EXPERIENCE SCIENCE TECHNOLOGY FUTURE

THE BULLETIN

OF THE SILESIAN UNIVERSITY OF TECHNOLOGY

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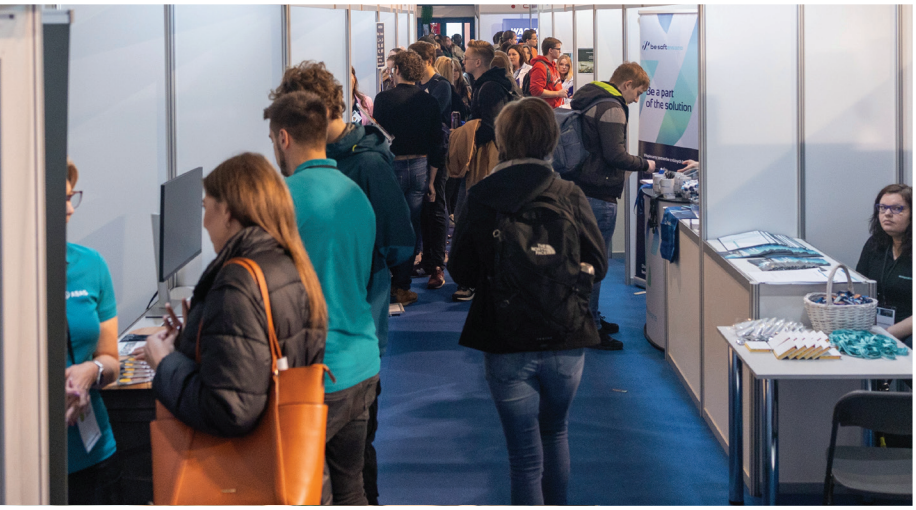
Silesian University of Technology

RESEARCH UNIVERSITY EXCELLENCE INITIATIVE



THE AUTUMN JOBS, ENTREPRENEURSHIP, TECHNOLOGY AND ACCESSIBILITY FAIR OF THE SILESIAN UNIVERSITY OF TECHNOLOGY

Photos: Maciej Mutwil

FROM THE EDITOR

The times we live in are certainly not the easiest. The demands placed on us by the development of civilization are compounded by global crises, including those concerning values and relationships. Galloping technological progress forces the learning of new competences and skills, which means that lifelong learning ceases to be a choice and becomes a requirement.

What role should the university play in the process of preparing the young generation to face the challenges of reality? Is a modern university still just a place to acquire knowledge and conduct scientific research, or rather a place to obtain experience and skills without which successful adaptation to the constantly changing market will be impossible? What does the process of shaping future competences and building entrepreneurial attitudes look like? We would like to draw the attention of our readers to these issues in the November issue of the Silesian University of Technology Bulletin. The edition will also include information and descriptions of technologies that are revolutionizing communication, both geographically and for communication, and pose a significant challenge to our cognitive processes. In one sentence, we present to you an issue packed with news, visionary projects and solutions for the future that our University co-creates.

On behalf of the Editorial Board,
I wish you interesting reading,
Iwona Flanczewska-Rogalska

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SMALL BUT GREAT! TESTING AN AUTONOMOUS BUS

text: **Katarzyna Siwczyk**
photo: **Przemysław Bratkowski**

TESTS OF THE BLEES BB-1 AUTONOMOUS MINIBUS HAVE BEGUN AT THE SILESIAN UNIVERSITY OF TECHNOLOGY. THE VEHICLE IS SCHEDULED TO TRAVEL AROUND THE ACADEMIC CAMPUS IN GLIWICE UNTIL THE END OF DECEMBER.

It looks inconspicuous. From the outside it looks like an ordinary minibus. There are no surprises inside either - we have seats and handles for safe driving in a standing position, all in a modern green decor. Only one detail may attract attention - the lack of a traditional driver's cabin. This is a brief description of the autonomous minibus that has been driving around the academic campus of the Silesian University of Technology for several days.

– This is a historic moment for the Silesian University of Technology. The first Polish autonomous vehicle was created in cooperation with scientists from the Silesian University of Technology and is being tested here - emphasizes dr hab. Eng. Anna Timofiejczuk, prof. SUT, the Dean of the Faculty of Mechanical Engineering.

In the project, the role of scientists led by prof. Piotr Przystałka, was mainly the preparation of algorithms and the position of a remote operator who observes the operation of the vehicle and, if necessary, takes control of it.

Pilot courses began at the end of October, initially in Katowice, in the Valley of the Three Ponds, and two weeks later in Gliwice, along Akademicka Street, in the academic campus.

– Residents will be able to take a closer look at the latest technology using, among others: technologically advanced sensors, object recognition and vehicle control systems using artificial intelligence. All this, encased in the modern and distinctive form of the Blees BB-1 minibus. For Katowice and Gliwice, which are the organizers of the tests, this is a breakthrough step on the way to introducing autonomous minibuses in public transport - we read in a press release from Blees.

In the future, this type of vehicles will complement public transport, providing transport in areas where it is currently impossible or inefficient. This will increase the accessibility of transport for all residents. Before this happens, the vehicles must pass many tests.

First of all, the vehicle itself, which is packed with modern technologies, is tested.

The Blees BB-1 minibus uses an autonomous driving system at SAE level 4. This means that it is capable of driving independently and handling all manoeuvres on programmed routes. Thanks to the advanced autonomy system, the vehicle detects obstacles and other road users, and accelerates, slows down and brakes appropriately to the situation.

– There are a lot of sensors in the vehicle. We have 7 lidars, 3 radars and 11 cameras. Additionally, GNSS modules, i.e. very precise GPS. We also use IMU, so we know what forces act on the bus. As a result, the vehicle quickly determines where it is, what is happening to it and, as a result, makes further decisions - explained Łukasz Wójcik, technical director of Blees, during a conference in Muchowiec in Katowice.

During the presentation of the bus, the first passengers' questions concerned, apart from technical data, mainly safety. The possibility of driving a vehicle in which we do not see the real driver causes some concerns, but scientists explain that, if necessary, a remote driver will take over control of the vehicle.

– The remote operator will only take control of the vehicle when the road situation is too complex for the autonomous control system to cope with on its own – explains prof. Wojciech Moczulski. Such a situation could arise, for example, due to a cyber-attack. Since the vehicle moves based on designed artificial intelligence algorithms that are vulnerable to cyberattacks, the design team had to take many factors into account. The team working on the project at the Silesian University of Technology includes seven scientists: dr hab. Eng. Piotr Przystałka, prof. SUT – managing director of the Silesian University of Technology team and at the same time head of R&D works in the consortium and specialists in control systems, simulators, communication and software development; prof. dr Wojciech Moczulski, prof. dr hab. Eng. Andrzej Klimpel, dr Eng. Wawrzyniec Panfil, dr Eng. Mateusz Kosior, MSc. Eng. Maciej Malczyk and MSc. Eng Witold Krafczyk.

– We are developing the part of the project related to remote supervision of the vehicle in autonomous mode. Due to some sudden events, road conditions, etc., this system, in rare cases, must be supported by a remote operator who monitors the vehicle remotely, i.e. constantly looks at screens showing traffic situations and the situation in the monitored vehicle. When he assesses that the situation may soon become too difficult for the autonomous system, he takes over control remotely, using appropriate control systems, including steering wheel and throttle - explains dr hab. Eng. Piotr Przystałka, prof. SUT. Researchers at Silesian University of Technology have a very responsible task ahead of them. From the point of view of remote control and monitoring of the vehicle, a very important challenge is the transmission of streaming data, including images from multiple cameras with minimal delay. – We need to provide the remote operator with a high-resolution view of what is happening around the vehicle and inside it, while guaranteeing very low latency. Our algorithms that we developed as part of the project deal with this problem - adds prof. Przystałka.

Interestingly, the remote operator is able to simultaneously observe 10 autonomous vehicles moving on the road, on different routes. Ongoing tests involve simulating road situations, e.g. how to avoid unplanned road works, and are intended to check the efficiency of the designed systems. Additionally, by the end of December, scientists want to check another important aspect of the remote vehicle, namely people's reactions to such a technological solution.

– In addition to testing the vehicle itself, at the same time, in cooperation with psychologists from the University of Silesia, we will also conduct research on people's reactions to contact with the minibus. This is important to us because we will learn not only how people accept new technologies, but also whether they would propose any changes in the functioning of the vehicle - adds prof. Anna Timofiejczuk and encourages all to travel by bus. – I believe that the very denial of technology, because we are simply afraid of it, is hindering the development of innovation and progress, so I appeal: let's try it and only then give an opinion.

The reassuring fact is that the vehicle is not moving at breakneck speeds. It can reach a maximum speed of 25 km/h. 15 people can travel by bus at one time.

The test phase of the bus may last for years. Reason? In order for it to be implemented permanently, it is necessary to adapt road traffic regulations to autonomous vehicles. ■

POGADAJMY O NAUCE

You can listen to more about the autonomous minibus in the podcast "Let's talk about science".

CYBER EXPERTS URGENTLY WANTED

text: **Katarzyna Siwczyk**
photo: **Przemysław Bratkowski**

NEW REGULATIONS WILL COME INTO FORCE NEXT YEAR UNDER THE EU CYBERSECURITY DIRECTIVE. THIS WILL MEAN THAT EVEN MORE EXPERTS IN THIS FIELD WILL BE NEEDED ON THE MARKET.

The Silesian University of Technology can play an important role in the future cybersecurity management system. Today, the University has its own Cybersecurity Centre. Soon, other public and private entities will have to create such places, especially those responsible for the country's strategic infrastructure.

The NIS2 Directive, an amendment to the first European cybersecurity law NIS, aims to adapt IT security standards to new digital threats across the European Union.

– The updated directive is intended to increase requirements related to risk management, improve response to cybersecurity incidents and impose obligations related to reporting security incidents – explained dr Eng. Jarosław Homa – deputy director of the Cybersecurity Centre of the Silesian University of Technology.

The new regulations will mean that network security experts will be in high demand.

– There is a huge gap in the market. We – at the Silesian University of Technology – train in this area. We have IT studies in the field of computer networks, cybersecurity, but also cybersecurity management. We can be a leader in education in this field. This is certainly the field of the future - added dr Homa.

You will be able to learn more about the new regulations related to digital threats, which are becoming an element of hybrid warfare, during the Silesian Science Festival, to which we cordially invite you today. On December 10th at 11 a.m. in conference room No. 9 at the MCK in Katowice, there will be a debate with the participation of experts from the Silesian University of Technology, who will talk about this topic. Admission to this event is free. ■

THE LABORATORY OF THE FUTURE

text: **Jolanta Skwaradowska**
photos: **archive of Nokia**

A MODERN 5G LABORATORY UNDER THE PATRONAGE OF NOKIA WAS LAUNCHED AT THE FACULTY OF AUTOMATIC CONTROL, ELECTRONICS AND COMPUTER SCIENCE OF THE SILESIAN UNIVERSITY OF TECHNOLOGY. THIS IS ANOTHER PLACE WHERE 5G TECHNOLOGY WILL BE USED. THE ULTRAFAST 5G CAMPUS NETWORK HAS BEEN OPERATING IN THE INDUSTRY 4.0 TECHNOLOGY TESTING CENTRE SINCE SEPTEMBER.

The 5G laboratory launched at the Faculty of Automatic Control, Electronics and Computer Science will expand the university's teaching offer. New subjects related to the 5G network are now offered in the fields of Electronics and Telecommunications, Teleinformatics and Computer Science. In the field of Electronics and Telecommunications, second-cycle studies, under the patronage of Nokia, a new specialization called "Wireless Devices and Systems" was launched, where students will be able to gain experience in the operation and design of 4G and 5G networks and learn about their possibilities. This will make it easier for them to meet the demands of today's labour market.

– The opening of this laboratory confirms the real cooperation of our university with the socio-economic environment. We want the latest technologies currently being developed in industry to also be present at universities that prepare staff for the industry of the future. In September, we opened our campus network at the Industry 4.0 Technology Testing Centre, today we are opening a teaching laboratory that will educate future specialists in 5G network design. This is a technology necessary in the technological development and industry of the future - said the Rector of the Silesian University of Technology, prof. Arkadiusz Mężyk.

The Silesian University of Technology is one of the key universities with which Nokia cooperates.
– We are a technology company that ensures that the latest technologies are constantly developing, therefore we must rely on experts. We want universities to educate the employees of the future, hence our involvement in such investments - said Krzysztof Persona, director of the Nokia Centre in Krakow.

The laboratory launched by Nokia will allow students to familiarize themselves with 5G technology in real conditions. – Our students will be able to practically learn about what they will encounter in real life after graduation. The laboratory will be used primarily by students of electronics, ICT, IT students dealing with networks, as well as all students who want to learn the secrets of the 5G network - said prof. Dariusz Kania, Dean of the Faculty of Automatic Control, Electronics and Computer Science.

Students present at the ceremony emphasized that the laboratory will allow them to gain practical knowledge, which is important when looking for a job. – Here we are able to verify theoretical knowledge, because not everything can be described, some problems arise in practice. So, such a laboratory gives us a much better picture of how such systems work, and this is of great importance for our future employer - said Hubert Rajczyk, who is studying Electronics and Telecommunications. – 5G technology is just being implemented, and thanks to the laboratory we can acquire this knowledge on an ongoing basis and in practice – added Krzysztof Dybowski, also studying electronics and telecommunications.

The 5G network is the next generation of mobile networks, after 4G networks. Compared to previous technologies, it allows to create a new type of systems that will make it possible to integrate virtually everything and everyone. The higher bandwidths, very low delays in data transmission and greater reliability offered by 5G networks make the practical implementation of modern solutions, such as the Industry 4.0 concept, much closer.

– According to information from the Office of Electronic Communications, on October 18th this year, the tender procedure for the 3.4-3.8GHz frequency band intended for 5G network systems has ended. Four operators received licenses, i.e. Polkomtel, P4, Orange and T-Mobile. This moment is changing the landscape of the Polish telecommunications market, because the expansion of radio networks that is just starting will improve their ranges and increase the achieved data transmission rates, which will translate into the implementation of new services and the emergence of new business industries. It will be possible, for example, to implement the so-called digital twin, where the decisive requirement is very low delays - said dr Maciej Surma from the Department of Electronics, Electrical Engineering and Microelectronics.

Cooperation between Nokia and the Silesian University of Technology has been ongoing since 2014. It resulted in the creation of a 4G network station at the Faculty of Automatic Control, Electronics and Computer Science, commonly known as the LTE network. Nokia experts also participated in classes with students. The idea of creating a 5G network laboratory came up in 2020. However, its implementation was delayed by the pandemic. The project was resumed in 2023, when an agreement was signed under which a laboratory with installed devices operating in the 5G standard was established at the Department of Electronics, Electrical Engineering and Microelectronics of the Faculty of AEiI (Faculty of Automatic Control, Electronics and Computer Science).

The opening ceremony of the 5G Laboratory was accompanied by Nokia Day, during which students of the Silesian University of Technology could meet Nokia representatives and learn about the company's offer and development opportunities. In addition, a series of open lectures with Nokia specialists and workshops were held. ■

STUDENTS OF THE SILESIAN UNIVERSITY OF TECHNOLOGY RETURNED TO RYBNIK

text: **Anna Świderska**
photos: **Przemysław Bratkowski**

CONTINUING EDUCATION CENTRE - A BRANCH OF THE SILESIAN UNIVERSITY OF TECHNOLOGY IN RYBNIK HAS BEEN EDUCATING THE FIRST GROUP OF STUDENTS IN THE FIELD OF LOGISTICS SINCE OCTOBER. THUS, ON-SITE CLASSES HAVE RETURNED TO THE RYBNIK BRANCH OF SILESIAN UNIVERSITY OF TECHNOLOGY, WHICH RECENTLY CELEBRATED ITS 60TH ANNIVERSARY.

GRADUATE IN LOGISTICS HIGHLY REQUIRED

The first, after the break, field of study offered by the Rybnik branch of the Silesian University of Technology, run together with the Faculty of Organization and Management, is logistics. It is one of 16 fields of study that has had a modernized formula since this academic year. – In the first year, there are common curricular structures in which we try to educate young people in what they do not know, for example in mathematics – said, after the inauguration, prof. dr hab. Eng. Jan Kaźmierczak, dean of the Faculty of Organization and Management. – Then students choose thematic paths. I require employees to renew the content they teach to students, to take part in conferences, and to publish in highly rated and frequently cited journals - added the dean.

Logistics in Rybnik is focused on urban engineering, which is particularly important for the region.

– Human capital is the most important, we want to ensure that the cities of the subregion are not depopulated. Young people should find a place of education, work and residence here - said dr hab. Zygmunt Łukaszczyk, prof. SUT, the head of Continuing Education Centre - a branch of the Silesian University of Technology in Rybnik. – We see depopulation in some municipalities in the western subregion due to this industrial monoculture. We have to create new quality, new proposals.

WHAT MATTERS MOST IS THE QUALITY

In the first year of logistics, 16 students started their studies. – We set very high recruitment conditions because we wanted the quality of education to be at a very high level – emphasized prof. dr hab. Eng. Arkadiusz Mężyk, Rector of the Silesian University of Technology. – I am extremely glad that we

managed to rebuild the academic potential of Rybnik, also because higher education institutions have a stimulating influence on the development of the regions and cities in which they are located. We want to educate the staff of the future, we want the Silesian University of Technology, which focuses on modern technologies, to also be a symbol of the Rybnik Hydrogen District, as defined by the mayor of the city - added the rector.

HYDROGEN INSTEAD OF CARBON

The presence of the Silesian University of Technology in Rybnik favours the transformation for which the city authorities are preparing its inhabitants. Rybnik is turning towards green energy. Hydrogen-powered buses run on the streets, and the first publicly available hydrogen station in Silesia and the second in Poland was recently opened. – We are glad that the Silesian University of Technology participates in the life of the city and is developing a new full-time course here – said Janusz Koper, deputy mayor of Rybnik. – We know that mining, which dominates our region today, will become an increasingly less significant industry in the coming years, so we must think about what will happen in 20, 30 years, so that residents can work here and want to live in our area.

IT IS COOPERATION THAT COUNTS

During the ceremonial inauguration and matriculation of first-year logistics students, prof. Jerzy Kucharczyk, creator of the Rybnik Coal District was commemorated. The bust of the professor, who made enormous contributions to the development of the Rybnik region, was unveiled by his daughter in front of the branch campus of the Silesian University of Technology.

– Professor Kucharczyk launched and organized the Rybnik Coal District in such a way that a group of separate mines formed a common entity. I hope that what is starting here in Rybnik will also function in this way, we will prepare young people to create unified organisms with cities and communes willing to cooperate with each other - added prof. Kaźmierczak.

Logistics is the first full-time course of study at the Rybnik branch of the Silesian University of Technology, but the branch management already plans to open more. Due to the architectural profile of classes at the Academic Secondary Comprehensive School in Rybnik, it is planned to create fields of study in architecture and civil engineering. ■

EDUCATION IS A PASSPORT TO THE FUTURE

text: Arkadiusz Mężyk
photos: Przemysław Bratkowski

CREATING SUCCESSFUL, OPEN AND CRITICALLY THINKING PEOPLE REQUIRES SPECIAL FORMS OF EDUCATION AND QUALITATIVE COMPETENCES OF ACADEMIC STAFF. A GOOD ACADEMIC AND SCIENTIST SHOULD VIEW SCIENCE AS A CREATIVE PROCESS, CONSTANTLY SEEKING NEW QUESTIONS AND ANSWERS. ONLY THEN WILL EDUCATION BECOME A PASSPORT TO THE FUTURE. THESE WORDS WERE ADDRESSED TO LOGISTICS STUDENTS IN RYBNIK BY PROF. ARKADIUSZ MĘŻYK, RECTOR OF THE SILESIAN UNIVERSITY OF TECHNOLOGY. WE PUBLISH THE ENTIRE SPEECH BY THE RECTOR DELIVERED AT THE INAUGURATION OF FULL-TIME STUDIES AT THE CONTINUING EDUCATION CENTRE OF THE SILESIAN UNIVERSITY OF TECHNOLOGY IN RYBNIK.

It is June 2005. Steve Jobs delivers his famous graduation speech at Stanford University, citing, among other reasons, why he dropped out of college. "…I naively chose a school that was almost as expensive as Stanford and all of my parents' savings went to finance my education. After six months, I couldn't see any results and I had no idea what I wanted to do with my life or how studying could help me achieve it. I was wasting money that my parents had saved all their lives. That's why I decided to resign, believing that everything would work out somehow... The moment I quit, I could stop going to compulsory classes that didn't interest me and sign up for those that seemed interesting. Reed College offered what was probably the best calligraphy course in the country at the time... There I learned about serif and sans-serif fonts, variable spacing between combinations of different letters, and what makes for great typography... I had no hope that any of these things would ever find practical application in my life. But ten years later, when we were designing the first Macintosh computer, it all came back to me. We applied all these principles to the Mac - it was the first computer with beautiful typography... Of course, it was impossible to connect these events looking into the future, while I was at university. But it was very, very clear looking back 10 years before. I'll say it again - you can't connect the dots by looking forward, you can only connect them by looking back. So you have to trust that somehow the dots will connect in the future. You have to believe in something: God, destiny, life, karma, whatever.

Because believing that the dots will connect in the future will give you the confidence to follow your heart, even if it leads you off track."

These words that I have chosen, which the creator of Apple's power addressed to young people like you, are a praise for following your own paths and making sometimes difficult choices, but they are also a praise for investing in knowledge and skills, the importance of which we can only assess from the perspective of time.

Today I stand before you, dear students, both as the rector of the Silesian University of Technology, but also as a graduate of the university that you also chose as your alma mater. My only advantage is that I am now able to assess the validity of the choice I have made. This was brilliantly expressed by the former Prime Minister of the Polish government and President of the European Parliament, prof. Jerzy Buzek, who also graduated from the Silesian University of Technology. When asked about the meaning of technical education, he said "as engineers, we are demiurges of reality; However, a technical university should become more and more humanized, because the technology we produce is now also responsible for solutions of a philosophical nature. The fact that everyone has a mobile phone in their pocket is a completely new reality, responsible for changes in social space. This is our great responsibility."

Today, universities must respond to changes and modernize the education system. This is not easy, considering that students and teachers, already at school, are pushed into a rigid framework and focus mainly on learning how to solve exam questions.

Yet a university must inspire; encourage and attract young people who are curious about the world, giving them a chance for personal development and enabling them to pursue their passions and interests, and, above all, creating prospects for a good and valuable life in the future.

University is a place where we should teach thinking and a creative approach to life's challenges. The quality of a graduate is not only a derivative of the quality of the candidate for studies, but above all a reflection of the quality of the teacher and the knowledge he shares.

I am convinced that these values are close to your teachers; I also hope that they will become your mentors and guides through complex everyday problems.

Ladies and Gentlemen,

after many years, academic education returns to Rybnik. It comes back to continue long and proud traditions. Already in 1962, the Silesian University of Technology Local and Extramural Centre was established in the city. A huge contribution to its establishment had prof. Jerzy Kucharczyk, whose activities and

contributions to the region will be celebrated today by unveiling a commemorative bust. In the following years, the centre was transformed into a branch of the University, expanding its offer by launching full-time studies. Today we are witnessing another breakthrough. At the Continuing Education Centre, we have launched education in the field of logistics, conducted by the Faculty of Organization and Management. I would like to thank everyone who contributed to this through hard work and determination. This is an important moment in the life of the University and extremely important in the lives of you, our students. The logistics industry is developing very dynamically today. The main reason for this is the technological leap that the world has made in recent years. The trends present in this branch of the economy are constantly gaining strength. It is about the close connection of production with logistics, the concentration of logistics services, the consequences of the development of e-commerce and the pursuit of climate neutrality and the related use of zero-emission transport. I am convinced that the knowledge and skills acquired during studies will result in a satisfying professional career in the future. The mission of the university is to educate elites capable of creating civilizational development; people aware of the threats and able to broadly analyse the effects of decisions made, including their impact on the environment and society.

The priorities of the Silesian University of Technology in this regard include the creation and implementation of modern methods and forms of educating students and doctoral students.

We base this process on scientific research and innovation, which is why we are implementing education in a new, more flexible model. We systematically try to reduce the number of related fields of study in favour of a smaller number of more general fields, with elective classes in various competence modules, thus enabling students to create many individual profiles and specializations. Perhaps if such an education model had been available during Steve Jobs' student days, he would not have given up his studies?

Together with the local government representation of students and doctoral students, we decided that a flexible, modular and elective format of education is necessary because it responds to the development of civilization and social needs.

It is worth adding here that creating change, leaders should start at the stage of teaching in secondary or even primary schools. That is why the Silesian University of Technology, being involved in the field of educational activities in Gliwice and Rybnik, runs Academic Secondary Schools, secondary schools which many of you have graduated from.

I deeply believe that the future of education is combining sciences, interdisciplinary research and a holistic view. Engineers must think about the effects their achievements may have, as

well as the relationship between technology and people. Narrow specializations are slowly starting to lose their meaning. Rapid technological progress means that at the end of the specialist's education stage, their area of operation may look completely different. That is why, at the University, we have replaced some of the study programs with the development of soft skills that allow for flexible adaptation to the constantly changing reality. The Polish higher education system is transforming, although it is a slow process, due to the still low share of science financing in GDP (this year only 1.1%). This translates into low attractiveness of an academic career and a lack of young talents. Old habits and the inertia of the academic community are still noticeable.

Advanced education requires, first of all, special preparation of academic teachers to lead project groups and to implement the idea of mentoring.

Creating successful, open and critically thinking people requires special forms of education and qualitative competences of academic staff. A good academic and scientist should view science as a creative process, constantly seeking new questions and answers. They should conduct reliable scientific research that serves the economy and society and communicate their results to a wide audience, while ensuring the mentoring of the next generation of scientists. The main challenges of the education and higher education system in the country are currently: effective adaptation of education and training systems to the realities of the digital era, including the development of artificial intelligence, involving students in conducting scientific activities, effective development of soft skills, regardless of the university profile, implementation of new forms and methods for developing creativity, high-quality educational content, student involvement in solving real social and economic problems and ecological education. Our University, which has started the academic year for the 79th time, is actively involved in the green transformation of Upper Silesia and the implementation of the UN sustainable development goals. Today, the Silesian University of Technology is one of the 10 research universities in the country and one of the 7 members of the Academic Consortium Katowice - City of Science. We are an academic centre that systematically builds its recognition on the international arena, creating, together with the partners of the EURECA-PRO consortium, the concept of a "university without walls", thus implementing the flagship program of the European Commission. An academic university should strengthen the sense of meaning in life and security, doing so through education, popularization of reliable knowledge and scientific achievements, active involvement in the processes of consolidating social bonds, integration of the academic community and greater involvement of its members in activities aimed at increasing security as a common good. This development path is consistently followed by the Silesian University of Technology.

The inauguration of the academic year is a great celebration for every academic community - for university authorities, scientists, but above all, for students. This is a special moment that symbolizes the beginning of the next chapter in life.

Dear Students, you have many challenges and opportunities ahead of you. Use them wisely and prudently. Don't design your life as a response to the expectations of others. Look for your own path, develop your passions and interests. Gain knowledge and experience from your teachers. Learn from your failures and be patient. Success is not built in leaps and bounds, it is a process, often riddled with failures. Those who trust in their own dreams win. A few months ago, our University was visited by prof. Brian Kobilka, an American doctor and biochemist who, together with prof. Robert Lefkowitz received the Nobel Prize in Chemistry in 2012 for his research on cell receptors. When asked about the path to this success, he replied without hesitation: “You have to be persistent, even if everyone around you tells you that you are wrong. I also heard this many times, but I was persistent because I knew I was right, I just had to look for evidence to prove these hypotheses. And so it happened, although this search took me about 20 years.”

Looking at your young faces, I realize that such a distant prospect may terrify you. In our consumer culture, what counts is a quick return on investment, even if it is education. Remember, however, that ripe fruit tastes best.

I wish you all fruitful classes, inspiring lectures and successful scientific endeavours. In a world of many crises, the modern university and the world of science must describe and shape reality with courage, but also with humility and respect for universal and academic values, without losing sight of the enormous responsibility for the quality of life of future generations. ■

THE SILESIAN UNIVERSITY OF TECHNOLOGY WILL HELP NATO

text: Katarzyna Siwczyk
photo: Przemysław Bratkowski

THE SILESIAN UNIVERSITY OF TECHNOLOGY STARTED COOPERATION WITH NATO. JOINT ACTIVITIES WILL COVER THE EDUCATIONAL AREA, AND SPECIFICALLY IMPROVING THE QUALITY OF EDUCATION IN COUNTRIES BELONGING TO AND ASPIRING TO MEMBERSHIP IN NATO STRUCTURES.

At the end of September, at the invitation of the director, prof. Marek Gzik, at the European HealthTech Innovation Centre of the Silesian University of Technology (EHTIC), another meeting of the group of scientists who will be responsible for cooperation with NATO, and specifically with the NATO DEEP eAcademy institution - an entity focused on supporting the transformation of military education systems (Defence Education Enhancement Program) was held. This cooperation will be possible thanks to the established GETES foundation.

– The GETES Foundation is an international non-profit organization whose goal is to shape the future of education, training and professional e-sports. It strives to create standards for the use of new technologies, such as AI or VR/AR/XR, in the educational process. Particular emphasis is placed on vocational education in the industrial, production and military sectors - explains dr

Eng. Aldona Rosner, one of the coordinators of GETES activities on behalf of the Silesian University of Technology.

During the meeting at EHTIC, scientists discussed the problem of the so-called educational islands.

– Our goal is to build bridges between member countries and those aspiring to NATO membership in such a way that we can conduct joint exercises in the future, compare the results of acquired competences, and collect data. We are primarily interested in the area of vocational education - said dr Eng. Karol Jędrasiak, future president of the GETES foundation and NATO DEEP eAcademy VR Coordinator. The GETES Foundation aims to compensate for educational differences in various countries, especially in the area of using modern technologies, including simulators and virtual reality for educational purposes, e.g. in the field of defence and security.

From the left: dr hab. Eng. Jacek Jurkojć, prof. SUT, dr Eng. Piotr Wodarski; MSc. Krzysztof Sierański, MBA; dr Eng. Karol Jędrasiak; dr Eng. Aldona Rosner; prof. dr. hab. Eng. Marek Gzik, MBA; dr hab. Michał Kłosiński, prof. University of Silesia

– We want to help, especially in building applications that use the capabilities of virtual reality and examining the impact of this technology on the health of people who will use it. We can teach how to certify products using VR, but also how to design these applications so that they are useful and safe for users - explained dr Eng. Piotr Wodarski from SUT.

– In the process of testing solutions using innovative training technologies, we will cooperate with EHTIC at the Silesian University of Technology, where, using well-equipped laboratories, scientists will test the safety and usability of the solutions – said dr hab. Eng. Jacek Jurkojć, prof. SUT

The Foundation has a difficult task to perform because it must take into account cultural diversity and different levels of education and access to new technologies in different countries around the world.

– Educational results must be comparable for people from different cultures, with different experiences, brought up in different places around the world. Thanks to the foundation's work, we can develop one assessment method, based on various standards, but - importantly - cyber-secure, i.e. resistant to hacker attacks and any tampering attempts - said Krzysztof Sierański, Accreditation Director of the Foundation. The standards that will be developed by an international group of scientists from the GETES Foundation will in the future help educate NATO experts employed in defence industry plants. Starting from mechanics working in armoured forces plants to pilots of combat aircraft.

– We want to build a global system for assessing the effectiveness of developing competences and skills using the latest technologies, which will take into account significant cultural differences in thinking and learning (e.g. between the inhabitants of Europe, Asia and the Americas). Our goal is certification and standardization based solely on knowledge and scientific tools that will allow to compare the educational effects of VR / AR technologies and certify them in line with medical, engineering or business standards (such as ISO standards). Therefore, we want to develop a methodological framework that will allow us to check what solutions are the most effective depending on the cultural environment, educational problem, and demand on the labour market - explained dr hab. Michał Kłosiński, prof. University of Silesia

The GETES initiative, created by scientists from various educational centres, will formally begin operating in the form of a foundation next year, and its command centre will be in Brussels. Currently, the initiative has established cooperation with specialists and institutions from over 20 countries, government institutions, public and private universities, military academies and business partners from many industries, international organizations and NGOs. The countries that have already engaged in these activities include Armenia, Azerbaijan, Colombia, Mauritania and Ukraine. ■

HOSPITAL WILL EMPLOY A BIOMEDICAL ENGINEER

Edited by **Jolanta Skwaradowska**
photo: **istock**

IN SEPTEMBER 2023, REGULATIONS GOVERNING THE EMPLOYMENT OF BIOMEDICAL ENGINEERS IN HEALTH CARE FACILITIES ENTERED INTO FORCE. ACCORDING TO THE NEW RULES, ONLY GRADUATES OF BIOMEDICAL ENGINEERING WILL BE ABLE TO PURSUE THE PROFESSION OF BIOMEDICAL ENGINEER.

Existing legal regulations prevented the employment of graduates of this field in health care units. They additionally forced, similarly to graduates of automation and robotics, electronics and telecommunications or computer science, the need to complete a two-year specialization and obtain the title of medical engineer.

The new regulations gave biomedical engineering graduates the opportunity to be employed in health care facilities. Importantly, according to the new rules, only they will be able to practice as biomedical engineers. This will increase the integration of the medical and engineering communities and, consequently, improve the quality of treatment and diagnosis of patients.

Legal regulation of the issue of employing biomedical engineering graduates is the result of an initiative undertaken ten years ago by the Faculty of Biomedical Engineering of the Silesian University of Technology, in cooperation with the academic community of all faculties providing education in the field of biomedical engineering and with the support of the Committee of Biocybernetics and Biomedical Engineering of the Polish Academy of Sciences.

– On the initiative of the then dean of the Faculty of Biomedical Engineering of the Silesian University of Technology, prof. Marek Gzik, in the years 2014-2017, cyclical meetings of deans of all faculties in Poland where the biomedical engineering field is implemented were organized. Their result was a proposal that only graduates of biomedical engineering could obtain the title of specialist medical engineer without having to complete an additional two-year specialization - says prof. Zbigniew Paszenda, dean of the Faculty of Biomedical Engineering.

Subsequent proposals developed by the deans concerned, among others: management and supervision of IT systems in hospital units, integration of infrastructure and IT systems used, supervision of the proper operation of equipment in the operating theatre, and control and preparation of medical equipment.

The deans' initiative was supported by the medical community, including by the then director of the Silesian Centre for Heart Diseases in Zabrze, prof. Marian Zembala and the director of the Provincial Specialist Hospital No. 4 in Bytom, dr Jerzy Pieniążek.

– The developed proposals met with great interest from the Ministry of Health. As a result, a team was established which, together with representatives of the academic community, began work on regulating the issue of obtaining qualifications for biomedical engineering graduates giving them the opportunity to be employed in health care units. In the following years, at the annual meetings of deans, details of the scope of education and responsibilities that a medical engineer should undertake were discussed - adds prof. Paszenda.

In 2020, a draft regulation of the Minister of Health was created on the qualifications required of employees in particular types of job positions in healthcare entities. In this project, it was decided to introduce new positions reserved for graduates of biomedical engineering - junior biomedical engineer (requires a bachelor's or engineer's degree in biomedical engineering) and biomedical engineer (master's degree in biomedical engineering with a specialization in medical engineering, three years of work experience). The issue of obtaining the title of medical engineer for graduates of the other previously mentioned fields of study has remained unchanged. After numerous consultations, the regulation entered into force on September 5th, 2023.

– The new regulations provide clear information for managers of medical entities who will employ biomedical engineers in their units. This will enable a greater use of the potential of existing and new, innovative technologies and medical devices introduced to health care units. Such activities will also create conditions for better integration of the community of doctors and engineers working to improve the quality of services provided to patients and people with disabilities. Additionally, it will improve the quality of diagnosis, eliminate unnecessary additional procedures, streamline the treatment process and, consequently, also bring economic benefits - explains prof. Zbigniew Paszenda, dean of the Faculty of Biomedical Engineering.

Currently, education in biomedical engineering is provided at sixteen faculties of national universities, including the Silesian University of Technology. In 2023, this field of study at our University received the Certificate of Educational Excellence from the Polish Accreditation Committee in the category "Excellent field of study - excellence in education in the field of study". ■

HOW TO DEVELOP COMPETENCES OF THE FUTURE

text: **Jolanta Skwaradowska**
photos: **Maciej Mutwil**

TODAY'S LABOUR MARKET REQUIRES UNIVERSITY GRADUATES NOT ONLY TO HAVE A UNIVERSITY DIPLOMA, BUT ALSO TO HAVE PROFESSIONAL EXPERIENCE, PRACTICE, APPROPRIATE QUALIFICATIONS AND SOFT SKILLS. GRADUATES WHO PARTICIPATED IN COURSES, TRAININGS OR INTERNSHIPS DURING THEIR STUDIES HAVE MUCH GREATER EMPLOYMENT OPPORTUNITIES IN LEADING COMPANIES WITH GOOD WORKING CONDITIONS.

Students can acquire all these additional skills at our University. There are many scientific clubs, a Business School at the Silesian University of Technology, and the Student Career Office, supporting academic entrepreneurship, has a wide range of training courses. The Silesian University of Technology organizes periodic Job, Entrepreneurship, Technology and Accessibility Fairs, during which students and PhD students can find many job, internship and training offers. An important aspect in which the University supports students is the development of soft skills, such as communication skills, the ability to cope with stress and team cooperation.

– The mission of the university is not only to impart knowledge, but also to teach thinking. We must provide students with competences that will allow them to function in this rapidly changing world, full of challenges, where many things are difficult to predict. We certainly need to increase the flexibility of education, which we have already done, but mainly change the curriculum so that students can develop their soft skills, i.e. not only those related to professional knowledge connected to their field of study - emphasizes the rector of the Silesian University of Technology.

One of the forms of supporting students in gaining experience and developing competences is the Talent Hub

program. This is an initiative established by the Business School of the Silesian University of Technology in cooperation with the Katowice Special Economic Zone and selected business partners.

Talent Hub is intended to help students enter the labour market and learn about the industrial environment in which they may find employment in the future. As part of the program, students can take advantage of activities such as: apprenticeships and internships, training, workshops, lectures, study visits, consulting, coaching and mentoring.

– Talent Hub is a talent management formula in which companies, by organizing and financing various initiatives, for example competitions for solving a given task, can support talented young people, invite them to workshops, internships, involve them in their own activities and, ultimately, also employ them in their companies. Today, we are increasingly talking about the issue of talent outsourcing, the search for talent management methodologies in organizational networks, and the challenges related to talent diagnostics within the so-called competences of the future, hence our attempt to get involved in these issues. We believe that thanks to the Talent Hub initiative, it will be possible to provide specific help to our students - says dr hab. Małgorzata Dobrowolska, prof. SUT, director of the Business School of the Silesian University of Technology.

In Professor Dobrowolska's opinion, it is also important to help develop competences that will enable young people to find their way in the modern, demanding world. It is the ability to think critically, as well as personal flexibility and interdisciplinarity. – Flexibility helps us adapt to different situations, while interdisciplinarity provides a good basis for us to be able to move in different fields, if necessary. In today's world, we play many roles, we need to have different skills to develop, adds Professor Dobrowolska.

Young people seem to understand the challenges of the modern world, which is why they willingly use the various forms of support offered by the University. Each Job, Entrepreneurship, Technology and Accessibility Fair at the Silesian University of Technology is visited by hundreds of students and PhD students. – Here they can find out what specialists employers are looking for and will be looking for. Already during your studies, it is worth planning your future well and knowing what company or position you are interested in, emphasizes dr hab. Eng. Tomasz Trawinski, prof. SUT, Vice-Rector for Infrastructure and Promotion.

Students also believe that the fair provides an opportunity to learn about labour market trends and potential employers.

– This is definitely a very good opportunity to think about what we want to do during our studies and in the future. We come to university after secondary school with the intention to study in a given field. Here we have a chance to verify our views on a given profession, talk to employers, and find out what they expect from us, says Patryk Jaworski from the Student Self-Government of the Silesian University of Technology.

At the fair, in addition to job offers, you can find proposals for courses, training and internships that improve professional skills and better prepare you for the requirements of the modern labour market.

Students of the Silesian University of Technology can also count on the help of a career advisor when choosing fields of study and entering the labour market. This assistance is offered by the Student Career Office.

– Our office supports students in their professional development and enables them to improve their competences in various areas in which they want to develop. These include courses strengthening technical skills, closely related to engineering tasks, but we also have a whole range of courses improving soft skills, such as the ability to communicate, organize work, time management, cope with stress and the changes that inevitably await us at work – says Barbara Odoszewska from the Student Career Office.

The university supports academic entrepreneurship, among others: by implementing projects under PBL (Project Based Learning) and organizing the "My Business Idea" competition, supporting the development of academic entrepreneurship among students and employees of the Silesian University of Technology. The competition rewards innovative ideas, products and services based on sustainable technologies that may provide jobs in the future. The competition winners receive a cash prize that can help them develop their own business.

– The "My Business Idea" competition is a long-term initiative and great support for young people who are thinking about a career as an entrepreneur - adds Vice-Rector Trawiński.

In addition to the above-mentioned forms, the Silesian University of Technology also provides additional professional support for students with special educational needs. The university offers them, among others: individual and group counselling. ■

PUT ON YOUR CHEMICAL GOGGLES AND SEE THE SMELLS

text: **Agata Krupa**
photos: **author's archive**

IF SOMEONE ASKS YOU WHAT YOUR FAVORITE SCENT IS, WHAT COMES TO MIND FIRST? THE SMELL OF ROSES, CHOCOLATE, OR MAYBE ROASTED COFFEE? OUR WORLD IS FULL OF DIFFERENT SMELLS, FROM THOSE THAT MAKE US UNABLE TO STOP SAVORING THEM TO THOSE THAT MAKE US SICK.

As humans, we distinguish as many as a trillion smells! This is a huge number, and we recognize them using only four hundred receptors. What is smell really and how do we sense it? You may not have been aware, but we can actually see smells. Various aromas are caused by small chemical molecules, also called odorants, which disperse easily in the air. They have a high vapor pressure, in other words they are volatile, which literally means "easily evaporates". When volatile molecules hit our nose, they dissolve in its mucous membrane. At the back of our nose is the olfactory field, covered with the olfactory epithelium, where there are millions of neurons whose terminals contain proteins called chemoreceptors. When such an odorant connects to the receptor, it initiates an electrical signal traveling to the olfactory bulb, from which it is further transmitted to other areas of the brain to process and identify the odour. Odour information can also be transmitted to brain regions involved in memory (Figure 1). Thanks to this, scents can build memories associated with them.

Now that we know how we feel smells, let's move on to the rich source of odorants: plants, especially flowers. Chemical compounds - terpenes or their derivatives, terpenoids - are responsible for the smell of many plants. For example, the smell of roses, the smell of which each of us knows, is mainly caused by the cis isomer of rose oxide. It is detectable by our olfactory cells in very low concentrations in the air - up to 5 parts per billion!

Now I will tell you about less known flowers, which are violets. Their smell results primarily from the presence of compounds belonging to terpenoids, which are called ionos. Ionos bind to our olfactory receptors in a characteristic way. As humans, we are able to remember smells. We can also get used to them to such an extent that we won't notice some of them after some time, because the sense of smell adapts very quickly, which means that

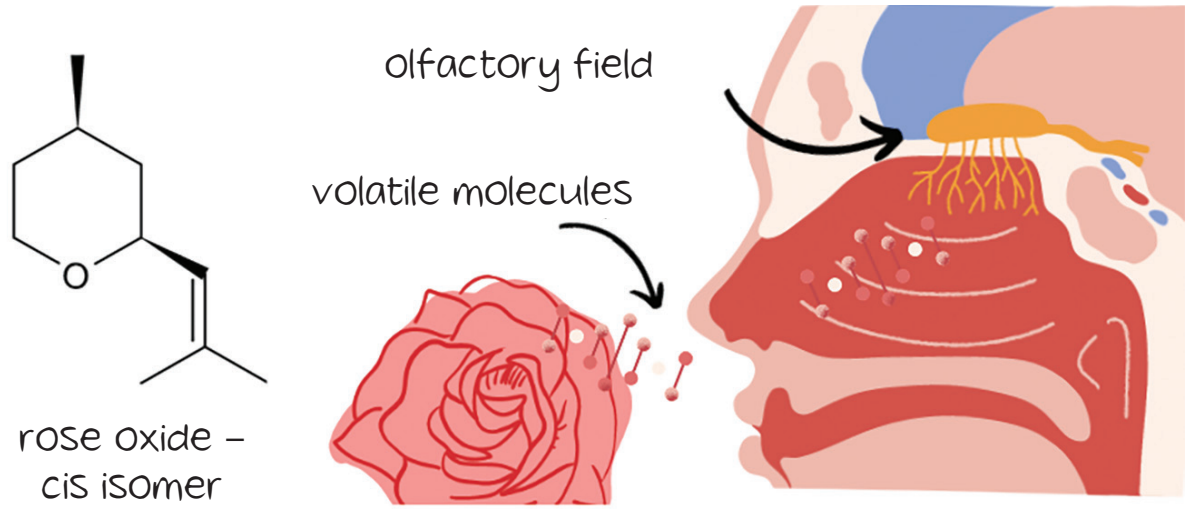

Fig. 1 Mechanism of action of the olfactory organ

the sensitivity of the receptors decreases. When smelling violets, we have the impression that the scent disappears and then fills our nostrils again. This happens because ions temporarily "silence" our receptors. After some time, however, they will be detected again by the receptors of the olfactory epithelium and even interpreted by us as a completely new smell!

Let's move on to the aroma that many of us associate with the smell of holidays and delicious baked goods, and even brings back memories related to them. Yes, it is the scent of cinnamon. Cinnamon is a spice obtained from the inner bark of Cinnamomum trees. The sharp, characteristic odour comes from cinnamaldehyde (Fig. 2).

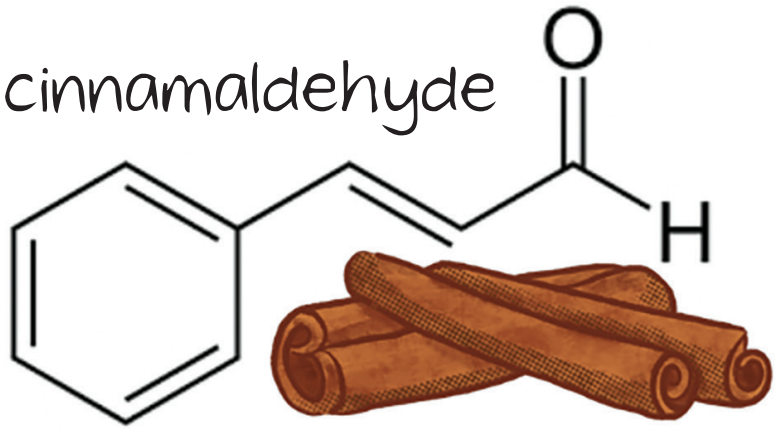

Fig. 2 Cinnamaldehyde

When you had a cold, did you feel like you were losing your taste? But is it really just taste? The sense of smell is extremely important when experiencing flavours. The taste we feel is not only the substances that touch the taste buds covering our tongue, but also the volatile odorants that reach our nose. Therefore, when we have a cold, food may often seem bland. Our sense of smell has up to 75-95% influence on taste. If it were not for volatile fragrances, we would only be able to experience sweet, bitter, salty, sour and umami tastes!

An example is cinnamon. If it weren't for volatile molecules, we wouldn't be able to taste cinnamon. Believe me, with a stuffy nose, it's hard to tell just by the cinnamon powder in your mouth that it tastes like cinnamon.

We have already mastered pleasant smells, but what about the less pleasant ones? Well, this is extremely interesting! Imagine an overcrowded bus, gym, locker room. As you already know, scents stay in our memory, but this particular one is probably the most hated. I mean, of course, the smell of sweat. So where does it come from? Imagine that it has a lot in common with... a goat! Specifically, the source of this odour is TMHS, or trans-3-methyl-2-hexenoic acid. But what does a goat have to do with it? TMHS is related to caproic acid. Its name comes from Latin. capra, i.e. goat, and that is why our sweat smells like a goat. Where does this kinship come from? Caproic acid is a saturated fatty acid, its structure contains only single bonds, however, when a double bond appears in its carbon chain and a methyl group ($-CH_3$) is added, we obtain 3-methyl-2-hexenoic acid (Fig. 3).

Sweat itself is composed mainly of water, but this acid molecules are responsible for the smell. They are released by bacteria that absorb our sweat and feed on it, giving us an unpleasant odour in return. The next time you come face to face with trans-3-methyl-2-hexenoic acid, remember - it's just a goat.

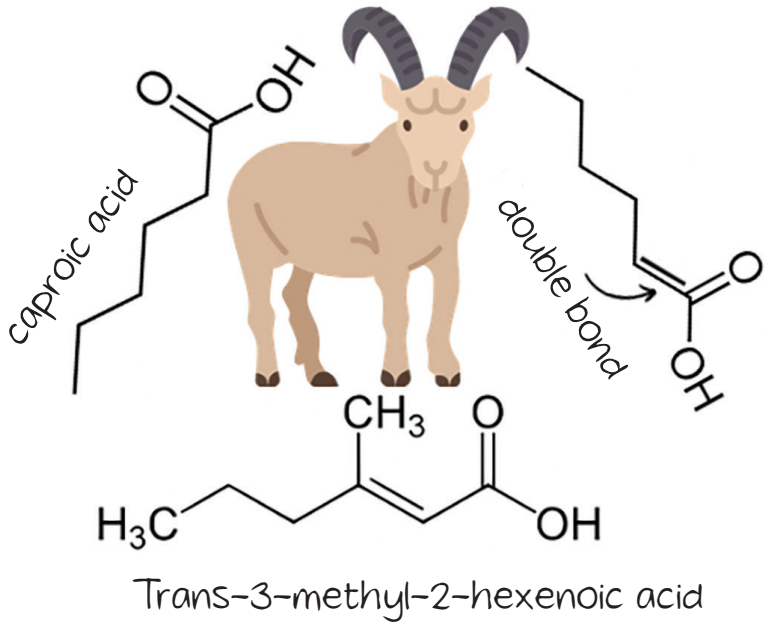

Fig. 3 Origin of trans-3-methyl-2-hexenoic acid

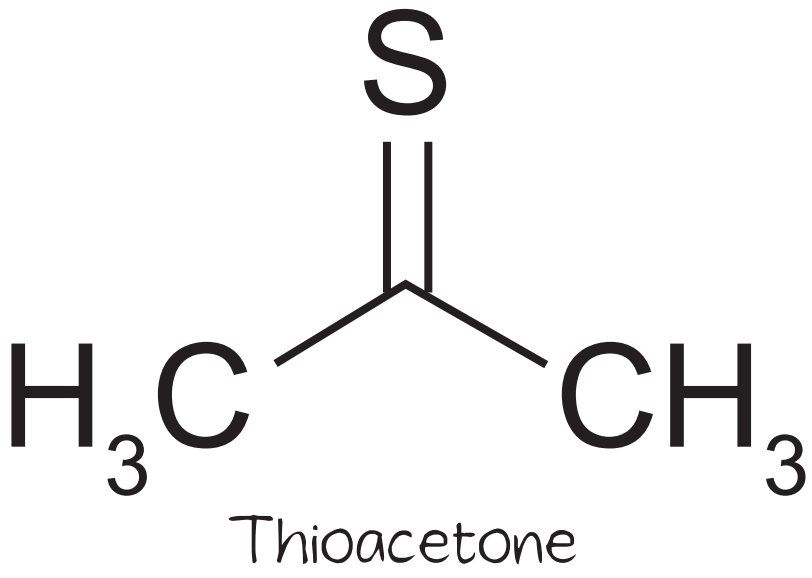

Fig. 4 Chemical structure of thioacetone

Can you guess what the worst smell in the world is? The smell of sewage, rotten eggs or garbage? Well, no, believe me, there is a much worse smell. We are talking about thioacetone (Fig. 4). It is by far the smelliest molecule in the world.

Thioacetone seems like an inconspicuous molecule, but even in small amounts, its odour is strong enough to induce vomiting in some people. However, it is a molecule that fortunately does not occur naturally. It can be made by heating a trimer of thioacetone, which produces three very smelly molecules. You're probably wondering why synthesize it if it stinks so terribly? However, there were the first brave chemists who decided to obtain this stinking compound. Only complaints from city residents made them stop research!

You have to ask yourself, why does it smell so terribly? Thioacetone has a sulphur atom in its structure, the compounds of which very often have an extremely unpleasant smell (they occur, for example, in rotting food). Our sensitivity to the smell of sulphur probably has an evolutionary basis. Humans have always used their sense of smell to determine whether food is edible or not. Our sense has become so sensitive to this smell that we are able to recognize it flawlessly. According to literature sources, it is recognizable even to us in one part in a billion. Imagine an Olympic-size swimming pool filled with water and half a teaspoon of sugar poured into it - at this scale we are able to recognize the smells associated with certain sulphur compounds!

Smells are an integral part of our lives. They build our memories, make us happy and allow us to fully enjoy the delicious flavours of dishes. They also tell us what to keep far away from us and have been warning us from the beginning of our existence about what it is better not to eat. Some of them, even though they smell unpleasant, are just secretions of our body with which we must learn to live in harmony. Fragrance chemistry is a fascinating science that we already understand to some extent, but it is still full of mysteries, which makes it even more interesting. ■

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"ABOUT SCIENCE IN A HUMAN WAY - ALO MINIATURES"

The competition "About science in a human way - ALO miniatures" was held for the third time. It is addressed to pupils of Academic Secondary Comprehensive Schools of the Silesian University of Technology. Secondary school pupils participating in the competition passionately describe issues from the fields of interest to them. The works are assessed by jurors who take into account not only the substantive value, but also the popularizing value of the articles. We presented the winning works in the last three issues of the Bulletin. In the November issue we present our final work entitled "Put on chemical glasses and smell the smells" by Agata Krupa, for which the secondary school pupil won first place in the competition.

A TECHNOLOGICAL TRIP INTO OLD AGE

text: **Martin Huć**
photos: **Maciej Mutwil**

IN THE BLINK OF AN EYE YOU FEEL TIRED, YOUR BODY BECOMES HEAVIER, AND YOUR EYESIGHT BECOMES WEAKER... BUT YOU DON'T CARE. YOU KNOW IT WILL BE OVER IN A MOMENT. AFTER A WHILE, YOU TAKE OFF THE OLD AGE SUIT AND EVERYTHING RETURNS TO NORMAL. THANKS TO IT, YOU GAIN EMPATHY AND UNDERSTANDING. YOU LOOK AT CERTAIN MATTERS RELATED TO YOUR HEALTH AND THE ELDERLY DIFFERENTLY.

For two years, students of our University have had the opportunity to use the old age suit. After putting on its individual elements, we can feel what ailments people over 75 years of age face. It imitates the limitations typical of people of this age. It consists of, among other things, a vest that weighs down our body, causing changes in body posture.

– The most important thing is the load on the joints, which makes it difficult for us to move – says dr hab. Eng. arch. Katarzyna Ujma-Wąsowicz, prof. SUT, Vice-Dean for Infrastructure and Organization of the Faculty of Architecture. – We also put on headphones that limit hearing and goggles that destabilize vision - disturbing visual acuity, narrowing the field of vision, yellowing the image. The suit changes the body posture - we are bent over, and the legs bend in a characteristic way. Weights make it difficult to move, our neck is stiff. After a while, we realize that it is difficult for us to bend down and that we need support. The set also includes a hand tremor simulator that shows what a person with Parkinson's disease feels like. There are also gloves that reduce the feeling in the fingers and limit hand movements. In such a set, performing the simplest activities, such as drinking tea or grabbing small items, is a challenge.

– The topics of aging society and universal design have been discussed at the Faculty of Architecture for years – recalls dr Eng. arch. Iwona Benek. – We knew that the old age suit was already available at other universities in Europe, so as soon as we managed to obtain funding from the "Accessible univer-

sity"[1] project, this suit was one of the first pieces of equipment purchased. It is constantly used for training, workshops and science festivals. It is used by both students and employees of the Silesian University of Technology, e.g. colleagues from the Faculty of Biomedical Engineering, the Faculty of Automatic Control, Electronics and Computer Science. The suit allows us to design better and empathize with the user's needs.

During the workshops, the suit is a big attraction, students are very interested in trying it on. At first, they treat it as fun, but they quickly become surprised at how the suit works, and after a while, they get tired. This makes young designers aware of the problems they will have to face in several dozen years.

– The suit is constantly used as part of universal design classes – says prof. Katarzyna Ujma-Wąsowicz. – One of the parts of this subject are workshops during which students, riding in wheelchairs or wearing overalls, experience various disabilities, which helps them understand the needs of this group of users and design space for everyone. In addition, there is preventive action encouraging us to properly prepare for this stage of our lives.

The old age suit also appeared on the 18th. Researchers' Night of the Silesian University of Technology at the "Gryfna Starość" (Good Old Age) exhibition, arousing great interest, especially among the youngest participants.

– We were very surprised by the weight of the simulator and the difficulties in carrying out everyday activities that we asked our testers, such as tying their shoes or taking out pink paper clips from their wallets – says dr Eng. arch. Agnieszka Labus. – Visitors to the stand experienced physical aging, which they perceived as a major limitation in everyday functioning. Our goal was to draw attention to the "negatives" of the aging process, which we can largely slow down or reduce thanks to a healthy lifestyle and a properly prepared environment.

dr Eng. arch. Iwona Benek and dr hab. Eng. arch. Katarzyna Ujma-Wąsowicz, prof. SUT, Vice-Dean for Infrastructure and Organization of the Faculty of Architecture

The old age suit and other equipment needed to carry out the simulation workshops were purchased by the Office for Persons with Disabilities for the Universal Design Knowledge Centre at the Silesian University of Technology. ■

[1] The project "Silesian University of Technology- a university aware of the needs and equalizing life opportunities" is co-financed by the European Social Fund under the Operational Program Knowledge Education Development 2014-2020, Priority Axis III Higher education for the economy and development, Measure 3.5 Comprehensive programs of higher education institutions, under the co-financing agreement. POWR.03.05.00-00-A084/19-00

A SCANNER INTO THE WOUNDS

text: Jolanta Skwaradowska
photo: Piotr Jańczyk

TREATING CHRONIC WOUNDS IS COMPLEX, TIME-CONSUMING AND OFTEN EXPENSIVE. WITHOUT APPROPRIATE THERAPY, THESE WOUNDS WILL NOT HEAL SPONTANEOUSLY - THIS ESPECIALLY APPLIES TO DIABETIC WOUNDS OR VENOUS ULCERS. THE TREATMENT PROCESS CAN BE SUPPORTED BY A WOUND SCANNER, WHICH IS BEING DEVELOPED AS PART OF THE WOUNDSCANNING PROJECT WITH THE PARTICIPATION OF SCIENTISTS FROM THE FACULTY OF BIOMEDICAL ENGINEERING OF THE SILESIAN UNIVERSITY OF TECHNOLOGY.

The scanner is used to image and diagnose difficult-to-heal wounds. Scanning is performed in a non-contact manner, which makes the procedure sterile, hygienic and does not cause pain to the patient. The construction of the device is carried out by a company from the Yoshi Group - WoundScanning sp. z o. o. and is the implementation of research results conducted by the Department of Medical Informatics and Artificial Intelligence in the field of imaging and analysis of chronic wounds. The Silesian University of Technology is a subcontractor in the project, carrying out conceptual work in the field of scanner construction and in the processing and analysis of collected data. The university is also responsible for developing appropriate software.

The scanner allows to take a 3D image of the wound using a ToF (Time-of-Flight) camera. – The device is equipped with a camera and a thermal imaging camera. It is designed and calibrated in such a way that it is possible to superimpose both a photographic and thermal image on a three-dimensional surface model. Wound scanning using 3D ToF-based technology brings many benefits, including high precision, speed of measurement, painlessness - says dr Jan Juszczyk from the Department of Medical Informatics and Artificial Intelligence.

Previous research on the possibility of visualizing difficult-to-heal wounds by creating 3D models has demonstrated the usefulness of such visualization in monitoring the treatment process. – The scanner construction project is a further stage of this work. The goal is to develop a device that will allow a quick scan of the wound surface in a chronic wound treatment clinic - explains the scientist.

This scanning device will be used to document chronic and difficult-to-heal wounds, i.e. those that last longer than 6 weeks. These include postoperative wounds, diabetic foot, bedsores, burns, ulcers, and oncological lesions. The process of their treatment is often long and difficult to assess. One of the basic methods of verifying the progress of therapy is to compare the size of the wound surface between subsequent visits to the clinic. For this purpose, photographic documentation is made.

– On the one hand, the wound scanner will simplify this process, and on the other hand, it will allow for greater objectivity by providing a 3D model of the wound and enriching it with the information contained in the thermal image. Obtaining reliable and possibly accurate

imaging data translates into a greater amount of valuable information for the doctor - explains dr Juszczyk.

The scanner is a compact device with a housing resembling typical hand-held 3D scanners. It consists of a module containing sensors and a viewing screen connected to the handle. The device is designed to be operated with one hand, even when wearing gloves, it is powered by batteries and connects to the computer wirelessly, so it does not restrict the operator's freedom of movement.

– Performing a scan is very simple. Just point the device towards the wound so that the entire wound is visible on the preview screen and press the button. The rest of the registration happens automatically. The scanner is a non-contact device and its operation is similar to operating a simple camera - explains the scientist.

Importantly, the wound scanner does not use any radiation that is harmful to the patient.

– The main benefit for the patient is faster and more precise determination of effective therapy. Thanks to this, if the expected treatment results are not achieved, the doctor will be able to react earlier by modifying or changing the therapy - emphasizes the scientist.

In turn, for medical staff, the greatest benefit will be the shortening and improvement of the process of creating photographic documentation and ensuring more precise measurement results.

Work on the wound scanner is nearing completion. A prototype has already been created. Now scientists from the Faculty of Biomedical Engineering of the Silesian University of Technology are testing the software. ■

MUSICIANS SUPPORTED BY RESEARCH

text: **Martin Huć**
photos: **Anna Miller-Banaś**

CAN STRING INSTRUMENTS BE PLAYED BETTER WITH THE RIGHT BODY POSTURE? CAN IT BE DONE IN A WAY THAT IS HEALTHIER FOR OUR BODY? IT TURNS OUT THAT IT DEFINITELY CAN. THANKS TO RESEARCH CARRIED OUT AT THE FACULTY OF BIOMEDICAL ENGINEERING OF THE SILESIAN UNIVERSITY OF TECHNOLOGY, MUSICIANS WILL BE ABLE TO IMPROVE THEIR BODY POSTURE WHILE PERFORMING.

"Application of biomechanical research to assess the body posture of musicians playing string instruments" - this is the full name of the research carried out by prof. dr hab. Eng. Robert Michnik from the Faculty of Biomedical Engineering, Joanna Kruszyńska-Szwedo, M.A., a PhD student from the University of Silesia and finalist of the Silesian edition of the Three Minute Thesis 2022 competition, and Anna Miller-Banaś, M.A., a Ph.D. student from the Faculty of Biomedical Engineering of the Silesian University of Technology.

– It is a combination of our passions for scientific research and music – says prof. Robert Michnik. – It so happens that in our research team, Joanna is a trained musician, and I am an amateur musician. Moreover, in her doctorate, Joanna discusses topics related to how to support children on the autism spectrum with the use of music. I became interested in it when we met, and I offered her an internship at our faculty and cooperation. Together, we agreed that it was worth focusing on the topic of musicians' research. The aim is primarily to show how the stability of body posture and the concentration of eyes on the notes and fingers playing the instrument affect the quality of musical performance.

– We want to show how scientific research can improve the well-being of musicians and how to work with a young musician to achieve a virtuoso level – explains Joanna Kruszyńska-Szwedo, MA.

EVERY MOVE IS RECORDED

– I have already had the opportunity to measure, analyse and evaluate many forms of human physical activity, for example athletes. This time it's time for musicians - says prof. Robert Michnik.

– The musician plays with the body. To play well, they must use their musculoskeletal system appropriately. Hence our biomechanical research. Therefore, a set of sensors, inertial sensors, are placed on the musician's body, thanks to which the movement of individual body segments is recorded. There is also a platform measuring the forces acting on the feet on which the examined person stands. The measurements are visible in a computer program, in the form of a video and an animation with a 3D skeleton showing the movements of the subject. We can rotate it to fully assess its posture.

– The measuring equipment includes research on kinematics, i.e. how musicians move while playing, and research on the loads acting on the feet – continues prof. Robert Michnik. – We check what the musician's body posture looks like and what the tensions are in the muscular apparatus. We have a device that measures the force with which, for example, a guitar neck is pressed. We can check the average body position of the tested musician, as well as how many movements he or she performs. The equipment includes special glasses with one camera at the front, as well as additional cameras on the rims to attach the glasses, which in turn track eye movement. The image is recorded, and we see on the computer screen, through a designated point, where the eyes are focused at a given moment.

prof. dr hab. Eng. Robert Michnik and Joanna Kruszyńska-Szwedo, M.A.

– Cameras even capture the moment when a person blinks – explains Anna Miller-Banaś, MA. – This equipment also has the advantage that we can connect it to our phone and thus make the recording without using a computer.

– Playing most instruments requires the musician to adopt an unnatural body position – says prof. Robert Michnik. – In the case of string instruments, for example violins, the body posture while performing the piece is asymmetric. Our body does not like asymmetrical positions because it involves loads. Thanks to our equipment, we can check the level of asymmetry while playing. This means that with the results obtained, we can correct the musician's body posture, even by centimetres, and thus influence his health, prevent injuries, fatigue during a long performance, and even improve the quality of the performed piece.

SCIENCE AND MUSICAL GENRES

Scientists emphasize that regardless of the music genre, the most important thing for a person playing instruments

is to maintain the correct body posture throughout the performance, so that it is the same at the beginning and at the end.

– We analysed eye movements, checking where a given musician focused his eyes, to help them adjust their body posture in relation to the notes – says prof. Robert Michnik. – Depending on how the musician has the music stand positioned, it will either improve the body posture or worsen it, because if they have it too low, for example, it will force the body to lean.

– However, it is not that simple, because in an orchestra there are often two people sitting at the music stand – says Joanna Kruszyńska-Szwedo, MA. – In the case of popular, contemporary or rock music, the songs are very rich and full of emotions, which increases the risk of muscle tension. On the other hand, guitarists, for example in a rock band, do not sit in one place for the entire concert. They can relax and loosen up.

– However, I believe that the less movements a musician makes while playing instruments, the better the final effect is – provided that there are no muscle tensions – says prof. Robert Michnik. – Staying with the rock musician, we can tell them what height the guitar should be placed at and how to hold it. It is important. Research focuses on improving musician's ergonomics.

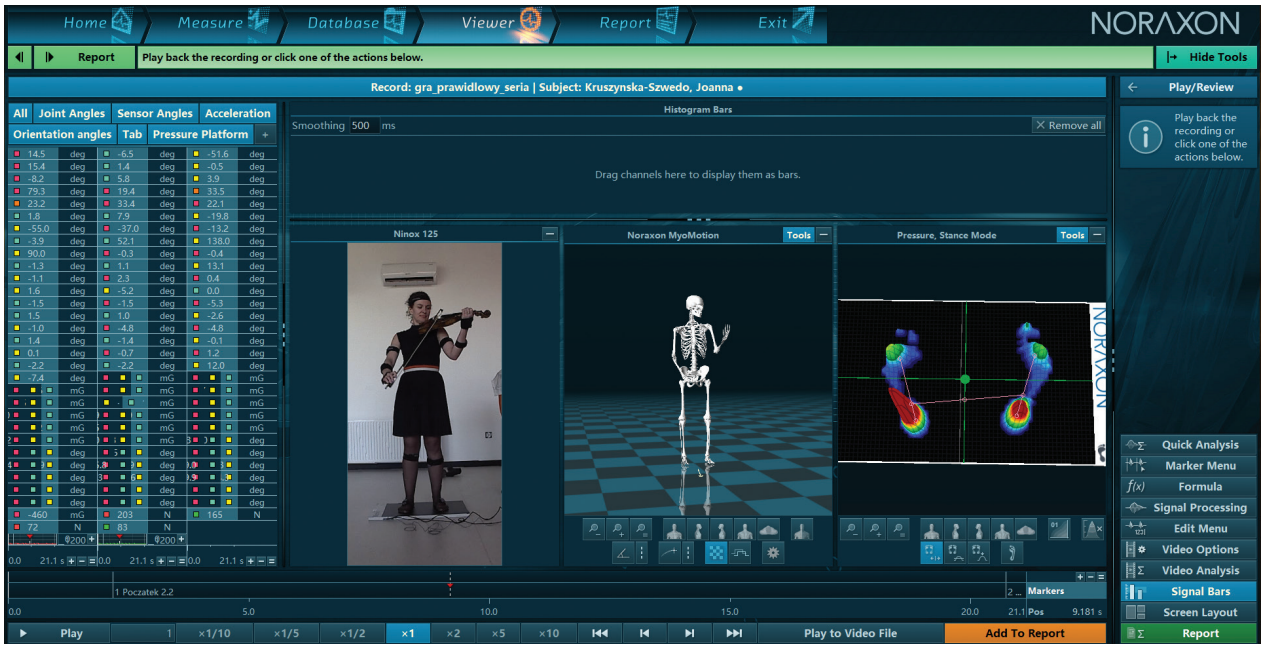
– Each type of instrument generates different problems – a guitarist has different problems, a violinist has others, for example – says Joanna Kruszyńska-Szwedo, MA. – When playing, we tense our muscles too much - this is a problem that often occurs among musicians. For example, if a guitarist presses his or her hand too hard against the fretboard, the risk of feeling pain in the upper limb increases. People who play the violin may complain, for example, of pain in the spine and shoulder girdle. Thanks to research, we are able to tell a musician that they turn their torso too much while playing, that they unnecessarily shift their body weight to one leg. This happened very often when we watched violinists.

THE PROBLEM IS NOTICEABLE

The research began last year. The first students to be examined were the students of the Secondary Comprehensive Music School named after Fryderyk Chopin in Bytom. These were children starting to learn to play instruments.

– We observed the children first in their natural standing position, and only then while playing the instruments – explains prof. Robert Michnik. – In some children we noticed an increased transfer of body weight to one limb, i.e. greater asymmetry. During these studies, it turned out that almost 50 percent of students have incorrect body posture without an instrument and need to be corrected, preferably before they start learning to play, which could increase the problem. Therefore, we would like to point out that there is a need, already at the stage of recruiting students to a music school, to pay attention to their attitude.

– From the perspective of a young scientist, I am glad that a niche has been found, be-



cause biomechanical research on musicians is not popular – says Anna Miller-Banaś, M.A. – This offers great prospects and the possibility of development in the field of music and biomechanics. Importantly, such research is actually needed and can really help someone.

Last year, the Aukso orchestra from Tychy was invited to join them.

– This time we examined fantastic, professional musicians – recalls prof. Robert Michnik. – We assessed the body's mobility during the performance and where the eyes were focused. We examined musicians while playing five different compositions. We wanted to check what the difference was when performing easier and more difficult pieces - some were played using notes, others from memory.

INVITATION TO RESEARCH

There is a chance that researchers will be able to establish cooperation with Anna-Sophie Mutter.

– She is described by the best conductors as the "first violin" of Europe, and we can draw an example from her when it comes to the playing the instrument - says Joanna Kruszyńska-Szwedo, M.A.

The scientists emphasize that this is only the beginning of their research, and the response from people associated with the music community is very positive. That's why they invite other musicians and music schools to cooperate.

– We would like our idea to reach schools and children who are just starting their adventure with music, so that they have the correct posture from the very beginning – natural, i.e. unforced – explains prof. Robert Michnik.

– We showed up at the Researchers' Night and that day showed us how much interest and need there is to conduct this research - says Joanna Kruszyńska-Szwedo, M.A. – We had ten workshops that were supposed to last about forty minutes, but due to many questions from children, their parents and young musicians from high schools, they lasted longer. Most of them were surprised why this issue is not so emphasized when learning to play an instrument.

– In Western countries, this problem has already been noticed, for example in Spain, Switzerland, France and the United States, there are institutes comprehensively dealing with musicians – sums up prof. Robert Michnik. – There are orchestras there that have their own physiotherapists. Our musicians privately use the help of rehabilitators because they see the need to take care of their musculoskeletal system. The trick, however, is to focus on prevention. We are able to make a very precise diagnosis and we would also be happy to cooperate with physiotherapists who deal with musicians. There are many teachers who want to share their knowledge and experience. If someone contacts us, we will of course take care of them and offer help. ■

CIVIL ENGINEERING IN TIMES OF TECHNOLOGICAL LEAP

Edited by **Jolanta Skwaradowska**
photos: **Photo archive of the Faculty of Civil Engineering of the Silesian University of Technology**

ON SEPTEMBER 24-28, 2023, THE 68TH EDITION OF THE KRYNICA SCIENTIFIC CONFERENCE OF THE CIVIL AND WATER ENGINEERING COMMITTEE OF THE POLISH ACADEMY OF SCIENCES AND THE SCIENCE COMMITTEE OF THE POLISH CHAMBER OF COMMERCE WAS HELD AT THE FACULTY OF CIVIL ENGINEERING OF THE SILESIAN UNIVERSITY OF TECHNOLOGY. DURING THE MEETING, ISSUES RELATED TO BROADLY UNDERSTOOD CIVIL ENGINEERING WERE DISCUSSED.

The event was attended by almost 200 people, representatives of technical universities from all over Poland, as well as the socio-economic environment and industry. The aim of the conference was to integrate the scientific community and create a forum for presenting current research and exchanging scientific achievements and experiences.

– This year's conference enjoyed great interest from the scientific community and attracted a record number of participants. Many scientific papers were presented in various specializations. The scientists' discussions were at a very high level, they were assessed by the Scientific Committee as exceptionally valuable and making a significant contribution to Polish science - said prof. Joanna Bzówka, dean of the Faculty of Civil Engineering.

The participants discussed, among others, the challenges of civil engineering in mining, post-mining and degraded areas. The general part of the conference included thematic sessions devoted to general civil engineering, geotechnics and communication engineering: roads and bridges.

– The conference is a prestigious scientific event, bringing together scientists and practitioners from all over Poland, which influences the establishment of new contacts and cooperation between individual scientific centres. It is also an opportunity to initiate and expand cooperation with representatives of the socio-economic environment, and thus transfer knowledge, research and analyses for practical applications. All this leads to enriching the scientific achievements of the conference participants, and thus Polish science - emphasized prof. Bzówka.

During the event, an anniversary session was held to celebrate the 90th birthday of Professor Włodzimierz Starosolski, an outstanding scientist, expert, engineer and educator of many generations of students and employees. The scientific, expert, teaching and organizational achievements of the Jubilarian were presented by prof. Łukasz Drobiec. The ceremony was honoured by the performance of the Academic Choir of the Silesian University of Technology.

For the first time in the history of the Krynica conferences, a reminiscence session was also held, during which the figures of great professors were recalled - the creators and founders of the Faculty of Civil Engineering of the Silesian University of Technology, as well as their successors. The presentation regarding deceased professors, outstanding scientists, researchers, rectors, deans and educators was prepared by the dean of the Faculty of Civil Engineering of the Silesian University of Technology - prof. Joanna Bzówka.

During the conference, awards and medals of the Polish Association of Civil Engineers and Technicians (PZITB)

were presented. Participants also had the opportunity to visit tourist attractions in Silesia, including: the Guido mine in Zabrze or the castle in Toszek.

Articles and papers that received positive opinions from reviewers were published in monographs published by the Silesian University of Technology Publishing House, including a problem monograph entitled: "Challenges of civil engineering in mining, post-mining and degraded areas", in the Jubilee monograph, which included 16 works by the Jubilarian's - prof. Włodzimierz Starosolski's - closest collaborators. In addition, abstracts of all papers submitted to the 68th edition of the Krynica Scientific Conference were published in the Book of Abstracts, published by the Silesian University of Technology Publishing House.

Articles prepared by conference participants have been or will soon be published in the following scientific and technical journals: Archives of Civil Engineering, Architecture Civil Engineering Environment, Cement Lime Concrete, Engineering and Construction, Building Materials and Construction Review.

This year's Krynica Scientific Conference of the Civil and Water Engineering Committee of the Polish Academy of Sciences and the Science Committee of the Polish Chamber of Commerce was held for the 68th time. It is organized every year by various research centres. The place of the conference was almost always Krynica, hence its name. This year, the host of the event was the Silesian University of Technology.

The honorary patrons of the conference were:

His Maginficence Rector of the Silesian University of Technology prof. Arkadiusz Mężyk, Minister of Infrastructure - Andrzej Adamczyk, chairman of the Silesian District Chamber of Civil Engineers - Roman Karwowski, chairman of the Association of Communication Engineers and Technicians of the Republic of Poland in Katowice - Jerzy Jakimowicz.

The media patrons of the event were the following magazines: Architecture Civil Engineering Environment, Archives of Civil Engineering, Cement Lime Concrete, Roads, Engineering and Construction, Insulation Magazine, Building Materials, Modern Construction Engineering and Construction Review.

The event sponsors were: Mostostal Zabrze GPBP, NDI SA, Solbet Sp. z o. o., Keller Polska Sp. z o. o., GEO-Instruments Polska, Budimex SA, AMK Kraków SA, Jastrzębska Spółka Węglowa SA, Silesian District Chamber of Civil Engineers and the Rudziniec Forest District.

The 68th Krynica Scientific Conference also received funding from the state budget, granted by the Minister of Education and Science under the "Excellent Science II" Program.

POGADAJMY O NAUCE

You can learn more about modern civil engineering and functional materials by listening to the podcast "Let's talk about science", in which we talk to dr Eng. Marcin Górski, prof. SUT, from the Faculty of Civil Engineering.

EVENTS

Silesian University of Technology with the Elsevier Research Impact Leaders 2023 award

The Silesian University of Technology is among this year's winners of the Elsevier Research Impact Leaders award in the special category of the European University Alliances Members' Research Impact Leaders Award 2023, granted for activities under the "European Universities" initiative program.

The Elsevier Research Impact Leaders Award is one of the elements of Elsevier's global initiative to support research and the development of science. The award, granted since 2016, is an expression of recognition for outstanding research institutions presenting high quality of research undertaken and its internationalization, as well as the implementation of strategic excellence initiatives, at the national and international level, contributing to better recognition of Polish science in the world.

The distinction is awarded in 6 main categories: agricultural sciences, engineering and technical sciences, humanities, natural sciences, medical sciences and social sciences. For the first time, the award was also granted in a special category rewarding involvement in the implementation of the prestigious European Commission program "European Universities Initiative", for which - apart from the Silesian University of Technology - the Gdańsk University of Technology and the University of Opole were also nominated.

This is the third Elsevier Research Impact Leaders award for the Silesian University of Technology. In 2016, the university was distinguished in the area of engineering and technical sciences, and two years later in the social sciences category.

Elsevier announced the winners of the Research Impact Leaders Awards on October 26 this year, during the plenary meeting and the presidium of the Conference of Rectors of Polish Academic Schools held on October 26-27 in Łódź. ■

Silesian University of Technology at the International Congress on Education Quality

The International Congress on Education Quality was held in Katowice, organized by the Academic Consortium Katowice - City of Science. The congress was an opportunity for the academic community to gain and develop experience in the process of improving teaching. The event, which was also attended by representatives of the Silesian University of Technology, brings together people interested in the quality of education, enabling the exchange of knowledge and experiences in this area. ■

photo Maciej Mutwil

Silesian University of Technology at the SME Congress

"Ready for Change?" – this is the motto of the 13th European Congress of Small and Medium-sized Enterprises, which took place on October 25-27, 2023, at the International Congress Centre in Katowice. It is a place for meetings, discussions, inspiration and exchange of ideas focused on topics related to the future of business. Representatives of the Silesian University of Technology took part in the event.

This year's edition of the SME Congress focused on the question: "Ready for Change?" The question is asked not only to entrepreneurs, but also to the inhabitants of the province of Silesia - a region that has undergone economic transformation, but reality still poses new challenges for people. In a world of constant economic and technological changes, not only entrepreneurs must be ready for innovation. ■

Educating staff for the Just Transformation of Silesia

The Faculty of Mining, Safety Engineering and Industrial Automation of the Silesian University of Technology, together with Jastrzębska Spółka Węglowa, are launching staff training for the Just Transformation of Silesia. The contract was signed on October 11, 2023, at the Silesian University of Technology.

The agreement signed between the Faculty of Mining, Safety Engineering and Industrial Automation of the Silesian University of Technology and Jastrzębska Spółka Węglowa SA covers, among others, the search for solutions that create lasting and effective cooperation in the field of creating modernization models of effective education, supporting the transformation of the teaching, learning system and improving the professional qualifications of industry 4.0 employees. This is only possible by involving the stakeholders of vocational education in the University environment as well as industry institutions and companies in the change process. ■

Another group of students from China at the SUT

The University authorities welcomed over a hundred students from China who are starting their studies at the Silesian University of Technology as part of the European Institute of Yanshan University. Cooperation between both universities is developing very dynamically - in total, nearly 170 students from the Middle Kingdom are studying at the Silesian University of Technology.

Education for students recruited in China lasts 4 years and is carried out in the "1+3" scheme, i.e. for the first two semesters, classes are conducted at Yanshan University, and the next 3 years- at the Silesian University of Technology. Chinese students study at four faculties: Electrical Engineering, Mechanical Engineering, Chemistry as well as Faculty of Automatic Control, Electronics and Computer Science. As part of the cooperation, common curricula have been agreed upon. Graduates will receive a bachelor's degree from Yanshan University and an engineer's degree from the Silesian University of Technology. ■

photo Przemysław Bratkowski

The Silesian University of Technology is starting a project with universities from Ukraine and Georgia

From November 6 to 10, 2023, the Silesian University of Technology hosted representatives of Ukrainian and Georgian universities that participate in the joint educational project PROMENT (Promoting professional education and students' engagement through comprehensive mentoring and tutoring system in HEIs).

The aim of the project is to increase students' employment opportunities by developing their professional competences on the one hand and civic engagement on the other. The project will be implemented based on a comprehensive tutoring and mentoring (T&M) system at partner universities. ■

photo Tomasz Stokłosa

10th anniversary of the Corporate Readiness Certificate educational program

"The phenomenon of the CRC educational program, i.e. 10 years of fruitful cooperation between the city, universities and business"- this was the slogan of the conference in Katowice on the occasion of the anniversary of the Corporate Readiness Certificate educational program. The authorities of the Silesian University of Technology were present at the ceremony: prof. Bogusław Łazarz, Vice-Rector for General Affairs, and dr hab. Eng. Tomasz Trawinski, prof. SUT, Vice-Rector for Infrastructure and Promotion.

The anniversary was preceded by a symbolic planting of plants at the KTW Office complex at Walenty Roździeński Alley in Katowice.

Then, at the Faculty of Materials Engineering of the Silesian University of Technology, a debate was held with the participation of representatives of the entities creating CRC entitled: "The phenomenon of the CRC educational program, or 10 years of fruitful cooperation between the city, the university and business."

During the meeting, among others, assumptions of the program, opportunities for its participants and what impact it had on the career development of participating students were presented. ■

photo Maciej Mutwil

30 years of the Faculty of Energy and Environmental Engineering

The Faculty of Energy and Environmental Engineering is celebrating its 30th anniversary. On October 20th, 2023, official celebrations took place with the participation of the University authorities and the faculty.

The authorities of the Silesian University of Technology were present at the anniversary - prof. Marek Pawełczyk, Vice-Rector for Science and Development, and prof. Janusz Kotowicz, Vice-Rector for Cooperation with the Socio-Economic Environment, as well as the faculty authorities.

- The Faculty of Energy and Environmental Engineering is the jewel in the crown of the Silesian University of Technology. It is of great importance, not only for the university but also for our region. In Silesia, issues related to energy and environmental engineering are of key importance. We set trends in the development of the energy industry, of course taking into account environmental protection, sustainable development and consumption - said prof. Janusz Kotowicz, who was also the dean of this faculty.

The Faculty of Energy and Environmental Engineering was established in 1993 from the merger of the Faculty of Environmental Engineering and the Faculty of Energy Mechanics. – Combining both faculties was a very good decision. Today, both energy and environmental aspects are very relevant. We face more and more challenges and threats related to environmental protection. Importantly, our faculty has both very good scientific staff and research infrastructure - said prof. Mariusz Dudziak, dean of the faculty. ■

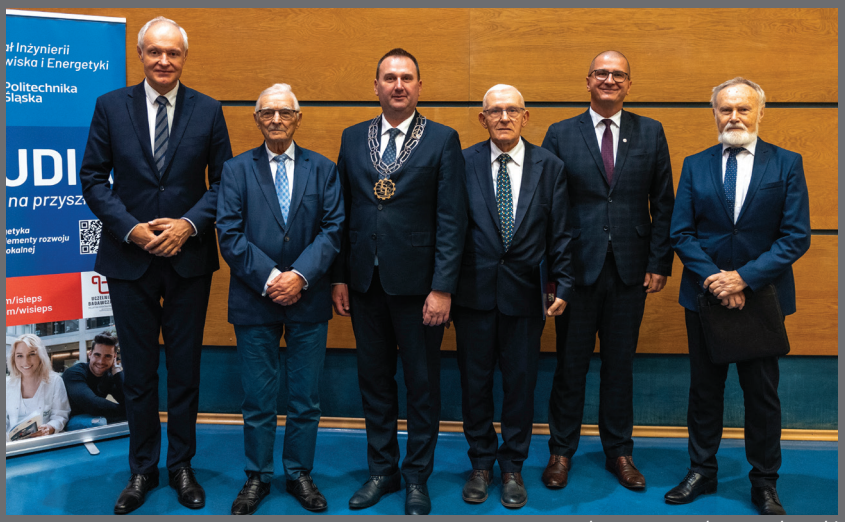


photo Przemyslaw Bratkowski

Malaysian scientists visit the Silesian University of Technology

On October 12th, 2023, a delegation from the Malaysian University of Technology in Malaka (Universiti Teknikal Malaysia Melaka, UTeM) visited the Silesian University of Technology. The meeting concerned current and future cooperation between both universities.

The visit was the result of activities undertaken in Malaysia by the Silesian University of Technology, as part of the international Erasmus E+ Project "Geomatics for Disaster Risk Reduction". ■

photo: SUT

About the languages of the future at the Silesian University of Technology

At the Educational and Congress Centre of the Silesian University of Technology, the 12th edition of Scientific and Didactic Conference entitled "Languages of the future - the future of foreign languages" was held. The organizer of the event dedicated to language teaching was the Foreign Languages Centre of the Silesian University of Technology. Teachers and foreign language instructors took part in the conference. The topics that were discussed included competences of the future teachers and new languages of communication. ■

photo: SUT

Delegation of the Silesian University of Technology in Georgia

On October 19th-21st, a delegation from the Silesian University of Technology visited Georgia. Representatives of our University took part in the celebration of the 90th anniversary of the State University named after Akaki Tsereteli in Kutaisi (ATSU). During the ceremony, prof. Aleksander Sładkowski received the title of Doctor Honoris Causa of ATSU.

The delegation was headed by: Vice-Rector for General Affairs prof. Bogusław Łazarz and the representative of the Rector of the Silesian University of Technology, prof. Aleksander Sładkowski. – Both universities enjoy many years of fruitful cooperation in the field of education and science. Scientists and academic teachers participate in joint conferences and publish joint scientific articles. An academic cooperation agreement was signed between the universities. A double diploma agreement was also recently signed, which gives Georgian students the opportunity to obtain a European diploma, said prof. Aleksander Sładkowski.

During the event, prof. Aleksander Sładkowski received the title of Doctor Honoris Causa from the Akaki Tsereteli State University of Kutaisi. The resolution of the ATSU Academic Council emphasized that this title was awarded for contribution to institutional development and strengthening the internationalization of the Akaka Tsereteli State University and many years of fruitful cooperation with the university. ■

Upper Silesian Space Scientific Conference "GeKKoN"

Several hundred secondary school pupils and university students took part in the Upper Silesian Space Scientific Conference GeKKoN. The organizer of the event was the Silesian Aerospace Technologies science club operating at the Institute of Physics at the Science and Education Centre of the Silesian University of Technology.

Space enthusiasts met in Mrowisko. Participants could share their experiences and research in the field of space engineering.

The Upper Silesian Space Scientific Conference GeKKoN was held under the patronage of KPLabs and the Polish Space Agency. ■

photo Jan Szady

Meeting of the Silesian University of Technology authorities with retired employees of the University

On October 7th, 2023, the annual meeting of the University authorities with retired employees was held at the Educational and Congress Centre of the Silesian University of Technology in Gliwice. Nearly 600 retirees came to the ceremony- both people who have just retired and distinguished seniors.

The meeting took place on the occasion of National Education Day. The participants were welcomed by prof. Bogusław Łazarz, Vice-Rector for General Affairs of the Silesian University of Technology. The Vice-Rector expressed his best wishes on the National Education Day and thanked them for their long-term work for the academic community.

The ceremony was an opportunity to meet former colleagues from work and remember the time spent at the Silesian University of Technology. The ceremony was honoured by the performance of the ABBA FAMILY band, which recalled the hits of the Swedish band from the 70s and 80s. ■


photo Tomasz Stokłosa

PROJECTS

The first monograph under EURECA-PRO

Sustainable production and consumption, selected environmental aspects - the first monograph at the Silesian University of Technology, created as part of EURECA-PRO, was published. The monograph presents selected problems regarding sustainable production and consumption in the environmental aspect.

The study discusses, among others, problems related to soil management, the growing problem of lack of availability of water of appropriate quality, air pollution and waste management. ■

The Silesian University of Technology trains drone experts

The second edition of the Metropolitan Drone School has started. This is a joint project of the Civil Aviation Personnel Training Centre of Central and Eastern Europe of the Silesian University of Technology and the GZM Metropolis. The training is addressed to local government officials. It will concern the technology of unmanned aircraft and the possibility of its use by local government units in the performance of public tasks.

The training began on October 17 this year and will be attended by approximately 30 employees representing 10 city and commune offices of GZM.

The aim of the Metropolitan Drone School is to develop in the GZM area a group of specialists with professional knowledge of unmanned aerial vehicles (drones), and in particular the use of these technologies to implement local government tasks. ■

50 weeks in the City of Science

The year 2024 will belong to the European City of Science! On this occasion, a number of educational and scientific events will be held in Katowice.

Next year Katowice will be the European City of Science. As part of the celebrations, activities focused on selected topics will take place for 50 weeks - from January to December. These will include workshops, conferences, training and outdoor events. ■

Registration of groups for the Silesian Science Festival started on November 12

The Silesian Science Festival 2023 is fast approaching. The event will last from December 9 to 11 at the MCK (International Congress Centre) in Katowice. As usual, the third day of the event will be dedicated to students and teachers. It is worth remembering that those interested in participating in this event should register in advance.

On December 11 in Katowice, teachers, pupils and students have the opportunity to participate in hundreds of events popularizing science and art - numerous lectures, workshops, exhibitions, demonstration stands, meetings with a huge number of special guests from Poland and abroad, and many other attractions. Such a visit can be an excellent alternative to traditional lessons at school.

Based on registration, which started on November 12, groups can take part in most festival activities (the entry ticket allows you to move freely in the festival space). Only some of them (workshops and special events) will require additional registration. ■

Competition for the best diploma theses related to GZM

GZM Metropolis encourages students to participate in the competition for the best bachelor's, engineer's and master's theses on metropolitan topics. There are attractive prizes to be won.

Bachelor's, engineering and master's theses defended after the establishment of the metropolitan union in the Silesian Voivodeship, i.e. from July 1, 2017, may be submitted to the competition. The topics of works that can be submitted to the competition should cover issues important for the functioning of the GZM Metropolis and its development based on the Development Strategy of the Upper Silesian-Zagłębie Metropolis for 2022-2027 with a perspective until 2035.

Applications will be accepted until November 30. ■

photo: SUT.

International design workshops

Architecture students of the Silesian University of Technology and the Technical University of Ostrava took part in joint design workshops. Together, they prepared various communication solutions for Bytom as part of the project of the Minister of Funds and Regional Policy for the Central Subregion of the Silesian Voivodeship for 2021-2027.

The workshop coordinator from the design perspective was dr hab. Eng. arch. Grzegorz Nawrot, prof. SUT, who together with prof. Eva Špačková from the Technical University of Ostrava and dr Eng. arch. Jan Kubec, dr Eng. arch. Jerzy Wojewódka, prof. SUT and dr Eng. arch. Aleksandra Śliwa, synchronized student design ideas. The participants were students and architects – research and teaching staff of the Faculty of Architecture of the Silesian University of Technology and the Technical University of Ostrava, who developed three concepts of Transfer Centres: two local at housing estates and the main one at the railway station in the city centre. They were part of the task "Mobile Metropolis- construction of transfer centres in the Bytom commune", which is one of several projects of the cities of the Metropolis, on the list of integrated projects implementing the goals of the Strategy of the Central Subregion of the Silesian Voivodeship for 2021-2027, with a perspective until 2030.

The essence of the project was to integrate bus, rail and tram transport in the very centre. The guidelines as well as source and study materials were developed by the City Hall of Bytom and the Upper Silesian-Zagłębie Metropolis. The key issue was the inclusion of railways in the public transport system, in connection with the renovation of the main railway station in Bytom and local stations. The workshops were held with the participation of the Mayor of Bytom, Mariusz Wołosz, and Vice-President Michał Bieda, who familiarized students with the study materials and guidelines prepared by the City Hall and the Upper Silesian-Zagłębie Metropolis, and in the summary took part in a discussion on the developed projects. ■

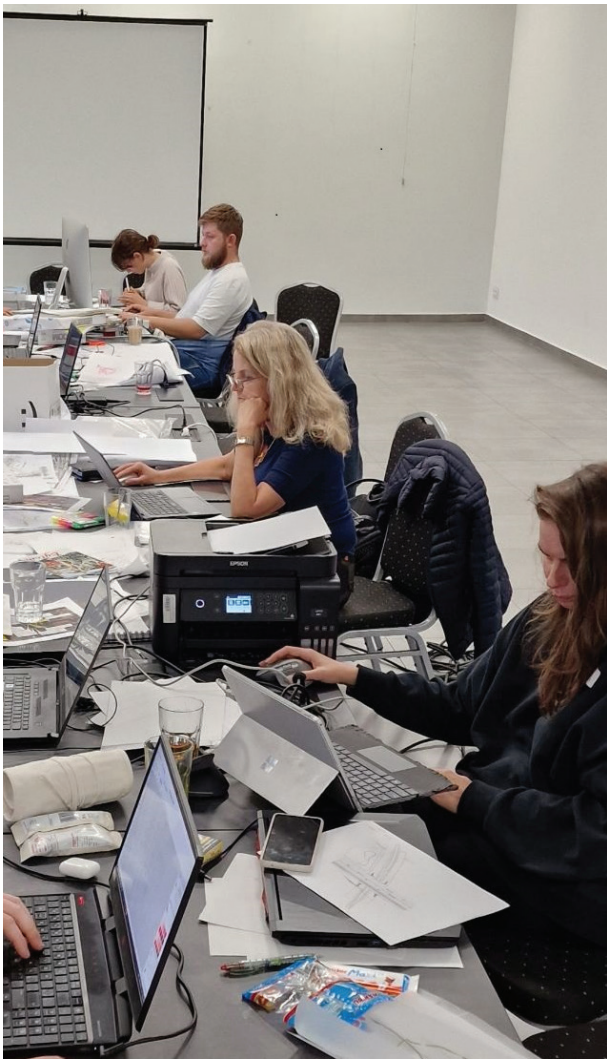


photo Hubert Klimek

Workshops for career counsellors

We invite secondary and primary school teachers and all other people interested in career counselling, in particular higher education paths. The workshops will be held on December 14, 2023 (Thursday) from 9.30 to 11.30 at the Education and Conference Centre.

The workshops will cover:

- higher education system (various variants, universities with different profiles),
- educational paths and system at the Silesian University of Technology (technical and humanistic fields),
- future and universal competences - an example of flexible education at the Silesian University of Technology,
- exemplary career paths of graduates of the Silesian University of Technology.

Workshop participants will receive presentations and teaching materials, as well as confirmation of participation in the workshops. ■

SUCCESSES

Honorary Award Scientist of the Future 2023 for dr hab. Aleksandra Kuzior, prof. SUT.

Dr hab. Aleksandra Kuzior, prof. SUT, is the winner of the 2023 Scientist of the Future Honorary Award. The award was granted for outstanding scientific achievements.

Dr hab. Aleksandra Kuzior, prof. SUT is the vice-dean for cooperation and development at the Faculty of Organization and Management of the Silesian University of Technology. She received the Honorary Award of the Scientist of the Future for outstanding scientific and teaching achievements, implementation of scientific and research projects and internationalization of Polish science. ■

photo: private archive

Arch. Martyna Krzysteczko with the best diploma thesis in the national competition

Arch. Martyna Krzysteczko, this year's graduate of the Faculty of Architecture of the Silesian University of Technology, won the 24th edition of the national academic competition for the best diploma thesis - Concrete Architecture 2023 for the work "Pokłady Pamięci - KWK Centrum XXI. Conceptual design of a multi-functional building in Bytom".

An architect from Ruda Śląska, Martyna Krzysteczko, obtained her master's degree in June this year. The supervisor of the awarded work is dr Eng. arch. Damian Radwański from the Faculty of Architecture of the Silesian University of Technology.

- When entering the competition, I always hope for a positive reception and recognition of my project - says arch. Martyna Krzysteczko. – Master's theses are the result of cooperation between the student and the supervisor. I was pleased to have the opportunity to consult on my diploma project with dr Eng. arch. Damian Radwański. His extensive knowledge and professional approach were invaluable support. When I found out about the win, I felt satisfied and happy. This is an important distinction for me. The evaluation criteria adopted by the jury when selecting the works took into account the architectural values of the project, based on its aesthetic and concrete construction values. The way of presenting the design concept and its compliance with the architectural assumptions of the project was also important. The project by the graduate of the Silesian University of Technology turned out to be the best among the 25 submitted works. ■

photo Jan Zych, Krakow University of Technology

The Silesian University of Technology awarded at the Silesian Academic Sports Gala

The winner of the general classification and medal classification of the Silesian Academic Championships in the 2022/2023 season, as well as the most titled university in the 50-year history of the Silesian Academic Championships - these are the most important awards won by the Silesian University of Technology during the 13th Silesian Academic Sports Gala.

Domination - this is a word that was often addressed to our University during the 13th Silesian Academic Sports Gala, which took place in the theatre and cinema hall of the Youth Palace in Katowice.

The Silesian University of Technology won the most important general classification of the Silesian Academic Championships for the tenth time in a row. Athletes competing for our University stood on the podium in as many as 41 disciplines in the 2022/2023 season. They won 18 gold medals - a record result, they won silver 15 times and bronze medals 8 times, thanks to which they also turned out to be the best in the medal classification. ■

POSITIONS, DEGREES AND ACADEMIC TITLES

DOCTORAL DEGREES AWARDED

Dr Eng. Piotr ARCISZEWSKI

Uniraven - Gliwice. Supervisor: dr hab. Eng Janusz Mazurkiewicz, prof. SUT Auxiliary supervisor – dr Krzysztof Bortel. Thesis topic: "Analysis of changes in selected properties of highly foamed polyethylene depending on the material composition and conditioning time." Conferring the degree of doctor of engineering and technical sciences with distinction. In the discipline – materials engineering. Resolution of the Materials Engineering Discipline Council of September 19, 2023.

Dr Eng. Joanna BADURA

Supervisor: dr hab. Marek Sikora, prof. SUT Thesis topic: "Solutions for selected problems of demand forecasting based on machine learning methods and domain knowledge." Conferring the degree of doctor of engineering and technical sciences with distinction. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Eng. Zdzisław BIELECKI

Supervisor: dr hab. Eng Dariusz Choiński, prof. SUT Auxiliary supervisor - dr Eng. Jarosław Dziuba. Thesis topic: "Control in multiphase flow systems." Conferring the degree of doctor of engineering and technical sciences. In the discipline – automation, electronics, electrical engineering and space technologies. Resolution of the Automation, Electrical Engineering, Electrical Engineering and Space Technologies Council of September 26, 2023.

Dr Eng. Marta BIESOK

Silesian University of Technology Faculty of Biomedical Engineering – assistant. Supervisor: dr hab. Eng Pawel Badura, prof. SUT Auxiliary supervisor – dr Jan Juszczyk. Thesis topic: "Segmentation and three-dimensional visualization of pathological changes of the mammary gland in ultrasound images using artificial intelligence methods." Conferring the degree of doctor of engineering and technical sciences with distinction. In the discipline – biomedical engineering. Resolution of the Biomedical Engineering Discipline Council of October 19, 2023.

Dr Eng. Wojciech DUDZIK

Supervisor: dr hab. Eng Michal Kawulok, prof. SUT Auxiliary Supervisor: dr hab. Eng Jakub Nalepa, prof. SUT Thesis topic: "Ensembles of Support Vector Machines with Evolutionarily Optimized Hyperparameters and Training Sets." Conferring the degree of doctor of engineering and technical sciences with distinction. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Eng. Mariusz DUKA

Supervisor: dr hab. Artur Strzelecki, prof. UE. Thesis topic: "Determining the ranking of websites using the ISOWQ Rank algorithm." Conferring the degree of doctor of engineering and technical sciences. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 12, 2023.

Dr Eng. Patryk JARNOT

Silesian University of Technology Faculty of Automatic Control, Electronics and Computer Science - assistant. Supervisor: dr hab. Eng Aleksandra Gruca, prof. SUT. dr hab. Marcin Grynberg. Thesis topic: "Methods for similarity analysis of low complexity regions in protein sequences". Conferring the degree of doctor of engineering and technical sciences with distinction. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Mateusz KANIA

Supervisor: prof. dr hab. Eng Andrzej Polanski. Thesis topic: "Data Clustering with Mixtures of Multidimensional Distributions." Conferring the degree of doctor of engineering and technical sciences. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 12, 2023.

Dr Eng. Maciej KLIMAS

Silesian University of Technology, Faculty of Electrical Engineering – assistant. Supervisor: dr hab. Eng Andrzej Grabowski, prof. SUT Auxiliary supervisor - dr Eng. Dawid Buła. Thesis topic: "Comparative analysis and implementation of selected new alternating current electric arc models". Conferring the degree of doctor of engineering and technical sciences with distinction. In the discipline – automation, electronics, electrical engineering and space technologies. Resolution of the Automation, Electrical Engineering, Electrical Engineering and Space Technologies Council of September 26, 2023.

Dr Eng. Wojciech KOREK

Supervisor: prof. dr hab. Eng Joanna Polańska. Auxiliary supervisor - dr Eng. Wen-Chin Li. Thesis topic: "Research and development of a new touch-screen based inceptors design for an aircraft control." Conferring the degree of doctor of engineering and technical sciences with distinction. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Tomasz KUJAWA

Supervisor: prof. dr hab. Eng Joanna Polańska. Auxiliary supervisor - dr Eng. Michal Marczyk. Thesis topic: "Skipping batch effect correction: clustering-based methods for analysing confounded single-cell RNA-sequencing data." Conferring the degree of doctor of engineering and technical sciences with distinction. In the discipline – biomedical engineering. Resolution of the Biomedical Engineering Discipline Council of October 19, 2023.

Dr Eng. Anna KULIŚ-KAPUŚCIŃSKA

Silesian University of Technology Faculty of Automatic Control, Electronics and Computer Science - assistant. Supervisor: dr hab. Eng Monika Kwoka, prof. SUT Thesis topic: "Characterization of Surface properties of low dimensional zinc oxide ZnO nanostructures for potential microelectronics application". Conferring the degree of doctor of engineering and technical sciences. In the discipline – automation, electronics, electrical engineering and space technologies. Resolution of the Automation, Electrical Engineering, Electrical Engineering and Space Technologies Council of September 26, 2023.

Dr Eng. Paweł KUŚ

Supervisor: prof. dr hab. Eng Marek Kimmel. Auxiliary supervisor - dr Eng. Roman Jaksik. Thesis topic: "Models of cancer genome evolution used to evaluate the role of selection and occurrence of new mutations." Conferring the degree of doctor of engineering and technical sciences. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Eng. Magdalena ŁUGOWSKA

Supervisor: prof. dr hab. Eng Marek Kimmel. Auxiliary supervisor - dr Eng. Marcin Pacholczyk. Thesis topic: "Algorithms for the analysis of molecular protein structures and drug-like ligands for modelling and simulation of residence time drug-molecular target". Conferring the degree of doctor of engineering and technical sciences. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Eng. Arkadiusz MUSIAŁ

Marani Sp. z o.o. Supervisor: dr hab. Eng Jacek Kalina, prof. SUT Thesis topic: "Optimization of design and operational parameters of an ORC power plant powered by waste heat from industrial processes." Conferring the degree of doctor of engineering and technical sciences. In the disciplines - environmental engineering, mining and energy. Resolution of the Environmental Engineering, Mining and Energy Discipline Council of October 19, 2023.

Dr Eng. Agata MUSZYŃSKA

Supervisor: dr hab. Eng Paweł Łabaj. prof. dr hab. David Kreil. Thesis topic: "Advanced data exploration techniques for augmented transcriptional landscape and its better quantification." Conferring the degree of doctor of engineering and technical sciences. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Eng. Daria NIEWOLIK

Supervisor: dr hab. Eng Katarzyna Jaszcz, prof. SUT Thesis topic: "Research on the preparation, characteristics and application possibilities of polyanhydrides based on betulin and its derivatives." Conferring the degree of doctor of exact and natural sciences. Discipline: chemical sciences. Resolution of the Chemical Sciences Discipline Council of October 11, 2023.

Dr Jarosław PACIEJ

Provincial Sanitary and Epidemiological Station in Katowice. Supervisor: prof. dr hab. Eng Izabela Zimoch. Thesis topic: "The use of DSS IT tools to build elements of the water health safety system." Conferring the degree of doctor of engineering and technical sciences with distinction. In the disciplines - environmental engineering, mining and energy. Resolution of the Environmental Engineering, Mining and Energy Discipline Council of October 19, 2023.

Dr Eng. Marta PRZYPIS
Supervisor: dr hab. Eng Danuta Gillner, prof. SUT Thesis topic: "The use of chemical and enzymatic methods in the transformation of cellulose and agricultural waste into Fine Chemicals products." Conferring the degree of doctor of exact and natural sciences. Discipline: chemical sciences. Resolution of the Chemical Sciences Discipline Council of October 11, 2023.

Dr Eng. Rafał ROBAK
Avio Polska Sp. z o.o. Supervisor: dr hab. Eng Sebastian Rulik, prof. SUT Co-Supervisor: dr hab. Eng Mirosław Szczepanik, prof. SUT Thesis topic: "Optimization of dynamic parameters of low-pressure turbine guides of a turbofan engine using artificial intelligence methods." Conferring the degree of doctor of engineering and technical sciences. In the disciplines - environmental engineering, mining and energy. Resolution of the Environmental Engineering, Mining and Energy Discipline Council of October 19, 2023.

Dr Eng. Dariusz ROGOWSKI
Supervisor: dr hab. Eng Andrzej Białas, prof. ITI EMAG. Auxiliary supervisor - dr Eng. Artur Kozłowski. Thesis topic: "A method for assessing the security of industrial network components on the example of industrial controllers." Conferring the degree of doctor of engineering and technical sciences with distinction. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

Dr Eng. Adam SKOWRONEK
Silesian University of Technology – PhD student. Supervisor: prof. dr hab. Eng Adam Grajcar. Thesis topic: "Improvement of the ductility of high-strength medium-Mn steels through intercritical annealing". Conferring the degree of doctor of engineering and technical sciences with distinction. In the discipline – materials engineering. Resolution of the Materials Engineering Discipline Council of September 19, 2023.

Dr Eng. Aleksandra SUWALSKA
Silesian University of Technology Faculty of Automatic Control, Electronics and Computer Science - assistant. Supervisor: prof. dr hab. Eng Joanna Polańska. Thesis topic: "Developing a system of automatic identification of cellular subpopulations in data from single-cell mass cytometry with the use of algorithms for grouping of high dimensional data." Conferring the degree of doctor of engineering and technical sciences with distinction. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 12, 2023.

Dr Eng. Krzysztof SZCZYRBA
Supervisor: dr hab. Marek Sikora, prof. SUT. Auxiliary Supervisor: dr hab. Łukasz Wróbel. Thesis topic: "A system for visualization and diagnostics of device operation based on a wireless network of vibroacoustic sensors and data mining methods." Conferring the degree of doctor of engineering and technical sciences. Discipline: technical information technology and telecommunications. Resolution of the Technical Information Technology and Telecommunications Discipline Council of September 29, 2023.

AWARDED DEGREES OF HABILITATED DOCTOR

Dr hab. Eng. Marcin MICHALAK
Silesian University of Technology Faculty of Automatic Control, Electronics and Computer Science - assistant professor. Resolution of the Technical Informatics and Telecommunications Discipline Council of September 12, 2023. In the discipline of technical informatics and telecommunications.

EMPLOYMENT AS A UNIVERSITY PROFESSOR

Dr hab. Eng. Damian Borys
RAU1-KIiBS from October 1, 2023

Dr hab. Ewa Brągoszewska
RIE3 from October 1, 2023

Dr hab. Eng. Małgorzata Czichy
RCH4 from October 1, 2023

Dr hab. Eng. Tomasz Haniszewski
RT3 from October 1, 2023

Dr hab. Eng. Gabriela Kamińska
RIE4 from October 1, 2023

Dr hab. Eng. Anna Kaźmierczak-Bałata
RIF3 from October 1, 2023

Dr hab. Eng. Marcin Kubica
RAU12-KSC from October 1, 2023

Dr hab. Eng. Edyta Kudlek
RIE4 from October 1, 2023

Dr hab. Eng. Joanna Machnik-Słomka
ROZ4 from October 1, 2023

Dr hab. Eng. Anna Mainka
RIE2 from October 1, 2023

Dr hab. Eng. Józef Ober
ROZ2 from October 1, 2023

Dr hab. Tomasz Skalski
RJO11-CB from October 1, 2023

Prepared by **Katarzyna Mryka**

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2. Municipal Theatre 44-100 Gliwice, 55/57 Nowy Świat
3. Katowice International Airport in Pyrzowice, 42-625 Pyrzowice 90, Wolności Street, Departures terminal
4. Project Management Centre, 44-100 Gliwice 10, Banacha Street
5. NZOZ Academic Clinic, 44-100 Gliwice 5, Łużycka Street
6. Faculty of Automatic Control, Electronics and Computer Science ,44-100 Gliwice, 16, Akademicka Street
7. Faculty of Mechanical Engineering, 44-100 Gliwice 18A, Konarskiego Street
8. Institute of Physics - Centre for Science and Education, 44-100 Gliwice ,22B, Konarskiego Street
9. Faculty of Materials Engineering, 40-019 Katowice 8, Krasińskiego Street
10. Faculty of Mining, Safety Engineering and Industrial Automation, 44-100 Gliwice, 2, Akademicka Street
11. Faculty of Organization and Management, 41-800 Zabrze 26-28, Roosevelta Street
12. Faculty of Biomedical Engineering, 41-800 Zabrze, 40, Roosevelta Street
13. Faculty of Transport and Aviation Engineering, 40-019 Katowice, 8, Krasińskiego Street
14. Faculty of Civil Engineering, 44-100 Gliwice 5, Akademicka Street
15. International Centre for Interdisciplinary Research, 44-100 Gliwice 18B, Konarskiego Street, room 202
16. Zabrze City Hall - Customer Service Point, 41-800 Zabrze, 5 - 7, Powstańców Śląskich Street
17. Faculty of Applied Mathematics, 44-100 Gliwice 23, Kaszubska Street
18. Faculty of Energy and Environmental Engineering, 44-100 Gliwice, 18, Konarskiego Street
19. Faculty of Electrical Engineering 44-100 Gliwice, 2, Bolesława Krzywoustego Street

PUBLISHING NEWS

Production and analysis of the properties of multi-component composite nanofibers containing conductive polymers and rare earth oxide nanoparticles

Wiktor MATYSIAK

Ed. I, 2023, PLN 30.45, p. 224

The main research goal of this monograph was to produce and study the morphology, structure and optical properties, first of polymer nanofibers doped with nanoparticles of conductive polymers (PANI or PPy), and then the world's first multi-component composite nanofibers doped simultaneously with nanoparticles of conductive polymers (PANI or PPy) and elemental oxides of rare earths (CeO_2, Y_2O_3, Eu_2O_3).

Complex numbers. Vol 1 Basic operations on complex numbers

Waldemar HOŁUBOWSKI, Mariusz PLESZCZYŃSKI, Michał RÓŻAŃSKI, Roksana SŁOWIK, Adrian SMUDA, Roman WITUŁA

Ed. I, 2023, PLN 32.55, p. 216

The presented didactic monograph is devoted to an extensive introduction to the topic of complex numbers and their applications. The work includes an introduction to the topic of complex numbers of a historical and algebraic nature, the basic algebraic operations on complex numbers are explained, and the square roots and exponentiation of complex numbers are thoroughly considered. The monograph ends with seven independent chapters - appendices, which constitute a kind of guide summarizing the issues considered and a compendium of facts, as well as selected identities and patterns.

The use of fungi in environmental engineering

Wioletta PRZYSTAŚ

Ed. I, 2023, PLN 29.40, p. 203

The monograph describes the results of research on the degradation and support of removal processes of selected pollutants using fungi representing various systematic and physiological groups (mainly mold fungi and white rot fungi and yeasts). The importance of fungi in the composting process and the possibilities of supporting this process with the use of wood rot fungi and mold fungi were discussed.

Prepared by **Małgorzata Mizera**

DECEMBER REPERTOIRE OF THE STUDENT CULTURE CENTER "MROWISKO"

1.12 at 18:00 and 20:15
Performance titled "Script for three actors", Jan Peszek, Andrzej Grabowski, Mikołaj Grabowski

8.12 at 9:30 and 10:30
Szancik

8.12 at 20:00
Good Evening with a Vinyl Record

9.12 at 18:00
Concert for the 50th anniversary of Hip-Hop culture entitled RAP Gliwice

13.12 at 19:00
MrOFFisko Theatre, performance entitled "Funny Exquisites".

14.12 at 11:00
Science with Culture - a musical meeting for seniors

15.12 at 19:00
BOOZE & GLORY concert, Darek Dusza and Demony, ADHD Syndrome

16.12 at 18:00
Drum workshops

17.12 at 10:00-14:00
Gliwice Record Exchange

17.12 at 17:00
Wit-Wit Musical Theatre "Black or White" charity concert with the best hits of Michael Jackson

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