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TECH**

Vilnius Gediminas
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Dear readers,

As autumn reaches its midpoint, cities are living at an intense pace. Every day, so many people, ideas and experiences meet in the streets, on public transport, at workplaces and in educational institutions. With the start of the new academic year, thousands of students from different parts of Lithuania arrive to university cities to study, create and plan their futures, enriching urban life with new ideas, energy and ambition.

In this constantly moving organism, technology has long become an inseparable part of everyday life. We often do not even notice it and yet it is precisely technology that helps create a safer, more sustainable and more comfortable environment in which we live. It is no coincidence that the theme of this issue of "Sapere Aude" is "The City and Technology."

However, it isn't only about technology. Our priority is to talk about people whose ideas, whether born in lecture halls, laboratories or research centres, eventually become solutions that transform cities and our everyday lives.

Modern cities must find answers to increasingly complex questions: how to adapt to climate change, ensure sustainable mobility, develop infrastructure and use resources responsibly. In addressing these challenges, the collaboration of different fields is becoming more and more important. Engineering, urban planning, artificial intelligence, data analysis, environmental protection and communication complement one another today, helping to create more advanced and people-oriented solutions.

It is these kinds of answers that the VILNIUS TECH community is seeking. This issue reveals the harmony between research, studies and



Neda
Cerniauskaite
Editor-in-Chief

practice, as well as the university's ambition to be an active creator of the city of the future. Here, experienced scientists, young researchers, students, alumni and partners come together, united by curiosity, creativity and a desire to contribute to meaningful change.

This issue comes at an important time for the university, when attention is focused not only on what has already been accomplished but also on future directions. It is a good opportunity to remember that progress begins with the ability to ask questions, while the future is created where knowledge, responsibility and the courage to look for new opportunities meet.

Technology changes cities, but people create the future of cities. I hope that the stories in this issue will inspire you to look at the city we live in from a new perspective.

Wishing you inspiring stories,
Editor-in-Chief Neda

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"Sons & Daughters"

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Fundamentals of sciences faculty Dean Prof. Dr. Simona Ramanauskaite: „A smart city is impossible without smart residents“



Fundamentals of sciences faculty
Dean Prof. Dr. Simona Ramanauskaite

Artificial intelligence (AI), data analysis and other advanced technologies are transforming cities as well as our everyday lives. However, the origins of these solutions lie in the fundamental sciences. Prof. Dr. Simona Ramanauskaite has begun leading the VILNIUS TECH Faculty of Fundamental Sciences (FMF), taking over as dean from Prof. Dr. Dalius Mazeika. Her vision focuses not only on scientific and technological progress, but also on an open, curious community that is ready to grow.

We spoke with the new faculty dean about people, technology and the future direction of FMF.

What encouraged you to take on this challenge and accept your new position?

To be honest, I have never sought leadership positions. However, my desire to look for new opportunities, implement technologies and explore new ways of working, collaborating gradually led me to a such position.

I accepted this challenge as an opportunity to implement the ideas I have. Together with members of the FMF community, we can create an environment that encourages personal as well as university development in the areas of science, studies and service to society. I believe that leadership in itself is not the goal. It is a means of bringing people together, motivating them and creating change collectively.

How do you see FMF's place and role within the university in the future? What, in your opinion, could make the faculty stand out?

I am convinced that the Faculty of Fundamental Sciences holds an important place within the

university, and its significance will only increase in the future. Our activities and expertise in information technology, mathematics, physics and chemistry can become an important connecting component between different university departments. It could also strengthen the university's links with the wider environment.

These competencies form the foundation for digital transformation, automation and the development of new technological solutions in various fields. I believe that the faculty's distinctive feature could be its ability to combine fundamental knowledge with an applied approach. This would not only create new knowledge, but also turn it into solutions valuable for science, business and society. However, to fully realize this potential, we must work together and look for opportunities to collaborate among faculties and different institutions.

What kind of FMF would you like to build as dean?

I would like to build an inclusive, open and curious community that shares its experience and actively learns from others. I would like this openness and curiosity not to be limited to the faculty. I believe that a strong, learning-oriented and collaborative FMF community can not only grow itself, but also contribute to the development of VILNIUS TECH as a whole.

Fundamental sciences can sometimes seem quite distant from people's everyday lives. However, their results form the basis of many technologies we use today. How close are fundamental sciences really to our everyday lives?

Fundamental sciences are much closer to our everyday lives than they may sometimes appear. The knowledge they generate forms the basis of many technologies we use today, but their value extends beyond technology and its commercialization. Fundamental sciences also directly contribute to quality of life - they help create a safer, more convenient, more efficient and more sustainable environment as well as address issues that are important to society. Therefore, I believe that the fields developed by our faculty are very closely connected to how we will live in the future.

What role do fundamental sciences play in creating the city of the future?

Knowledge of mathematics, information technology, physics and chemistry makes it possi-

ble to develop smarter, more efficient and more sustainable urban solutions. In addition to data-driven management and automation solutions it also includes systems for monitoring and ensuring environmental quality. I believe that the most important thing here is not only the technologies themselves, but also the ability to apply them to improve people's quality of life. Therefore, fundamental sciences can serve as an important link between on one side - university developed knowledge and technologies and on the other - the real needs of cities and society.

A smart city is no longer just a vision - it uses AI, data analysis and smart infrastructure solutions. In your opinion, how will these technologies change cities and their people's lives over the next 10-20 years?

For me, a smart city is impossible without smart residents. Therefore, when I think about the city of the future, I focus less on how many of the latest technologies it will have and more on how the people who use them will grow and change.

Over the next 10-20 years, technology, AI and data analysis will undoubtedly become even more integrated into our everyday lives. However, the most important thing will not only be to know how to use them effectively, but also to learn how to apply them creatively, sustainably and flexibly.

Therefore, I believe that the true measure of a smart city will not be the amount of technology it has, but its creative, curious and responsible residents, who are capable of using these technologies in meaningful ways.

Technology can help cities become more convenient, safer and more sustainable, but it also raises new questions. What risks or challenges should we not forget when creating a city that increasingly relies on technological solutions?

I believe the greatest risk is to think that technology will solve all of a city's problems on its own. Technology should be a tool that helps address real urban and societal challenges, so it is important to continuously evaluate the benefits and impact it creates. Consequently, when developing a smart city, it is important to maintain a balance: use technology where it creates value for people as well as the environment, while preserving critical thinking, freedom of choice and human connection.

Electric scooters in the city: what is needed to make everyone feel safer?

Some people like them, while others cannot stand them. Some of us own them, while others rent for short trips or to avoid traffic jams.



Prepared by Lina Mustafinaite, Project Manager, Public Relations Department

Electric scooters have already become an integral part of urban transport systems. However, the incidents that occur almost every day and their painful consequences are forcing us to look for solutions to ensure that people on wheels and pedestrians feel safe in the streets. We discuss the main road safety problems related to electric scooters and possible solutions with Edita Juodvalkiene, a researcher at VILNIUS TECH.

You are currently preparing a dissertation on infrastructure adapted for the safe use of electric scooters. What encouraged you to focus on this issue?

The topic of my dissertation is "A model for the selection and adaptation of infrastructure for the safe use of electric scooters." I chose this topic because electric scooters have become an important part of urban transport systems in a relatively short period

of time. However, existing infrastructure is not always properly adapted to them. The small wheels of electric scooters are particularly sensitive to uneven surfaces, cracks, potholes, curbs and other defects. This affects not only riding comfort, but also the stability of the scooter and road safety.

In addition, as the use of electric scooters increases, so does the number of traffic accidents involving them. Therefore, it is important to assess not only the behaviour of riders or legal regulations, but also the quality of the infrastructure. In my research, I examine which types of transport infrastructure are most suitable for safe and comfortable electric scooter use.

I analyse scientific literature, data on electric scooter traffic accidents, and the legal regulation of their use in Lithuania and other countries. During experimental studies, I conduct rides in real urban conditions. During these rides, I use specialised equipment

to record the movement trajectory and speed of the electric scooter and assess the condition and unevenness of the road surface. For the experimental studies, I also use the mobile laboratory of the VILNIUS TECH Road Research Institute, which is equipped with a laser crack measurement system.

What do you see as the main road safety problems related to electric scooters today?

One of the most important problems is the lack of continuous and properly adapted infrastructure. Electric scooter riders often have to move through different spaces: cycle paths, the roadway or pedestrian areas. When a cycle path suddenly ends, is too narrow or has a poor-quality surface, the rider is forced to unexpectedly change direction or merge into the flow of other road users. This increases the risk of collisions and falls.

An even greater difference in speed and movement patterns occurs in shared spaces with pedestrians. Pedestrians move more slowly and may suddenly stop or change direction, while an electric scooter can approach them relatively quickly and quietly. Children, older people, and people with visual or hearing impairments are particularly vulnerable. Therefore, shared spaces require lower speeds, sufficient distance and clearly understandable traffic organisation.



Discontinuous bike path

People also often get angry about the irresponsible behaviour of scooter riders.

Yes, another group of problems is related to the behaviour of the riders themselves: failing to choose a safe speed, riding two people on one scooter, not wearing a helmet or using visibility-enhancing equipment. Additionally, they might use a phone, make sudden manoeuvres, or ride while under the influence of alcohol or other substances. The risk is also increased by insufficient riding experience. It is very easy to start riding an electric scooter, but not everyone immediately knows how to brake properly, assess the condition of the road surface and manoeuvre safely.



VILNIUS TECH Road Research Institute's mobile laboratory equipped with a laser crack measurement system

There are also frequent conflicts with car drivers. It can be difficult to notice an electric scooter in time and assess how quickly it is approaching. The risk increases even further at night and in poor visibility conditions.

Nevertheless, the safety problems associated with electric scooters cannot be attributed solely to rider behaviour. They are determined by a whole range of factors: the continuity and quality of infrastructure, differences in the speed and movement patterns of various road users, the technical characteristics of the vehicle, riders' experience, traffic culture, clear legal regulation and compliance with it. To achieve safer traffic, all these areas need to be assessed comprehensively.

What mistakes do cities most often make when organising electric scooter traffic?

One of them is assuming that all cycling infrastructure is automatically suitable for electric scooters.

Another problem is the lack of continuity in infrastruc-



Electric scooter with special equipment

ture. High-quality sections of paths may be built, but they can suddenly end, lead into another traffic area or encounter inconveniently organised intersections. Therefore, it is important to think not only about individual paths, but the entire journey route.

What is the experience of other countries?

In many cities, it is not all electric scooters that have been banned, but only scooter-sharing services. For example, Paris stopped offering rental electric scooters in 2023, but residents can still use privately owned ones. The decision was driven by traffic accidents, poorly parked scooters and public dissatisfaction. In Madrid, permits for scooter-sharing operators were also revoked in 2024 because they failed to ensure adequate control over riding and parking.

From 2026, Prague and Florence also stopped offering electric scooter-sharing services. In Barcelona, such services have not been permitted since 2019. However, privately owned electric scooters can still be used in all of these cities.

Not all cities choose bans immediately. Some first introduce stricter regulations for sharing services. In Oslo, the number of rental scooters was limited, as was their rental at night, when the risk of accidents is higher. Stockholm chose a permit system, established specific requirements for operators and limited the number of scooters in operation. Brussels implemented data-driven management, making it possible to monitor scooter use and adjust traffic and parking arrangements according to the actual situation. Nevertheless, Brussels has also decided not to renew permits for electric scooter-sharing operators from 2027. This shows that even when regulatory measures are applied, managing sharing services remains a challenge for cities.

How do you see the future of electric scooters?

I do not think electric scooters will disappear from cities. They have already become an important part of micromobility and are convenient for short trips as well as for connecting with public transport.

However, their use will most likely become increasingly regulated. Lithuania should not rush to choose a complete ban. It is more important to create a functioning system: establish clear rules for riding and parking, regulate speeds appropriately, ensure responsible oversight of operators, educate road users, and develop continuous, high-quality and well-maintained infrastructure.

After completing the main stages of my research, I would like to present the results to representatives of the city of Vilnius and other municipalities. I believe that my research could help not only address existing electric scooter traffic problems, but also contribute to creating safer infrastructure for all micromobility users.

“ I do not think electric scooters will disappear from cities. They have already become an important part of micromobility and are convenient for short trips as well as for connecting with public transport.

Edita Juodvalkiene

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The search for safer micromobility has begun on the streets of Vilnius

Dominykas Eicinas,
VILNIUS TECH Faculty of Transport
Engineering graduate

Electric scooters, shared bicycles and other micromobility vehicles have already become an integral part of urban transport systems. However, as their popularity grows, safety and comfort challenges are also becoming increasingly apparent. VILNIUS TECH Faculty of Transport Engineering graduate Dominykas Eicinas in his master's thesis explored how the safety of micromobility vehicles could be improved by integrating a suspension system into the wheels. The thesis was submitted to the student thesis competition organised by the Ministry of Transport and Communications of the Republic of Lithuania.

The idea for the research wasn't born in a laboratory or lecture hall, but rather during the experience of daily travelling on the streets of Vilnius. When frequently using electric scooters and shared bicycles, D. Eicinas noticed that even minor road irregularities could have a significant impact on riding comfort and safety.

"After using these vehicles, I quickly realised that they were not safe enough. When riding an electric scooter, I did not feel safe because even the slightest road irregularity was transmitted through the handlebar directly to my hands. This

gave me the idea of adapting a suspension system for micromobility vehicles," says the VILNIUS TECH graduate.

According to him, as the number of micromobility users is rapidly increasing, so is the risk of accidents. Therefore, one of the key challenges is developing safer vehicles.

In his master's thesis, D. Eicinas sought to determine whether suspension elements could improve the performance characteristics of micromobility vehicles. During the research, he developed a model of a wheel-integrated suspension system that would allow the suspension to be installed without changing the existing frame structure of the vehicle.

One of the main advantages of this solution is the possibility of adapting it to many electric scooters and bicycles already in use. "The main objective of the research is to determine whether suspension elements are beneficial for micromobility vehicles and to develop a model of a wheel-integrated suspension system," says the author.

The research employed advanced modelling tools -

“SolidWorks”, “MATLAB” and “Ansys”. These tools were used to develop and optimise the suspension structure as well as conduct additional analyses. According to D. Eicinas, mathematical modelling makes it possible to quickly evaluate various engineering solutions before manufacturing prototypes or conducting tests under real-world conditions.

The research results showed that the suspension system can significantly improve ride quality. It was found that vertical acceleration decreased more than threefold, while the vehicle’s tyres maintained contact with the road surface throughout the entire movement. In contrast, the model without a suspension system became completely detached from the road surface twice during the simulation.

“The research results revealed that micromobility vehicles equipped with a suspension system become more comfortable and safer,” says D. Eicinas.

The research results were also supported by a patented shock absorber developed together with his thesis supervisor, Associate Professor Dr Mykola Karpenko, and used in the model. It operates at different speeds depending on the direction of the load, allowing vibrations and impacts to be dampened more effectively. Such a solution could further improve riding comfort and increase vehicle safety, particularly when travelling over uneven road surfaces.

“To reduce the number of injuries, we need to improve not only vehicles but also infrastructure. We need to consider solutions that would reduce the risk of accidents

Domingkas Eicinas

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Nevertheless, in D. Eicinas’ view, improving vehicles alone is not enough. Urban infrastructure also plays an equally important role.

“To reduce the number of injuries, we need to improve not only vehicles but also infrastructure. We need to consider solutions that would reduce the risk of accidents,” he says.

According to the VILNIUS TECH graduate, future micromobility vehicles will incorporate an increasing number of safety-enhancing solutions - from automatic speed-limiting systems to advanced suspension systems. Nevertheless, even the most advanced technologies will not be able to completely replace safe infrastructure. Therefore, safer mobility in cities will depend not only on engineering innovations but also on how well cities are adapted to their users.





A city that adapts to water

Climate change is transforming urban planning around the world. Increasingly intense rainfall, more frequent extreme weather events and the growing urban heat island effect are forcing cities to look for new solutions to manage excess water while also creating a higher-quality living environment. With that being said, Gabriela Sokolovskaja, a graduate of the VILNIUS TECH Master's programme in Architecture, suggests looking at this problem from a different perspective: perhaps it is not water that should be adapted to the city, but the city that should be designed according to natural water processes.

She explored this idea in her final thesis, "From utopia to prototype: water as a driver of sustainable urban transformation", in which she analysed how rainwater could be one of the key elements shaping the city of the future rather than being a problem.

"What prompted me to analyse this topic was the increasingly relevant problem of surface water management in the context of climate change. However, I was interested in a broader question - why do we first shape the city and only then decide where water should flow within it? In my work, I tried to reverse this logic: instead of adapting water to the city, to shape the city's structure according to natural water processes. In this way, water became not a technical problem, but a tool for urban transformation," the author explains.

The path from utopia to prototype mentioned in the title reflects an effort to test theoretical ideas in a real urban environment. According to G. Sokolovskaja, urban utopias have often emerged throughout history as responses to various social problems - from sanitation crises to technological changes. Therefore, in this work, utopia became a means of rethinking established urban planning logic, while the prototype made it possible to test these ideas in a specific area.

"Since water itself is a dynamic element that depends on terrain and climate, it became a means of transferring this theoretical idea into urban planning. The prototype is a way of testing it within the real urban fabric of Vilnius. By analysing the terrain and the movement of surface water, it became clear that water behaves very differently in different parts of the city. This led

to one of the most important conclusions of the work - there cannot be a single universal model. Therefore, I developed different principles of urban formation for different hydrological and urban situations,” says the VILNIUS TECH graduate.

According to her, climate change is transforming beyond urban infrastructure, also affecting the very logic of planning. The city is increasingly understood as more than a fixed structure, but rather a system capable of adapting to constantly changing environmental conditions.

“Intense rainfall, heatwaves and droughts are the factors increasing the importance of green spaces, permeable surfaces, water storage and infiltration. In my work, I wanted to go a step further and ask whether the logic of water could shape not only individual spaces, but the urban structure itself,” the author says.



The research also used GIS and terrain analysis tools, which made it possible to model the movement of surface water and identify areas where it accumulates. These analyses helped provide a better understanding of natural processes and became the basis for developing different urban planning principles for different areas of the city.

In the imagined fragment of the city, rainwater would not be hidden underground. On the contrary, it would become a visible part of urban spaces and an element of the urban structure. In some areas, water would be collected and infiltrated in sunken green spaces, while elsewhere it would flow through open channels. Such a system would not only help manage excess water generated during heavy rainfall, but would also



” Intense rainfall, heatwaves and droughts are the factors increasing the importance of green spaces, permeable surfaces, water storage and infiltration.

Gabriela Sokolovskaja

“

create new public spaces, recreational areas and pedestrian connections.

“In the detailed fragment, this logic even influences the city’s functions: cultural and recreational activities are concentrated around slower, absorbent spaces, while retail, offices and more intensive programmes are located near active channels that carry water away. In this approach, the movement of water organises not only infrastructure but also urban life,” G. Sokolovskaja explains.





**VILNIUS
TECH**
Vilniaus Gedimino
technikos universitetas

VILNIUS TECH STUDENTS



Lithuanian students

Faculty	2026	2025
AGAI	186	151
AIF	61	47
AF	105	89
EF	331	234
FMF	237	340
KIF	175	163
LJA	116	106
MF	182	108
SF	188	151
TIF	94	67
VVF	99	79



Overall (excluding
withdrawals)

1,774

1,535



International students

1,741

International
students

341

Erasmus exchange
student



Overall international
students

2,082

Most admitted students from these countries



India
103



Ukraine
102



Azerbaijan
94



Belarus
92



Türkiye
72



Kazakhstan
32



Top countries of origin
for Erasmus exchange
students



Spain



France



Germany



Italy

Tech Fund – for the future of the university and the country

Prepared by Egle Kiriliauskaite-Blazevice



Adas Meskenas,
VILNIUS TECH Vice-Rector for
Strategic Partnerships

Modestas Plakys,
member of the Tech Fund Board, investment
and wealth management expert

A technologically advanced and resilient, future-ready Lithuania – this is the main direction that will be pursued by the newly established VILNIUS TECH Tech Fund, an endowment and support fund. It is a technology community platform, bringing together different people and businesses in order to achieve long-term growth of Lithuanian talent and innovation. This long-term project, which will focus on technological competencies, technological resilience and technological breakthroughs, is discussed with Vice-Rector for Strategic Partnerships and patron of the Tech Fund Adas Meskenas and head of the family office “Gausus”, member of the Tech Fund Board, investment and wealth management expert, and VILNIUS TECH alumnus Dr. Modestas Plakys.

Let us start from the very beginning: how would you describe the Tech Fund? What is its purpose and what will its future activities be?

A. Meskenas: The Tech Fund is a platform for bringing together the technology community, connecting the university, its alumni, technology businesses, the scientific community and students. The main goal of the fund is to mobilise financial, human and partnership capital so that, in the long term, we can strengthen technological talent, fundamental and applied research that translates into innovation. The fund also has two modes of operation: fundraising and another, more important one – an endowment. The accumulated capital is invested, and the returns it generates will be used to fulfill the mission of the university and the fund.

M. Plakys: The fund places great importance on promoting, supporting and developing engineering education and learning for future students as well as the education system. The main idea is based on global practice, both in the United States (US) and in Europe, where a connection is created between those who graduate from universities, share the wealth and assets they have accumulated with the students and the teachers. In this way, a portion of accumulated wealth is returned to one's Alma mater. The main goal is to build a connection between business, science and young professionals, who can gain better opportunities and a higher-quality education through alumni investments. The essence of an endowment is not to use the principal amount for one-off needs, but to invest it for the long term. A portion of the investment income can be allocated to the fund's objectives while seeking to preserve the real value of the capital for future generations.



” The main goal of the fund is to mobilise financial, human and partnership capital so that, in the long term, we can strengthen technological talent, fundamental and applied research that translates into innovation.

Adas Meskenas

“

What current problems and emerging challenges will be addressed through the use of this fund?

A. Meskenas: The main question is how we can come together today so that, in the long term (looking 20–50 years ahead), both Lithuania and the university will be strong. We assessed the challenges emerging now and in the near future: the shortage of talent, cyber and information security, and the transformation of scientific expertise into high-value-added products. These are not only university's challenges as they are relevant to the whole country. We believe that through the university's activities together with the Tech Fund, these challenges can be addressed.

What community does the Tech Fund bring together and how can people contribute to it?

A. Meskenas: It consists of the university community, businesses, alumni and other participants in the technology ecosystem. Contributions to the fund can be made not only financially, but also through knowledge, mentoring, partnerships and contacts. Formally speaking, both individuals and legal entities that contribute to achieving the fund's objectives can become members of the fund.

Modestas, why did you decide to join the Tech Fund Board?

M. Plakys: I am a VILNIUS TECH alumnus, who defended a doctoral dissertation in economics at the Faculty of Business Management (VVF). When



this faculty celebrated its 30th anniversary, I had a brief conversation with the rector and asked why VILNIUS TECH did not have an endowment fund – this is how the dialogue began about what an endowment fund should look like, who the founders should be and who should serve on the board. On this board, I am the investment management specialist; my role is to contribute, together with the other board members, to the development of the investment strategy and oversight of its implementation. It is important to formulate a sustainable investment strategy, seek long-term returns that correspond to the risk taken, while preserving the purchasing power of the capital.

What added value will the fund bring to the university and its community?

A. Meskenas: Greater unity and the opportunity to invest more in what is important to our university: talent, science, technology and innovation. Another important aspect is greater long-term financial independence – once the fund has grown to a certain level, the returns it generates become another source of funding. The larger the fund and the returns it generates, the more we, as a university, diversify our income and have greater security and independence. At the same time, the university can use its financial resources for things that matter and create the future. Establishing such a fund will also create a stronger, closer relationship between business, alumni and the university.

M. Plakys: I would also add that investing is now

a relevant topic for many people. The investment strategy of endowment funds is often an excellent example of how to manage one's money. The fund's activities can become a practical example of financial literacy, demonstrating the importance of long-term investing, diversification, cost control and risk management. Thus, another added value is the growing financial literacy of the university community. VILNIUS TECH certainly has excellent lecturers and can provide a great deal of knowledge in this field; perhaps it is positioned less publicly. The VVF gave me a great deal, so why not share that knowledge with others?

” The main idea is based on global practice, where a connection is created between those who graduate from universities, share the wealth and assets they have accumulated with the students and the teachers.

Modestas Plakys

“



Are there any similar successful practices around the world that will serve as examples?

A. Meskenas: One of the strongest examples in the world for us is the Massachusetts Institute of Technology, which has a huge endowment fund, as well as Harvard University. In terms of European examples, we should mention Aalto University in Finland, which also has a strong fund linked to the university's core activities and missions: developing specialists and talent as well as strengthening science.

M. Plakys: The Aalto example shows the scale that a systematically developed endowment can achieve. In 2025, it provided the university with EUR 42 million in funding, while EUR 46 million is planned for 2026. The capital is diversified across financial markets, and the annual distribution is determined according to a long-term spending policy. This does not replace state funding, but it provides the university with an additional, more stable source of funding.

What impact and significance will the Tech Fund have for the future of our country? What is its vision?

A. Meskenas: We decided to call the VILNIUS TECH endowment and support fund the Tech Fund because the university needs to move in the direction of its greatest potential – technology. This fund will benefit not only the university, but also our country. We see Lithuania in the future as an advanced, adaptable and forward-looking country. Advanced, because it is capable of

creating technological change together with us. Adaptable, because we are only developing some technologies, while we are already using others to address current realities and new circumstances. Forward-looking, because we invest in things whose benefits won't be seen tomorrow, but rather, in some cases, only after decades. This is probably how we understand a future-ready Lithuania: it is not simply an investment in the state through the Tech Fund, but also the use of investment consciously to create a Lithuania that is ready for the future.

M. Plakys: These are long-term projects that will deliver the most tangible returns after 10–20 years. At first, it is difficult to understand how to start from zero, but all universities that decide to establish their own funds start from the same point. If we had systematically started growing the capital a decade ago, today we would already have a significant financial base, I would guess EUR 10–20 million, and we could finance scholarships and other long-term programmes on a larger scale. When talking to potential investors, we see that everyone's goal is to have capable, talented employees, prepared for the labour market by the university. It is evident that technology and engineering need to bring people together. We want to create a platform for cooperation, i.e. give the university the role of coordinator, so that representatives of the technology community can provide insights into future skills needs, while academic and funding priorities would be determined independently and transparently by the university and the fund's board.

Modern science is developing faster than ever before, and the world is changing along with it. “Global News” introduces the achievements of partners, the latest research directions, and ideas that are already today shaping the future.

**Dr. Michal Aibin,
Head of the Master’s
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Institute of Technology
(Canada)**

The Disaster Resilience Initiative at the British Columbia Institute of Technology (BCIT) brings together research on wildfires, floods, and critical infrastructure. One of its main areas of focus is wildfire prevention through developing computer vision and machine learning solutions. It is done by transforming data collected by drones and satellites into maps of combustible materials and assessments of wildfire risk in different areas.

These solutions help utility providers, municipalities, and local Indigenous communities in advance identify the areas that require preventive measures to be implemented before the start of the fire season. Pilot projects are currently being implemented in 12 locations across British Columbia. A public demonstration platform for Vancouver’s Stanley Park is available online at stanleypark.skyscoutai.com.



Most of the modeling work is carried out by students in the Master’s Programme in Applied Computing who participate in “Mitacs”-funded internships. Project partners implement the tools developed in practice. Organizations interested in collaborating with researchers can find more information online at bcit.ca/resilience-research.



From Warehouse to Innovation Center: How Are Old Buildings Being Revived?

The Massachusetts Institute of Technology (MIT) recently completed one of its most impressive infrastructure projects. The more than century-old former warehouse building, “Met Warehouse”, was transformed into a modern center for the School of Architecture and Planning, featuring spaces for study, research, events, and collaboration.

During the renovation of the building, the architects sought not only to preserve its historic character, but also to adapt it to modern needs. One of the biggest challenges was bringing more natural light into the massive brick-walled build-

ing, so part of the facade was replaced with glass structures. Open spaces for interdisciplinary collaboration were also created, where scientific research and practical creative work take place alongside one another.

The project is considered an excellent example of sustainable architecture. Instead of demolishing the old building and constructing a new one, MIT chose to convert it, demonstrating that historic infrastructure can be successfully adapted to the needs of the future.

This project sends an important message to architects, urbanists, and city planners: a sustainable future often begins not with new construction, but with the creative use of spaces that already exist.

Prepared based on the MIT News publication
“How architects turned a hulking brick box into MIT’s newest academic hub”



VILNIUS TECH and LRT are connected by people: the stories of two alumni



Mindaugas Užkuraitis,
LRT's chief designer

Martynas Pabreza,
Head of Projects at LRT

Prepared by Lina Mustafinaite, Project Manager, Public Relations Department

What do VILNIUS TECH, which is celebrating its 70th anniversary, and the public broadcaster LRT, which is celebrating its centenary, have in common? Not only impressive anniversaries and jointly implemented projects, but also talented people such as VILNIUS TECH alumni Martynas Pabreza and Mindaugas Užkuraitis who work at LRT. Even though their professional paths are different, they both agree that the knowledge and way of thinking gained at university continue to be useful in their everyday work.

Engineering thinking is useful beyond the workplace

Martynas Pabreza, who now works as Head of Projects at LRT, after studying the Energy and Transport Construction programme at what was

then Vilnius Gediminas Technical University two decades ago, earned a Bachelor's degree in Civil Engineering.

"The engineering mindset I developed at university helps me assess situations systematically, look for rational solutions and understand the bigger picture of complex projects. This knowledge is useful when working on infrastructure and engineering projects at LRT. However, its benefits go beyond work. An engineering education is also helpful in everyday life, for example, when planning and implementing a house-building project or making various technical decisions. I believe that university provided me with more than only professional knowledge as it also shaped a particular way of thinking that remains useful throughout life," says M. Pabreza.

"It was also interesting to observe how the lecturers' attitudes changed during the years of study. In the first years, students are often simply a large audience of young people, while towards the end of their studies, there is more mutual familiarity, relationships based on respect, and communication with students as future potential colleagues," he recalls.

For Mindaugas Uzkuraitis, who works as LRT's chief designer, returning to VILNIUS TECH is a much more frequent occurrence. He is continuing his doctoral studies at the university and teaches in the Department of Design. Mindaugas's research covers topics related to design, architecture and space.

I think the relationship also works in the opposite direction - my practical experience at LRT constantly feeds back into the university. Questions that arise in real projects become material for discussions with students, while ideas developed and refined in the academic environment

Martynas Pabreza

Asked what they would wish for their Alma Mater on its 70th anniversary, Martynas and Mindaugas first and foremost talk about people and an environment where it is possible to learn, create and seek new solutions.

"I would like VILNIUS TECH to continue being a place where technology, creativity, science and real professional practice do not simply exist alongside one another, but actually come together. It seems to me that the most interesting things are born precisely at these intersections," says Mindaugas.



The city of the future is being born today

What shapes the future of cities isn't just technology, but rather a multitude of interconnected solutions: more sustainable use of resources, more efficient energy management, smart systems, and data-driven solutions.

Although these topics are most often discussed in research centers or technology companies, original ideas are also born in school classrooms. Participants in VILNIUS TECH's distance learning platform "Future Engineering" sought answers in their projects to real challenges faced by the cities of today and tomorrow: how to turn waste into valuable raw materials, how to create a healthier learning environment, how to make more efficient use of renewable energy, and what role autonomous technologies will play in the future.

The ideas of young creators reveal that technology is not only about complex devices or software code. It is also a new approach to everyday problems, the ability to seek sustainable solutions, and the courage to experiment. Together with VILNIUS TECH consultants, students developed projects that not only address specific challenges today, but also offer a glimpse of what the city of tomorrow could look like - smarter, more sustainable, and more focused on people's needs.

Vilnius Maironis Progymnasium students Ieva Razdaigoraite and Urte Varneckaite in their project "Using coffee grounds to make objects" explored how everyday waste can be adapted to create sustainable products.



I. Razdaigoraite and U. Varneckaite in their project "Using coffee grounds to make objects"

What surprised you the most while developing the project "Using coffee grounds to make objects"?

I. Razdaigoraite and U. Varneckaite: When making the containers, what surprised us most was that it is actually possible to create sustainable containers from coffee grounds. It was also unexpected that coffee grounds, which are usually simply thrown away, can become a valuable recycled raw material. Although there were plenty of challenges during the process as we had to carry out quite a few experiments and correct shortcomings. We learned from each failure, drew conclusions, and ultimately achieved the desired result.

E. Marciulaitiene: We usually associate waste with something unpleasant - something unattractive to look at, something that gives off an unpleasant smell and that we want to throw away as quickly as possible. However, the students' curiosity overcame these stereotypes. They looked at coffee grounds as a valuable raw material and tested as many as six different recipes at home. There were experiments with natural binders such as starch, gelatin, flour, beeswax as well as flax seed, and then observations how the properties of the products changed were made. This project once again showed that sustainable



VILNIUS TECH consultant –
Assoc. Prof. Dr. Egle
Marciulaitiene, Department of
Environmental Protection and
Water Engineering, Faculty of
Environmental Engineering

engineering solutions are around us; all it takes is curiosity, the courage to experiment, and an unconventional approach.

How do you envision this idea being applied in the future?

I. Razdaigoraite and U. Varneckaite: We believe that in the future people will pay more and more attention to recycling and sustainable solutions, which will encourage the search for creative ways to reuse waste, just as we chose to use coffee grounds to make objects. We believe that in the future this idea could be applied to making various interior details or small household items that do not require particularly high resistance. We hope that more and more people will choose different ways to contribute to environmental protection and create a more sustainable future.

E. Marciulaitiene: In the future, I see this idea as an excellent example of a circular economy: coffee grounds collected from cafes could be used to make interior details or even furniture. As manufacturing technologies improve and the material's resistance to moisture increases, such composites could be used even more widely, for example, in the packaging industry or 3D printing. Most importantly, such solutions not only help reduce the amount of waste, but also encourage more sustainable consumption and promote a more responsible approach to resource use in society.

What single technology will change cities the most over the next 20 years?

I. Razdaigoraite and U. Varneckaite: We believe that artificial intelligence (AI) will change cities the most over the next 20 years. We can already see its impact today: the economy and labor market are changing, medicine is developing more rapidly, and communication habits as well as media consumption patterns are being transformed. It is likely that in the future AI will become an integral part of city management, service provision, and everyday life.

E. Marciulaitiene: I believe that the cities of the future will be transformed most by AI-controlled digital twins operating together with advanced sensor networks.

This technology will make it possible to model, predict, and optimize various urban processes in real time - from energy and water consumption to traffic flows and waste management. Cities will become not just a collection of infrastructure, but dynamic, data-driven systems capable of quickly adapting to residents' needs and the challenges posed by climate change. This will help manage resources more efficiently, improve quality of life, and create a more sustainable urban environment.

Vilnius Tuskulenai Gymnasium students Daumantas Kundrotas, Simas Vilkinas, and Zilvinas Jucys created the "YouthVibe" project, a noise alarm that analyzes noise levels at school and warns the community when they become too high.



D. Kundrotas, S. Vilkinas, and Z. Jucys created the "YouthVibe" project, a noise alarm that analyzes noise levels at school



VILNIUS TECH consultant -
Assoc. Prof. Dr.
Linas Krugelis,
Department of Design,
Faculty of Architecture

What surprised you the most while developing the project about a noise alarm that analyzes noise levels at school and warns students when they are too high?

D. Kundrotas: What surprised me most was the noise level itself. I would never have thought that the noise made by students could be so high. I was also surprised by the possibility of measuring it accurately in decibels. Although the noise was high, its level did not reach the figures I had expected. As far as I remember, the highest recorded level was around 95 dB. Nevertheless, this noise is still harmful to people's health and needs to be reduced.

S. Vilkinas: Before creating the noise alarm, we conducted a study to find out whether the noise level in the gymnasium exceeded the requirements of the Lithuanian hygiene standard (HN 33:2011). The results of this study surprised me the most. We found that during breaks, the average noise level in our gymnasium reaches around 80 dB. Constant noise at this level tires students and makes it difficult for them to concentrate and study.

Z. Jucys: What surprised me most was the programming code. At first it seemed quite complicated and difficult to understand, but after looking into it more closely, it became clear that its operating principles were actually quite simple and logical.

L. Krugelis: When evaluating the project, it was particularly gratifying to see that the students had successfully understood the essential principles of problem-solving based thinking and human-centered design. This approach demonstrates a mature and professional understanding of problem solving. The noise signaling system they created is a creative and practical solution to a relevant problem in students' everyday lives. When creating the prototype, the students applied interdisciplinary knowledge: they used

electronics, sensors, and programming, as well as digital manufacturing and prototyping methods. The project clearly demonstrates how knowledge from different fields can be integrated to create innovative solutions that respond to real needs.

How do you envision this idea being applied in the future?

D. Kundrotas: I think this device could be used not only in schools, but also in other educational institutions or workplaces. I also see opportunities to improve it further. For example, its sound volume could be increased, buttons could be installed to allow users to adjust the decibel threshold at which the device activates, and other solutions could be added to improve its functionality and convenience.

S. Vilkinas: Although when creating the noise alarm we initially focused on its application in schools, it could also be used in other places where high noise levels commonly occur and need to be limited. Installing such a system throughout an entire school would be difficult, but it is entirely possible in individual classrooms. At present, the alarm is sometimes used in our gymnasium's technology classroom and helps raise students' awareness by drawing attention to noise levels.

Z. Jucys: I think this solution could be used more widely in the future. For example, various automated or smart teaching systems could use such an alarm to help maintain order in the classroom and remind students about excessive noise.

L. Krugelis: In the future, this idea could be directly applied in school spaces to increase the comfort and improve the quality of the learning environment. In addition, such a system would help raise students' awareness, encourage them to assess their behavior more responsibly, and at the same time become a useful tool for teachers working with more active classes.

What single technology will change cities the most over the next 20 years?

D. Kundrotas: Today, when new technologies are emerging one after another and existing ones are rapidly improving, choosing just one is quite difficult. Nevertheless, I would probably choose artificial intelligence. It may sound somewhat banal, but in my opinion, it is one of the most significant technological achievements. When properly applied, AI could fundamentally transform cities and the way they function in the future.

S. Vilkinas: I believe that over the next 20 years AI will become an integral part of city management. It will be able to predict and manage traffic flows in real time, thereby reducing congestion. It will also help predict buildings' energy and water needs more accurately and direct surplus renewable energy to where it is needed most. Although we may not notice its activities directly, its ability to respond quickly to constantly changing situations will help cities become more efficient and sustainable.

Z. Jucys: I believe AI will have the greatest impact on the cities of the future. It could help cities become safer, speed up construction and design processes while managing various urban systems more efficiently. For example, AI could analyze video camera data and help responsible services detect potential violations or dangerous situations more quickly. Architects could also prepare and improve building designs faster. However, this technology is not yet sufficiently developed, so errors still occur and its capabilities are not yet being fully utilized.

L. Krugelis: I believe that the cities of the future will be changed not by one specific technology, but by the interaction of different technologies. AI working together with autonomous vehicles could fundamentally change the way cities look and function. It is likely that people's mobility habits, the nature of work, and everyday services will change. More efficient resource management and smart solutions would make it possible to create greener, more convenient, and more resident-friendly cities.

Svencionėliai King Mindaugas Gymnasium students Tomas Sabaliauskas and Gleb Pavliukevic presented the concept of an autonomous vehicle in their project “Photocar: energy source hunter”, enabling the vehicle to independently detect light sources and use them to charge its batteries.



VILNIUS TECH consultant -
Assoc. Prof. Dr.
Robertas Peceliūnas,
Department of Automotive
Engineering, Faculty of
Transport Engineering

What surprised you the most while developing the project “Photocar: energy source hunter”?

G. Pavliukevic: What surprised me most was the project idea itself and the fact that implementing it required very little soldering. At first, I expected the construction to be much more complicated.

T. Sabaliauskas: What surprised me most was the final result. We built a car that does not require any additional charging because it gets its energy from sunlight. It was interesting to see how a theoretical idea turned into a working model.

R. Peceliūnas: What surprised me most was the students' ability to turn a fairly complex energy-efficiency problem into a specific, functioning technical solution. It was particularly interesting to observe how the idea of an “energy hunter”



T. Sabaliauskas
and G. Pavliukevic
presented the
concept of an au-
tonomous vehicle
in their project
“Photocar: energy
source hunter”

became a real small car that searches for the most intense light source itself and orients the solar module toward it. This project showed that curiosity, experimentation, and the desire to understand how technologies work can become a strong motivation for creating innovative and practically applicable solutions.

How do you envision this idea being applied in the future?

G. Pavliukevic: I imagine that in the future this type of photocar could be used to photograph animals and nature. Because of their ability to orient themselves toward a light source independently, they could operate for long periods without human intervention.

T. Sabaliauskas: I think this technology has great potential in the future. By improving solutions for using solar energy, we could move closer to vehicles that would travel on city streets for longer periods and need to stop for charging less frequently.

R. Peceliunas: The principle behind this idea could be applied to various autonomous vehicles and robotic systems where energy independence is important. For example, similar solutions could be used in autonomous robots, solar-powered vehicles, or remote systems operating in places that are difficult for people to access. I believe that in the future, not only the use of renewable energy sources will become increasingly important, but also the ability to autonomously locate and use available energy as efficiently as possible.

What single technology will change cities the most over the next 20 years?

G. Pavliukevic: In the future, taxis could drive completely autonomously - without a driver and without any charging.

T. Sabaliauskas: I think that in the future people will start installing solar panels more widely on the walls of apartment buildings.

R. Peceliunas: I think the greatest impact on cities will come from the integration of AI and autonomous systems. They will make it possible to manage traffic flows, energy consumption, public transport, parking, and various urban infrastructure systems more efficiently.

It is likely that the city will increasingly become an “intelligently responsive” system in which

decisions are made by analyzing real-time data and predicting residents’ needs.

President Jonas Zemaitis Gymnasium student Erikas Sunolaitis created a compact and easily transportable energy generator in the project “Prototype of a single-axis solar tracking system”. Using solar modules, it generates electricity and stores it in a battery. The stored energy can be used to charge various low-power devices, such as mobile phones or portable batteries.



E. Sunolaitis created a compact and easily transportable energy generator in the project “Prototype of a single-axis solar tracking system”

What surprised you the most while developing the project “Prototype of a single-axis solar tracking system”?

E. Sunolaitis: What surprised me most was that even a single-axis tracking system makes it possible to obtain significantly more energy without overly complex mechanisms. Building the practical model and calibrating the sensors showed



VILNIUS TECH consultant -
Dr. Algimantas Rotmanas, Head of the
Center for Technical Creativity and
Innovation, VILNIUS TECH Faculty of
Mechanics.

that small changes to the software code or component calibration have a huge impact on the efficiency of the entire device. This is excellent proof that simple engineering solutions are often the most practical.

A. Rotmanas: I was surprised and, I must admit, pleased that a student completed such a project alone - in “Future Engineering”, projects of this kind are usually carried out by teams of 3-5 students, combining the different competencies of the participants. His work - is not merely a theoretical idea, but a real engineering prototype in which he had to coordinate the mechanical structure, servo drive, sensors, energy generation, storage, and control. In general, I really like the principle of “Future Engineering” itself: the student creates and experiments independently, but when necessary can rely on consultations with VILNIUS TECH lecturers, real technical assistance and the university’s infrastructure. This means that even at school, students can experience how real engineering differs from a problem in a textbook.

How do you envision this idea being applied in the future?

E. Sunolaitis: I see this idea being applied in smart homes, greenhouses, or autonomous systems in the future, where every watt of energy matters. If such tracking mechanisms become inexpensive, compact, and easy to install, anyone who wants to increase the efficiency of their solar modules could use them.

A. Rotmanas: I find this idea attractive primarily because of its rationality: there is no need to complicate the structure and automatically control the solar module along two axes. One drive can track the daily movement of the Sun, while the second - seasonal - angle of the module can be adjusted manually just a few times a year, for example, during routine power plant maintenance. In this way, it is possible to approach the energy benefits of two-axis tracking while keeping the structure simpler, cheaper, and more reliable. Therefore, I see this principle as a very realistic solution for small individual or autonomous solar power plants.

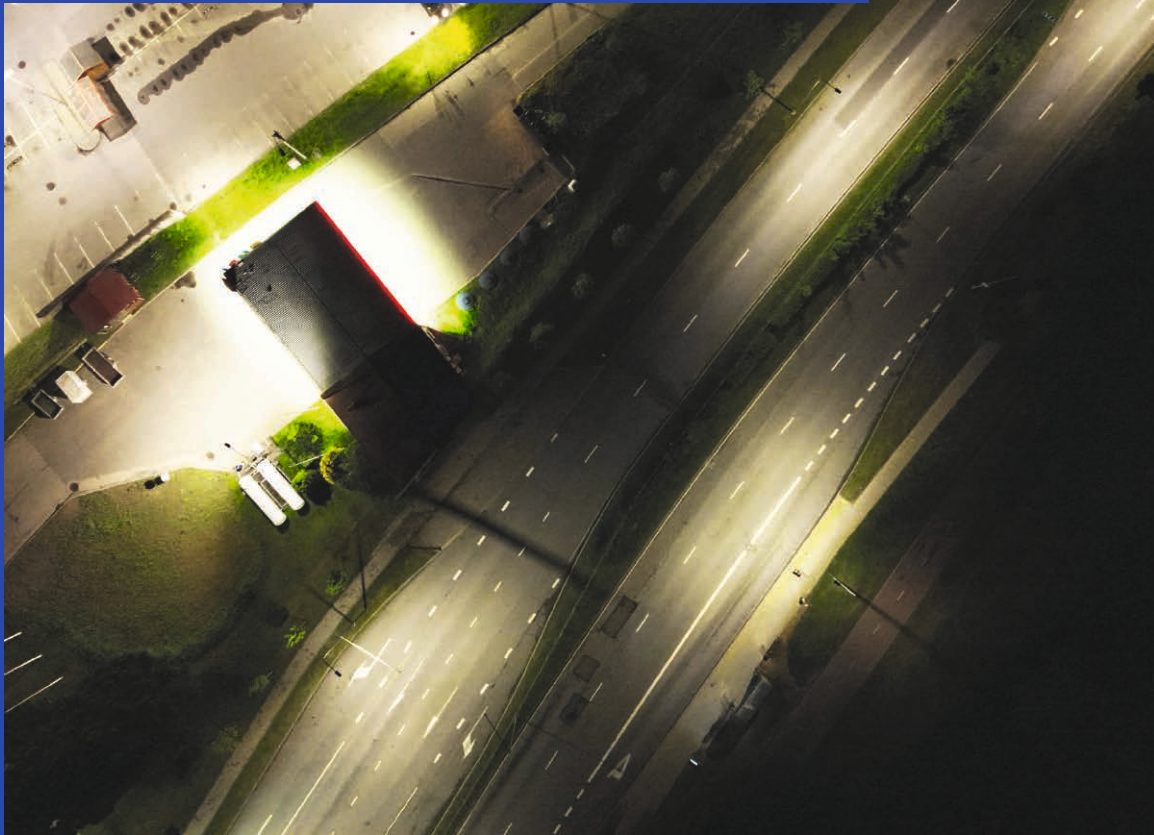
What single technology will change cities the most over the next 20 years?

E. Sunolaitis: I think smart electricity grids (Smart Grids) controlled by AI will change cities the most. When buildings not only consume energy but also generate and store it themselves, AI will help distribute it efficiently to where it is most needed at any given time.

A. Rotmanas: I think it will be next-generation heat pumps and energy recovery systems, which will not only heat or cool buildings, but also increasingly manage their thermal energy flows. In the future, low-temperature heat collected from cooled buildings could be concentrated and part of it converted into mechanical or electrical energy.

This could involve working fluids with new properties, much more efficient thermoelectric elements, microturbines, or other technologies that are still being developed today. What interests me more than guessing what specific device we will use in twenty years is the fact that the low-temperature thermal energy considered waste today will most likely be regarded as a raw material by future engineers. After all, not so long ago we used to throw paper, plastic, glass, and metal into one container, whereas today these are secondary raw materials that are highly valued in industry. I think the same will happen with heat - in the future, we may even be surprised at how wastefully we could simply release it into the environment. In such an energy-active building, a small local solar power plant will also have its place, so the small solar tracking prototypes created by students today may be more than a toy, but rather a small yet highly valuable part of the energy model of the future city.

Creating a solution for a smarter city: drones and artificial intelligence to monitor the capital's streetlights



Smart cities today are not limited to smart traffic lights or data analysis platforms. Technology is increasingly being used to address everyday urban maintenance tasks as well. One such solution is being developed in the final thesis of Laurynas Zalaga, a master's student at the Faculty of Fundamental Sciences at VILNIUS TECH. Studying in the "Management of Artificial Intelligence Solutions" programme, the student decided to explore how drones and artificial intelligence (AI) could be used to automate the monitoring of urban lighting systems and identify faults more quickly.

"The idea came from looking for a practical solution to one of the everyday problems associated with maintaining urban infrastructure. Approximately half of the streetlights within the territory of the Vilnius City Municipality do not have controllers that would allow faults to be detected automatically. As a result, the responsible services often learn about a malfunctioning streetlight only after receiving reports from residents. This created a need for a reliable yet cost-effective solution allowing the condition of the city's lighting systems to be monitored more efficiently," explains L. Zalaga.

Both drones and AI play an important role in the solution proposed by the student. First, a flight route is planned and transmitted to the drone. At a predetermined time, the drone automatically takes off from a docking station and follows the route, photographing locations where lighting poles are recorded according to their coordinates. After the flight, the collected data is transferred to a cloud platform, where it is analysed by a pre-trained AI model. By evaluating the images, the model can accurately determine which streetlights are not working and which ones require repairs.

“Such a solution would provide tangible benefits to the city. Faults would be detected more quickly and therefore repaired more promptly, while the quality of urban lighting would improve. At the same time, infrastructure maintenance work could be organised more efficiently and dependence on random reports of faults could be reduced,” the VILNIUS TECH student explains, describing the benefits of the solution.

However, according to L. Zalaga, urban lighting is only one of the potential areas where the technology could be applied. Images collected by drones

could also be used to assess the condition of other parts of urban infrastructure. Even images captured during nighttime could be analysed to assess road surface conditions, traffic control infrastructure, bicycle paths, road markings, and other urban elements. This would make it possible in one flight to collect data that could be useful for different areas of urban maintenance.

“The biggest challenge in developing the solution was preparing the dataset required to train the AI model. This required the shutdown of specific streetlights during nighttime to coincide with the drone’s flight and photography schedule. The process had to be carried out efficiently and promptly, as prolonged lack of lighting could cause inconvenience or even pose a danger to residents. Additional challenges also arose when annotating the images. Sometimes, even when we knew which streetlights had been switched off, they were difficult to locate because of insufficient lighting. Nevertheless, every stage of the project provided valuable practical experience and helped me better understand both AI and the possibilities for managing urban infrastructure,” L. Zalaga shares.

In the opinion of the VILNIUS TECH student, in the future the management and maintenance of cities will increasingly become data-driven and based on real-time information. More and more processes will operate autonomously, while AI and other advanced technologies will help identify problems more quickly as well as make it possible to predict them before they become serious challenges. This would open up opportunities to create cities that operate more efficiently, are safer and smarter.



“ Such a solution would provide tangible benefits to the city. Faults would be detected more quickly and therefore repaired more promptly, while the quality of urban lighting would improve.

Laurynas Zalaga

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Assoc. Prof. Dr T. Sledevic, who is developing a bee behaviour recognition system: „We aim to ‚compress‘ the beekeeper’s experience into an algorithm“



Prepared by Giedre Gedeikyte, Head of External Communications Projects

Bees are increasingly settling not only in gardens or rural homesteads, but also in cities – on building rooftops, in small courtyards and parks. Here, their lives unfold right alongside people, yet observing what is happening at the hive entrance is not always easy. VILNIUS TECH researchers are looking for a way to do this using technology – they are developing a system that can detect changes that would normally only be recognised by an experienced beekeeper.

In the face of technological progress, there are hardly any areas that have not been touched by innovation in one way or another. And although beekeeping remains firmly rooted in traditions cultivated over centuries, researchers are looking for ways to modernise the field.

One of them is Assoc. Prof. Dr Tomyslav Sledevic from the Department of Electronic Systems at the Faculty of Electronics of VILNIUS TECH, who studies bee behaviour at the hive entrance and analyses it using smart technologies.

“It all started with a simple hypothesis: if an experienced beekeeper can understand the condition of the entire hive by observing bee behaviour at the hive entrance, then computer vision and deep learning methods should be able to automate this behavioural analysis,” says the researcher.

The goal – to develop a bee behaviour recognition system

The origins of this research date back to 2018, when Assoc. Prof. Dr T. Sledevic began training convolutional neural networks to recognise pollen carrying bees as well as to look for the optimal balance between speed and accuracy.

The research has now become much broader: the aim is to develop a bee behaviour recognition system that could operate effectively on compact embedded computers located right next to the hive.

“The main goal is to develop a bee behaviour recognition system that can analyse bee actions in the hive accurately and quickly. It also aims to optimise neural networks so that they can operate effectively on compact embedded computers located right next to the hive.

At present, we are investigating how accurately and how quickly trained networks recognise a specific action in an image, especially when bees

are densely clustered and obscure one another, and the action itself lasts for a very short time,” explains the researcher.

The system should recognise and track insects – bees, bees carrying pollen loads, drones and wasps – and determine their coordinates, direction, speed or behavioural class. Different types of bee behaviour are being studied: the intensity of bees entering and leaving the hive, ventilation, trophallaxis, cleaning the hive entrance and defensive reactions.

Particularly useful for urban beekeeping

The urban environment has its own particular characteristics for bee life. Due to the urban heat island effect, it is warmer here, so bees often start flying earlier in spring and remain active for longer in autumn. Urban vegetation is also more diverse and blooms throughout almost the entire season – in parks, gardens, trees growing along streets and even on balconies.

Nevertheless, urban hives are often located on rooftops or in small courtyards, making remote monitoring particularly useful. An urban beekeeper often looks after several hives located in different places, so an automated system would allow the monitoring even when they are not nearby. Thus, the most important thing is not the behavioural recognition itself, but what it signals.

“The hive entrance is like a window into the overall internal condition of the colony; by observing



” The main goal is to develop a bee behaviour recognition system that can analyse bee actions in the hive accurately and quickly. It also aims to optimise neural networks so that they can operate effectively on compact embedded computers located right next to the hive.

“

Tomyslav Sledevic



it, a beekeeper can predict a great deal without opening the hive. An automated system transfers part of this observation to a computer that can operate 24 hours a day and immediately alert the beekeeper when it detects an anomaly,” explains Assoc. Prof. Dr T. Sledevic.

Computer vision does not learn this intuitively, but by analysing statistical data: researchers prepare thousands of video frames in which a person marks where the bee and wasp are, where trophallaxis is taking place or where a defensive reaction is occurring. By “showing” these examples to a deep learning network, it learns to recognise the same visual features that an experienced beekeeper recognises subconsciously.

“Essentially, we are trying to ‘compress’ the accumulated experience of a beekeeper into an algorithm that becomes accessible even to a novice beekeeper who does not yet have such intuition,” says the researcher.

The vision for the future – a smart hive

In the future, individual behaviour recognition modules could be combined into a single mobile system that would operate continuously on a compact computer located next to the hive. Upon detecting something unusual, it would immediately send a notification to the beekeeper’s phone.

“ The hive entrance is like a window into the overall internal condition of the colony; by observing it, a beekeeper can predict a great deal without opening the hive.

Tomyslav Sledevic

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However, a fully smart hive would not rely solely on visual monitoring. The view at the hive entrance does not reveal everything happening inside the hive, so in the future it could be complemented by scales, temperature and humidity sensors, as well as sound analysis.

“This is still a vision for the future – for now, we are working on reliable recognition of individual behaviours and their optimisation for embedded systems, but these are precisely the fundamental building blocks from which a fully smart hive could be assembled in the future,” says Assoc. Prof. Dr T. Sledevic.

AI – assistant or main content creator?

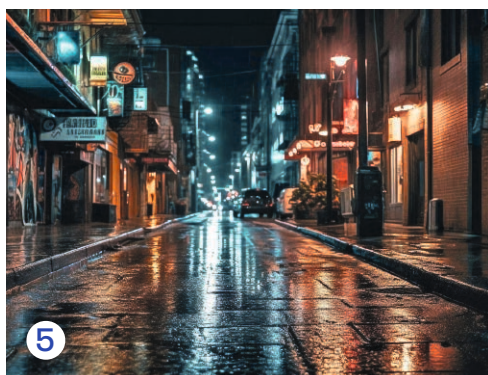
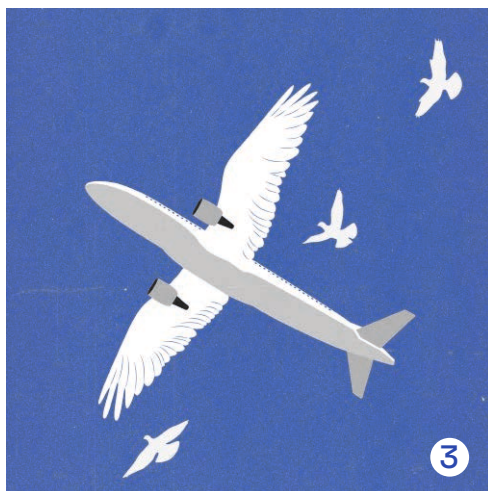
Take a look at these images. Which one do you think is the most beautiful? Which one is technically better executed? Which were created by a human and which by artificial intelligence (AI)?

Prepared by Internal Communications Project Manager Milda Mockunaite-Vitkiene



And how would your assessment change if you found out that they were all created by AI?

We live in a time when AI is increasingly moving into urban spaces - from social media campaigns to advertisements, posters and informational visuals. It is quite possible that soon a large proportion of the images we see around the city will be marked with the words "Created using AI." But does knowing who created an image change the way we perceive it?



(But before you continue reading, we will reveal that: image 1 was created by AI, image 2 by Giedre Gedeikyte, image 3 by Lukrecija Jaseviciute, image 4 and 5 by DI, image 6 by Milda Mockūnaitė-Vitkienė).

A bachelor's thesis research project by Laura Dutkute, a graduate of the VILNIUS TECH Entertainment Production study programme, titled "Consumer Participation in Visual Communication in the Digital Environment: Human and Artificial Intelligence Interaction," revealed that when evaluating visual content, audiences consider not only its aesthetics or quality, but also how and by whom it was created. Nevertheless, although AI is increasingly becoming part of the creative process, the role of the human is still essential.

L. Dutkute, who conducted the research, notes that AI is often presented in society as a competitor to creators. However, the research results reveal a somewhat different reality - audiences primarily see AI as a tool that exists alongside humans.

Moreover, information about the use of AI can change the way a person evaluates the work itself.

"This means that the label indicating the use of AI is not completely neutral. If for the audience AI has negative connotations, this perception can also be transferred to the work, even if AI's contribution was minor," the graduate explains.

One of the most important findings of the research is that AI does not eliminate the role of the human as the creator. It can perform certain parts of the creative process, help generate ideas, create different visual versions or personalise content, but the final decisions still have to be made by a human.

Therefore, according to L. Dutkute, the creative process does not become any less human but, in a sense, becomes a more collaborative process where AI can offer numerous options and the human is still the one making a choice, evaluating, modifying and maintaining the creative direction.

The creator's own skills become particularly important here. The responses from specialists in the study showed that the outcome is strongly determined by how well a person knows how to use the selected tool.

As AI becomes increasingly integrated into the creative process, the user's relationship with content is also changing. For users, it is important to know who the content creator is, how it is presented, where it came from and whether it can be trusted.

"With the emergence of AI, users have begun to evaluate content more rather than simply enjoy it. On the other hand, people are not always able to recognise for themselves that visual content was created using AI. Once they learn about its origin, they may change their assessment. Therefore, it is important not only to be able to recognise AI-generated content, but also to improve society's overall AI literacy," says L. Dutkute.

The involvement of AI in the creative process inevitably raises the question of what we actually mean by authorship today. If one part of a work is created by a human and another is generated by AI, whose work is it?

"AI is not a replacement for the creator; it simply serves as another creative tool – just like Canva,

Google or Photoshop. Its use has expanded the possibilities even further while also it placing even greater responsibility on the person who decides what they create with this tool and how they present that work to the audience. Ultimately, the person remains responsible for the final result," she says.

Therefore, according to the interviewee, it is important to communicate transparently about AI's contribution.

All of this is also changing the nature of work for visual communication specialists. In the future, those who simply know how to use one AI tool or another will become less important than those who understand when to use it, what to entrust to it and how to critically evaluate the result.

"Specialists will need to compete with AI less and learn how to integrate it properly into their work more. There will be a greater need for people who can choose the right AI tool, formulate a task, evaluate the result and maintain the creative direction," says Laura.

According to the graduate, AI is best viewed not as a tool that will take over the entire creative process, but as an assistant capable of expanding human capabilities.

“ AI is not a replacement for the creator; it simply serves as another creative tool – just like Canva, Google or Photoshop. ”

Laura Dutkute



Between Ships and Technology: How Can Safe Vessel Traffic Be Ensured in the Port of Klaipėda?



Kamilija Budvytyte,
a graduate of the Marine
Navigation study programme

The Port of Klaipėda is Lithuania's only ice-free port and one of the most important transport hubs in the Eastern Baltic region. Every day, vessels of various types – from passenger and cargo ships to tankers – navigate its waters, making safe vessel traffic one of the port's key priorities. Heavy maritime traffic, narrower sections of the channel and large vessels moored alongside the quays present challenges for navigation specialists that require not only knowledge and experience, but also advanced technologies.

Kamilija Budvytyte, a graduate of the Marine Navigation study programme, dedicated her bachelor's thesis to exploring this topic. She was awarded a scholarship by the Klaipėda Industrialists'

Association for research of significance to the city of Klaipėda. In her thesis, *"Analysis of the Safe Passing of Vessels with Moored Ships in the Port of Klaipėda Based on the Recommendations and Regulations of International and Local Institutions"*, she examined how the speed of a passing vessel and its distance from a moored vessel affect navigational safety.

Using an advanced navigation simulator and digital modelling, K. Budvytyte analysed various vessel-passing scenarios and assessed their impact on mooring systems and overall safety. The research results revealed that even relatively small changes in speed or distance can have a significant effect on the safety of vessel traffic and can help facilitate more effective decisions when organising traffic in the Port of Klaipėda.

Although it may seem that the greatest risk is faced by moving vessels, according to the VILNIUS TECH graduate, moored vessels are also exposed to hazards. A passing vessel generates waves, water currents and pressure changes that can affect a moored vessel. These hydrodynamic effects can cause a vessel to be drawn towards the passing ship or pushed away from the quay, placing additional loads on mooring lines and quay

fenders. Such situations are particularly sensitive when tankers are moored alongside the quay.

“During my research, I paid particular attention to the factors that determine the safe passing of vessels. Some of the most important are vessel speed, the distance between vessels, their size and draught, as well as the width and depth of the channel. Weather conditions are equally important, including wind, currents and visibility. The main principle is simple: the higher the vessel’s speed, the greater the safe distance from a vessel moored alongside the quay should be,” says K. Budvytyte.

To assess the impact of these factors, she used modern technologies. The research was conducted using the *Wärtsilä TRANSAS NTPro 6* navigation simulator, in which the Port of Klaipėda channel was recreated. Different scenarios were modelled to analyse the passing of a Ro-Ro vessel alongside a tanker moored at the quay, while varying the vessel’s speed and the distance between the ships.

According to the author, digital modelling provided insights that went far beyond theoretical calculations. The simulator made it possible to assess not only hydrodynamic forces, but also the effects of wind, currents, restricted water depth and changes in manoeuvrability. Such simulations provide an opportunity to safely test a variety of scenarios that would be difficult or even dangerous to reproduce under real-life conditions.

“One of the most interesting findings of the research was that even small changes in speed or distance can significantly affect the loads on

mooring lines. The highest loads were recorded not when the vessels were approaching or moving away from each other, but when they were sailing parallel to one another in close proximity. For example, when a vessel was travelling at a speed of 8 knots at a distance of just 50 metres from a tanker, the maximum load on a single mooring line reached 7.2 tonnes-force. When the speed was reduced to 4 knots or the distance increased to 120 metres, the loads decreased several times. These results clearly demonstrated that lower speeds and greater distances make a significant contribution to safety,” explains the VILNIUS TECH graduate.

According to K. Budvytyte, the findings of the research could be useful not only for scientific research but also for the practical operations of the Port of Klaipėda. They could help determine safe sailing speeds more precisely in different areas of the port, improve vessel traffic management procedures, and support the training of pilots and bridge teams. K. Budvytyte also suggests considering situational speed restrictions in areas where vessels pass particularly close to tankers moored alongside the quays.

Today, safe navigation is supported by a wide range of smart technologies. Vessels use electronic navigation systems, radar, Automatic Identification Systems (AIS), electronic charts and various communication solutions. An important role in port operations is played by the Vessel Traffic Service (VTS), which monitors vessel movements in real time and coordinates their actions.

“Future ports will increasingly resemble smart transport systems. Artificial intelligence (AI), automated traffic management platforms and so-called digital twins will help predict potential risks more accurately, identify the safest routes and optimise vessel movements. Nevertheless, even as technologies continue to advance rapidly, the human factor will remain crucial – whether it is a pilot, captain or traffic management specialist who makes the final decision in critical situations,” says K. Budvytyte.

The research conducted by the VILNIUS TECH graduate demonstrates that modern maritime navigation is inseparable from advanced technologies, while safety still depends heavily on people’s ability to make responsible decisions. The study highlights how scientific knowledge, digital modelling and innovation can contribute to safer and more efficient port operations in the future.

“Even as technologies continue to advance rapidly, the human factor will remain crucial – whether it is a pilot, captain or traffic management specialist who makes the final decision in critical situations

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Kamilija Budvytyte