OVERVIEW OF LITHUANIAN INNOVATIONS
Dear readers!

Innovations are usually associated with novelties used right here and right now. However, if we look back to the past, we can see that some objects that look so ordinary these days seemed to be a true innovation 10, 20 or even 100 years ago and changed the daily, professional life or leisure time for many of us.

Last year we commemorated the 100th anniversary of Lithuania. On this occasion, we invite you to look through the pages of history. What specific innovations, inventions, established institutions laid the grounds for nowadays Lithuania – innovatively and prospectively not only on the regional, but also on the international scale?

Innovations have been developed at different speeds and, at the moment, they have gained the fastest momentum. Various reasons led to this result. One of them is the increasing focus of the state on the Lithuanian innovators. It is expected that the ongoing Innovation Reform will encourage Lithuanians to create and develop innovation projects. For more information please take a look at the next pages of this publication.

And, of course, the core of this publication – the Lithuanian innovators. Many of you could not imagine your everyday life without their inventions. About some of them you will probably hear for the first time. So let us take a trip to the world of innovations full of discoveries and interesting facts.

Have a nice trip with the Agency for Science, Innovations and Technology (MITA)
The inventors knew no rest, have no rest and will probably refuse to have any rest in the future. We invite you to take a look at the Lithuanian inventions and discoveries of the last century.

In 1922, the first Lithuanian plane was designed – a wooden sports monoplane created by Jurgis Dobkevičius.

In 1925, the first practical Lithuanian inventions were introduced by Alfonsas Mažonis. He invented an electric bell able to ring at several different places at a pre-determined time. The invention was soon adapted at the university to inform on the start and the end of the lectures. His second invention was a manually rotated dynamo machine. After its adaptation to the ordinary cinema apparatus, the movies could be screened in spaces without electricity.

In 1925, the aviator Antanas Gustaitis introduced the first constructed single-pilot sports plane ANBO-I in Lithuania.

In 1928, the first patents were issued to the Lithuanian inventors. The first of them – to engineer A. Veintraubas from Kaunas, who patented the wire stand X-shaped device preventing the wire strand bottom of the bed from tumbling in. There were even very simple inventions to facilitate household works, for example, ‘Improved rakes’, ‘Machine for cleaning herring’, ‘Head support in the bath’, ‘Quill pen holder’, ‘Method for production of gumshoe polish’, ‘Rubber fingertip with 2 rows of bristle on the top outer part for cleaning teeth and gum massage’.

In 1962, the first Lithuanian electronic calculation machine-computer ‘Rūta’ was designed.

Inter-departmental tests of ‘Rūta’ and a signed certificate opened the doors to a serial production. This machine gave a start to the projects of a larger ‘Rūta 110’ and other machines.

By 1940, Lithuanian inventors received about 130 patents.

In 1940, the first Lithuanian factory of TV sets was founded in Šiauliai. After 2 years, the first TV set ‘Temp-6’ was assembled.

In 1961, the first Lithuanian factory of TV sets was founded in Šiauliai. After 2 years, the first TV set ‘Temp-6’ was assembled.

In 1962, the first Lithuanian electronic calculation machine-computer ‘Rūta’ was designed.

Inter-departmental tests of ‘Rūta’ and a signed certificate opened the doors to a serial production. This machine gave a start to the projects of a larger ‘Rūta 110’ and other machines.

By 1940, Lithuanian inventors received about 130 patents.

In 1940, the first Lithuanian factory of TV sets was founded in Šiauliai. After 2 years, the first TV set ‘Temp-6’ was assembled.

In 1966, the first Lithuanian factory of TV sets was founded in Šiauliai. After 2 years, the first TV set ‘Temp-6’ was assembled.

In 1922, the first Lithuanian plane was designed – a wooden sports monoplane created by Jurgis Dobkevičius.
In 1966, the first laser was constructed in Lithuania and was used for testing the properties of semi-conductors. Pursuant to the test results, the new semi-conductor research methods were designed. Innovation was realised by Prof. Habil. Dr. J. Vaitkus from Semi-conductor Physics Department of the Faculty of Physics of the Vilnius University.

In 1970, the senior research fellow Liucija Serekaitė-Juozonienė from K. Baršauskas Problematic Ultrasound Laboratory of Kaunas Polytechnic Institute discovered as new physical phenomenon and named it as acoustic surface longitudinal waves. Around the world, these waves are also referred to as the creeping waves and, in Lithuanian, they are frequently called the Juozonienė waves.

In 1977, the first scientific invention was registered (Steponas Ašmontas, Juras Požėla and Konstantinas Repšas).

In 1980, the researchers Ramutis Bansevičius and Kazimieras Ragulskis of Vibrotechnique Research Centre of Kaunas Polytechnic Institute designed the first piezoelectric robots.

In 1989, a Lithuanian medical laser for endoscopic surgeries ‘Medula’ was designed. It was installed in a factory in Panevėžys and was introduced at the International Conference FIGO in Singapore in 1991. Innovation was realised by the Laser Centre of the Vilnius University – the temporary collective ‘Rūta’ (B. Bareika, J. Ališauskas, A. Vaitkuvienė).

In 1997, the first European joint research and business project was initiated (UAB Ekspla).

In 2014, the first Lithuanian satellites ‘LituanicaSAT-1’ and ‘LitSat-1’ were launched to space.

In 1977, the first scientific invention was registered (Steponas Ašmontas, Juras Požėla and Konstantinas Repšas).

In 1980, the researchers Ramutis Bansevičius and Kazimieras Ragulskis of Vibrotechnique Research Centre of Kaunas Polytechnic Institute designed the first piezoelectric robots.

In 1989, a Lithuanian medical laser for endoscopic surgeries ‘Medula’ was designed. It was installed in a factory in Panevėžys and was introduced at the International Conference FIGO in Singapore in 1991. Innovation was realised by the Laser Centre of the Vilnius University – the temporary collective ‘Rūta’ (B. Bareika, J. Ališauskas, A. Vaitkuvienė).

In 1997, the first European joint research and business project was initiated (UAB Ekspla).

In 2014, the first Lithuanian satellites ‘LituanicaSAT-1’ and ‘LitSat-1’ were launched to space.

In 1970, the senior research fellow Liucija Serekaitė-Juozonienė from K. Baršauskas Problematic Ultrasound Laboratory of Kaunas Polytechnic Institute discovered as new physical phenomenon and named it as acoustic surface longitudinal waves. Around the world, these waves are also referred to as the creeping waves and, in Lithuanian, they are frequently called the Juozonienė waves.

In 1977, the first scientific invention was registered (Steponas Ašmontas, Juras Požėla and Konstantinas Repšas).

In 1980, the researchers Ramutis Bansevičius and Kazimieras Ragulskis of Vibrotechnique Research Centre of Kaunas Polytechnic Institute designed the first piezoelectric robots.

In 1989, a Lithuanian medical laser for endoscopic surgeries ‘Medula’ was designed. It was installed in a factory in Panevėžys and was introduced at the International Conference FIGO in Singapore in 1991. Innovation was realised by the Laser Centre of the Vilnius University – the temporary collective ‘Rūta’ (B. Bareika, J. Ališauskas, A. Vaitkuvienė).

In 1997, the first European joint research and business project was initiated (UAB Ekspla).

In 2014, the first Lithuanian satellites ‘LituanicaSAT-1’ and ‘LitSat-1’ were launched to space.
In 1923, the x-ray radiation therapy started to be applied in treatment of malignant tumours at the Clinic of Obstetrics and Gynaecology of the Lithuanian Red Cross Hospital.

In 1928, the oncologic diseases started to be treated with radium rays at the Clinic of Obstetrics and Gynaecology of the Lithuanian Red Cross Hospital.

In 1974, Prof. Emilija Daktaravičienė performed the first cornea transplantation at Kaunas Republican Clinical Hospital in Lithuania.
In 1977, the first scientific discovery was registered (Šteponas Ašmontas, Juras Požėla and Konstantinas Repšas).

In 1987, the first heart transplantation was performed in the Baltic States.

In 1999, the medics at Santara Clinics were the first ones to start using artificial hearts in the Baltic States. The first artificial heart surgeries were performed by the famous Lithuanian cardiac surgeons – professors Algimantas Marcinkevičius, Jonas Vytautas Sirvydis and others.
In 1926, the first Lithuanian radio station started operating in Kaunas and the first radio show was broadcasted in Lithuania. The reporter Petras Speičys read the greeting word of the Ministry of Education and a couple of ELTA news. In the same year, 323 receivers were registered in Lithuania.

1991 was the year of the birth of Internet in Lithuania. The first signal to the entire Lithuania was sent from the building at Goštauto g. 12 – the current seat of MITA. The computer satellite communication unit ‘LITHUANIA – INTERNET’ started to function.

In 1991, the State Patent Bureau (SPB) was established.

In 1995, mobile digital communication services started to be provided in Lithuania. The first provider was UAB Omnitel. The graduates and employees of the Vytautas Magnus University contributed to this innovation.
In 1957, the Lithuanian National Radio and Television (LRT) was established and was named as Vilnius Television Studio.

In 1992, the registration of applications for inventions, industrial samples and trademarks was launched in Lithuania.

In 1992, the first online website with the Lithuanian domain ‘lt.’ was created.

In 2005, the Lithuanian Innovation Centre launched the first portal for popularisation of innovations www.inovacijos.lt.

In 2006, the video report ‘What is innovation?’ was created in the TV show ‘Klausimelis.’
In 1922, the University of Lithuania was established in Kaunas. This university developed into other higher education schools of Lithuania: Kaunas University of Technology and Vytautas Magnus University.

In 1924, the Agricultural Academy was established. In 1996, it was renamed to the Lithuanian University of Agriculture, and in 2011 the Aleksandras Stulginskis University.

In 1983, the Laser Research Centre was founded. Doc. A. P. Piskarskas was appointed as the head of the Centre. The Centre was established near the Department of Astronomy and Quantum Electronics.

In 1989, the first business school the International Business School of the Vilnius University was established in Lithuania.
At the request of Agency for Science, Innovation and Technology, information was provided by the institutions and authorities responsible for the creation and dissemination of innovations.

In 1987, the first Lithuanian laser was sold (UAB Eksma).

In 1993, the first science and technology park was founded in Vilnius.

In 1994, the Ministry of Education and Science was established.

In 1996, the Ministry of Economy was established.

In 1996, the first Lithuanian innovations support organisation was founded – Public Institution Lithuanian Innovation Centre.

In 2010, the Agency for Science, Innovation and Technology (MITA) was founded.
In the Innovation Index, Lithuania ranked 37th in 2019 (34th in 2018), while Estonia – 36th and Latvia – 42th (data of 2019 Bloomberg Innovation Index).


46.6% of Lithuanian companies introduce innovations (data of the Department of Statistics of the Republic of Lithuania, 2014–2016).

43.9% of innovative companies cooperated with other companies or organisations when introducing innovations (data of the Department of Statistics of the Republic of Lithuania, 2014-2016).

During the period 2014-2016, the innovation activities were performed by 90.7% of large (>250 employees), 63.3% of medium-sized (from 50 to 249 employees) and 41.4% of small (from 10 to 49 employees) companies (data of the Department of Statistics of the Republic of Lithuania).

The majority (87%) of companies introducing technological innovations used their own funds for the implementation of product and/or process innovations, whereas 13% - state or European Union support funds. 7.5% of technologically innovative companies used the EU funds (data of the Department of Statistics of the Republic of Lithuania).

The majority of technologically innovative companies acquired NEW EQUIPMENT (67.5% of all companies implementing technological innovations), others – invested in training of their employees (39.9%) (data of the Department of Statistics of the Republic of Lithuania).

Among the factors having the most impeding effect on the innovative activities, 30.3% of innovative companies indicated the lack of partners for cooperation, 26.9% – lack of good ideas, 25.8% – lack of qualified personnel, whereas 25.2% – insufficient market demand for implementation of innovations (data of the Department of Statistics of the Republic of Lithuania).

At the moment, more than EUR 698 MILLION of investments of EU instruments are allocated for promotion of R&D and innovations (data of esinvesticijos.lt).

More than 20 instruments are allocated for the promotion of innovations (data of esinvesticijos.lt).
ECOSYSTEM OF LITHUANIAN TECHNOLOGIES AND INNOVATIONS
In 2017, the sum of EUR 371.7 was allocated to the R&D activities in Lithuania (data of the Department of Statistics of the Republic of Lithuania).

R&D costs increased by EUR 44.1 million or 13.5% as compared with 2016.

Same as in 2016, the majority of R&D costs were allocated in the field of higher education – EUR 133.6 million or 35.9% of all R&D costs in 2017. In business sector, EUR 132.3 or 35.6% of all costs for the R&D were allocated, whereas in the government sector – EUR 105.8 million or 28.5%.

In 2017, EUR 200.7 million or 54% of all R&D costs were allocated to the wages of R&D employees, other R&D costs amounted to EUR 101.9 million or 27.4%.

The largest share of R&D costs – 37.1% – constituted of state budget funds according to the financing sources, funds of business companies – 34.3%, foreign funds – 24.8%, higher education and non-profit institutions – 3.8%.

At the end of 2017, 23.6 thousand employees were engaged in research activities, 8.2 thousand of them had a doctoral degree. In higher education and public institutions, R&D activities (in the main and non-main workplace) were performed by 18.1 thousand employees, 7.8 thousand of which – researchers having a doctoral degree. The number of men having a doctoral degree accounted for 3,837 (49.1% of all researchers having a doctoral degree), women - 3,973 (50.9%).

Data the Department Statistics the Republic of Lithuania
01. In 2018, 105 patent applications were received, 81 of which were submitted by Lithuanian applicants and 24 by foreign applicants.

02. 523 patents were valid on 31 December 2018: 474 on the national level, 49 on the international level.

03. In 2018, 1,998 European Patents were validated in the Republic of Lithuania (1,980 of them were validated according to the European Patent Convention).

04. 2,774 trademark applications for 4,419 classes of International Classification of Goods and Services, including 2,438 trademark applications by Lithuanian applicants for 3,769 classes, 336 trademark applications by foreign applicants for 650 classes, were filed in 2018.

05. 37,326 trademark registrations were valid on 31 December 2018.

06. In 2018, 51 design applications for 159 designs were filed by Lithuanian applicants and 8 design applications for 10 designs were filed by foreign applicants.

07. 293 registrations were in force on 31 December 2018.
Innovation Reform is slowly gaining a momentum. The foundation for this was laid by the adoption of the Law on Technologies and Innovations and amendments made to the Law on Higher Education and Research in 2018. Innovation Policy was delegated to the Ministry of the Economy and Innovations, whereas the quality of higher education was delegated to the Ministry of Education, Sciences and Sport. The Reform is aimed at the following challenges:

### ESSENTIAL TRANSFORMATIONS

- **Reallocated areas of responsibilities**
- **Updates concepts**
- **Plans to establish the Agency for Innovations**
- **Planned fund for promotion of innovations**
- **Planned strategic Science, Technology and Innovation Council (STIC)**
The Innovation Reform is forecasted to provide a possibility for the wages to increase by one sixth, the growth of GDP to increase by one fifth and the export volumes to increase by another 1.4 billion euro in 2020. The influence of Reform on the country’s economy will be expressed by the increasing number of innovative companies and higher volumes of value-added production in the total company’s income structure.

**BENEFITS OF THE INNOVATION REFORM IN 2020**

**For the person**
- The wages will increase from 6% to 7%
  
  +**EUR 20** per month

**For business**
- The number of innovative companies will increase from 46.6% to 53%

**For the country**
- The GDP will increase from 2.5% to 3%
  
  +**404 million euro**

- The export will increase from 5% to 10%
  
  +**1.4 billion euro**
INNOVATIONS IN A WALLET
Cryptocurrency exchange and wallet .......................................................... 23
Reputation and payment platform ............................................................... 24

INNOVATIONS AT WORK
Accounting platform .................................................................................. 27
Identification system ................................................................................... 28
Image recognition system ........................................................................... 29

TRAVEL INNOVATIONS
Car register system .................................................................................... 31
Electric drive for bicycles ......................................................................... 32

ENVIRONMENTALLY-FRIENDLY INNOVATIONS
Dual solar module ...................................................................................... 35
Plastic PET container blowing device ....................................................... 36
Black toothpaste, mouthwash and foam .................................................... 37

HEALTH INNOVATIONS
Vibrating ball to reduce hand tremor ......................................................... 39
Gene scissors .............................................................................................. 40
Smart life-collar ......................................................................................... 41
Disease diagnosis system .......................................................................... 42

ACTIVE LEISURE INNOVATIONS
Balance platform ....................................................................................... 45
Step calculator app .................................................................................... 46
Motivational organiser ............................................................................. 47

DESIGN INNOVATIONS
Multifunctional furniture/system of possibilities ....................................... 49
Paper handbag ........................................................................................... 50
Food and beverage blender/shaker .......................................................... 51
Over the years, the appearance of money has changed, but their meaning and importance remained the same. Over the last decade, the ordinary wallets have faced more challenges related to cryptocurrencies that function on the basis of blockchain technology, whereas the responsibility for settlements or payments is borne by each person without any intermediaries.

Taking its first steps a decade ago, this method of payment is now quite well-known not only in Lithuania, but also around the world.

We invite you to familiarise with the inventions of Lithuanian innovators that make management of finances more convenient and simple.
Innovation

A cryptocurrency exchange and wallet based on blockchain technology and offering functional and safe cryptocurrency solutions that may be used 24/7. Everyone can reach the most popular cryptocurrencies (Bitcoin, Ethereum, Dash, etc.) by creating a free account online or by downloading a mobile application.

INTERESTING FACTS

- 30% of people are completely delimited from the global financial market and cannot perform any financial operations due to their place of residence, economic, social or political factors.
- At the moment, there are approximately 28 million active users of cryptocurrency wallets in the world and this number is constantly growing.

ADVANTAGES OF INNOVATION

Crypto-payments are innovation that changes the financial market on a global scale. All that the user needs is simply an access to Internet and a cryptocurrency wallet. Cryptocurrencies are not related to a specific location or a specific system of the norms of law (jurisdiction), decentralisation reduces the payment costs, whereas the transfers last from several seconds up to several minutes, irrespective of whether the payment travels to America, Asia or a small island in the Pacific.

PURPOSE OF INNOVATION

International and safe payments in cryptocurrencies available to everyone. This solution is oriented to a modern person, who seeks for an effective, innovative and flexible control of finances. You don’t need to be a specialists of finance or cryptocurrencies to use them. Everyone, who wishes to use cryptocurrencies, can make money transfers, settle for the services in online and physical shops or exchange Bitcoins, Etherium, Dash and XEM to other currencies at any time and in any country of the world.

AUTHOR OF INNOVATION

SpectroCoin.
Innovation

The platform is designed to use blockchain technology to solve sensitive problems of electronic commerce, such as fraud, falsified overviews, slow and expensive payments, inability to transfer the earned reputation to other websites. The startup combines two fields – payments and trust. Two innovations are created and developed at the moment:

- innovation of conclusion and signing of safe transactions for the goods or services;
- electronic commerce payment system allowing to accept cryptocurrencies and develop your electronic reputation.

INTERESTING FACTS

- The developers of platform implemented one of the most successful ICOs in the world – collected 37 million dollars in barely 18 minutes.
- The two young co-developers Justas Pikelis and Laurynas Jokubaitis were selected for the prestigious list of ‘Forbes 30 under 30’.

BENEFITS OF INNOVATION

The owner of online shop who installs the payment system can easily and reliably accept payments in cryptocurrencies and exchange them into other currencies, for example, euro. This method enjoys more advantages than a traditional payment system, because it does not require any mediation services that mean higher fees and slower operations.

The users of mobile application can safely conclude and formalise transactions, create their reputation and use it everywhere irrespective of the point of sale.

AUTHOR OF INNOVATION

Monetha.
It is probably the fantasy movies that force us to imagine robots whenever we think about the innovations at work. As a matter of fact, these also cause a certain concern – could it be true that after a hundred of years human resources will no longer be useful, because our works will be performed by robotised devices? There is no need to worry about that. According to robotics specialists, robots will not exclude people from the labour market – after all, people are the ones creating and controlling robots. We will always need people to take care of robots and, most importantly, to improve them.

Furthermore, many companies, institutions and organisation are already using robots, robotised facilities or various systems and platforms to assist the employees.

The fastest development of robotisation is observed in the industry sector. Platforms or systems used to facilitate the work are becoming increasingly more popular in other fields as well. This saves time and costs of company and employees that can be invested to further activities of the company or employee.

Are you interested in innovations in the working environment? Turn the pages and you will learn more. Lithuanian innovators offer unique and exclusive solutions.
Innovation

An accounting system where all initial documents – from cheques to agreements – can be represented in various forms, including the photos from mobile devices. A list of documents is found on the platform including the processing status, references to processed documents and comments of the accountant. All documents are processed in real time. It provides an opportunity for ‘live’ monitoring of financial results in intuitive reports.

ACCOUNTING PLATFORM

INTERESTING FACTS

- The system contributes to the nature conservation and encourages to use less paper – over 5,000 personnel documents were signed electronically during the previous year.
- The platform collective unites people of different professions – programmers and accountants.

ADVANTAGES OF INNOVATION

Innovation saves costs and time of the users. It also encourages them to be more advanced, effective and innovative.

AUTHOR OF INNOVATION

RoboLabs.
Innovation

A widely applied automatic biometric identification system using one of the most advanced algorithms of biometric recognition of fingerprints, face and iris designed on the basis of neural networks.

IDENTIFICATION SYSTEM

AWARDS AND EVALUATIONS

- In 2018, the fingerprint recognition algorithm was recognised as the most accurate in the world (NIST MINEX III).
- In 2018, the iris recognition algorithm was recognised as the fastest and the second most accurate in the world (NIST IREX IX).
- In 2018, the face recognition algorithm was recognised as one of the most accurate in the world (NIST FRVT, category where images of faces are taken 5 and more years apart).

BENEFITS OF INNOVATION

- The system is characterised by extremely high accuracy of biometric recognition algorithms.
- Multi-biometry (fingerprints, face and iris) provides flexibility and wide application possibilities.
- The architecture of system and speed of recognition algorithms ensures high level of efficiency and reliability.

AUTHOR OF INNOVATION

Neurotechnology.

PURPOSE OF INNOVATION

The system is aimed at identification of people by using biometric symptoms. It can be adapted in both state and business sectors. At the moment, it is successfully used in systems for issue of passports and visas, organisation of elections, state border control, criminal, social and financial service systems.

INTERESTING FACTS

- The system has been successfully used in over 10 countries around the world.
- One recognition server can perform up to 1.2 billion biometric comparisons per second.
- In 2018, the system was used for mass identification of voters in the Democratic Republic of Congo in order to find the duplicates. 46.5 million fingerprints and faces were compared and 5.3 million duplicates were found.
Innovation

A platform helping to create algorithms used for processing and recognition of images. By using this platform, the user can upload any available photos or other images, set classes and train the model to recognise the classes. The classes of images can be simple objects, such as a ‘dog’, ‘cat’ as well as abstract types of images, for example, ‘autumn’, ‘winter’, ‘spring’, ‘summer’. It is the user who decides what he/she wishes to recognise in the images.

INTERESTING FACTS

- The use of platform allows to identify the classes even of abstract objects, where objects are completely different from each other.
- The functioning of platform is based on artificial intelligence algorithms.

BENEFITS OF INNOVATION

- It allows to develop (train) individual image processing algorithms fitted to solve the problems related to client data.
- It is possible to create algorithms without programming, therefore, the platform is suitable even to those who are not skilled in IT area.
- Complete statistics on the functioning and effectiveness of model, explanations of statistical criteria.
- Convenient data labelling and automatic data processing.

AUTHOR OF INNOVATION

Neurotechnology.
Travelling is possible with various means of transport. Nowadays, they become increasingly more innovative and interesting. They also demonstrate progression each year. If a year before last year electric cars and bicycles became increasing more popular in the cities, last year, the streets were flooded with electric scooters. Isn’t it interesting how our mode of travelling will change this year?

Electric vehicles are attractive to those wishing for a friendly environment and to innovation fans wishing to try new stuff. They also attract our attention because of the need to find better, more comfortable and effective ways to travel. With the speed of life becoming faster and faster, we also find ourselves in the need to travel the distances much faster. For this reason, the ordinary vehicle is no longer sufficient. We are looking for the ways how to improve the ordinary means of transport and to create completely new ones.

The innovators, however, create not only means of transport, but also systems or platforms helping us to choose the means of transport, for example, a car.

How to shorten the search for a suitable mean of transport and to find a truly high-quality option? Take a look at the next page.
Innovation

A car history register system based on the blockchain principle, where you can find information on the damage incurred by the vehicle, defects of the model, the mileage, country of registration and archive photos.

**PURPOSE OF INNOVATION**

The system is aimed at solving a relevant problem of the industry of used cars. In the constantly growing market of used vehicles, the vehicles change many countries and owners, however, information about the vehicles travels slower. Also, it is usually available in several and basically private, closed and centralised sources. It stops the flow of data and reduces their reliability. This situation is much more aggravated by different regulatory environments, possible sensitivity of information related to personal data and its protection. This system is aimed at providing more order and structure in the industry, which is still too chaotic.

**INTERESTING FACTS**

- At the end of 2017, the first public system cryptocurrency offer (ICO) was realised. In less than a month, it collected 20 million US dollars and became one of the most successful whole time ICOs in the world of motor vehicles.
- In summer of 2018, the reports of vehicle histories were presented to the Lithuanian market. The register system became the first provider of reports in the world, receiving part of real-time data directly from the vehicles. The implementation of idea was highly contributed by the cooperation with BMW Group.
- The council of system advisers includes representatives of the current and former largest vehicle manufacturers in the world: BMW, Tesla, FIAT, General Motors. This allows to provide front-line recommendations.
- Volkswagen, the largest manufacturer of vehicles in the world, invited the creators of innovation to ‘Future Mobility’ incubator where they can develop joint blockchain projects.

**BENEFITS OF INNOVATION**

Exclusiveness of system – the data centralising blockchain technology. The information dispersed in this way is gathered at a single place. The user is able to check data on the vehicle he/she wishes to buy in an easy and fast manner.

**AUTHOR OF INNOVATION**

carVertical.
Innovation

This electric drive can turn each ordinary bicycle into electric. The drive is completely wireless, 50% lighter than its predecessor and has the regenerative stopping possibility.

AWARDS AND EVALUATIONS

- The first place at the national ‘Good Design 2018’ awards in product and industrial design categories.

BENEFITS OF INNOVATION

Innovation is characterised by a very simple installation on a bike. It takes less than a second to put on and remove the electric drive from the bicycle and it is an absolute record in the category of electric drives.

AUTHOR OF INNOVATION

UAB Rubbee.

PURPOSE OF INNOVATION

The innovation is oriented to all those wishing to facilitate their daily or weekend travels. One bicycle can become a mean of transport with two ways of use.

INTERESTING FACTS

- By using wireless accelerometer, the electric drive measures the person’s riding efforts and determines when the electric help is necessary.
- Innovation uses modular accumulators and this allows to increase the driven distance up to three times.
- When riding down the hill, it is possible to turn on the regenerative stopping to charge the product batteries.
Quiz

Find the following dates in the number maze:

1961 | 1922 | 1977
1987 | 1957 | 2005
1966 | 1989 | 2014
1928 | 1974 | 1999
1926 | 1983 | 1993

1982

Quiz

Find and circle the date in the number maize.

In what year the first Lithuanian TV set factory was established?

1 9 8 2
9 5 5 7
6 8 6 6
1 7 4 1

In what year the first scientific discovery was registered?

5 7 6 8
4 2 3 9
1 9 7 7
6 7 1 5

In what year the LRT was established and named as Vilnius television studio?

1 8 0 8
2 9 3 3
1 4 5 3
9 6 1 7

In what year the first heart transplantation was performed in the Baltic States?

9 6 1 2
1 9 8 7
3 4 5 9
8 0 4 0

In what year the website www.inovacijos.lt for popularisation of innovations was created?

2 0 0 5
1 9 6 7
2 9 3 6
3 4 1 5

The topics of sustainability and ecology have become increasingly more popular and important. We are becoming more concerned about the environment we live in today and the environment we will live in tomorrow. Even more questions arise when we think about the future of our children and grandchildren. In view of these and similar concerns, in 2018, the European Commission (EC) signed the Circular Economy Directive stipulating the necessity of sustainable use of resources. If the economy model 'buy, use & dispose' was dominating previously, the principle of circular economy highlights the reduction of costs of resources and waste by combining them in a closed circuit, for example, adequate maintenance or repair, re-use, remanufacturing or renewal of things and, finally, recycling. All these processes can prolong the use of a specific object from several days to several years. Thus, before making a purchase, it is worth to consider if object is still suitable for the function it performs?

If the object needs to be replaced or we simply want something new, it is necessary to consider environmentally-friendly things developed in view of the principles of circular economy. Such objects are made of recycled raw-materials or by using only a minimum amount of raw-material that is harmful to the environment. Products and equipment one the main functions of which is to save the earth’s resources are also being developed.

We invite you to take a look at interesting, high-quality, functional and sustainable inventions of Lithuanian innovators.
Innovation

Solar energy is one of the fastest growing fields of industry. Scientists around the world are constantly looking for a more effective way to generate solar power. In cooperation with ISC (International Solar Energy Research Center Konstanz), the Lithuanians designed, tested and introduced dual solar modules to the market.

P PURPOSE OF INNOVATION

Dual solar modules collect not only direct sunlight, but also its reflections from the land or the roof. As a result, they can generate up to 25% more electricity than the usual single-sided modules.

INTERESTING FACTS

- Dual solar modules can serve for more than 50 years.
- They are resistant to sand, moisture and many other environmental factors.

BENEFITS OF INNOVATION

Dual solar modules are laminated between two sheets of tempered glass. A binding material (special film) that is resistance to moisture and chemicals is used in the production. It allows to ensure that such solar module would be useful for nearly twice longer than the usual solar module. Due to the durability and effectiveness of module, the price of a kilowatt hour produced decreases and the total effectiveness of solar power plant as well as its profitability increases.

AUTHOR OF INNOVATION

SoliTek.
**PLASTIC PET CONTAINER BLOWING DEVICE**

**Innovation**
A universal 2-step PET container formation device designed for production of both narrow neck bottles (from 18 mm) and wide neck containers (120 mm). One and the same machine can be used to make small (50 ml) bottles and large volume (6,000 ml) bottles, hot-filling and oval-shaped containers. For a long time, various different devices have been used for containers of different formats and now a single one is sufficient. Furthermore, the time needed to change the format of bottles, including the form and neck, is one of the fastest on the market.

**BENEFITS OF INNOVATION**
Modern market leaders are usually the ones dictating the conditions to the clients, however, the creators of innovations do the opposite: they offer a flexible attitude and look for the solutions that would be suitable for both sides – the manufacturer and the client.

**AUTHOR OF INNOVATION**
UAB Terekas.

**PURPOSE OF INNOVATION**
The device is suitable for making different types of containers in small batches.

**INTERESTING FACTS**
- The device is used to produce environmentally-friendly containers, as its special technology allows to obtain products of especially thin plastic. It not only reduces the costs, but also reduces a harm caused to the environment.
Innovation

The Lithuanian toothpaste was introduced to the market in 2011, while the production of black toothpaste started a year later. The toothpastes are produced by combining natural ingredients found in the nature (camomile, clove, various medical herbs) as well as scientific knowledge. The toothpastes were developed in cooperation with the Lithuanian University of Health Sciences. This toothpaste is black due to oak charcoal characterised by the whitening effect. The toothpaste is enriched with TeavifoTM – a green tea extract that reduces the content of bacteria causing caries and supports healthy oral microflora, whereas the black oak charcoal acts as a soft abrasive material. This toothpaste has improved during a period of eight years. Now it is suitable even for vegans (the content of natural ingredients increased from 90% to 98%). The aim is for all ingredients to be as natural as possible. In 2017, an alcohol-free black mouthwash was developed. It is visually transparent, however, turns black when you shake it. Finally, in 2018, in view of the life rhythm of consumers, black foam was developed to be used on the go.

Awards and Evaluations

- In the competition organised by the editorial office of the Polish magazine ‘Kosmetyki’ in 2017, the black toothpaste won the award of the ‘Most innovative oral care product in Poland’.
- In the competition organised by the editorial office of the Polish magazine ‘Kosmetyki’ in 2018, the black whitening mouthwash won the award for the ‘Most innovative oral care product in Poland’.
- In the UK health products network ‘Holland & Barrett’, the black toothpaste has been leading according to the sale of toothpastes.

Benefits of Innovation

Black oral care products are exclusive not only by their colour. The Lithuanian products are made of natural ingredients.

Author of Innovation

UAB BIOK laboratorija.

Purpose of Innovation

These are the means for daily use. Black toothpaste and mouthwash remove scurf and whiten teeth. The washing foam provides the feeling of freshness (for example, after meal) and protects from formation of dental calculi. This foam is also convenient for use on a trip, at work, at home, in case of need of freshness and cleanliness.

Interesting Facts

- The success of black toothpaste is what the creators expected the least, however, namely the ‘black’ products opened the doors to a wider world. At the moment, the production is exported to 35 countries around the world.
- Lithuanians were among the first ones to start the production of toothpaste in the world.
- In 2012, the first black toothpaste for mass consumption was developed in Lithuania.
The health is considered to be our major asset and it is not surprising that a special focus is directed to the innovations in the healing sector. It is an area of particular interest for the doctors, patients and, of course, the relatives of the patients. If incurable diseases meant a verdict a century ago, nowadays, they mean a challenge. Lithuanian innovators search for possibilities how to cure them or at least to reduce their symptoms.

The health innovators are usually inspired by their personal experience or health disorders of their loved ones. In order to help themselves and others, the innovators create and improve inventions that help dozens of people around the world.

Furthermore, our attitude to health changes – we are becoming more conscious about our health. People are more often searching for the healing methods, try new health improvement means, apply for help or advice to the innovators of health promotion sector.

We invite you to meet the inventors, whose decisions impress and fascinate not only Lithuania, but also the entire world.
Innovation

The device created on the basis of oscillation helps to reduce the stiffness of hands for those having rheumatoid arthritis and hand shake for those having essential tremor and Parkinson’s disease. The mobile app is currently under development and will allow to carry out diagnostics and to evaluate the changes of health condition.

AWARDS AND EVALUATIONS

- KTU ‘Technorama 2017’ - 3rd place; 2018 - 1st place.
- ‘European Youth Awards 2018’ (1st place).
- ‘Kaunas startups 2018’ (1st place).
- ‘EitHealth’ competition, best idea/business plan in health sector in 2017 – 1st place.
- Having completed the acceleration programme (OpenAccelerator 2018), the creators of innovation won the ‘Seed’ investment and partnership with the Italian pharmacists ‘Zambon’.

BENEFITS OF INNOVATION

This technological solution is patented and is not used in any other device. It allows oscillation to obtain the highest effectiveness on the basis of therapy.

AUTHOR OF INNOVATION

MB Fidens.

PURPOSE OF INNOVATION

The vibrating ball is the first non-pharmacological solution to reduce hand tremor. The device is created in view of the recommendations and suggestions of potential clients.

INTERESTING FACTS

- In case of joint disorders, the ball reduces the morning stiffness by 30% and increases the strength of hand and flexibility of wrist joint.
- After the therapy of 10 minutes, the hand tremor is reduced by 50%, whereas the effect lasts for up to 4 hours.
Innovation

When experimenting and testing mechanisms of protection of bacteria from viruses, the innovators discovered protein Cas9. It cuts the virus DNA like the scissors. In case of purposeful application of technology, i.e. programming the protein to cut DNA at the exact point, it is possible to edit the genome.

GENE SCISSORS

BENEFITS OF INNOVATION

It is believed that the ‘gene scissors’ will be used to treat hereditary genetic diseases.

AUTHOR OF INNOVATION

CasZyme.

PURPOSE OF INNOVATION

By using Cas9 protein, CRISPR-Cas technology allows to edit DNA much easier and faster than ever before. After the application of this technology, it is possible to treat genetic diseases and cancer, derive/breed new species of plants and animals that are more resistant to diseases. CRISPR-Cas technology is special, because it allows to edit DNA easier and faster – to cut unnecessary parts and to stick the new ones.

INTERESTING FACTS

- CRISPR-Cas genome editing technology is predicted to receive the Noble Prize.
- It is believed that CRISPR-Cas technology helps to treat various genetic diseases and forms of cancer.
Innovation

A unique invention that protects children from drowning. In case the water passes on the sensors, the collar automatically (without human intervention) starts to blow air-pillows that lift the head over the surface of water and protect from drowning.

**PURPOSE OF INNOVATION**

The collar is dedicated to children who play by the water without the supervision of adults or cannot swim. When placed on the neck, the collar can be worn all day long. In case the child falls into water, the collar blows the air-pillows within 3-4 seconds and slowly lifts the child’s head above the surface of water. It ensures that the child would not drown until the help arrives. In the future, it is planned to integrate the alarm signal for the parents. This function would allow to inform the parents in advance that the collar rescue mechanism was activated.

**INTERESTING FACTS**

- Drowning is one of the leading causes of accidental children deaths.
- The highest children drowning rates are observed in South-East Asia, in poor countries where parents cannot supervise their children all day long due to high level of occupation and another reason is that many children cannot swim.
- The creation of collar was inspired by the unfortunate experience with a happy ending: approximately 27 years ago the sister of the creator of collar accidentally fell into the water container. She almost drowned. Luckily, the little girl was saved thanks to the immediate reaction of others.

**BENEFITS OF INNOVATION**

Various means for protection from drowning are currently used in the world. The creators of this innovation offer a different solution for protection of children from drowning. This invention is exclusive, because it is light and comfortable. Innovation weights as much as a smartphone.

**AUTHOR OF INNOVATION**

Smartmedic.
Innovation

An artificial intelligence-based set of tools for processing of medical images to facilitate the work of doctors.

PURPOSE OF INNOVATION

Innovation automatically records radiological descriptions of the chest radiographs. In the chest X-ray images, the programme automatically detects 75 radiological features – approximately the same as the doctor radiologist does.

Automatic generation of description significantly reduces the mechanical workload of the doctor. The innovation increases the productiveness of radiologist by more than 40% and reduces the risk of human error.

This solution helps to control patient flows. The system automatically generates the sequence of radiographs according to the possible danger of diagnosis to the patient’s health. It allows the radiologist, first of all, to examine the radiographs of patients who may need an emergency aid.

The system finds radiologically similar images and helps to use the archives of previously collected images and descriptions to improve the accuracy of diagnosis.

INTERESTING FACTS

- It is the only product that generates complete radiological descriptions of chest radiographs certified for clinical use in the EU countries.
- The chest radiograph is the most common radiological test. About 2 billion tests are performed worldwide each year and this number increases by approximately 100 million each year.

BENEFITS OF INNOVATION

The innovators were the first ones in Europe granted an authorisation to commercialise the product of artificial intelligence making full description of chest radiographs. According to the completeness and accuracy of generated descriptions, the designed solution is among the leaders in the world.

AWARDS AND EVALUATIONS

- The innovation won a prestigious EIT Health InnoStars award; ‘Society for Imaging Informatics in Medicine’ recognised it as one of the most innovative inventions of 2018.
- In 2018, the innovators also won the Lithuanian and German business awards, ‘Life Sciences Baltic’ and ‘Startup Fair’ competitions.

AUTHOR OF INNOVATION

Oxipit, UAB.
Do you prefer active or passive leisure time? There is no wrong answer to this question. Both active and passive leisure helps to relax and get away from daily problems as well as reduce stress and anxiety.

Health specialists recommend to focus more on the physical activity. And there’s much to choose from these days – gyms, team and individual sports, dance, martial arts, etc. However, this supply does not always meet our expectations and possibilities, so we can choose from the alternatives. For example, to exercise at home. Don’t have enough time? No problem – you can exercise during your break. New sports programmes that require only 10-15 minutes of your daily time are now being developed. Home exercise machines are becoming increasingly more convenient and effective.

New solutions are explored to help people to take care of their bodies and health. You will soon learn about one innovative Lithuanian on the next page.

Motivation is yet another topical problem encountered by the exercising people. It is probably a common knowledge that physical activity brings positive changes, however, not everyone is able to motivate himself/herself. It is more difficult to do so in case of exercising at home. However, a Lithuanian innovator decided to solve this problem and created a mobile app and an organiser to propagate physical activity and healthy lifestyle. See the next page to find out more about these novelties.
Innovation
Unstable platform designed for training and testing of the balance for the people of various ages and physical capacities.

PURPOSE OF INNOVATION
It is used for prevention of traumas in professional trainings of sportsmen, healthiness sector, during rehabilitation period, identification of the risk of falling for older persons and reduction of the risk during exercises.

INTERESTING FACTS
- Testing takes less than 2 minutes.
- Uniqueness of device and effectiveness of use were approved in 4 research works.
- Devices are tested by using modern 3D motion measuring and analysis systems.
- The system can be used for playing virtual reality games.

AWARDS AND EVALUATIONS
Winners in competitions ‘Technorama 2017’ and ‘Innovation Laboratory SMART UP LAB 2018’.

BENEFITS OF INNOVATION
Easy to transport and safe device for testing and training balance. Easily customised level of instability, height of handles, variety of leg positions and a unique programme solution ensures comfortable and safe training and testing. Virtual reality games make exercising more interesting to younger persons.

AUTHOR OF INNOVATION
UAB Abili.
A mobile app that counts steps and offers additional functions: step wallet, cognitive trails and step challenges to companies. Step wallet is used for exchanging the collected steps to discounts. The app generates a unique code that can be used to activate a discount. Cognitive trails offer interesting leisure time and to experience the environment when walking.

**BENEFITS OF INNOVATION**

This innovative application not only promotes physical activity, but also helps to learn more about your country. Thematic walking trails are stretching through the picturesque places of Lithuania.

**AUTHOR OF INNOVATION**

MB Vlada.lt.

**INTERESTING FACTS**

- 150 companies are currently competing in the challenge for companies.
- This innovative app is among the most popular ones in ‘Health&Fitness’ category.
- The users of the app have already walked over 2 billion steps. It constitutes approximately 2 million km. It means that the app users have already walked around the globe 46 times or walked to the Moon six times.
Innovation

It is a unique motivational book-personal organiser which, used with a mobile app, can scan AR sound codes and listed to audio motivations.

BENEFITS OF INNOVATION

It is the first personal organiser in Lithuania combined with AR audio codes. Just scan the code and you can simply close the organiser and listen to motivations. The user can choose whether he/she wishes to use it with the organiser or download an audio book separately. The user will also have a possibility to test guidance motivations. For example, at 7:30, he/she will receive an advice why it is worth to refuse sugar at least for one day. In the evening, he/she will receive an additional enquiry whether he/she managed to realise the motivation. The collected statistics will help to monitor which advices are the most difficult to follow and the received data will help to create a future plan of motivational recommendation and to recommend suitable lecturers to the user or the company.

PURPOSE OF INNOVATION

This innovative notebook is used to write important thoughts and it is possible to read and listen to motivations on healthiness and successful lifestyle. There are 52 of them in total.

INTERESTING FACTS

- This personal organiser functions with a free mobile app.
- Motivational guidance plans have been created in cooperation with the Lithuanian universities.

AUTHOR OF INNOVATION

MB Vlada.lt.
What would you choose: functionality or aesthetics? Those choosing a functional object would not be disappointed – it will perform its function well. Nowadays, the transformable objects performing several different functions have become increasingly more popular. Another important aspect is minimalism. The latter becomes increasingly more popular and primitive. Why do you need several if you can have only one that performs all the necessary functions and does not overcrowd your home with unnecessary stuff?

What do those choosing aesthetics win? Beauty and emotions, of course. Beautiful things cause almost all the positive feelings that you can image. We probably all have that one object that we purchased affected just by its appearance and only then by its functionality or other characteristics.

Is it possible for the object to be functional and aesthetic at the same time? Beautiful and comfortable or beautiful and functional? Yes, of course! Such synergy becomes increasingly more common and popular. To have two in one or ten in one is much more comfortable, right? All the more so, the beautiful appearance does not impair the properties of a functional object, on the contrary, it adds more points.

So just turn the page and find out more about the Lithuanian inventions that combine beauty and functionality.
Innovation

A multifunctional piece of furniture the structure of which reminds of a flexible and strong human spine. Furniture can be reformed according to everyone’s individual needs. Functional and unique system of possibilities can become a deckchair, table, chair, partition, pouf, bench or any other furniture; and they all are elegant and comfortable. The furniture consists of 61-76 unique components made of more than 1,600 fine wooden elements.

Any furniture modification can withstand the weight of over 200 kg.

The creator of multifunctional furniture has been creating and developing the idea for 10 years.

BENEFITS OF INNOVATION

Multifunctional furniture submits to the principles of circular economy. This furniture may be transformed according to the individual needs, without loading home with a dozen of different pieces of furniture. The minimalist, environmentally-friendly interior of home or work environment can be created.

AUTHOR OF INNOVATION

Mindaugas Žilionis.

TRADEMARK

Spyndi.

FOUNDERS

Mindaugas Žilionis, Raimonda Klimašauskaitė, Andrius Pateckis.

INTERESTING FACTS

- In 2016, the funds were raised for the development of product in the largest global crowd financing platform kickstarter.com. The Lithuanian project gained an incredible success in the vastness of the Internet: over 110 thousand euro was collected in a month (three times exceeding the need), whereas the presentation movie was viewed 30 million times.
Innovation

Handbags, backpacks and cosmetic purses are made of paper which is extracted from cultivated fibre, and, as a result, does not contribute to the destruction of forests. This handmade product is made with care and love to the nature. The creator of innovation was the first to start producing backpacks, handbags, cosmetic purses and other haberdashery products of this usual material in Lithuania.

BENEFITS OF INNOVATION

Paper that is used to make handbags, backpacks or cosmetic purses is specially soured and stretched, therefore, the products are elastic and durable as leather.

AUTHOR OF INNOVATION

Tata Paper.

PURPOSE OF INNOVATION

These products are designed for daily use. The creator of innovation seeks to combine beauty, functionality, style and environmentally-friendly attitude. Paper used to make handbags, backpacks or cosmetic purses is extremely durable, therefore, can be used in any weather – during rain or sunlight.

INTERESTING FACTS

Handbags, backpacks and cosmetic purses can be in the water more than 72 hours.
Innovation

Smart new-generation fruit and vegetable blender distinguished by its modern, aesthetically attractive design and patented magnetic drive technology.

BENEFITS OF INNOVATION

Silent operation, modern, aesthetically attractive design and innovative technology, which has not been used in any kitchen appliance so far. The blender can be portable and blend up to 10 shakes with full load and stationary (connected to the power socket).

The blender is easy to maintain – it is possible to drink a smoothie from the same vessel it is made in, all you need to do is to rinse the cover with blender knives. In case of limited time, it is possible to use a special cover allowing to leave the rinsing for later without leaving any mess at the same time.

PURPOSE OF INNOVATION

The device is designed to blend fruits and vegetables. This innovation is oriented to a modern user who enjoys a fast lifestyle.

AUTHOR OF INNOVATION

UAB Millo Appliances.

INTERESTING FACTS

- The technology applied to create the motor of this blender is usually used in the drones.
- Although the product has not been introduced to the market, it was already mentioned in over 40 various online portals, including ‘Forbes’, ‘Huffington Post’, ‘Mashable’ and ‘Which?’.
INNOVATIONS

maize
<table>
<thead>
<tr>
<th>INNOVATION</th>
<th>CAR</th>
<th>WINNER</th>
<th>THERAPY</th>
<th>LITHUANIAN</th>
<th>STARTUPS</th>
<th>TECHNOLOGIES</th>
<th>PRODUCT</th>
<th>SERVICES</th>
<th>INTERNATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLOCKCHAIN</td>
<td>BUSINESS</td>
<td>PROGRAMS</td>
<td>FINTECH</td>
<td>PARTNERS</td>
<td>SUN</td>
<td>MENTORING</td>
<td>GOVERNMENT</td>
<td>LABORATORY</td>
<td>FURNITURE</td>
</tr>
</tbody>
</table>
There are no success indices or tips that would allow any idea to earn a national or international success. Each innovator should find his own recipe for success. Some manage to do so right after the start of development of idea, others have to face disappointed and search for other possibilities and solutions. It doesn’t mean that some ideas or activities are better or worse than others.

You had an opportunity to familiarise with quite diverse innovations. Some of them are more common in you daily life, others are less common, and some of them were probably completely new to you (maybe they encouraged you to try some of them?). These innovations also enjoy different popularity – some are well-known in Lithuania and slowly make their way to the international markets, others managed to get into the wide waters straight away.

However, at the start of activity, all innovators had only an idea they believed in and worked hard, searched for advices, colleagues, partners and investors.

We hope that this publication not only extended your knowledge about the innovations created by the Lithuanians, but also brought inspiration or motivation to realise your own ideas.