

МІНІСТЕРСТВО ОСВІТИ ТА НАУКИ УКРАЇНИ

НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ
«Харківський політехнічний інститут»

SCIENCE LOOKS AHEAD

Наука – погляд у майбутнє

Матеріали
міжвузівської студентської науково-практичної конференції

Харків, 27 квітня 2021 року



Харків
НТУ «ХПІ»
2021

УДК 811.111

ББК 81.2 Англ, нім

Редакційна колегія:

С. В. Гармаш, ст. викл. (відп. редактор);

Т. Є. Гончаренко, канд. педагог. наук, доц.;

О. Я. Лазарева, канд. техн. наук, доц.

*Затверджено кафедрою іноземних мов
Національного технічного університету «ХПІ»
(протокол № № 10 від 6 квітня 2021 р.)*

Science Looks Ahead = Наука – погляд у майбутнє: матеріали міжвузівської студ. наук. конференції, 27 квітня 2021р. / відп. ред. С.В. Гармаш. – Х.: НТУ «ХПІ», 2021. – 60 с. – Англ. та нім. мовами.

Збірник містить матеріали міжвузівської студентської наукової конференції, що була проведена кафедрою іноземних мов НТУ «ХПІ» 27 квітня 2021 року. Конференція присвячена 70-річчю створення кафедри.

Матеріали охоплюють широке коло питань з новітніх досягнень в різних галузях науки й техніки. Матеріали публікуються англійською та німецькою мовами.

Призначено для студентів, магістрів та аспірантів технічних ВНЗ.

УДК 81.111

ББК 81.2 Англ

© НТУ «ХПІ», 2021

CONTENTS

ENGLISH SECTION	5
Mykola Anufriyev. FOREIGN LANGUAGES DEPARTMENT. 70 YEARS	5
Kyrylo Andryuschenko, Konstantin Velichko. DUBBING AND LOCALIZATION	6
Artem Barsukov. THE LATEST ACHIEVEMENTS OF MANKIND IN OPHTHALMOLOGY	8
Bohdan Borysov. ARTIFICIAL INTELLIGENCE AND ITS PRESENCE IN OUR LIFE.....	10
Valeria Budanova. CONSEQUENCES OF THE TRADE WAR BETWEEN THE UNITED STATES AND CHINA AND THEIR IMPACT ON THE ECONOMIC DEVELOPMENT OF THE COUNTRIES	11
Vadym Chernyshov, Ihor Romanovych. HOW EASY IT IS TO MAKE GAMES.....	13
Mariia Gurtova. CORONAVIRUS IMPACT ON ADVERTISING MARKET	14
Sofiia Ivanova. THE JOB OF HR MANAGER IN IT.....	16
Valentyn Korniienko. POSSIBILITIES AND NEW SOLUTIONS IN THE ASYNCHRONOUS COMPONENT INTERCONNECTION FOR THE EMBEDDED SYSTEMS ARCHITECTURE	18
Kyrylo Kozhykhov. 5TH GENERATION MOBILE NETWORK	20
Georgiy Lamash. WORLD OF SOCKETS.....	21
Veronika Melehova. SETTLERETICS: MENTAL HACK.....	22
Pavel Migunov. THE ROLE OF NORTH STREAM 2 IN EU FOREIGN ECONOMIC POLICY FORMATION.....	24
Vadym Naumenko. THE ROLE OF PROGRAMMING IN THE MODERN WORLD ..	26
Oleh Olefirenko. HOW DOES THE COMPUTER’S PROCESSOR WORK?	28
Danylo Osypov. APPLE PAY IS AN INCREDIBLE DIGITAL PAYMENT SERVICE. 29	
Illia Para. USE OF ENGLISH PUNS IN MASS MEDIA.....	30
Oleksandra Petrenko. PSYCHOLOGY AND AI: BRAIN OR MIND.....	33
Liliia Pohorielova. THE PROSPECTS OF USING QUANTUM COMPUTERS IN THE MODERN WORLD	34
Sofia Rutska. FUTURE WITH NEURALINK.....	36
Olha Savchenko. PERFORMANCE TESTING IN AUTOMATED QUALITY ASSURANCE	37
Vadym Sheveliev. SELF CHECKOUT TECHNOLOGY.....	39

Lidia Starkova. ALTERNATIVE METHOD OF MAKING PAPER AS A METHOD FOR RESCUING ENVIRONMENT FROM DEFORESTATION.....	42
Veronika Tsarfina. CRYONICS, BRAIN PRESERVATION AND THE WEIRD SCIENCE OF CHEATING DEATH	43
Anton Velikodvorskiy, Sergii Shvedyuk. UKRAINIAN PORTABLE ANTI-TANK MISSILE SYSTEMS	45
Karina Vrakina. VIRTUAL REALITY OR THE WORLD OF THE FUTURE.....	47
Maria Zhvanko. MICROSOFT MESH.....	50
DEUTSCHE SEKTION	52
Sasha Hryhorovych. PHOTOPLETHYSMOGRAPHIE UND PULSOXYMETRIE	52
Oleksandra Komina. NEUES PROJECT „STARLINK“ FÜR GLOBALES INTERNET	54
Anastasiia Novoselova. ANALYSE KOMBINATORISCHER SOFTWARE-TESTVERFAHREN	56
Olha Savchenko. AUTOMATISIERTE TESTDURCHFÜHRUNG BEI DER SOFTWAREENTWICKLUNG.....	58
Volodymyr Stasov. SOLARKOLLEKTOR UND SEINE VERWENDUNG.....	59

ENGLISH SECTION

FOREIGN LANGUAGES DEPARTMENT. 70 YEARS

Mykola Anufriyev

National Technical University “Kharkiv Polytechnic Institute”

Language adviser – Olga Lazareva

This year the foreign languages department commemorates its 70th anniversary. And this is a good occasion to overview its activity and people without whom this department would never have happened.

The department of foreign languages was initiated by professor Roginsky, Doctor of Physical and Mathematical Sciences as far back as in 1950. Many generations of teachers have changed since then. And today the department staff includes 25 teachers and 4 engineers and is headed by Tatiana Goncharenko, PhD in pedagogy.

The work of the department can be divided into several categories. The first and, probably, the most obvious one is academic work. The department of foreign languages provides courses in English, German and French not only to students of bachelor’s degree, but also for master degree students, foreign students, and even teachers of other departments, who wish to improve their knowledge of foreign languages.

Through the time, forms and the content of teaching have also evolved dramatically. At first, the students of the department were mainly taught to read and translate, while today at foreign language classes students do not only develop their language abilities, but also practice such important job-related skills as communication, presentation, team work, brainstorming and others.

The next area is methodological work. It includes various activities that facilitate and improve students’ learning experience. For this purpose, the teachers of the department have written hundreds of textbooks, “metodichkas”, tests, exercises etc. They are mastering and introducing modern educational and technological tools.

Another sphere of the teaching staff responsibilities is scientific research. So the teachers of the department publish scientific papers, participate and even organize scientific conferences. Student conferences are an important part of the department activities since 2000.

Besides all that, the teachers also develop professionally. The German teachers regularly visit Germany and are taught by European standards< which they further implement in their educational work. Same goes for our English teachers: for 5 years – from 2014 to 2019 – they participated in British Council’s “English for universities” project, where British tutors shared new methods of learning and other useful

professional knowledge to teachers from all over Ukraine. Our university was among the first universities to take an active part in this program.

Apart from these traditional areas, the teachers of the department are involved into other pursuits. For example, they serve as interpreters for the University authorities when foreign delegations arrive. They translate into English and German books, booklets and documents published at the University, the latest one being the book devoted to the 135th anniversary of our University. And there is no end to other small and big tasks.

So, to sum it all, I think, 70 years of devoted work is a good reason to celebrate. Let us congratulate the staff of the department of Foreign Languages on covering such a long way and wish them further accomplishments.

DUBBING AND LOCALIZATION

Kyrylo Andryuschenko, Konstantin Velichko
National Technical University “Kharkiv Polytechnic Institute”
Language adviser – Olga Lazareva

Most people enjoy watching movies, reading books or playing video games from time to time. But not all of them are created in our native language. And since not everyone can perceive English, people have to come up with a remarkable solution: translation, localization and dubbing.

Translation is a direct rendering of meaning from one language to another. At the same time, **localization** is the process of adapting a product taking into account cultural and regional differences. However, if you want to create a truly high-quality content, these two methods won't be enough.

Modern movie makers have come up with a brilliant solution called dubbing. **Dubbing** is the process of adding new translated dialogues or other sounds to the original sound to create the finished soundtrack. This process is usually used to create films, series or videos.

There are several types of dubbing films:

- Dub (Dubbing) – full dubbing, when all the original speech is replaced;
- VO (Voice-Over) – actor voices are recorded over the original audio track which can be heard on the background;
- Sub (Subtitles) – only translated text shown on the screen and the original soundtrack is used

Dubbing and Localization of products is a complicated problem. One of the main challenges is to make the correct translation despite language differences. For example,

translation can lead to the loss of meaning and messed up jokes. It can be also difficult to localize some English puns and names. For instance, the following phrase “*Sir John Strange. Here lies an honest lawyer, and that is Strange*” if translated directly, can cause misunderstanding because of loss of intended similarity of the name and common adjective.

Quite rarely, localization becomes almost impossible due to language and cultural differences between countries.

Correct translation of homonyms can, also, be quite challenging. The word “fire”, for example, has 3 main meanings: flame, light, enflame (set on fire, arson, ignite); shoot; dismiss an employee from the job.

The grammatical differences between languages also have to be taken into consideration. The phrase “Thanks! You helped me a lot” can be translated in several ways depending on characters’ gender and status “Дякую! ти мені дуже допоміг” or “Дякую! ти мені дуже допомогла!” or “Дякую! ви мені дуже допомогли”.

Localization of games is not very different from localization of films, but it has some significant aspects.

Interactive cues. Some games allow player to choose their answer. This way translators work with huge sets of phrases and separate sentences and need to link them so that every question would get grammatically and emotionally correct reply.

Of course, this may not be a problem if translator has the context. But sometimes people need to work without it, so this complicates understanding of context and can cause mistakes.

One of the techniques of dubbing is lip sync (short for lip synchronization). It is a process of matching a speaking or singing person's lip movements with sung or spoken vocals.

It can be used in film production, particularly, in dubbing process; in modern animation; in almost all modern video games; in music industry etc.

One of the technologies applied for dubbing is “motion capture”. It is a technology of recording movement of objects or people. Such films as *Avatar* or *Iron Man* used this technology.

In modern animation, motion capture is really important for the process of dubbing and lip sync, because it records not only the movement of the body, but also the movement of the actor's face and lips. This technology allows creating high-quality lip sync, because there is almost no delay between a character's voice and their movements.

To draw a conclusion, the process of making high-quality localization and dubbing is very difficult and important at the same time. There are sophisticated tools and complex problems, which our localizers and dubbers have to deal with. So we hope that

the next time you watch an outstanding movie or play your favourite game, you will pay more attention to the amount of work done by these people.

REFERENCES

1. https://www.speech-graphics.com/wp-content/uploads/2014/10/IEEE_article.pdf
2. <https://www.gala-global.org/knowledge-center/about-the-industry/language-services>
3. <https://blog.languageline.com/what-is-localization>
4. <https://bunnystudio.com/blog/library/dubbing/what-is-dubbing/>

THE LATEST ACHIEVEMENTS OF MANKIND IN OPHTHALMOLOGY

Artem Barsukov

National Technical University “Kharkiv Polytechnic Institute”

Language Adviser – Viktoriia Vrakina

Many people around the world suffer from refractive errors, partial loss of vision or complete blindness. Regardless of how serious ophthalmic pathologies are, they cause discomfort and difficult socialization of a person.

The ability to have full vision allows people to feel independent and free. Therefore, scientists regularly introduce the latest technical developments and other solutions into ophthalmology that make it possible to successfully correct refractive errors, simplify the diagnosis of eye pathologies and improve the methods of their therapy.

In recent years, significant discoveries have been made in ophthalmology related to the improvement of techniques that help people "see" the world around them in case of partial or complete blindness.

Among the latest achievements, the KAMRA technology should be highlighted, which is already actively used in the countries of South America, Asia and Europe. It is based on the implantation of thin rings that replace corneal particles damaged due to age-related changes. On April 17, 2015, this innovative technique was approved by FDA experts. The technique has not yet found wide application due to the high cost of materials. Currently, it has been tested on a small group of people and gave a positive result: improvement of vision clarity up to 80% with a high degree of myopia. It is believed that in the future, this technology will eliminate the need for glasses and contact lenses.

There are other promising novelties that are in the active stage of development. Researchers are gradually introducing concepts such as stem cell therapy and even the

bionic eye into the field of ophthalmology. Most of the significant advances in ophthalmology and discoveries have been made during the last 10 years.

Glasses with automatically adjusting lenses were created in 2012 in London, biocompatible implants have been invented and gene for myopia has been found, etc.

In addition, in recent years, new studies of the cerebral cortex, which is responsible for visual processes, have been carried out, as well as other work in the field of genetic engineering. The number of significant achievements in ophthalmology is constantly growing.

One of the latest advances is actively developing the direction associated with the prospects for the treatment of macular degeneration. Today, according to American statistics, this disease, characterized by damage to the retina and causing blindness, affects about 2 million local residents. Even 7 years ago, there were no effective methods of treating this pathology, but now everything has changed with the advent of effective methods that allow stopping even advanced forms of the disease. This became possible thanks to the technology of cold laser correction and the emergence of innovative drugs, some of which are still in the testing stage.

Scientists are working hard to bring about positive changes at the gene level through the introduction of stem cells. According to the researchers, this will open up unlimited possibilities in the treatment of serious pathologies of the organs of vision. In the short term, scientists intend to create artificial conditions for trophism and normal functioning of the eyes. This approach, according to leading Western scientists, has already begun to be partially tested for the treatment of pigment dispersion syndrome.

Modern ophthalmology has stepped forward so much that today a large number of tests are carried out with artificial retinas - special eye sensors that are connected to a mini-computer that interprets light signals and transmits the information received to the brain.

Still, the most interesting and unusual methods of treating ophthalmic pathologies are the use of stem cells.

The surface of the human eyes is covered with the thinnest shell - the cornea, without which the visual process is impossible. In one study, scientists convert stem cells into a specific type of retinal cell in the hope that the process of their introduction will positively affect the restoration of vision in people with macular degeneration.

Fascinating is the fact that such clinical trials are actively practiced today. In this regard, experts expect that in the next 10-20 years, new methods of stem cell treatment will help ophthalmologists learn to suspend or even stop the process of blindness.

But, despite the trendy technologies and advances in the field of ophthalmology, prevention is still considered the best method of treatment. Many patients of clinics

turn to specialists after partial loss of vision. It should be remembered that the earlier the diagnosis is carried out, the greater the chances of successful treatment.

ARTIFICIAL INTELLIGENCE AND ITS PRESENCE IN OUR LIFE

Bohdan Borysov

National Technical University "Kharkiv Polytechnic Institute"

Language Adviser – Viktoriia Vrakina

Artificial intelligence (AI) is a technology that is already affecting how users interact with the Internet. Its influence is likely to grow in the near future. Artificial intelligence can significantly change the way people interact, not only with the digital world but also with each other, for the better or for the worse as a result of their work and other socio-economic institutions.

You probably don't know about that, but you deal with AI every single day. A simple example is your smartphone keyboard. We type some text every day, chatting with friends, working, searching for some information, etc. But what we don't think about – is that our keyboard works really hard when we type. With every single tap, the phone predicts which word do you want to type and what letter will be the next. Even people with small displays and big fingers, will not feel uncomfortable to type on a touchscreen keyboard. The keyboard even corrects you when you tap the wrong key. So, AI helps us every single day and we don't even notice that.

There are also a lot of different cases when we think that we're doing something by ourselves, but it is not so.

Nowadays programmers work with artificial intelligence so much. It sounds really paradoxically, but AI helps its creators now. Almost every modern IDE, which is code writing software, has its own neural network, that analyses programmer's code, completes unfinished lines, and helps in debugging.

With the development of mobile technologies more and more people become photographers. Sometimes, the shots made on a phone look better than ones made on a professional camera. It adjusts focus, exposure, and white balance for the photographer. AI also increases the quality of a bad shot and makes some sort of post-processing, in order to make the photo looking more professional.

Finally, searching for some piece of information on the Internet wouldn't be so easy, if not for artificial intelligence's help.

So, AI makes our life much easier and we don't even know about it. We live in the future when people don't have to care about things that AI can do by itself.

REFERENCES

1. John McCarthy // Computer Science Department // What Is Artificial Intelligence? // November 12, 2007.
2. Daniel Faggella, Head of Research at Emerj // Machine Learning in Finance – Present and Future Applications
3. Jack Copeland // What is Artificial Intelligence? // May 2000
4. Indrasen Poola // Cisco Systems, Inc // How Artificial Intelligence is Impacting Real Life Every day // October 2017

CONSEQUENCES OF THE TRADE WAR BETWEEN THE UNITED STATES AND CHINA AND THEIR IMPACT ON THE ECONOMIC DEVELOPMENT OF THE COUNTRIES

Valeria Budanova

V.N. Karazin Kharkiv National University

Language Adviser – Olena Radchenko

The main participants in trade wars and disputes are developed countries. The leader among them is the United States, which has been a party to the dispute more than 200 times. China, as a leading country in international trade, has often (31 times) been the subject of complaints from trading partners during its WTO membership, but has initiated only 10 complaints from its trading partners.

The basis of trade wars in the international economy is the conflict of economic interests of the participants in the war and the variety of tools of covert protectionism used in the trade war.

The use of these tools of covert protectionism in the trade war leads to: an increase in state budget revenues, GDP growth, activation of the labor market, etc. However, in addition to receiving positive results from the use of covert protectionist tools, the corresponding actions of other countries in the trade war lead to negative consequences for the national economy.

The question arises as to the effects of the trade war between China and the United States on the world economy. Although this conflict is formally bilateral, its consequences for the world economy may be more devastating than the recent financial crisis, as more and more countries are gradually drawn into it. In particular, the following consequences can be identified.

1. The trade war forces the conflicting countries to look for markets for their products, which provokes a fall in world prices for these same goods.

2. The introduction of reciprocal restrictions leads to a reduction in the production of those goods that become in surplus and, consequently, to an increase in unemployment in countries.
3. Substitution in the domestic market of goods, the import of which is subject to restrictions, leads to their rise in price and, as a consequence, accelerate inflation.
4. Moreover, the world trade regime may move from "openness" to "protectionism", which will have a particularly negative impact on countries whose economies are export-oriented (and this is the majority of developing countries).
5. Another consequence may be a reduction in the influence of the international community, in particular the World Trade Organization (WTO).

According to IMF estimates set in 2019, the introduction of tariffs on all bilateral trade between the US and China reduced world GDP by 0.3% in 2020, and the effect was halved due to deteriorating business expectations and investor sentiment in financial markets.

At the same time, emerging markets (EM) will suffer the most from the US-China confrontation. This will be due to:

- general slowdown in world economic activity;
- reduction of world trade and, consequently, exports, on which EMs are excessively dependent as small open economies;
- lower prices for basic customs goods, including metals, agricultural products, and other raw materials amid concerns about the stability of demand; this, in turn, will negatively affect trade balances and exchange rates in the EM countries;
- acceleration of inflation due to currency devaluation and the related deterioration of inflation expectations due to a significant level of dollarization of economies;
- increase in volatility (an indicator that characterizes the trends of market prices and incomes over time) in world commodity and financial markets.

Deteriorating economic growth prospects in emerging markets will reduce investor demand for the assets of these countries, which will create conditions for capital outflows and, consequently, the devaluation of their national currencies.

Thus, according to the Institute of International Finance, only from April (the beginning of the trade war) to September 2018, the volume of portfolio investment in EM decreased by 20.3 billion dollars. At the same time, the world's largest banks (Goldman Sachs, Citigroup, Morgan Stanley) announced the sale of currencies of this group of countries, taking into account the growing risks to the world economy.

REFERENCES

1. Novaya ekonomicheskaya voyna mezhdou ssha i kitaem vozmozhnosti i posledstviya. Available at: <https://www.finam.ru/analysis/forecasts/novaya-ekonomicheskaya-voyna-mezhdou-ssha-i-kitaem-vozmozhnosti-i-posledstviya-20200728-121426/>
2. Graphs external growth. Available at:
3. <https://www.imf.org/external/np/g20/pdf/2019/060519.pdf>
4. Bar chats increase. Available at:
5. https://www.wto.org/english/res_e/reser_e/ersd201904_e.pdf
6. Trade Map of the countries. Available at:
7. https://www.trademap.org/Country_SelProductCountry_Graph.aspx?nvpm=1%7c842%7c%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c1%7c1%7c2%7c1%7c1%7c2

HOW EASY IT IS TO MAKE GAMES

Vadym Chernyshov, Ihor Romanovych

National Technical University “Kharkiv Polytechnic Institute”

Language Adviser – Anna Salamatina

Where should we start?

Before you start making a game, you need to understand what is needed for a full-fledged game:

- Every game must have a set of mechanics.
- There must be a visual that would be pleasant to play the game.
- You can also add sound design for better immersion.

Let us discuss all the details.

Engine selection

For a long time, developers had to write their own engine to create a game. And spend a lot of time on it, not on the game itself.

It's good that times have changed and anyone can download game engine that has been already written and tested by thousands people. 2D or 3D doesn't matter because you could find game engine for any purposes.

Gameplay

So, we have chosen the engine, now we turn to the most important thing – game mechanics.

What is game mechanics?

- You need to figure out what the player should do, for example, run, jump, collect coins.

- Now we need to implement this.

- It's good that modern engines help you do this without any serious programming knowledge (but this does not negate the fact that you still need to know the base), for example, using visual scripts in UE4.

Choosing an art style

After we have figured out the gameplay core, it's time to start rendering the project. It's good that you already have a bunch of ready-made applications for this from Maya to Blender. You can also buy a model in the store that will significantly save your time. And so we decided how to figure out what now. Basically, there are two variants of the development of the Low and High poly model. --Should we describe them?--

Sound Design

The sound designs in video games and movies are similar in many ways. But the former are of an interactive nature, due to which other approaches are used. Sound design should be a way for the device to interact with the world at will. In this case, not a single element should be knocked out of the general row.

In custody

In conclusion, I want to say that it is much easier to create a game now than it was even 8 years ago, since there are a lot of tools for implementation. So, if you think about creating your own game, feel free to recruit a company of enthusiasts and do your own projects. Maybe you are the next Hideo Kojima or Cory Barlog.

CORONAVIRUS IMPACT ON ADVERTISING MARKET

Mariia Gurtova

National Technical University “Kharkiv Polytechnic Institute”

Scientific Adviser - Kitchenko Olena

PhD in Economics, Associate Professor,

Associate Professor Department of Economics and Marketing,

Language Adviser – Shuliakov Igor

Associate Professor Department of Cross-Cultural communication and

Foreign Languages.

Nowadays, almost every one has felt the relentless impact of the pandemic. The consequences of COVID-19 have already affected all spheres of human activity and the economy is no exception. Restrictions or so-called lockdowns have become the norm for many businesses. Most businesses have begun to change the usual forms of

communication with their consumers and move to the online sphere. This, in its turn, has significantly changed not only the structure of marketing and advertising costs, but also led to a change in brands' views on further promotion and development strategy.

For many organizations, COVID-19 has turned the 4Ps of marketing – product, place, price, and promotion – into 4Cs: confusion, calamity, chaos, and complexity [1]. Also, first of all, it should be noted that during the pandemic, almost all offline activities have lost their meaning and the marketing market is not an exception here. In addition, COVID-19 has significantly influenced consumer behavior - changing consumer needs and demands, so businesses need to find new ways to communicate and change their advertising efforts to communicate with consumers in a new online format.

Although demand for some goods and services has grown significantly (such as contactless payments or healthcare providers), most companies and organizations still reduce advertising costs [2].

I would like to add that almost all companies have resorted to change or correct their behavior. Many brands are moving back to marketing basics: demonstrating a core purpose, serving customers in the true sense of the word, and just trying to be helpful. Trust is crucial during this time. The brands are trying to find new points of intersection with the consumer as the consumer habits change. They are trying to understand what new products the consumer needs today, what he pays most attention to. The brands try to solve consumer problems related to health, well-being, the meaning of existence in new social conditions [3].

New marketing efforts should be made in two main ways:

1. On the one hand, marketing teams need to embrace agile culture of innovation and creativity when everyday brings a new challenge. Today, the main focus of brands in advertising should be focused on an interesting and unusual creativity, using creative and aggressive tools of marketing communications. Creativity, viral campaigns and unusual methods of promotion are the main driving force of today.
2. On the other hand, the market has changed, so the basis for further success of enterprises against the background of growing competition will be the implementation of creative and innovative strategies for marketing development. Such strategies should be aimed at strengthening the reputation of brands and a deeper work with social networks.

Recent research [4] say that advertising costs will increase and their structure changes. A significant share of costs will be involved in the online sector: advertising on social networks, advertising on Youtube, regular online advertising, etc. These changes are related to the fact that more than 45% of consumers spend more time on

social networks, increased gaming traffic (15%) and streaming video on the Internet by 26%.

During COVID-19 pandemic, retailers big and small have been scrambling to set up an online presence, with mixed results. Those brands which have spent the last couple of years investing in their online customer journeys – be it via their website, app, or in new technologies such as live streaming – are now seeing the payoff [3].

Thus, there are a large number of forecasts for the further development of the advertising market. It is impossible to say unequivocally that in the future there will be a downward trend in advertising budgets. But it is safe to say that consumers will buy more online, that is why companies should adjust most of their advertising budgets in this field of market.

REFERENCES

- 1 The 4Ps of Marketing Amid COVID-19: Strategy Reassessment and Adjustment. – Available at: <https://www.marketingprofs.com/articles/2020/42801/the-4ps-of-marketing-amid-covid-19-strategy-reassessment-and-adjustment>
- 2 Revised advertising spending worldwide in light of the coronavirus outbreak from 2019 to 2024. - Available at: <https://www.statista.com/statistics/1103992/impact-covid19-ad-spend-world/>
- 3 Four COVID-19 marketing trends: navigating what's next. - Available at: <https://www.warc.com/newsandopinion/opinion/four-covid-19-marketing-trends-navigating-whats-next/3643>
- 4 Global advertisers will increase ad spend by 4.3% in 2020. - Available at: <https://www.zenithmedia.com/global-advertisers-will-increase-adspend-by-4-3-in-2020/>

THE JOB OF HR MANAGER IN IT

Sofiia Ivanova

Kharkiv National University Of Radioelectronics

Scientific Adviser – Yevhenii Batrakov, assistant

Language Adviser - Viktoriia Arkhylova, senior lecturer

HR (Human Resources) is a service function, the main task of which is to achieve the company's business goals with the help of human capital.

It is important to understand that for the most part this is not only working with people, it is the ability to competently build systems and processes so that these people work successfully and effectively in them. This job involves active interaction with all

departments of the company: from marketing to production. Accordingly, understanding of the business is necessary. It turns out that HR is a “business advocate” on the one hand and an “employee defense side” on the other. There should be taken into account the interests of both business and specialist for their most beneficial cooperation.

Responsibilities of an HR specialist depend on the size of the company and the goals of the business, but in general, the following can be distinguished:

- recruiting - filling vacancies. The recruiter assesses the candidate’s Hard and Soft Skills, as well as his compliance with the corporate culture;
- adaptation - helping a specialist to integrate into a new work environment;
- assessment - analysis of the existing professional skills of a specialist in order to organize quality training and improve work results;
- education and development;
- compensation and benefits - management of the remuneration system;
- corporate culture - the values of the company, its uniqueness, as well as the representation and dissemination of these values both within the organization and outside it.

The HR department is often a separate business unit and includes various areas, each of which is interesting in its own way.

The researcher is looking for suitable candidates. Such a specialist works with the resume database, selects potential candidates and coordinates the further stages of an interview. The researcher does not conduct interviews; this is the task of the recruiter. The position is suitable for beginners.

The recruiter selects staff, analyzes the labour market and conducts interviews. The recruiter is the face of the company, since it is he/she who makes the first contact with the candidate.

The C&B manager (Compensation and Benefits Manager) is in charge of the employee grading system. Grading system helps determine the value of a specialist to a company. The HR specialist uses it to create and optimize the remuneration and motivation system. The C&B manager develops and implements compensation and incentive systems for the company employees.

The T&D / L&D manager (Training and Development, Learning and Development) takes part in the continuous development of employees, evaluates their potential in order to realize it within the company.

The Employer brand manager is responsible for developing the employer’s brand, increasing company awareness, and developing an EVP (employee value proposition). Employer brand manager makes the company as attractive and interesting as possible

for a potential candidate, using knowledge in marketing, PR, HR. Creative and innovative approaches are indispensable here.

The Career Adviser is a coordinator who helps an employee define or change their professional path, find out what knowledge and skills are lacking to advance or move to a new position. Such a specialist creates an individual development plan for an employee, taking into account their skills.

The HR People Partner is responsible for working on the satisfaction, motivation and development of employees in the company. It is a mediator between the interests of the company and the employee. It is important for People Partner to find an individual approach to each person. This direction is more common in large companies.

The HR Generalist has knowledge in all key areas of HR management. This specialist carries out the entire cycle of work with personnel: from studying the labor market and hiring personnel to drawing up development maps and dismissal. The role is found in small companies.

REFERENCES

1. Martin Kütz. IT Performance Management / M. Kütz. – Bookboon, 2018. – 178 p.
2. S. Ren, S.E. Jackson. HRM institutional entrepreneurship for sustainable business organizations Human Resource Management Review (2019), 10.1016/j.hrmr.2019.100691
3. D. Valizade, C. Ogbonnaya, O. Tregaskis, C. Forde A mutual gains perspective on workplace partnership: Employee outcomes and the mediating role of the employment relations climate Human Resource Management Journal, 26 (3) (2016), pp. 351-368
4. <https://www.digitalhrtech.com/human-resource-basics/>

POSSIBILITIES AND NEW SOLUTIONS IN THE ASYNCHRONOUS COMPONENT INTERCONNECTION FOR THE EMBEDDED SYSTEMS ARCHITECTURE

Valentyn Korniienko
Kharkiv National University of Radioelectronics
Scientific Adviser – Inna Filippenko, Professor,
Kharkiv National University of Radioelectronics
Language Adviser – Nataliia Malko,
National Technical University “Kharkiv Polytechnic Institute”

The modern possibilities, which are available for using both in Desktop and Embedded Software development require more facilities from compiler vendors and

tools companies. There are many approaches for building a complex system, but some of them could be extended with modern one. This article is a brief overview of coroutines concepts and some of stable methods for designing an embedded firmware.

The growing tendency of high-level programming languages, which are used in fields related to embedded systems, allows to use new facilities to create more flexible, compact, and fast solutions. Despite of new approaches and tools, the firmware and software development for embedded is based on the FSM(Finite State Machine) models with a combination of transferring a state between modules indirectly. The FSM model is the most flexible because of reliability in the synchronous approach, but with some lacks in error-processing and asynchronous data processing integration.

There are also intermediate states which are added into the existing FSM while extending it with asynchronous components, such as peripheral modules with DMA, which lead to increasing complexity of the system supporting. The next presented problem is either a state context transferring or a switching execution context between modules from an interrupt service routine to the main execution thread. One of the existing solutions is adding RTOS (Real Time Operation System), which allows to expose system facilities with all typical components in Real Time system.[1] The issues, which relate to an error-prone usage of a system, are caused by overengineering for components, where strict response time is not required. The memory and the CPU time consumption can be sufficiently more, than requested for a transition and restoring either a program or a function state. Also, not all mechanisms in RTOS are customizable for supporting a full control of the resource management.

In a case of using instruments, which were added as experimental features in 2015 for the MSVC compiler and accepted as a standard in C++20 the coroutine concept was supported for building an embedded firmware with using it. Also, there are possibilities for well-designed lock-free algorithms and cooperative multitasking.

In full terms, the coroutines concept is not a new one in programming or in the computer science, but adding it to a compiler's standard set allows to use it. For the current moment, the full implementation for this feature is available in Clang, GCC10.2 and MSVC (16.8).[2] The full usage is possible both with the Operation System + arm-gcc-eabi toolset and the bare metal environment with arm-gcc-none-eabi. The memory control facilities are available with overloading new and delete for a user's Awaitable type which is necessary for using with coroutine-keywords.

As a conclusion, all the approaches, which were reviewed, influence on improving and structuring of interaction between asynchronous components, with either separated or combined processing for each component. It's necessary to mention, that the tendency of using coroutines in applications is increasing for non-blocking I/O

implementations and network interfaces communication for simplifying a program structure and its speed-up because of reduced time for context-switching/restoring operations.

REFERENCES

1. Real-Time C++: Efficient Object-Oriented and Template Microcontroller Programming – Berlin, Germany: Springer-Verlag Berlin and Heidelberg GmbH & Co. KG, 14. – 426 c. – (Springer-Verlag Berlin and Heidelberg GmbH & Co. KG).
2. Gor N. A proposal to add coroutines to the C++ standard library (Revision 1) [Web-resource] / Nishanov Gor // Programming Language C++, SG1. – 2014. – Available at: <https://isocpp.org/files/papers/n3985.pdf>.

5TH GENERATION MOBILE NETWORK

Kyrylo Kozhykhov

National Technical University “Kharkiv Polytechnic Institute”

Language Adviser – Viktoriia Vrakina

5G is the 5th generation mobile network. It is a new global wireless standard after 1G, 2G, 3G, and 4G networks. 5G enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices.

Main characteristics of the next generation network: speed up to 20 Gigabit per second, coverage density up to a million people per 1 square kilometer, signal delay up to 1 ms.

5G is still radio waves ranging from hundreds to several thousand megahertz. They are already used by Wi-Fi, Bluetooth, 3G, 4G and GPS. There are differences in code and hardware. But the waves are the same as before. The only thing is that the additives of the new coating will use the millimeter range. These frequencies are already in use and also pose no danger. Also, the higher the frequency, the lower the radiation power.

5G is used across three main types of connected services, including enhanced mobile broadband, mission-critical communications, and massive the Internet of things. This segment is huge. The devices do not consume a lot of traffic, but there are a lot of them and they often access the server. This puts a huge load on the network, which is why a high bandwidth of 5G is needed. Technology provides great opportunities for the development of telemedicine, virtual reality broadcasts, cloud gaming.

There are several main technologies due to which the network has such characteristics, these are non-orthogonal channel separation, massive multiple-input and multiple-output, beamforming.

Firstly, in 5th generation networks, all signals are even layered on top of each other, but with the help of enormous computing power, they can be separated. In other words, the entire spectrum is used with an efficiency of about 100 per cent. All this thanks to technology non-orthogonal channel separation.

Secondly, the signal from the stations goes in different ways, which leads to signal distortion. Thanks to use Massive Multiple Input Multiple Output in the 5th generation, they learned to recognize separate paths for sending different data along with them. The result is a multithreaded transmission, which increases the speed. That is they took advantage of the disadvantage and turned it into an advantage.

Thirdly, using the beamforming method, 5G stations do not send radio waves in all directions as before, but focus on the subscriber. This technology allows you to increase the range and not clog the air for other subscribers.

5G technology is revolutionary, but development does not stand still. Sixth generation networks are coming soon. It's expected that the framework for 6G will be completed by 2028 and the first 6G products will start appearing around the end of this decade.

REFERENCES

1. What is 5G | Everything you need to know about 5G [Electronic resource] - Access to resource mode: <https://www.qualcomm.com/5g/what-is-5g>.
2. What Is 5G Technology-Intel [Electronic resource] - Access mode to the resource: <https://www.intel.com/content/www/us/en/wireless-network/what-is-5g.html>.
3. Introducing 5G technology and networks [Electronic resource] - Access mode to the resource: <https://www.thalesgroup.com/en/markets/digital-identity-and-security/mobile/inspired/5G>.

WORLD OF SOCKETS

Georgiy Lamash

National Technical Institute “Kharkiv Polytechnic Institute”

Language Adviser – Tatjana Chudovska

AC power plugs and sockets connect electric equipment to the alternating current (AC) power supply in buildings and at other sites. Electrical plugs and sockets

differ from one another in voltage and current rating, shape, size, and connector type. Different standard systems of plugs and sockets are used around the world.

Plugs and sockets for portable appliances became available in the 1880s, to replace connections to light sockets with wall-mounted outlets. A proliferation of types developed for both convenience and protection from electrical injury. Today there are about 20 types in common use around the world, and many obsolete socket types are found in older buildings. Coordination of technical standards has allowed some types of plug to be used across large regions to facilitate trade in electrical appliances, and for the convenience of travelers and consumers of imported electrical goods.

Some multi-standard sockets allow use of several types of plug; improvised or unapproved adaptors between incompatible sockets and plugs may not provide the full safety and performance of an approved socket-plug combination.

A plug is the movable connector attached to an electrically operated device, and the socket is fixed on equipment or a building structure and connected to an energized electrical circuit. The plug is a *male* connector, often with protruding pins that match the openings and *female* contacts in a socket. Some plugs have female contacts that are used only for an earth ground connection. Some plugs have built-in fuses for safety.

To reduce the risk of electric shock, plug and socket systems have safety features in addition to the recessed contacts of the energised socket. These may include plugs with insulated sleeves, recessed sockets, or automatic shutters to block socket apertures when a plug is removed.

A socket may be surrounded by a decorative or protective cover which may be integral with the socket.

Single-phase sockets have two current-carrying connections to the power supply circuit, and may also have a third pin for a safety connection to earth ground. Depending on the supply system, one or both current-carrying connections may have significant voltage to earth ground.

SETTLERETICS: MENTAL HACK

Veronika Melehova

National Technical University “Kharkiv Polytechnic Institute”

Language Adviser – Viktoriia Vrakina

Settleretics ask themselves the question «How to "transplant the psyche" of a person from his mortal biological brain into an immortal simulated "neurocomputer brain»? ». And this is almost the last step towards human immortality.

Now scientists are trying to solve two main problems such as “how to extract information from the brain” and “how to download information into a made-up storage medium”. Simply put “uploading” and “downloading”.

As for the first problem, the main question here is if it is possible for the existence of sense in isolation from the biological body. According to one version, consciousness is not matter but encoded information. It exists in the form of encoded information concentrated in the human brain, mainly in the neocortex (the latest, "higher" part of the brain; in humans, the surface of the neocortex occupies 95.6% of the entire surface of the cerebral cortex). At the same time, from the side of the laws of nature there should be no prohibition on the "transfer" of personality and consciousness to another material medium, because information is invariant regarding its medium, both material, on which this information is encoded, and ideal, that is, the code itself.

Company IBM (International Business Machines) was one of the first to deal with the second problem. They attempted to model the human brain down to the molecular level. The project uses a Blue Gene mainframe with a throughput of 22.8 trillion floating point operations per second, which, in principle, allows for real-time operation.

A key part of the project will be the world's most complete computer model of the cerebral cortex and the brain itself.

There are some main directions of the development of Settleretics. Firstly it is implantation of a chip to build a "bridge" with a damaged area of the brain. Secondly this is regeneration of neurotissue by stimulating the growth of nerve fibers (irradiation with an electron flow or targeted exposure to the blue ("exciting" neurons) spectrum). Next route is to impulse control of "immobilized" muscles from healthy ones, bypassing the damaged area of the brain. And final course is transfer of consciousness to another material carrier or complete regeneration of brain cells and it means achieving physical immortality.

REFERENCES

1. Programmer's forum. URL: <https://xakep.ru/2007/08/21/39800/#toc04>
2. Clever Geek Handbook. URL: <https://tech-en.netlify.app/articles/en520566/index.html>
3. Korchmaryuk YI Settleretika or "digitized" the brain. URL: <https://settleretics.ru/en>

THE ROLE OF NORTH STREAM 2 IN EU FOREIGN ECONOMIC POLICY FORMATION

Pavel Migunov

V. N. Karazin Kharkiv National University

Language Adviser – Olena Radchenko

The European Union is an economic and political union of 27 countries. The Maastricht Treaty marked the creation of the European Union. It entered into force on November 1, 1993, on the basis of the European Economic Community and aims at regional integration [1]. The main criterion for joining the European Union is a stable and strong economy that will help the EU as the only actor in the international arena. At present, the European Union's foreign policy plays an important role in the Middle East peace process, in diplomacy with Iran and in strengthening stability in the Western Balkans, including Kosovo. But researching the areas of EU activity, it should be mentioned that the Nord Stream 2 project is one of the most pressing issues at the moment.

Nord Stream 2 (NS-2) is a Russian-German project to build a gas pipeline across the Baltic Sea from Russia to Germany. The pipeline passes through the waters of five Baltic Sea countries: Russia, Finland, Sweden, Denmark and Germany. The head of Gazprom's board of directors, Viktor Zubkov, said that the construction of Nord Stream 2 would be completed this year, with the pipeline completed by 90-92% [2]. The United States, which promotes its liquefied natural gas to the European Union, Ukraine, which fears the loss of Russian gas transit through its territory, and Poland oppose the project.

The main economic and geopolitical advantages of this project include the following:

- the export route PP-2 from the resource base (Yamal) to the consumer (North-West Europe) is 2000 km shorter than the route through Ukraine;

- Gazprom's (as a shareholder) transport tariff is set at \$ 2.1 US for 1000 m³ per 100 km, and through the territory of Ukraine it is 2.5 US for 1000 m³ per 100 km. Moreover, the operating costs of gas transit to Europe will be 1.6 times lower than through Ukrainian gas pipelines. As the result, over 25 years, Gazprom will receive dividends of about \$ 7 billion. USA.

Analyzing the implementation of the geoeconomic project "NS - 2", we can identify three main actors who are responsible for the implementation of the project in the international arena: the United States, the Russian Federation and Germany. Each of these actors builds its own foreign policy based on national interests.

Analyzing US foreign policy, we can identify two main motives for the country's activities in the European region:

1. The United States strongly opposes the Russian-German project. Washington argues that it creates a very high dependence of Europe on energy supplies from Russia. After all, in this case, Germany must play by the rules of Moscow [3].

2. The latter motive is hidden because, first of all, Washington does not want to lose the liquefied natural gas (LNG) market. The United States has never hidden its commercial interest in Europe. Russia is one of the main competitors of American companies in the EU gas market.

Moscow's foreign policy focuses on continuing the construction of Nord Stream 2 and unconditionally stating that the project is only economic in nature. We can assume two options for the development of foreign policy of the Russian Federation:

1. Sanctions are in force and partner companies "NS - 2" are starting to leave the game, thus Russia must complete the project using its own funds, which will take much longer in time and finances. But it should be understood that the total debt of Gazprom in 2019 has already exceeded 40 billion dollars USA [4]. Such actions will narrow the range of opportunities to complete Nord Stream 2.

2. Upon completion of this project, Russia and Berlin will have a favorable position for further development of their economic potential. Germany will receive natural gas through the pipeline and transport it to other member states of the European Union on its own terms.

The European Union's position on the completion of Nord Stream 2 is not entirely clear. The European Union is extremely interested in investing in both the state and social sustainability of regions to the east and south of its borders. Taking into account the new strategy of the European Union, we can say that they are trying to protect and strengthen the rules of international law in the international area. It is to support Ukraine in stabilizing the East and South of the country. But each actor in the international arena primarily protects only their own national interests. Therefore, on the one hand, we see aid points in the new strategy, but on the other hand, 24 European Union countries have signed a note of protest against US interference in the construction of the Nord Stream 2 gas pipeline, confirming the assertion of national interests.

To sum up, we can identify the following issues:

1. Construction of Nord Stream 2 will end even if the United States uses tougher sanctions.

2. The foreign policy of each actor in the international arena is primarily built taking into account the national interests of the country. Therefore, in one position, the European Union will support the member countries of the Association and try to help

resolve conflicts, but if we take into account the second position, the achievement of their own goals is more important for them, in our case - the completion and lifting of US sanctions on Nord Stream 2.

3. The United States has a clear political position on the construction of Nord Stream 2, even with changes in government, it does not alter the course to block the project so as not to lose the LNG market and gain economic achievements.

REFERENCES

1. Маастрихтський договір : електронна версія договору. URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:xy0026> (дата звернення: 04.04.2021);
2. Офіційний сайт електронний журнал «Известия»: електронний журнал. URL: <https://iz.ru/1142603/2021-03-26/v-gazprome-vyrazili-uverennost-v-dostroike-sp-2-v-tekushchem-godu> (дата звернення: 04.04.2021);
3. Офіційний сайт інформаційного агентства «DW»: інформаційний портал. URL: <https://www.dw.com/ru/ssha-trebut-nemedlennogo-prekrashhenija-stroitelstva-severnogo-potoka-2/a-56922172> (дата звернення: 04.04.2021);
4. Офіційний сайт інформаційного агентства «Укрінформ»: інформаційний портал. URL: <https://www.ukrinform.ru/rubric-world/2835330-ostanovit-severnyj-potok2-missia-vse-bolee-realna.html> (дата звернення: 04.04.2021);

THE ROLE OF PROGRAMMING IN THE MODERN WORLD

Vadym Naumenko

Kharkiv National University of Radioelectronics

Scientific adviser – Yevhenii Batrakov, assistant

Language adviser – Viktoriia Arkhylova, senior lecturer

Computers can do amazing things, from basic laptops capable of simple word processing and spreadsheet functions to incredibly complex supercomputers completing millions of financial transactions a day and controlling the infrastructure that makes modern life possible. But no computer can do anything until a computer programmer tells it to behave in specific ways. That's what computer programming is all about.

Over the past century, humans have been trying to figure out how to best communicate with computers through different programming languages. Programming has evolved from punch cards with rows of numbers that a machine read, to drag-and-drop interfaces that increase programming speed, with lots of other methods in between.

Programming is the process and art of creating computer programs. This includes coding and script writing, algorithm development, software development, layout, design, and much more. The basis of programming is the special languages in which the source code of programs is written. Programming occupies one of the significant niches in the modern world of technologies.

While sometimes used interchangeably, programming and coding actually have different definitions.

- Programming is the mental process of thinking up instructions to give to a machine (like a computer).
- Coding is the process of transforming those ideas into a written language that a computer can understand.

By 2021, programming has been so deeply embedded in everyday life that people just do not pay any attention to the great changes happened in their life. Hundreds of thousands of familiar things would not exist without programming or would be less convenient to use. Our household appliances such as a microwave oven or a washing machine are easily operated due to the programs embedded in them. One of the brainchild of programming can be called a virtual number service for SMS. By means of it, you can send, receive, and send mass SMS messages even without a phone number.

The current programming is multi-faceted and is used in such important areas as construction, business and economics, medicine, biology and physics. A large percentage of physical labor in the industrial sector has been replaced by machine and robotic labor, which is controlled by special software, which provides a significant increase in the speed, accuracy of operations and production efficiency. Such a wide range of applications is provided by a great number of programming languages, each of which has its own pros and cons.

Experts' opinions differ as to the number of existing programming languages. Every day, not only old languages are improved, but new ones are also developed, so the choice for learning is great. However, the most popular have remained unchanged over the past few years. According to Github, they are ranged as follows:

1. JavaScript;
2. Java;
3. Python;
4. PHP;
5. C++;
6. C#;
7. Shell;

8. C;
9. Ruby;

Programming is an increasingly important skill, whether you aspire to a career in software development, or in other fields. This is because programming is fundamentally about figuring out how to solve a class of problems and writing the algorithm, a clear set of steps to solve any problem in its class. Thus, learning programming languages opens up new opportunities and perspectives for everyone. Developing your skills will help you find your dream job in almost every country in the world or just telecommute (work remotely).

REFERENCES

1. Github-Ranking. Access to the source: <https://github.com/EvanLi/Github-Ranking>
2. Программирование и его роль в современной жизни. Доступ к ресурсу: <http://www.ar-ru.ru/75-nashr/781-programming-in-modern-life>
3. Важность программирования в мире и его возможности. Доступ к ресурсу: <https://mybuzines.ru/?p=30632>

HOW DOES THE COMPUTER'S PROCESSOR WORK?

Oleh Olefirenko

National Technical University "Kharkiv Polytechnic Institute"

Language Adviser – Olena Kovtun

The computer's processor performs calculations, makes logical comparisons and moves data up to billions of times per second. It works by executing simple instructions one at a time, triggered by a master timing signal that runs the whole computer.

First let us clarify what a PC processor is and what it does. A central processing unit, or CPU, is a piece of hardware that enables the computer to interact with all of the applications and programs installed. A CPU interprets the program's instructions and creates the output that we interface with when we are using a computer.

The next point is the interaction of the processor and other components of the computer. Buses are circuits on the motherboard that connect the CPU to other components. There are many buses on the motherboard. A bus moves instructions and data around the system. For example, the bus that connects the CPU to the memory is called the front-side bus (FSB) or system bus.

Finally, the main functions are the functions of the computer's individual parts, for example, the control unit, which coordinates all the activities in the computer. The

arithmetic and logic unit (ALU) manipulates numeric and logical data. The main memory provides temporary data storage.

APPLE PAY IS AN INCREDIBLE DIGITAL PAYMENT SERVICE

Danylo Osypov

Kharkiv National University of Radioelectronics

Scientific adviser – Andrij Rabotiahov, associate professor

Language adviser – Viktoriia Arkhypova, senior lecturer

The need for electronic payment systems has grown dramatically after the inception of online shopping and e-commerce websites. The E-payment system made it convenient for the customer to pay for anything at any time.

Electronic payment systems are going to be the future of digital payments. Here are the eight latest digital payment trends: mobile wallet, international remittance, peer to peer payment, wearables, biometric payments, QR codes, contactless payments, payments using AI.

Apple Pay is easy and works with the Apple devices you use every day. This service helps you to make contactless, secure purchases in stores, in apps, and on the web. It also serves you to receive and send transactions from other users.

Apple Pay is a tap-and-go system that stores all of your credit card details on your phone, replacing conventional swipe methods. It is compatible with any contactless payment system. It is real to pay if you see the contactless payments symbol or the Apple Pay symbol near the readers at the checkout.

Apple Pay works using the iPhone's near-field communication (NFC) chip. It is a form of wireless technology that gives you opportunity to send mobile payments over a short distance to a reader that accepts them after you validate them. Simply hold or wave your phone in front of one of these readers while holding your finger on the Touch ID or verifying payment with Face ID to submit a payment.

When you pay for services and goods, think of Apple Pay as a safe middleman between merchants and your wallet. Merchants do not see the credit card numbers or personal details, but they do receive the funds you want to send them.

Apple Pay is safer to use than other payment systems because it needs two-factor authentication for all transactions, whether you use Touch ID, Face ID, a PIN, or a passcode. Other contactless payment systems normally need a PIN only for transactions over a certain number.

Apple Pay has extra features in its architecture on the back end that help protect the data from being collected by the third parties, such as individuals and businesses selling

to you. The merchant never sees your credit card number when you use Apple Pay to make a purchase. Instead, the system identifies your computer with a number and creates a unique transaction code each time you make a purchase. Furthermore, neither the system nor Apple's servers store your credit or debit card numbers.

When you use your phone again, a card will come into sight on the screen showing your most recent Apple Pay transaction. Visit Apple Wallet and pick the needed card to see it again. The vendor's name, date, and total of your most recent transaction will be shown. Tap the ellipsis in the bottom-right corner and pick Transactions to see more of your history. You can also turn off your transaction history and alerts from this computer.

Moreover, with the additional security of the Touch ID that is needed to make payments, even if your iPhone is lost or stolen, it seems unlikely that anyone will be able to buy anything using Apple Pay. When it comes to credit card details stored on the iPhone, however, you can easily wipe it clean by using Find My iPhone to put your computer in Lost Mode and lock it down, or you can completely delete your records.

REFERENCES

1. How Does Apple Pay Work and Is It Safe? (dailydot.com)
2. How Does Apple Pay Work, Exactly? All Your Questions, Answered (bustle.com)
3. What is Apple Pay, how it works, and how you set it up (pocket-lint.com)

USE OF ENGLISH PUNS IN MASS MEDIA

Illia Para

Kharkiv National University of Radio Electronics
Scientific Adviser – Svitlana Melnyk, Senior Lecturer
Language Adviser – Svitlana Melnyk

Puns as a language phenomenon attract linguists with their meaningful content and cognitive structure. Being one of the most complicated stylistic means, they are widely used both in conversational speech and in written texts. With the help of puns, a text acquires a specific stylistic colour, has a comic effect, and gives irony or hint to some circumstances thanks to which they are often employed in Mass Media, especially in advertising [3]. As advertisers are under the increased pressure to make their products stand out to attract the potential buyers' attention due to the use of puns, they manipulate language to enable a particular advertisement reader to linger longer over it and ultimately buy the product. The **topicality** of our research is determined by a wide use of puns in Mass Media and lack of studies made by Ukrainian scholars on this topic.

The **object** of the research is the advertisements thoroughly chosen while observing and studying the English press and Internet sources.

The **subject** of the research is puns in English Mass Media.

The **purpose** of the research is to study the use and functions of English puns in English headlines of modern Mass Media and to create materials for students based on English puns in order to foster an interest in learning English, to show the beauty of the English language.

In accordance with the purpose, the following specific **tasks** are defined:

- to learn the nature and specificities of English puns;
- to give classification of puns;
- to analyze the advertising discourse for puns;

The research shows that puns have been mostly highlighted in the works by foreign researchers. Thus, linguistic features of puns and their classification are considered in the work by Meri Giogadze and Yousef Bader. Advertising slogans, comprising wordplay are analyzed by Kerstin Fuhrich, puns advertising are found in articles by Johan Gustafsson, Xiang Ling, Ciang Tang, N. Negryshev and T. Krutko.

A pun is a form of wordplay that creates humour due to the use of a word or series of words that sound similar but that have two or more possible meanings. Puns often make use of homophones – words that sound similar, and which are sometimes spelt the same way, but have a different meaning. Puns are generally jokes – but not always; we tend to write “no pun intended” in brackets if we have inadvertently chosen our words in a way that could be regarded as a pun. In our research, we have analyzed different classifications of puns. One of them includes homophonic, homographic, compound, and visual puns. A homophonic pun, a common type, uses word pairs, which sound alike (homophones) but are not synonymous. A homographic pun exploits words which are spelt the same (homographs) but possess different meanings and sounds. Such type of puns is used less in advertisements than others. A compound pun is a statement that contains two or more puns [4]. A visual pun is sometimes used in logos, emblems, insignia, and other graphic symbols, in which some pun aspects are replaced by a picture. Visual puns turned out to be the most widely used in advertising. Visual puns mainly aim at dramatizing negative aspects, showing visual effects, visual hyperbole, or presenting shocking facts [9]. According to another classification, puns can be subdivided into three groups: lexical-semantic, structural-syntactic and structural-semantic. This classification is based on lexical, semantic and syntactic ambiguity [7].

Thus, we have come to the conclusion, that puns are a powerful means of advertising because they are characterized by language brevity and rich meanings

conveyed. Therefore, it is easy to impress the readers and attract their attention to the advertised product.

REFERENCES

1. Крутько Т. В. Мовна гра як спосіб досягнення прагматичного ефекту рекламного тексту. *Лінгвістика ХХІ ст.: нові дослідження і перспективи* : зб. наук. праць. Київ: Логос, 2012. Вип. 6. С. 209–216.
2. Негрышев, А. А. Языковая игра в СМИ: текстообразующие механизмы и дискурсивные функции (на материале газетных новостей) // *InterCultural-Net*. Вып. 5. – Электрон. текстовые дан. – Владимир, 2006. – С. 66–79. – URL: <http://vfnglu.vladimir.ru/Rus/index.htm>. (Last accessed: 07.12.2021).
3. Чжан Т. – Каламбур в китайских рекламных текстах // *Litera*. – 2020. – № 6. – С. 113-123. DOI: 10.25136/2409-8698.2020.6.32175 URL: https://nbpublish.com/library_read_article.php?id=32175 (Last accessed: 12.04.2021).
4. Bader, Yousef. 2014. A Linguistic and Cultural Analysis of Pun Expressions in Journalistic Articles in Jordan. *European Scientific Journal* June 2014 /SPECIAL/ edition. Vol. 2. P. 18-29.
5. Fuhrich, Kerstin. Mixed-language and humorous advertising slogans. Thesis for PhD degree. Ludwig-Maximilians-Universität München. 2017. 195 p.
6. Giorgadze, Meri. Categories of visual puns // *European Scientific Journal*. Special edition. Vol. 2. December 2015. P. 362-371.
7. Giorgadze, Meri. Linguistic features of pun, its typology and classification // *European Scientific Journal*. Special edition. Vol. 2. November 2014. P. 271-275.
8. Gustafsson, Johan. Puns in Japanese advertisements. A serious approach on Japanese humour. Lund University Bachelor's thesis Centre for Languages and Literature Spring 2010, 44 p.
9. Pop, Amalia Madalina. The Best Examples of Creative Ads Using Visual Metaphors. Retrieved from: <https://blog.creatopy.com/visual-metaphors/> (Last accessed: 11.04.2021).
10. Xiang Ling. On the Pun in English Advertisement. *Canadian Social Science*. Vol. 2. No. 2. June 2006. P. 68-70.

PSYCHOLOGY AND AI: BRAIN OR MIND

Oleksandra Petrenko

National Technical University “Kharkiv Polytechnic Institute”

Language adviser – Viktoriia Grashchenkova

Science called “artificial intelligence” is included in the complex of computer science, and the technologies created on its basis belong to information technologies.

The task of this science is to provide reasonable reasoning and actions using computing systems and other artificial devices.

The forerunners of artificial intelligence, including Elon Musk, Stephen Hawking and Ray Kurzweil, predicted that by 2030, machines will acquire human-level intelligence. Over the past decades, we have seen a rapid surge in technology development. Computers are becoming more powerful and more affordable, by leaps and bounds. The future is coming faster than we can adapt to it.

Kurzweil's timeline of technological singularity is based on the law of increasing returns: the more powerful computers become, the faster they develop. This is a graph of extreme exponential growth, and we are now on the cusp of a steep curve that will lead us to intelligent machines and a world dominated by robots. This was believed by Kurzweil, Musk, Hawking and many other AI researchers. After all, it's so human to believe. By 2045, we ourselves can become machines. We just need to create a fairly advanced AI, and then bam - intelligent machines... Sounds nonsense, though, because despite of the fact that people know very little about the functional of our consciousness, it can be said without any doubts that it is still millions of times more unique than the most trained AI can demonstrate.

Human consciousness, the human way of knowing the world, is distinguished from a computer by the presence of two parallel systems of cognition.

The computer has one system of cognition, namely, symbolic or symbolic-logical.

Human, on the other hand, has two jointly working systems of cognition. One of them - it is reason, intellect or symbolic thinking. And the second system is perception and imaginative thinking. These two systems exist in humans as one, inseparable whole.

The goal of neuroscience and AI is to predict human behavior by studying how the brain works. The better we understand the brain, the more efficient our AI algorithms are. The technological explosion is approaching, but our understanding of psychology, neuroscience, and philosophy remains hazy.

Thus, before trying to recreate something, you need to understand how it works. Miracles won't happen if we don't unravel the secrets of the human mind.

REFERENCES

1. “Social Psychology” by David J. Myers
2. “The Structure of Mind: The Theory of Multiple Intelligences” by Howard Gardner

THE PROSPECTS OF USING QUANTUM COMPUTERS IN THE MODERN WORLD

Liliia Pohorielova

Kharkiv National University of Radioelectronics

Scientific adviser – Lina Larchenko, associate professor

Language adviser – Viktoriia Arkhyova, senior lecturer

In the course of dramatic advancement of technology, humanity has generated great amount of data. That has caused a need to process and visualize significant amounts of information, which is time-consuming and requires ultra-fast computing power. One of the promising areas of developing means for transmitting and processing large amounts of data is the creation of quantum computers.

The key difference between quantum computers and traditional ones is their methods of handling data. In case with conventional devices, all information is stored in bits (a unit of information that only can take on one of the two values: either 0 or 1). During the computation process, a huge amount of time is spent on writing and deleting intermediate values, which significantly slows down the operation of devices.

Quantum computers, in turn, use a fundamentally different approach: storing and processing data with the use of quantum bits that is qubits, which can take on the value of both 0 and 1 simultaneously. These units of information can store not only 0 and 1, but also be in a transitional state. Such a solution will significantly save time, and, therefore, complex tasks can be solved much faster.

Fundamentally different principle of data processing in quantum computers conditions the demand for developing new software: a special quantum OS and special quantum applications.

The prospects for using quantum computers cover a wide range of opportunities. Many researchers state that they will be especially relevant in such areas as: finance, information security, chemical industry, medicine and pharmaceuticals, and logistics.

As far as financial sphere is concerned, application of quantum computers could be of great importance for optimizing investment portfolios, forecasting financial crises, building credit risk models, and protecting against fraud by means of analyzing the history of transactions.

Due to the tremendous speed of computations, a quantum computer will reduce the time of decrypting information to several hours or minutes. The application of the ideas of quantum mechanics has already opened a new era in the field of cryptography, as the methods of quantum cryptography provide new opportunities in message transmission.

From theoretical point of view, quantum computers are also well suited for machine learning needs. They manipulate large amounts of data in a single pass and are capable of simulating large neural networks. In 2013, Google Corporation announced the opening of a quantum research laboratory in the field of AI (artificial intelligence). The automakers of Volkswagen and Daimler could potentially use quantum computers to develop new types of batteries and systems that calculate the optimal paths for cars, and the manufacturers of Airbus could calculate the most fuel-efficient take-off and descent paths for an aircraft.

It is assumed that with the help of quantum computers it will be possible to accurately model molecular interactions and chemical reactions. Chemical reactions are quantum in nature. As for classical computers, the calculation of behavior is available only for relatively simple molecules. According to experts' forecasts, simulation on quantum computers opens up new prospects for the development of the chemical industry, in particular, in the creation of medications.

Thus, quantum computers in the future are not just a new invention, but a solution to the most important issues of our time. It is quite possible that with the help of quantum computers, humanity will develop vaccines against most serious diseases or will be able to create unique materials with fantastic properties. Although the invention of quantum computers is still in the R&D (research and development) stage, advances in this area are already showing great promise.

REFERENCES

1. Bernhardt Chris, Quantum computing for everyone, Cambridge, The MIT Press Publ., 2019. 214 p.
2. Mingsheng Ying, Quantum computation, quantum theory and AI. Artificial Intelligence, no.174, 162–176 pp., 2010. Available at: <https://www.sciencedirect.com/science/article/pii/S0004370209001398> (Accessed 6 April 2021).
3. Matthews David, How to get started in quantum computing, Nature no. 591, 166-167 pp., 2021. Available at: <https://www.nature.com/articles/d41586-021-00533-x> (Accessed 6 April 2021).

FUTURE WITH NEURALINK

Sofia Rutska

Kharkiv National University of Radioelectronics

Scientific adviser – Vladimir Hahanov, Chief Research Scientist of the Department

Language adviser – Viktoriia Arkhypova, senior lecturer

Humanity has long understood that the brain can be influenced directly by sending certain signals from the outside. Neuralink is a project by Elon Musk that started in 2016. The company is developing a special device that can transmit brain signals via Bluetooth. This will allow control a computer or smartphone directly using brain impulses.

It is important to emphasize that Neuralink did not invent brain-computer interfaces they have existed and have been implanted in humans since 2006. The problem is that this is all work with a very low resolution. Such studies are carried out with paralyzed patients, who have a grid of electrodes attached to their heads that read very roughly the activity of the brain.

Many research groups and companies around the world are exploring the possibility of correcting what is not working as it should in the brain. For example, a paralyzed woman using an implant can use a robotic arm to bring a bottle of water to herself.

The complexity of the brain is not just a huge number of neurons interacting with each other according to complex algorithms, the problem is that the human brain has a dynamic structure. The same function, for example, to stretch the right hand up, is not simply implemented by a different set of electrical commands in the brain of different people, over time the same person can “encode” the same action in different ways.

On the night of August 29, 2020, as promised, Elon Mask, held an online presentation, where he spoke about the progress in the development of a high-tech neuro interface for connecting the brain with a computer over the past year (Neuralink, a neurotechnological startup). The developers showed the second generation of the neuro interface and the neurosurgical robot for its implantation.

As part of the presentation, Elon Musk demonstrated the operation of the neuro interface on the pig Gertrude: with the help of an implant it was possible to count the activity of neurons in its brain from all channels.

One of the main areas of the work of the Neuralink group is the development of methods that would make it possible to bring the resolution of information reading to a completely new level.

The company's main contribution to the technology is thin flexible wires that are covered with electrodes for recording brain activity. Filaments have more electrodes than other systems. That is, their throughput is much higher. Besides, they do not cause such serious damage as stiff needles. However, foreign objects in the brain are destroyed over time, and smaller ones are destroyed faster. One of the team members said that one of the main challenges for Neuralink was ensuring that the device could operate for decades in a hostile environment like the brain.

The initial goal of their technology will be to help people with paralysis to regain independence by means of the control of computers and mobile devices. Their devices are designed to give people the ability to communicate more easily via text or speech synthesis, to follow their curiosity on the web, or to express their creativity through photography, art, or writing apps.

In the long run, Musk claims that Neuralink could allow humans to send concepts to one another using telepathy and exist in a "saved state" after they die that could then be put into a robot or another human.

In the near future, Musk wants to implant Neuralink chips into quadriplegics who have brain or spinal injuries so that they can "control a computer mouse, or their phone, or any device just by thinking."

REFERENCES

1. <https://neuralink.com>
2. <https://www.cnbc.com/2021/02/01/elon-musk-neuralink-wires-up-monkey-to-play-video-games-using-mind.html>
3. <https://medium.datadriveninvestor.com/highlights-of-neuralinks-presentation-ddba1890e37a>
4. Changes in Cognitive State Alter Human Functional Brain Networks, Malaak Moussa, 2011.

PERFORMANCE TESTING IN AUTOMATED QUALITY ASSURANCE

Olha Savchenko

National Technical University "Kharkiv Polytechnic Institute"

Quality Assurance as a subset of the software development life cycle uses automated testing tools to run tests on the software being developed and report on the results. Automation testing handles many of the time-consuming tasks that were previously carried out by manual testers and is especially useful for continuous

integration and continuous delivery, where software is developed, tested, and deployed multiple times per day, rather than in stages.

The usage of different software tests depends both on the application and on development methods. Unit, integration, functional, smoke, end-to-end, regression and performance testing are used to prevent mistakes and defects in manufactured products and to avoid problems when delivering products or services to customers.

Performance testing quality assurance is especially important. This type of testing combines a series of non-functional tests used for checking the speed, stability, and reliability of the software under a particular workload – such as the amount of people using the app at any one time. The aim is to ensure the software satisfies performance requirements, and to identify and fix performance-related bottlenecks. Common performance problems are long load time, poor response time, poor scalability and bottlenecking. Load time is normally the initial time it takes an application to start. Response time is the time it takes from when a user inputs data into the application until the application outputs a response to that input. This should generally be kept to a minimum otherwise the user loses interest. A software product suffers from poor scalability when it cannot handle the expected number of users or when it does not accommodate a wide enough range of users. Load Testing should be done to be certain the application can handle the anticipated number of users. Bottlenecks are obstructions in a system which degrade overall system performance. Either coding errors or hardware issues cause a decrease of throughput under certain loads. Bottlenecking is often caused by one faulty section of code and is generally fixed by either fixing poor running processes or adding additional Hardware.

REFERENCES

1. https://en.wikipedia.org/wiki/Regression_testing
2. <https://medium.com/@allenliuzihao/automated-integration-testing>
3. <https://www.guru99.com/integration-testing.html>
4. <https://www.scientecheasy.com/2020/07/selenium-automation-testing.html/>
5. <https://www.walkterbeaconlab.com/quality-assurance/>

SELF CHECKOUT TECHNOLOGY

Vadym Sheveliev

National Technical University “Kharkiv Polytechnic Institute”

Scientific adviser – Dmytro Dvukhhlavov

Language adviser – Lidia Diomochka

Overview

Customers hate waiting in line to pay for their purchases. Long lines can be a big deterrent, and customers will often leave if they have to wait too long. This results in lost sales, loss of customer loyalty, and poor customer experience.

Self checkout has been increasing in popularity for several years, and since the outbreak of COVID, it has become the preferred way for many customers to pay for their purchases. It reduces the time spent waiting in line, and minimizes contact with both staff and other shoppers.

Customer trends leading to self-checkout popularity

1. DIY

Do-it-yourself has become the norm for today’s consumers. From self-scanning one’s bags at the airport to self-management of personal finances on phone apps, the tendency to DIY has spread to most facets of life. Across the world, there seems to be a shared preference for figuring things out on one’s own. Moreover, many would rather interact with machines than with people.

2. Rushed lives

Today’s consumers lead busy lives, and have no time to waste. They are used to getting what they want instantly. And when they shop in-store, they expect to do it at their own pace. They may wish to take their time picking out items – but once they are done, they want to speed through checkout, and be on their way.

3. Smaller hypermarket baskets

Across the globe, consumers go to the supermarket multiple times per week, and buy just a few items at a time. According to global research, today more than 60% of hypermarket baskets contain six or fewer items.

Self-checkout different types

There are different traditional checkouts with different pros and cons:

1. Self-checkout units

Some convenience stores have already been using self-checkout machines in their stores for a few years. They have some advantages: shorter lines and faster checkout; improved privacy; greater accuracy; reduced labor cost; better in-store optimization thanks to availability of new space with reduction of queues; improved customer

experience. However, they are not the ultimate solution for fully automated checkout since the customer needs to still checkout items one by one. Moreover, implementation costs are high.

2. Self-checkout units with RFID

A new RFID-based self-checkout counter in 2020. Retailers can label all their products with RFID tags. When costumers place their shopping bag on the counter, all the products get scanned at once without any effort and counter displays a full list of the products and total price. This technology reduces the time spent on the entire checkout experience to 30 seconds. For this technology to work, all items need to be tagged with RFID tags and these potentially expensive checkout machines need to be installed in stores.

3. Vending Machines

One company produces customized vending machines to provide automated checkout experience. Vending machines automates the checkout experience and is potentially more secure than other approaches. However, vending machines put a glass between products and customers and do not allow them to touch products before buying. In addition, these machines are also expensive hardware.

4. Scan & Go App

Walmart introduced the Scan & Go program in select stores between 2012 and 2014. The app basically allows customers to scan the products with their smartphones and pay by scanning a barcode for their total purchase and pay for their goods. Compared to other systems, this is the easiest to deploy system however creates additional work for customers. Due to customers' negative feedback about the confusing process of bagging, weighing and then scanning items, the company ended the program in 2018.

5. Smart stores

In general, the main reason for long waiting times in long checkout lines is POS systems and POS devices. Traditional scanning and payment processes cause increase in waiting times whether you are in a convenience store or supermarket. There are software solutions for payments. One of the key features of automated checkout systems is online payment with a pre-registered credit card.

Standard Cognition: The company uses computer vision technology to track people and the products in real-time in the store. Deep learning and image recognition technics enable Standard Cognition to recognize items.

Amazon Go: Amazon also uses computer vision and deep learning algorithms like Standard Cognition. Amazon calls this technology "Just Walk Out" and uses approaches used in autonomous driving vehicles. Amazon uses various cameras and

sensors to see what customers are putting into their shopping bags. Customers scan a QR code when they enter the store through an app, which is connected to their Amazon.com account. After shopping, customers can simply leave the store. Amazon automatically charges the customers' Amazon account and receipt is sent to the app.

Advantages

The reason why self-checkouts have become so popular is that they are beneficial for both the customers and the stores as well. Shoppers can expedite the least enjoyable process of shopping since they do not have to wait in line for their items and will, therefore, have fewer reservations about making repeated trips to a particular store. For the business, self-checkout machines offer an opportunity to save costs.

Reduced labor costs is one of the biggest potential advantages to businesses. Instead of needing one cashier per checkout lane, stores can now have one check-out manager oversee multiple machines. These machines also generally take up less space, which means stores can add more displays, or add additional checkouts.

From the customer experience point of view, customers can benefit due to a shorter wait in line, especially if cashier lines are large or you're at the store at a particularly busy period of the day. 39% of users surveyed said that going through self-checkouts is faster than standing in line, according to the study.

Additionally, not everyone wants to chat in the checkout lane. According to the survey, 73% of respondents were in favor of self-service technologies to improve the retail shopping experience and reduce staff interactions, up 10.6% from last year.

Disadvantages

Not everyone is in love with this new trend, and there are many good reasons why.

Shoplifting is a real issue, and when customers are entrusted to check out their purchases themselves, we can expect some cheating to happen. Nearly 20% of people surveyed admitted to having stolen when using a self checkout kiosk, according to the study.

A case could also be made that self-checkout's introvert-friendly features are not a good thing, as they negatively affect the customer-store relationship, especially for those shoppers who are less tech-savvy than others and can find the machines intimidating and inefficient. For example, whereas a cashier would be able to explain a customer why a discount is now invalid, an automated machine may not be able to do it.

Additionally, some people enjoy talking to the cashiers at their local store and maybe even look forward to the interaction — not to mention those who fear that the machines will negatively impact jobs.

Conclusions

Although more stores have implemented it, the costs of self-service checkout are high. Additionally, there are security risks. For low-volume, mom-and-pop shops, the service may not be worth it. However chains are already experimenting with the next level in allowing consumers to check themselves out using their mobile phone. Businesses with multiple locations, young clientele, and desire for speedy checkouts may benefit.

REFERENCES

1. N. Rashed, Self-Checkout: Pros, Cons, and the Future – SmarterCX // <https://smartercx.com/self-checkout-pros-cons-and-the-future/> // 30/08/2019
2. T. Watson, Self Service Checkouts // <https://skywell.software/blog/self-serve-checkouts-pros-cons-how-to-implement-in-your-store/> // 11/06/2020
3. C. Dilmegani, Self Checkout Systems in 2021: Comprehensive Guide // <https://research.aimultiple.com/self-checkout/#cons-of-self-checkout-systems> // 6/01/2021
4. G. Pezzini, Deliver faster, better service with self-checkout technology // <https://www.lsretail.com/blog/self-checkout-technology> // 2/07/2020
5. B. Dwyer, Pros and Cons of Implementing Self Checkouts // <https://www.cardfellow.com/blog/self-checkout-should-you-implement-it/> // 7/11/2019
6. M. Pratt, The Pros and Cons of Using Self-Checkouts // <https://www.business.org/software/point-of-sale/the-pros-and-cons-of-using-self-checkouts/> // 7/08/2013
7. T. Rueter, What's Next for Food Retail Self-Checkout? // <https://progressivegrocer.com/whats-next-food-retail-self-checkout> // 17/08/2020

ALTERNATIVE METHOD OF MAKING PAPER AS A METHOD FOR RESCUING ENVIRONMENT FROM DEFORESTATION

Lidia Starkova
National Technical University “Kharkiv Polytechnic Institute”
Language Adviser – Viktoriia Vrakina

This work is about the invention of Ukrainian student who lives in Zhitomir. In the spring of 2016, he came up with idea how to make paper from fallen leaves.

Everyone knows that the paper on which we write, draw, from which books, magazines, newspapers, postcards and much more are made, is made of wood. And for this, a huge number of trees are cut down! Statistics show 125 million trees cut down

annually to make paper. And this is not the limit. The world's population is growing, and so is the consumption of paper. Always the past 20 years, world paper consumption has increased from 92 to 208 million tons per year - an increase of 126%! It is sad to imagine what will happen to the forests in a few decades if this problem is not solved. What planet will our descendants inherit?

When making paper from leaves, more raw materials are needed than from wood; a ton of fallen leaves will save 100 trees from cutting down on average. Plain paper uses synthetic fillers to give it strength. The leaf paper contains common starch and kaolin. During the production process, crushed and peeled leaves are boiled in giant vats at a temperature not exceeding 40 degrees, which excludes the release of harmful substances. After primary processing, the raw material is diluted in production 50:50 with waste paper and sent to the conveyor, where it gradually loses excess moisture and stretches to the state of tissue paper.

In order to understand whether such production will be promising, it is necessary to calculate the cost of the processing of fallen leaves. Leaves in large cities are removed by utilities. Tons of leaves are taken to landfills, where they simply rot. We can find a more worthy use for them. If you conclude an agreement with utilities, you can get hundreds of thousands of tons of leaves almost free of charge. Then, necessary to rent a large room for processing leaves into briquettes and storing them. This is the most costly stage, especially since rent in different regions of our country costs differently

Further, these briquettes can be used according to the technology of our compatriot.

Having calculated the costs of producing this paper from leaves, everybody can realize that this costs is lower than the costs of producing paper from wood. It means this project may be implemented at enterprise which deals with the process of recycling waste paper.

CRYONICS, BRAIN PRESERVATION AND THE WEIRD SCIENCE OF CHEATING DEATH

Veronika Tsarfina
National Technical University “Kharkiv Polytechnic Institute”
Language Adviser – Larysa Sheina

The question of prolonging life of a human is rather widely studied nowadays. It is a popular stuff not only of science fiction but also of scientific research. One of the ways proposed is cryonics, e.g. chilling a body inside a stainless-steel chamber for years. But is cryonics a way to reverse death or is it just a pipe dream?

Critics say cryonics is a pipe dream, no different from age-old chimeras like the fountain of youth. Scientists say there's no way to adequately preserve a human body or brain, and that the promise of bringing a dead brain back to life is thousands of years away. One of the central questions of cryonics is how to preserve a dead body if there is a hope to revive it.

We paid our attention to “Alcor” – a company which proclaims itself a world leader in cryonics, offering customers the chance to preserve their bodies indefinitely, until they can be restored to full health and function through medical discoveries that have yet to be made. For the price of \$220,000, “Alcor” is selling the chance to live a second life. More than 1,300 people have now signed up to have their bodies sent to “Alcor” instead of the graveyard. It is possible to say that even if they don't know exactly when or how patients will be brought back, the team at “Alcor” knows one vital thing: they need to preserve as much of the brain and body as perfectly as possible.

As for the procedure, when patients come through the doors at “Alcor”, they have already been pronounced legally dead. Ideally, they haven't had to travel far to get here and they've had their body put on ice as soon as possible after clinical death. According to Chamberlain, that hypothermia is vital for "slowing down the dying process.

The ice bath is the first step in the preservation process, and it's here where the patient is placed in a kind of post-death life support. Drugs are administered to slow down metabolic processes, the body is intubated to maintain oxygen levels, and a mechanical thumper pumps the heart to ensure blood keeps flowing around the body. The team then prepares the body to be cooled down to its permanent storage temperature. The blood is replaced with cryoprotectant, which is pumped through the veins, all in a bid to (surprisingly) prevent the body freezing.

Freezing might sound like the natural end goal of cryopreservation, but it is actually incredibly damaging. Our bodies are about 50-60% water, and when this water starts to freeze, it forms ice crystals which damage the body's organs and veins. But if the water is replaced with cryoprotectant, “Alcor” says it can slowly reduce temperatures so the body vitrifies – turning into a kind of glass-like state, rather than freezing. From here, the body is placed in a giant stainless steel chamber, known as a dewar. It is said a cryopreserved body can be stored in this "long-term care" for decades.

Unfortunately we should conclude that this kind of future is possible only if the process of going into cryonic preservation doesn't damage your brain. The brain is a staggeringly complex organ, and storing it at subzero temperatures for decades at a time has the potential to cause serious cellular damage. And according to some scientists, that's the main issue with cryonics. Before you even get to the issue of reanimation, they say, cryonics doesn't come close to delivering on the promise of preservation.

So, it is a perspective future for us. We can be the oldest humanity of the world and be able to teach very fast our young future generation, how to do that, how to increase urgent problems in the science. Our science will grow rapidly.

REFERENCES

1. <https://www.brainpreservation.org/>
2. <https://www.alcor.org/library/neuropreservation-option/>
3. <https://pubmed.ncbi.nlm.nih.gov/14580852/>

UKRAINIAN PORTABLE ANTI-TANK MISSILE SYSTEMS

Anton Velikodvorskiy, Sergii Shvedyuk

Military Institute of Armed Forces, NTU «KhPI»

Scientific adviser – Basil Davudenko, Senior Lecturer

Language adviser – Viktor Basov

An anti-tank guided missile (ATGM), anti-tank missile, anti-tank guided weapon (ATGW) or anti-armor guided weapon is a guided missile primarily designed to hit and destroy heavily armored military vehicles.

ATGMs range in size from shoulder-launched weapons, which can be transported by a single soldier, to larger tripod-mounted weapons, which require a squad or team to transport and fire, to vehicle and aircraft mounted missile systems.

The introduction to the modern battlefield of smaller, man-portable ATGMs with larger warheads has given infantry the ability to defeat light and medium tanks at great ranges, though main battle tanks (MBTs) using composite and reactive armors have proven to be resistant to smaller ATGMs.^[1] Earlier infantry anti-tank weapons, such as anti-tank rifles, anti-tank rockets and magnetic anti-tank mines, had limited armor-penetration abilities or required a soldier to approach the target closely. As of 2016, ATGMs were used by over 130 countries and many non-state actors around the world. ALL this Portable antitank guided missile launchers is designed for destroying stationary and moving modern armored targets with composite, array or monolithic armor, including active armor, as well as pinpoint targets like weapon emplacements, a tank in a trench, light-armored objects and helicopters.

Main peculiarity is the ability to aim the missile from closed position and storage depots, reducing the risk of gun-layer destruction by enemy return fire.

SKIF

The system is equipped with 130 mm and 152 mm missiles in transport and launching containers with tandem hollow-charge (RK-2S, RK-2M-K) and high explosive fragmentation (RK-2OF, RK-2M-OF) warheads.

Skif can guide the missile at the target from closed emplacements and shelters to reduce the risk of the operator destruction by return fire attack of the enemy.

STUGNA P

Manufacturer: Kyiv Design Bureau “Luch”

Main Specifications are given in the table.

Firing range, m:	
– in the daytime	100-5000
– at night	100-3000
Maximum range total flight time, sec	23
Guidance system	by laser beam with automatic target tracking
Warhead:	
– type	cumulative tandem
– Active armor piercing	not less than 800
Weight, kg:	
– Missile in container	29,5
– Launcher	32
– Pointing device	15,5
– Remote control	10
– Thermal imaging module	6
Overall dimensions:	
– Missile caliber	130
– Shot length	1360
– Outer diameter of the container	140
Operating temperature range °C	from – 40 to +60

CORSAR ANTI-TANK MISSILE SYSTEM

Corsar is a light, portable anti-tank missile system

Missile Weight: 11.5kg

A mock-up of the Corsar missile system was exhibited at the seventh International Defence Exhibition (IDEX) held in Abu Dhabi, UAE, in February 2005. The weapon underwent live-firing tests at a firing range near Kiev in July 2013. A prototype of

Corsar was demonstrated at the 169 Land Forces training centre of the Armed Forces Desna of Ukraine in May 2015.

The anti-tank guided missile can attack targets up to a range of 2.5km and has a maximum flight time of 13 seconds at the maximum range. It can destroy low-speed evading targets. The weapon can operate in temperatures between -40°C and 60°C.

REFERENCES

1. Defense Express Media & Consulting Company (defence-ua.com)
2. Wikipedia.org
3. military-today.com

VIRTUAL REALITY OR THE WORLD OF THE FUTURE

Karina Vrakina

Kharkiv National University of Radioelectronics

Language Adviser – Tatyana Berkutova

VR, or virtual reality, is a term used to describe a world created in a computer environment with which a person can interact using the senses: sight, hearing, touch.

Virtual reality glasses allow you to immerse yourself in this world - this is a device with a screen divided in half by a partition. For each eye, a special stereoscopic image is displayed, thanks to which a feeling of the extension of space and the relief of objects is created. For a more complete immersion in the virtual world, stereo sound is used - depending on where it comes from, you will hear it quieter or louder.

You might think that this is a new technology, but the first virtual reality glasses were developed by the Philco Corporation back in 1961. They called their product Headsight, which was able to determine the position of the user's head and the direction of his gaze, but was quite cumbersome. Modern glasses are much more compact.

Now they are trying to use virtual reality in all entertainment, as well as scientific areas: cinema, games, education, experiments, etc. For example, using VR glasses, you can conduct experiments on labonlaptop or see how it looks solar system at materialworlds. Medical students learn more about surgery by performing surgery in as close to real conditions as possible, or study human anatomy.

In the entertainment field, things get much more complicated and confusing. What people are not trying to do to immerse themselves in the virtual world. In the gaming field, significant changes are now taking place, when instead of the usual keyboard and mouse, special "futuristic" controllers appear.

How will the world become more modern when the use of virtual reality becomes more widespread and familiar to everyone?

Considering the field of cinema, according to experts, we are now one step away from the revolution! According to the artist and virtual reality guru Chris Milk, the cinema of the future will offer a personalized approach to your needs and an immersive experience created especially for you. Such films will be able to develop the plot in real time, "specifically for you, to meet your exact needs, based on what you like and what you don't."

Milk likes the term "living the story", he replaces the usual one - "storytelling," telling a story. Milk believes that cinema technique will evolve so that the film will be perceived as part of everyday life, only with striking elements of fictional stories. The development of artificial intelligence technology will allow characters created with the help of a computer to respond to the requests of the audience in real time. Imagine a much more advanced version of Siri, just as a movie character.

Influential documentary journalist Nonnie de la Peña says that "flat media will still be with us, like radio has not gone anywhere, but cinematography will by no means remain flat."

Eugene Chang is the director of *Allumette*, a virtual reality movie set in a futuristic city floating in the clouds. It was filmed using "six degrees of freedom" (6Dof, immersive graphics) technology, which allows viewers to physically move around in the created world.

In the future, Chang believes, VR will increasingly merge with AR Cloud, which is essentially a digital copy of our world. "Imagine an extremely detailed version of Google Earth, in which not only the streets, but the whole world in every detail," he suggests. "We will mix this world with the highest class virtual reality, the technology of which is already quite impressive today." In the future, stories will literally surround you, according to Chang. For example, "you wake up, and on the table next to the bed, a movie character that you like is waiting for you. Already, films are being created that advance in this direction, for example," She ".

Australian VR artist and filmmaker Collisions and Awavena Lynette Wallworth says ways to tell a story using virtual reality technology will offer new experiences for people - like being autistic, experiencing the world around them. Wallworth foresees that VR and AR will expand the color palette of traditional films: virtual reality helmets will allow you to switch from simply "watching" a movie to being completely immersed in one or another episode of the film - at the request of the viewer himself. But there is also the danger of virtual, mixed reality: after all, the viewer, having the

freedom of action, can choose a completely different direction than the storyteller had in mind.

A similar fate will apply to video games. Players all over the world are waiting with bated breath for virtual reality to be actively used in video games. This is an opportunity not just to be a participant and an observer sitting on a chair. It's like becoming a character in the game yourself. There is already a list of the best video games for virtual reality. As the technical field of video games is undergoing constant modernization, gambling fans should be in awe. Very soon VR technologies will take over the gaming world.

Have you long dreamed of lighting up on a cool show of world celebrities? Virtual reality will easily solve the problem of buying expensive tickets. Will create the most real effect of presence. By the way, sports events are also interested in using virtual reality. What could be more beautiful than watching the decisive match from your couch? Firstly, an unlimited number of drinks at home, and secondly, no crowds. Only you, your favorite team and VR technology.

Shopping in the comfort of your home, perhaps, does not surprise anyone. We use online stores, applications. We order products and interior details with delivery. But here, too, virtual reality can surprise. Many stores are already preparing for the introduction of such technologies. For example, clothing boutiques want to use virtual fitting rooms so that shoppers can try on clothes without touching them. And Ikea decided to help make the right choice in this way. Through a special application, you can see how the furniture looks in your interior.

Thanks to the emergence of VR technologies in the teaching process, students will have the opportunity to participate even in historical events. Simulate any situation, travel back to the Middle Ages - no problem. The attendance of classes will increase significantly. Most likely, first, virtual reality will fill schools, well, and then move on to secondary and higher education. For example, students of engineering and medical universities will be able to visit laboratories and conduct experiments virtually.

Experts believe that virtual reality will help make a breakthrough in the treatment of diseases of the nervous system. VR technologies will begin to be used to combat phobias. Of course, VR will also contribute to the work of surgeons.

Now there are still a huge number of developing projects to help people with disabilities. Another example that the VR technologies of the future are not fun! I will give one of them as an example. Autism Spectrum Disorders (ASDs) manifest in different ways. These can be disorders of social behavior, communication and verbal abilities. Or, for example, narrowing of interests, repetition of actions that are specific to a certain person. Other disorders often accompany ASD: epilepsy, depression, anxiety,

and attention deficit hyperactivity disorder. The intellectual level ranges from severe damage to high cognitive abilities.

The VR project “Mechanics of Autism” is the first of a series of stories in the format of virtual and augmented reality, prepared by RIA Novosti journalists. With this VR solution, you can try on the role of a person with a special worldview. For example, feel the meltdown. This is a situation of extreme nervous excitement caused by an overabundance of sensations and feelings. Its opposite is the shutdown. With a shutdown, a person with an autistic disorder withdraws into himself, stops responding to the world around him and falls into a kind of trance or catatonia.

Users will learn how sensory overload occurs and what the risk of overfeeding is. The creators of the project launched a public campaign explaining how people with ASD see the world - why they have difficulties with abstract thinking and prefer to live according to a certain schedule. In 2019, the Mechanics of Autism project won the European Digital Media Awards, ranking 2nd for Best Use of Online Video, Including VR.

Virtual reality can make our real reality a lot easier. But life is one here, now and not only in 3D glasses. Let's remember this.

MICROSOFT MESH

Maria Zhvanko

National Technical University «Kharkiv Polytechnic Institute»

Language Adviser – Viktoriia Vrakina

The concept of Microsoft Mesh is closely connected with the meaning of the verb “to mesh”. When different things or people mesh, they suit each other or work well together.

Microsoft Mesh is something not just about sharing experience in mixed reality. It's more about making the idea that was always connected with the concept of future innovations a reality now and here.

For years people whose passion is virtual reality technologies have been trying to match the magic of visual and live performances. And as a result we have Microsoft Mesh, a new mixed-reality platform powered by Azure. It allows people in different physical locations to join collaborative and shared holographic experiences on many kinds of devices.

From the beginning the idea is so powerful that its applying is wide enough to affect nearly any aspect of our lives. Microsoft Mesh will enable geographically

distributed people to have more collaborative meetings, assist others, learn together, host virtual social meet-ups, have a casual conversation and so on.

The company said that a person would initially be able to express him- or herself as an avatar and use holoportation to project a body as most lifelike photorealistic person.

Looking at one of the examples of using this technology, anybody is immediately convinced of how vital this is going to be in the nearest future.

The situation in which you're an architect or a usual engineer, having some problems with your device inside is not solvable easily from the first glance. You have to take it apart, look through all the details, in the worst case, and only then find out what is wrong. But with the help of Microsoft Mesh you could physically walk through a holographic model, seeing how all the pieces of equipment fit together in three dimensions potentially avoiding costly mistakes.

Over time, the company said, that it would be possible for the customers to choose from a growing set of Microsoft Mesh – enabled applications and benefit from planned integrations with Microsoft products such as Microsoft Teams and Dynamics 365.

The future now is rather sooner than later and that is impressive.

REFERENCES

1. Microsoft. Microsoft Mesh. Retrieved from: <https://www.microsoft.com/en-us/mesh?activetab=pivot%3aprimar7>.
2. Microsoft News. (2021, March 2). Microsoft представила новую платформу Mesh для взаимодействия в смешанной реальности. Retrieved from: <https://news.microsoft.com/ru-ru/microsoft-mesh/>.
3. Vladimir Skripin. (2021, March 3). Microsoft представила Mesh – новую платформу для общения и работы в смешанной реальности на базе облака Azure. Retrieved from: <https://itc.ua/news/microsoft-predstavila-mesh-novuyu-platformu-dlya-obshheniya-i-raboty-v-smeshanno-j-realnosti-na-baze-oblaka-azure/>.

DEUTSCHE SEKTION

PHOTOPLETHYSMOGRAPHIE UND PULSOXYMETRIE

Sasha Hryhorovych

Charkiwer Nationale Universität für Radioelektronik

Projektleiterin – Deutschlehrerin Marina Plotnikowa

Heute gibt es in unserer Gesellschaft eine große Nachfrage nach nichtinvasiven erschwinglichen Methoden für präzise medizinische Diagnostik. Photoplethysmographie, oder PPG, ist eine optoelektronische Methode, die erlaubt, Herzfrequenz und Sauerstoffsättigung messen. Solche Geräte wie Pulsoxymeter, Fitnessarmbänder und selbst Kameras der modernen Handys können dabei helfen.

Ihre Hardware ist ziemlich einfach: es gibt Lichtdioden (LEDs, gewöhnlich Rot und Infrarot), um Gewebe zu erleuchten, und ein Fotodetektor, um resultierendes Signal zu erfassen. Es gibt zwei Wege, wie diese Teile plaziert werden können. (siehe Abb. 1). Transmissionsmodus bietet ein besseres Signal, aber wegen seiner Konstruktion können die Signale nicht von jedem Platz am Körper aufgenommen werden. Reflexionsmodus ist flexibler, aber das Signal ist schlimmer.

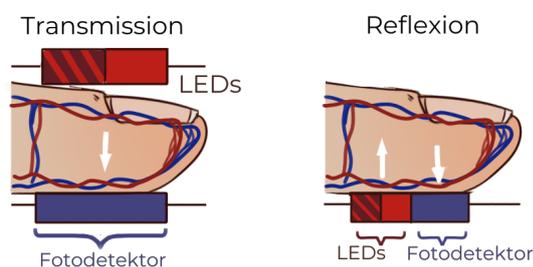


Abbildung 1 — Anordnung der PPG-Teile

Das PPG-Signal ist eine optische periodische Pulswelle, die vom Blutfluss generiert wird. Es gibt zwei Komponenten dieses Signals (siehe Abb. 2): die variable Komponente, die den arteriellen Bluteinfluss abbildet (so gennante AC); und die konstante Komponente, die mit optischen Signalen vom venösen Blutfluss, von der Haut, subkutanem Gewebe, Knochen usw. zu tun hat (so gennante DC).

Die Zeitspanne zwischen den Pulswellen bestimmt die Herzfrequenz. Herzfrequenzmessung mit PPG ist allgegenwärtig und relativ einfach zu machen, aber PPG kann viel mehr anzeigen.

Hämoglobin ist ein Protein unseres Blutes, das verschiedene Gase (Sauerstoff, Kohlendioxid usw.) vom Lungen zum Gewebe und zurück trägt. Wie viel Sauerstoff das

arterielle Blut enthält, ist ein wichtiges Lebenszeichen, Sauerstoffsättigung genannt. Sie kann durch Pulsoxymetrie gemessen werden.

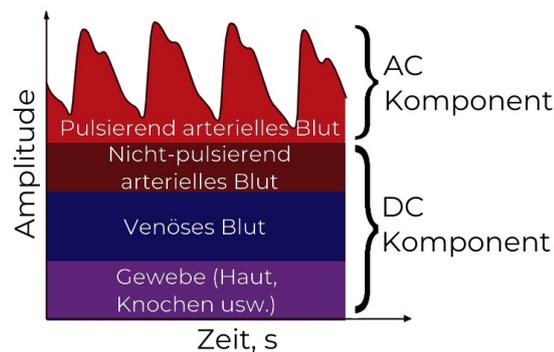


Abbildung 2 — Komponenten der PPG-Signale

Pulsoxymetrie benutzt den optischen Unterschied zwischen Hämoglobin, das Sauerstoff enthält (HbO_2), und gesamtem Hämoglobin (Hb), das andere Gase auch enthält. Sie erfasst die AC- und DC-Komponenten von Roten und Infraroten Wellenlängen und berechnet ihre Relation folgendermaßen:

$$R = \frac{AC_{\text{Rot}} / DC_{\text{Rot}}}{AC_{\text{Infrarot}} / DC_{\text{Infrarot}}}$$

Dieser Koeffizient ist jedoch kein Endergebnis. Es gibt eine non-lineare Beziehung zwischen der peripheren Sauerstoffsättigung und dem R-Koeffizient, die Kalibrationskurve genannt ist. Exakte Kurven kommen auf den Hersteller an.

Bevor Sauerstoffsättigung mit PPG allgegenwärtig wurde, waren die Messungen von Sauerstoffsättigung langsam und invasiv. Man musste eine Blutprobe nehmen und analysieren. Diese Methode ist auch benutzt — sie ist direkt und genau, aber für die meisten Zwecke ist Pulsoxymetrie eine gute Annäherung.

Experimentelle Algorithmen versprechen auch den Blutdruck mit PPG zu messen. Das war zuerst ein Versuch von intraoperativer Überwachung, zusätzlich zu traditionellen Blutdruckmessungen mit Druckmanschetten. Heute ist es möglich, den Blutdruck mit Hilfe von Fitnessarmbändern mit gewisser Genauigkeit zu messen — obwohl sie eine EKG-Signal mit einer Ableitung benötigen.

Andere Algorithmen helfen, die EKG selbst von PPG abholen, aber sie sind noch in Entwicklung. Es gibt Hinweise, dass wir andere Herzfunktionsangaben und den Blutzuckerspiegel mit PPG entziffern können, aber es ist noch ein langer Weg zu gehen.

QUELLENVERZEICHNIS

1. Allen, J. Photoplethysmography and its application in clinical physiological measurement (2007) *Physiological Measurement*, 28 (3), art. no. R01, pp. R1-R39. / DOI: 10.1088/0967-3334/28/3/R01 (дата звернення: 10.02.2021).
2. Tamura, T., Maeda, Y., Sekine, M., Yoshida, M. Wearable photoplethysmographic sensors — past and present (2014) *Electronics*, 3 (2), pp. 282-302. / DOI: 10.3390/electronics3020282 (дата звернення: 15.02.2021).
3. Shelley, K. H. Photoplethysmography: Beyond the Calculation of Arterial Oxygen Saturation and Heart Rate (2007) *Anesthesia & Analgesia*, 105(On Line Suppl.), S31–S36. / DOI:10.1213/01.ane.0000269512.82836.c9 (дата звернення: 19.02.2021).
4. Q. Zhu, X. Tian, C. Wong and M. Wu, ECG Reconstruction via PPG: A Pilot Study (2019) *IEEE EMBS International Conference on Biomedical & Health Informatics (BHI)*, Chicago, IL, USA, 2019, pp. 1-4, doi: 10.1109/BHI.2019.8834612. (дата звернення: 10.02.2021).
5. Monte-Moreno, E. Non-invasive estimate of blood glucose and blood pressure from a photoplethysmograph by means of machine learning techniques (2011) *Artificial Intelligence in Medicine*, 53 (2), pp. 127-138. / DOI: 10.1016/j.artmed.2011.05.001(дата звернення: 07.02.2021).

NEUES PROJECT „STARLINK“ FÜR GLOBALES INTERNET

Oleksandra Komina

Charkiwer Nationale Universität für Radioelektronik
Projektleiterin – Deutschlehrerin Marina Plotnikowa

“Starlink“ ist Elon Musks Projekt, das schnelles Internet aus dem Weltall für uns verspricht. Dieses Projekt ist auch Hoffnung für alle, die bisher keinen oder nur eingeschränkten Zugang zum Netz haben.

Starlink wird einen globalen Breitband-Internetgürtel um die Erde legen und auf 12.000 bis 42.000 Satelliten basieren. Im Februar 2021 gibt es schon 1081 Starlink-Satelliten im Erdorbit, so dass SpaceX heute der größte kommerzielle Satellitenbetreiber ist. Bis zum Jahr 2027 bestehen befristete Genehmigungen für den Start von maximal 11.927 Satelliten.

Die Satelliten fliegen auf relativ niedrigen Umlaufbahnen, erhalten Daten von Stationen auf der Erde und leiten sie untereinander per Laser weiter. Die Starlink-Satelliten werden sich in einer Höhe von 340 bis 1000 Kilometer über der Erde befinden. Sie werden erst mit einer Rakete in den Orbit gebracht und „ausgeladen“, dann breiten sie ihre Solar-Panäle aus und fliegen. Etwa einen Monat lang fliegen die

Satelliten nacheinander, wie an einer Perlschnur über den Himmel, bevor elektrische Antriebe sie an ihre vorgesehenen Positionen bringen.

Die Satelliten kommunizieren miteinander per Laser mit Lichtgeschwindigkeit. Die Daten werden per Funk zur Erde gesandt, wo sie mit speziellen Empfangsgeräten (sog. Phased-Array-Geräten) empfangen werden.

Für die Nutzer des Systems produziert SpaceX eigene Terminals. Das Terminal ist eine so genannte Phased-Array-Antenne mit 59 cm Durchmesser, die auf einem Stab montiert ist. Sie ist auch mit den Elektromotoren mechanisch ausgerichtet. Die Kosten für das Terminal sind ungefähr \$500 während des Beta-Tests, der auch als „Besser als nichts“-Test genannt ist. Die Bedienung selbst kostet \$100 pro Monat.

Die Übertragungsrate soll zukünftig mit 10 GBit pro Sekunde erfolgen. Das ist zweimal so schnell wie Glasfaserkabel.

Aber das Projekt bekommt nicht nur Anerkennung, sondern auch Kritik, besonders bei Astronomen und in den Medien. Über 100 Astronomen weltweit behaupten nun offiziell, dass das Starlink - Projekt den Nachthimmel für immer verändert und neue Entdeckungen durch Teleskope immer schwerer werden. "Starlink" verändert den gesamten Nachthimmel. Die Forscher sagen, dass es bald so aussehen wird, als gäbe es doppelt so viele Sterne am Himmel“.

Demnach sollen ausklappbare Schattenspender die Reflexion von Sonnenlicht von der Unterseite der Satelliten verhindern. Damit sollen die Satelliten astronomische Aufnahmen nicht mehr so stark stören wie bisher und auch für die Menschen nicht sichtbar werden.

Durch eine Art schwarzen Anstrichs konnte die Reflexion des Sonnenlichts laut SpaceX tatsächlich um 55 Prozent reduziert werden, allerdings brachte die spezielle Bauart Probleme mit sich: Die schwarze Farbe absorbierte nicht nur das Sonnenlicht, sondern auch dessen Wärme, der Satellit erwärmt sich sehr.

Die neuen Schattenspender sollen dieses Problem lösen, da sie nicht großflächig mit den Satelliten verbunden sind. Somit bleibt die Wärme in den Anbauteilen, der Satellit selbst erhitzt sich nicht.

QUELLENVERZEICHNIS

1. <https://www.starlink.com/>

2. <http://rockyourgoal.de/starlink/#:~:text=7%20Verwandte%20Beitr%C3%A4ge,Wie%20funktioniert%20Starlink%3F,Solar%2DPanale%20aus%20und%20fliegen>

3. <https://www.fr.de/wissen/starlink-satelliten-spacex-elon-musk-beobachten-sehen-perlenkette-lichterkette-himmel-zr-13270127.html>

4. <https://www.zdf.de/nachrichten/panorama/starlink-spacex-elon-musk-weltall-satelliten-100.html>

5. <https://web.de/magazine/wissen/weltraum/perlenkette-spacex-starlink-satelliten-deutlich-abdunkeln-34661644>

ANALYSE KOMBINATORISCHER SOFTWARE-TESTVERFAHREN

Anastasiia Novoselova

Charkiwer Nationale Universität für Radioelektronik
Sprachberaterin – Deutschlehrerin Marina Plotnikowa

Beim Testen von Software besteht die Herausforderung darin, alle möglichen Eingabemöglichkeiten von Daten zu testen. In den meisten Fällen ist dies jedoch recht schwierig oder sogar unmöglich. Somit sind hier vielversprechende kombinatorische Software-Testverfahren sehr nützlich. Sie reduzieren die Anzahl der Tests und dabei lässt sich ein ziemlich hohes Qualitätsniveau erreichen.

Erschöpfendes Suchverfahren umfasst die Aufzählung von Kombinationen aller Werte von allen Parametern. Es hat das höchste Qualitätsniveau unter den anderen kombinatorischen Methoden. Meistens ist es ungefähr 100%. Der Anwendungsbereich dieser Methode umfasst Software mit kritischer Funktionalität (Medizin, Nuklearindustrie usw.), aber für andere Softwaretypen ist ein solches Testverfahren jedoch nicht geeignet, da es zeitaufwändig ist, und die ganze Reihe der Kombinationen von Testdaten nicht immer überprüft werden kann.

Zufallsstichprobe. Diese Methode basiert auf der Erzeugung zufälliger Kombinationen von Eingabetestdaten. In diesem Fall ergibt jede Zufallsstichprobe einen Abdeckungsgrad von ungefähr 0,000001%.

Man muss beispielsweise für 100 eindeutige Kombinationen von Eingabeparametern 99 Tests durchführen. [1] Mit zunehmender Anzahl eindeutiger Kombinationen steigt die Anzahl der Tests nicht wesentlich an. So ist es klar, dass diese Methode nur für die Aufgaben geeignet ist, bei denen ein durchschnittliches aber kein hohes Qualitätsniveau erreicht werden muss.

Atomare Prüfungen. Beim Erstellen der Testkombinationen von Eingabedaten ändert sich jedes Mal nur ein Wert eines ausgewählten Parameters. Der erste Test umfasst eine Kombination von Parameterwerten, die von einem durchschnittlichen Benutzer eingegeben werden. Wenn das Programm zu diesem Zeitpunkt nicht funktioniert, handelt es sich dann um einen Fehler, und weitere Tests sind sinnlos. Wenn kein Fehler auftritt, setzt das Programm den Test fort, bei dem ein Wert von nur

einem Parameter in den Testfällen geändert wird und die anderen Parameterwerte unverändert bleiben.

Die Lokalisierung von Fehlern ist einfach. Daher wird die Methode zum Testen instabiler Rohprodukte sowie zum Testen unkritischer Funktionen verwendet. Das Qualitätsniveau liegt bei 71%.

Minimale Prüfungen. Bei dieser Methode wird eine Tabelle erstellt, in die alle Werte aller Parameter eingetragen werden. Leere Zellen werden mit Standardwerten gefüllt.

Da jeder neue Test mehrere neue Parameterwerte enthält, ist es schwierig, Fehler zu lokalisieren. Daher gibt es eine Methode für kurze Testzyklen, um die korrekte Leistung der Hauptfunktionalität zu bestätigen. Das Qualitätsniveau liegt bei 70%.

Paarweises Testen. Studien zeigen, dass die meisten Fehler erkannt werden können, wenn alle möglichen Paare von nur zwei Parametern getestet werden [2]. Die paarweise Testmethode wählt alle eindeutigen Kombinationen dieser beiden Eingabeparameter aus, ohne die Kombinationen anderer Eingabeparameter zu berücksichtigen. Somit kann die Anzahl der Testläufe erheblich reduziert werden.

Diese Methode wird zum Testen von Web- und Cross-Browser-Systemen verwendet. Sie eignet sich für Softwaretests in späteren Entwicklungsstadien. Das Qualitätsniveau liegt bei 97%.

Nach der Analyse und dem Vergleich der oben genannten kombinatorischen Software-Testverfahren können wir schließen, dass sie die Anzahl der Testversuchen verringern, die Geschwindigkeit und Qualität der Tests erhöhen können, ohne die Eingabedaten vollständig abzudecken. Paarweises Testen weist neben den erschöpfenden Suchverfahren die höchste Qualitätsstufe auf. Ihre Hauptanwendung ist die automatisierte Zusammenstellung von Testdatensätzen nach bestimmten Regeln. Die Auswahl eines bestimmten kombinatorischen Software-Testverfahrens hängt von der für den Softwaretestprozess zugewiesenen Zeit und dem zu erreichenden Qualitätsniveau ab. Wir können sagen, dass kombinatorische Softwaretestmethoden derzeit relevant sind und auch große Aussichten für die Entwicklung und Verwendung von Software beim Testen haben.

QUELLENVERZEICHNIS

1. Sehlhorst S. Тестируйте не числом, а умением. Software-Testing.Ru.

URL: <https://www.software-testing.ru/library/testing/test-analysis/1051-test-smarter-not-harder> (дата звернення: 15.02.2021).

2. Метод попарного тестирования. *Medium*.

URL: <https://medium.com/@breadcrumbszone/метод-попарного-тестирования-22ebdb18e88> (дата звернення: 10.02.2021).

3. Останко В. Разбор комбинаторных техник (Тест-Дизайн) - Первый Онлайн Институт Тестировщиков. *POINT*. URL: <https://pointschool.ru/razbor-kombinatornyh-tekhnik-test-dizajn/> (дата звернення: 18.02.2021).

AUTOMATISIERTE TESTDURCHFÜHRUNG BEI DER SOFTWAREENTWICKLUNG

Olha Savchenko

Nationale Technische Universität “Charkiwer Polytechnisches Institut”

Sprachberaterin - Natalia Mishenina, Oberlehrerin

Automatisierte Testdurchführung ist die Automatisierung von Aktivitäten beim Softwaretest. In der Softwareentwicklung ist es besonders wichtig, einen festen, definierten Status der Software zu kennen, deshalb lassen sich alle Änderungen prüfen. Automatische Tests, die nach dem Einspielen einer Änderung unerwünschte Auswirkungen auf andere Funktionen abtesten, werden Regressionstests genannt. Sie machen Software bezüglich ihrer Qualität erst messbar und zeigen mögliche Nebeneffekte von vorgenommenen Änderungen direkt und erkennbar an. Sie dienen als direkte Rückkopplung für Entwickler und für Tester, die unter Umständen nicht in der Lage sind, das Gesamtsoftwaresystem auf einmal zu überschauen, sowie zur Erkennung von Nebeneffekten und Folgefehlern.

Die Testautomatisierung liefert demnach eine Metrik, die Anzahl erfolgreicher Testfälle pro Testlauf. Abhängig vom verwendeten Format zur Beschreibung eines Testfalles lässt sich die Testfallerstellung automatisieren, indem hörsprachliche Beschreibungen beziehungsweise Testspezifikationen in dieses Format transformiert werden. Zur Testspezifikation werden Sprachen unterschiedlicher Abstraktionsstufe verwendet: einfache tabellenartige Notationen für Testdaten und Funktionsaufrufe, Skriptsprachen wie Perl, Python imperative Sprachen C, objektorientierte Ansätze wie JUnit und deklarative und logische Formalismen sowie modellbasierte Ansätze.

Für die schnelle, kontinuierliche Entwicklung und Bereitstellung von hochwertiger Software ist die komplette Automatisierung eine essenzielle Voraussetzung. Doch manche Bereiche wie Benutzerschnittstellen und Anwendungsintegration sind schwierig zu automatisieren. Diese erfordern eine individuelle Vorbereitung der zu verarbeitenden Testinformationen und der Infrastruktur.

QUELLENANGABEN

1. <https://de.wikipedia.org/wiki/Regressionstest>
2. <https://de.wikipedia.org/wiki/Softwaretest>
3. <https://de.wikipedia.org/wiki/Testautomatisierung>
4. <https://de.wikipedia.org/wiki/Testfall>
5. <https://www.salt-solutions.de/solutions/detail/testautomatisierung-definition-und-vorteile>

SOLARKOLLEKTOR UND SEINE VERWENDUNG

Volodymyr Stasov

Nationale Technische Universität „Charkiwer Polytechnisches Institut“

Wissenschaftlicher Berater - Yuri Selikhov, Professor

Sprachberaterin - Natalia Mishenina, Oberlehrerin

Derzeit wird das Thema alternative Energiequellen immer beliebter, daher halte ich dieses Thema für sehr relevant und habe einen Artikel zu diesem Thema geschrieben. Der Artikel beschreibt den Aufbau und den Betrieb des Solarkollektors [1]. In meinem Artikel habe ich erklärt, wo Sonnenkollektoren installiert werden müssen, um die Leistung zu steigern. Ich habe auch berechnet, wie viele Sonnenkollektoren erforderlich wären, um ein Wohnhaus mit heißem Wasser zu versorgen. Es war auch wichtig, die Amortisationszeit für diese Installation zu berechnen. Infolgedessen habe ich Schlussfolgerungen gezogen.

Nachdem ich die Literatur studiert hatte, berechnete ich die Anzahl der Sonnenkollektoren für mein Haus [2]. In dieser Aufgabe werde ich heißes Wasser für den häuslichen Bedarf verwenden und nicht zum Heizen des ganzen Hauses. Ich habe auch für das Vorhandensein eines Kessels in meinem System gesorgt und dessen Volumen berechnet. Es kann für die Winterperiode verwendet werden.

Schlussfolgerungen: 1. Der Solarkollektor kann Wasser auf 90 Grad Celsius erwärmen, 55 Grad Celsius reichen für den Hausbedarf. 2. Für ein Wohngebäude reichen 2 Solarkollektoren aus. 3. Das Automatisierungssystem ermöglicht den Betrieb der Anlage ohne menschliches Eingreifen. 4. Die Amortisationszeit der Anlage betrug sechs Monate bis elf Jahre, die Zeit hängt vom Herstellungsmaterial ab.

LITERATUR

1. Duffy J., Beckman W.A. Thermal processes using solar energy. - M: Mir, 1977.
2. Webseite: <https://www.solarhome.ru/basics/solar/solar-heat/solar-heating-design.htm>

SCIENCE LOOKS AHEAD

Наука – погляд у майбутнє

Матеріали міжвузівської студентської наукової конференції

27 квітня 2021 року

Англійською та німецькою мовами

Відповідальний за випуск С.В. Гармаш

Редактор О.Я. Лазарева