am Übersetzungsprozess zu lösen.

Abschließend möchte ich darauf hinweisen, dass ein Textübersetzungsprogramm ein Werkzeug zur Lösung von Übersetzungsproblemen ist; seine Effizienz hängt vor allem von seiner korrekten Verwendung ab.

DATA MINING

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Die rasante Entwicklung der Technologien verändert das menschliche Leben sehr schnell. Je mehr es Informationstechnologien gibt, desto schwieriger ist es alle Datenmengen zu analysieren und zu verarbeiten. Ein Forscher John Naisbett hat gesagt, „Wir ertrinken in Informationen, aber hungern nach Wissen“. Die historische

Entdeckung unseres Planetensystems verdeutlicht, wie eng das Sammeln von Daten und die Entdeckung von neuem Wissen zusammenhängen können.

Nicht alle Informationen sind gleichermaßen nützlich. Manchmal ist es zur Erläuterung eines Konzeptes erforderlich. Manchmal ist es genug, ein einfaches Diagramm zu betrachten, um die kompliziertesten Themen zu verstehen. Damit die Menschen leichter Information wahrnehmen können, wurden mathematische Formeln, Zeichnungen, Programmcode usw. erfunden. Darüber hinaus ist nicht nur die Information selbst wichtig, sondern auch ihre Darstellung.

Der Begriff „Data Mining“ wurde 1989 im Laufe des Grigory Pyatetskiy-Shapiros Seminars entstanden. Dieser Wissenschaftler beschäftigte sich mit der Frage, ob bestimmte Regeln automatisch gefunden werden können, um einige Abfragen an große Datenbanken zu beschleunigen. Auf Deutsch heißt es ‚Daten graben‘ oder ‚Daten abbauen‘.

Data Mining ist die systematische Anwendung computergestützter Methoden, um in vorhandenen Datenbeständen Muster, Trends oder Zusammenhänge zu finden. Zur Wissensentdeckung eingesetzte Algorithmen basieren unter anderem auf statistischen Methoden. Data Mining extrahiert die Zusammenhänge automatisch und stellt sie übergeordneten Zielen zur Verfügung. Die erkannten Muster können dazu beitragen, die Entscheidungsfindung bei bestimmten Problemen zu erleichtern.

Grundsätzlich basiert Data Mining auf folgenden drei Konzepten: mathematischer Statistik, künstlicher Intelligenz und maschinellem Lernen. Zu den typischen Aufgabenstellungen gehören Ausreißer-Erkennung, Clusteranalyse, Klassifikation, Assoziationsanalyse, Regressionsanalyse, Prognose und Zusammenfassung.

Data Mining kommt schon heute in vielen Bereichen zum Einsatz und bietet enorme Anwendungspotenziale für die Zukunft. Heute ist es in verschiedenen Lebensgebieten verwendet. Zum Beispiel, im Marketing hilft es einem bei der Marktsegmentierung, Warenkorbanalyse und Kundenprofil-Erstellung zum Management von Kundenbeziehungen. Außerdem spielt Data Mining eine große Rolle im Finanzbereich, im Versicherungswesen, bei der Internetnutzung usw.

In der Medizin ist Data Mining besonders wichtig. Es gibt viele bekannte Expertensysteme zur Erstellung medizinischer Diagnosen. Sie basieren hauptsächlich auf Regeln, die Kombinationen verschiedener Symptome verschiedener Krankheiten beschreiben. Mit Hilfe solcher Regeln versteht man nicht nur, woran der Patient erkrankt, sondern auch, wie er zu behandeln ist.

Das sogenannte Text Mining stellt eine Sonderform des Data Minings dar. Es teilt die grundsätzlichen Verfahren des Data Minings zur Informationsgewinnung. Das wird aber nicht auf strukturierte Daten, sondern auf hauptsächlich unstrukturierte Textdaten

angewandt. Mithilfe des Text Minings lässt sich Wissen aus Textdaten extrahieren. Im Textmining geht es um die Analyse von großen textuellen Datenbeständen. Dies kann beispielsweise der Plagiats-Erkennung dienen oder um den Textbestand zu klassifizieren.

Der Markt der Data Mining-Systeme wächst sehr rasant. An ihrer Entwicklung sind fast alle großen Konzerne beteiligt. Data Mining ist ein nützliches Mittel für Verarbeitung und Analyse der Daten. Deswegen kann es wie ein Bestandteil der großen Reihe von Informationstechnologien gezeichnet werden, die zu den Technologien der Zukunft gehören.

QUANTENCOMPUTER

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Ständig arbeiten die Menschen daran, ihr Leben zu vereinfachen und zu modifizieren. Damit sind viele Erfindungen verbunden. Unter anderem betrifft das die Erfindung vom Computer. In der letzten Zeit entstehen viele Computertypen, die komplizierte Aufgaben lösen können. Darunter ist Quantencomputer zu erwähnen.

Das weltbekannte Unternehmen IBM hat 2019 ein neuer Quantencomputer präsentiert, der Komponente der klassischen und Quantenberechnungen vereint hat, die für Nutzen dieser Maschine für Untersuchungen oder für Business-Applikationen notwendig sind. IBM-Q sieht als ein riesiger Korb, aber er enthält alles, was das Unternehmen für Experimente mit Quantenberechnungen braucht, sowie alle Vorrichtungen für die Abkühlung der Einrichtung.

Im Vergleich zu vorigen Modellen rechnet der IBM Q bereits mit 20 Qubits. Das ist ein Maßstab für einen korrekt funktionierenden Quantencomputer.

Dieser Computer soll jedoch nicht zum Verkauf angeboten werden. Stattdessen können alle Nutzer darauf per Cloud zugreifen und alle nötigen Berechnungen ausführen.

Bei einem Quantencomputer kommen sogenannte Qubits zum Einsatz. Gewöhnliche Bits nehmen nur zwei Zuständen an: 0 und 1, beziehungsweise "ein" und "aus". Ein Qubit jedoch kann sich dagegen eine bestimmte Zeitspanne, die sogenannte Kohärenzzeit, in einem Zwischenzustand aus Null und Eins befinden. Durch eine Messung geht das Qubit dann in einen der beiden klar definierten Zustände über, sodass man das Messergebnis in einem klassischen Bit speichern kann. Im Labor werden

solche Qubits aus Ionen oder supraleitenden Schleifen, sogenannten SQUIDs, hergestellt.

Für Rechenoperationen werden mehrere Qubits benötigt. Man spricht von einem sogenannten Quantenregister. Die Information wird dann auf alle Qubits eines Registers verteilt. Ein solches Quantenregister besteht meist aus 14 Ionen. Wichtig ist, dass diese Qubits einfach zu manipulieren, jedoch auch immun gegen Störeinflüsse sind. Das bedeutet, dass die Qubits möglichst lange in den jeweiligen Zuständen verbleiben müssen, bis die Rechenoperation durchgeführt wird.

Die bekanntesten Firmen, die sich mit der Entwicklung des Quantencomputers befassen, sind IBM und Google. Und zwar, sie haben neulich Prozessoren geschaffen, die auf Qubits basiert sind. Die neun Rechner sind aber noch nicht vollständig für die Nutzung bereit. Allerdings können sie für die Betriebe verwendet werden und schon jetzt die Arbeit viel schneller als gewöhnliche moderne Computern erledigen.

Quantencomputer kann in vielen Lebensbereichen benutzt werden. Die wichtigsten davon sind molekulare Modellierung, Medizin, Logistik, künstliche Intelligenz und Quantenkryptographie.

Wenn Quantencomputer gebaut werden wird, dann können sogar die schwersten Chiffren decodiert werden. Der sicherste Algorithmus ist momentan RSA. Mit der Quantenkryptographie lassen sich aber die Informationen in zählende Minuten deschiffrieren, Accounts hacken oder Daten einer Kreditkarte erhalten.

Es ist zu vermuten, dass die genaue Modellierung der molekularen Wechselwirkung und chemischen Reaktionen mit der Quantencomputer möglich werden. Jetzt ist diese Modellierung nur für die einfachen Molekülen verfügbar. Quantencomputer wird das mit allen Molekülen machen.

Quantencomputer sind für die künstliche Intelligenz sehr nützlich, weil sie für den Not der Maschinen passend sind. Sie arbeiten mit großen Umfängen und können gleich die großen Neuronetze modellieren.

Also, Quantencomputer können sehr effektiv in vielen Lebenssphären verwendet werden und unser Leben wesentlich vereinfachen. Aber für den korrekt funktionierenden Computer braucht man noch viele Untersuchungen und Modifikationen, um sogar die schwersten Operationen durchzuführen.

MIKROCONTROLLER

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Heutzutage kommen Mikrocontroller immer mehr überall in Europa und in der ganzen Welt zum Einsatz. In Haushaltsgeräten wie Waschmaschinen, Spülmaschinen, Trocknern, Kaffeeautomaten, elektronischen Waagen, Uhren, oder in der Vielzahl der digitalen Consumer-Anwendungen, im Automobil, in Telekom- oder Industrieanwendungen werden sie eingesetzt.

Das Ziel unserer Forschung ist den Begriff des Mikrocontrollers zu entschlüsseln, seine Funktionen und Bedeutung in verschiedenen Industriebereichen zu analysieren.

Mikrocontroller ist eine Mikroschaltung für die Steuerung von elektronischen Geräten. Ein typischer Mikrocontroller kombiniert die Funktionen eines Prozessors und der Peripheriegeräte auf einem einzigen Chip und enthält RAM oder ROM. Tatsächlich ist es ein Ein-Chip-Computer, der in der Lage ist, relativ einfache Aufgaben zu erfüllen. Er unterscheidet sich von einem Mikroprozessor dadurch, dass er über ein integriertes Ein- und Ausgabegerät, einen Timer und andere Peripheriegeräte verfügt.

Den alten Legenden zufolge kam dem britischen Radioingenieur Jeffrey Dummer zum ersten Mal die Idee, einen Chip zu entwickeln. Seit 1952 kam die technische Umsetzung der Idee nicht mehr in Frage. 1959 entwickelte Jack Kilby von Texas das Prinzip der Integration und schuf sogar die ersten Prototypen der Mikrocontroller. Das heißt, er entwickelte die Idee und kam der Umsetzung nahe.

Als der erste Mikroprozessor für Computer war der 1971 erschienene Intel 4004. Eine schwarze rechteckige Mikroschaltung mit sechzehn Stiften, acht an jeder Seite.

Es gibt viele Typen von Mikrocontrollern. Da sind einige davon.

DIP (Dual Inline Package) ist ein Gehäuse mit zwei Kontaktreihen. Die Anzahl der Beine in dem Fall ist 8, 14, 16, 20, 24, 28, 32, 40, 48 oder 56.

SOIC (Small Outline Integrated Circuit) – planarer Chip – die Füße sind auf der gleichen Seite der Platine wie der Körper gelötet. Somit liegt der Chip auf dem Board. Die Anzahl der Etappen und deren Nummerierung ist identisch mit der im DIP.

PLCC (Plastic Lead Chip Carrier) - quadratischer (seltener rechteckiger) Körper. Die Beine sind auf allen vier Seiten angeordnet und haben eine J-Form (die Enden der Beine sind unter dem Körper gebogen). Die Stromkreise werden entweder direkt auf der Platine abgedichtet (planar) oder in das Panel eingesetzt.

TQFP (Thin Profile Quad Flat Package) ist der Durchschnitt zwischen SOIC und PLCC. Quadratisches Gehäuse hat eine Dicke von ca. 1 mm, die Klemmen sind allseitig angeordnet. Die Anzahl der Beine reicht von 32 bis 144.

Weltbekannte Mikrocontroller-Entwickler sind Microchip, Technology, AVR, ARM, Renesas Electronics, Freescale, Samsung, TI und andere.

Heute gibt es mehr als 200 Modifikationen von Mikrocontrollern.

Aus diesem Grund sind Mikrocontroller überall in den elektronischen Blöcken ganz unterschiedlicher Geräte zu finden: auf den Motherboards von Computern, in den Steuerungen von DVD-Laufwerken, Hard- und Solid-State-Laufwerken, in Rechenmaschinen, auf den Steuertafeln von Waschmaschinen, Mikrowellenherden, Telefonen, Staubsaugern, Geschirrspülern, Innenheimrobotern, programmierbaren Relais, Maschinensteuermodulen und so weiter.

Wissenschaftler glauben, dass jeder Mensch sehr bald in der Lage sein wird, nicht nur Geräte, Elektronik, Computer, sondern auch seine Gesundheit zu kontrollieren, ohne etwas zu berühren. Zum Beispiel, dieses Gerät liest den Puls, den Blutdruck, die Körpertemperatur und andere Parameter ab. Nach jeder bestimmten Zeit, z.B. jede Stunde, wird die menschliche Gesundheit überwacht. Bei nicht normkonformen Ergebnissen erfolgt die Benachrichtigung an den Arzt und nahe Verwandte.

Die Medizin ist eine der technologisch am schnellsten wachsenden Branchen, und diese Technologien werden immer fantastischer.

Wir werden nicht erraten, wann wir sie selbst nutzen können, vielleicht noch sehr lange. Aber es gibt Veränderungen, und es ist gut zu wissen. Fast jedes moderne Gerät - vom Taschenrechner bis zum "Smart Haus" – basiert auf einem Mikrocontroller. Daher werden in Zukunft Mikrocontroller gefragt sein. Die Menschheit entwickelt sich auf dem technologischen Weg und wird sich von diesem Weg nicht abwenden.

QUELLEN

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