

THE INFLUENCE OF INFORMATION TECHNOLOGIES ON IMPROVING PEOPLE'S QUALITY OF LIFE: GLOBAL EXPERIENCE¹

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This article presents data from various well-known global analytical companies about the major volume of the global wearable electronics market in 2020 and the main trends in this industry. Also, the paper analyzes the leading companies in the wearable electronics market, such as Apple, Xiaomi, Huawei, Samsung, Garmin, Fitbit, Amazfit, etc. The different types of electronic devices and their classification are given, such as: self-directed wearables electronic (healthcare), smart-house, environment. Even today, improvements are being made in medical equipment and services, software, and the promotion of human health research in today's environment. The widespread use of information technologies in the medicine of the future will lead to patients monitoring their own health, for example, using a smartphone or various medical electronic devices. A doctor will be needed, mostly as a consultant and partner. Patients will keep their own health records and take an active part in their own treatment. Routine health care measures will increasingly devolve to patients. Queues in hospitals and clinics will be reduced, and specialists' time will be freed up to care for patients who do require the personal presence of a physician.

Key words: *information technologies, quality of life, wearable electronics, medical electronics, smart-house, environment.*

Acest articol prezintă date de la diverse companii analitice globale bine-cunoscute cu privire la volumul major al pieței globale de electronice portabile în 2020 și la principalele tendințe din această industrie. De asemenea, articolul analizează principalele companii de pe piața electronicelor portabile, cum ar fi Apple, Xiaomi, Huawei, Samsung, Garmin, Fitbit, Amazfit, etc. Sunt prezentate diferitele tipuri de dispozitive electronice și clasificarea acestora, cum ar fi: electronice portabile (sănătate), smart-house, mediu. Chiar și în prezent, se fac îmbunătățiri în ceea ce privește echipamentele și serviciile medicale, software-ul și promovarea cercetării în domeniul sănătății umane în mediul actual. Utilizarea pe scară largă a tehnologiilor informaționale în medicina viitorului va conduce la monitorizarea propriei sănătăți de către pacienți, de exemplu, cu ajutorul unui smartphone sau a diferitelor dispozitive electronice medicale. Va fi nevoie de un medic, mai ales în calitate de consultant și partener. Pacienții își vor păstra propriile dosare de sănătate și vor participa activ la propriul tratament. Măsurile de rutină în materie de sănătate vor reveni din ce în ce mai mult pacienților. Cozile din spitale și clinici vor fi reduse, iar timpul specialiștilor va fi eliberat pentru a se ocupa de pacienții care au nevoie de prezența personală a unui medic.

Cuvinte cheie: *tehnologii informaționale, calitatea vieții, electronice portabile, electronica medicală, case inteligente, mediul înconjurător.*

JEL: F18, F64, I15, O35, Q55

Introduction.

One of the strategic goals of the development of different countries is to improve the quality of life of the population. Today, we use various electronic devices in our daily lives. From the early morning until we get to bed, we use different gadgets in different ways. We can't imagine a day without them. Electronic gadgets are a category of devices that control most of our everyday life and they are not the only devices that can make life more efficient and more quality.

The purpose of this study is to analyze the market of modern electronic devices that make our lives more better and quality. The following research methods were used in the presented paper: induction and deduction, synthesis, logical, monographic, comparative, economic analysis of the statistical data and grouping method.

The global market of wearable electronic analysis. According to analytical company Strategy

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Analytics, the volume of the global market of wearable electronics in 2020 reached 527 million units, increasing by 37% compared with 2019, when the supply of such products was measured at 384 million units. According to experts, annual shipments of wearable devices crossed 0.5 billion units for the first time. Most of the sales (about 62%) in 2020 came from headphones - they went worldwide in the amount of 327 million units, which is 61% more than in 2019. The second largest category with a share of 36% were wrist gadgets - especially smart watches and fitness bracelets, whose sales rose by 11%, to 188 million units [1].

Also, 12 million wearable devices belonging to other categories were sold in 2020, which is about 2% of the total result. According to director of Strategy Analytics Neil Mawston, if the growth rate of wearable electronics that took place in 2020 is maintained, by the end of this decade global sales of wearable devices will exceed 2 billion and will outpace smartphone sales. The expert called the potential of wearable electronics enormous, noting that such devices can be on any part of the user's body, from the head to the toes. As examples, he cited augmented reality smart glasses, smart rings with built-in biosensors and smart sneakers with pollution level sensors [1, 2].

In 2020, CCS Insight researchers estimated that sales of smartwatches and fitness bracelets grew 22% in volume terms to 193 million units. In money terms, the market was close to \$24 billion. According to analysts, about 60% of total sales of wearable devices in 2020 were smartwatches, and the share of less expensive fitness bracelets was about 40%. Apple, Samsung, Garmin, Fitbit and Amazfit models were the most popular among smart watch buyers [3].

According to International Data Corporation (IDC), global wearable electronics shipments in 2020 will total 444.7 million units, an increase of 28.4% over the previous year. This is due to the rise of the market in question with a surge in consumer spending on electronics in the face of the coronavirus pandemic. In addition, sales and the release of new products by the end of 2020 had a positive impact [4].

This trend has not helped all segments of the wearable electronics market; some of them have been in decline due to a shortage of chips. For example, wristband sales declined 17.8% year-over-year and accounted for only 11.5% of the total wearable device market. Headphones remain the largest category, accounting for 64.2% of wearable electronics sales, followed by smart watches (24.1%).

Leading the market of wearable electronics Apple at the end of 2020 took it by 34.1% thanks to a 36% increase in the supply of products. The next Xiaomi is three times behind the leader in terms of market share; the indicator of the Chinese company was estimated by IDC analysts at 11.4%. Huawei rose in the top 3 vendors, recording an asset of 9.8% of wearable electronics deliveries against 9% for Samsung. The latter was in the top three in 2019.

Researchers attributed Apple's strengthening position in the industry to the appeal of its three differently priced smartwatches, the Apple Watch Series 6, Apple Watch SE, and Apple Series 3, which are in different price ranges. Also, the company has increased sales of headphones, but the dynamics are on the decline due to the fact that the user base of AirPods becomes huge, and further growth is limited.

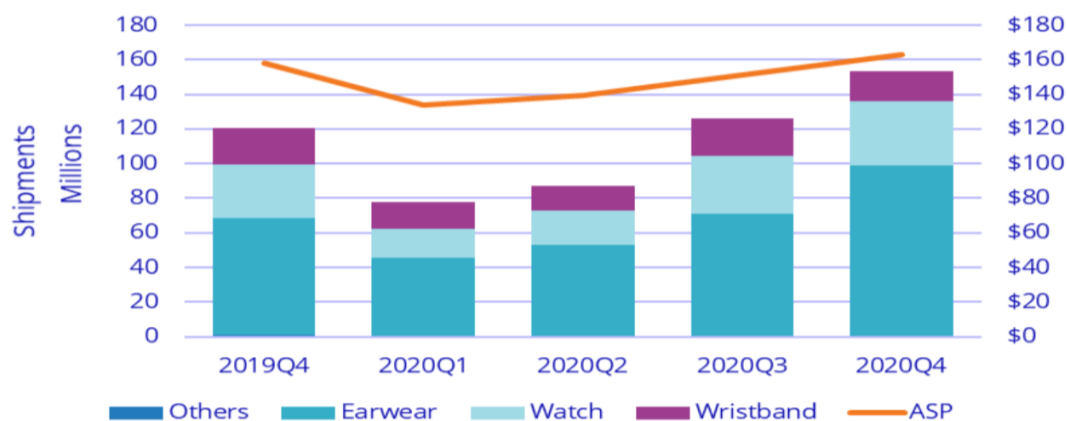


Figure 1. Worldwide wearables shipments by product type, 4 Quarter 2020

Source: IDC, 2021 [4]

According to Gartner, the global wearable electronics market will grow by about 50% in 2020, largely due to the COVID-19 coronavirus pandemic. According to estimates of this company, in 2020 sales of smart watches, fitness bracelets, headphones, smart clothes, virtual reality devices and other wearable

gadgets on a global scale reached \$68.99 billion against \$46.19 billion. According to experts, people began to work from home more often and are more interested in instruments to control their health, hence the growth of the wearable electronics market. Sales of so-called "smart stickers" (thermometers, heart rate monitors and other physical indicators that are glued to the skin) by the end of 2020 reached \$4.69 billion, while a year earlier the figure was \$3.9 billion [5].

Electronic devices and their classifications. The priority areas for information technologies are: self-directed wearables electronic (healthcare), smart-house, environment (Figure 2).

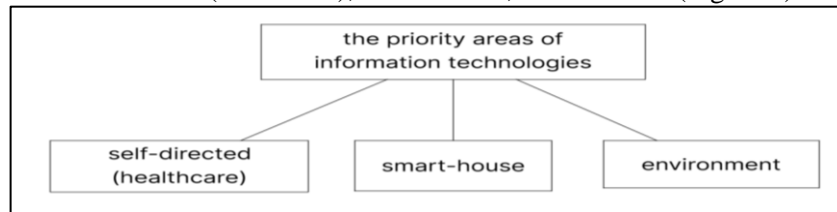


Figure 2. The priority areas of information technologies

Source: elaborated by the authors

Self-directed devices (health care). The introduction of information technology in the medical field touches everyone. They promise new methods for preventing, diagnosing, and controlling diseases, as well as new drugs and technology for tracking and treating ailments.

It is no surprise that one of the pioneers in the world of wearable devices was the cell phones and later smartphones. The second trend of wearable devices was created by companies in the field of healthy living and sports. The first fitness tracker is considered the fruit of a collaboration between Apple and Nike. It was called Nike + and was a smart sticker on sneakers, which received the user's activity data (time, pace, calories spent and the distance covered) and then transmitted them to iPod Nano.

A separate line in the history of wearables are medical devices that are implanted in the body or worn on the body for medical reasons. Modern pacemakers, insulin pumps, prosthetic limbs and organs are also connected to the network, monitor the environment and the body, and can look like an ordinary accessory.

A smart-watch is a companion device. Today, smart watches have become such a commonplace device that even in the subway it is easier to meet a person with a smart device on his wrist than with a classic chronometer. They are functional, practical and, most importantly, inexpensive. Their own functionality is rather limited, they work fully only in conjunction with a smartphone. In conjunction with a smartphone smart watches help:

- Stay connected without missing important calls, messages and notifications;
- track physical activity,
- lead a healthy and active lifestyle;
- Search for relevant information, etc.

The main function of children's smartwatches is tracking and transmitting the child's location to parents. Mom or dad will always know exactly where their son or daughter is walking. This increases the safety of the child. In addition, children's devices are also equipped with a built-in SIM card, so you can call your baby at any time.

It has recently become fashionable to track your daily diet and activity. To avoid spending extra money on a trainer and a nutritionist, smart watches are also used. The device stays on your arm all day and acts as a fitness assistant. Thanks to the built-in gyroscope and a bunch of sensors, the device calculates the distance covered during the day, the number of steps and heart rate.

Even the cheapest smartwatch can count steps. More expensive models determine heart rate, track physical activity, record workouts and suggest the right approaches to exercise. For example, Samsung Galaxy Watch can track the distribution of stress during running. But most importantly, the watch can really motivate you to lead a more active lifestyle. For example, to walk a few extra bus stops or to wake up in a fast phase to get up early but feel rested.

Weather, date of the next flight, time of the next event from the calendar, reminders, to-do list, buttons to control playing music on your phone – all this can be displayed right on your wrist. You won't have to pull out your phone and look in apps.

Many smartwatches can work in Bluetooth headset mode. So you can leave your smartphone behind and go work out at the gym or mount wires at altitude, and still stay connected by taking calls.

Another of the many medical applications of mobile technology is to help disabled people with low

or no mobility, as well as those with autism. With the help of mobile gadgets, millions of such people are able to get in touch with the world. For example, patients after apoplexy and brain injuries are now using tablets very successfully to regain their former abilities. The deaf are now able to correspond with other people thanks to SMS. Diabetics have been able to monitor their glucose levels and send data wirelessly to compact insulin pumps. Thanks to smartphones, the blind have become less dependent on sighted people, as there is now software to help them navigate cities, find the right clothes for the current weather, scan the change handed out and report the amount.

A fitness-bracelet is a gadget that, in most cases, is worn on the arm and has built-in sensors that track activity throughout the day, including: number of steps, heart rate, sleep, calories burned, etc. It is not a piece of jewelry, but a tool to monitor your health. The basis of any fitness bracelet is an accelerometer - a sensor that detects when you move. A fitness bracelet determines:

- how many steps you've taken in a day;
- how much distance covered;
- How much time in a day the activity lasted;
- The estimated number of calories burned and even how much gasoline was saved.

Also, it is no secret that health depends primarily on quality sleep. A fitness bracelet, which will "tell" in the morning, will help to solve the problem:

- total duration of sleep;
- duration of deep sleep;
- duration of REM sleep;
- provide recommendations on how to make your sleep healthy.

In addition to sleep information, fitness bracelets have a really "super-function" - an alarm clock. Most of them have a built-in heart rate monitor. What it gives you:

- you can measure your heart rate at any time;
- when your heart rate exceeds the allowable limit, the bracelet will vibrate.

Some fitness bracelets have their own food diary. In order to keep it, you need to scan the barcodes on the foods you consume, and it will count everything for you. In addition, the program on your smartphone will draw beautiful graphs about the calories burned and consumed, and you will know the balance of proteins, fats and carbohydrates.

The fitness bracelet will help you keep a personal workout calendar. The smart coach function will give you recommendations on how to improve your results. With a fitness bracelet, you have all the resources you need to build your body the way you want it.

A glucose meter is a device for measuring blood glucose levels. Glucose meters can be found not only in the home medicine cabinet of a patient diagnosed with diabetes, but also in those who take preventive measurements to be sure of their health. There are six main types of these devices:

1. Photometric: the principle of operation of such glucose meters is based on a puncture of the patient's finger and taking a small drop of blood. This blood is applied to a special test strip, which is coated with a special composition of reagents, so that after a few seconds the device displays the measurement result on the screen. Such devices are the most common, but can have an error of 20%.
2. Electrochemical: the operating principle of this type of glucose meters is based on the recording of the electric current, which occurs due to a chemical reaction during the measurement. This also requires a finger piercing and a drop of blood, but this technology is more advanced and it is believed that the result obtained is more accurate than the measurement with a photometric glucose meter.
3. Laser is an ultra-modern device. The patient does not need to prick his finger to conduct the procedure, the glucose meter will do it for him. The device has a special piercing device. With a light pulse, the skin is pierced and the device takes the amount of blood necessary for the measurement. The blood is then stopped by baking a tiny area of the puncture.
4. Disposable is not considered a full-fledged device, as it is a test strip. It does not give very accurate results, but it is also indispensable if necessary. The procedure requires a puncture of the patient's finger and a drop of blood. You can determine the level of glucose in the blood, thanks to the color scale.
5. Non-contact or sensory glucose meter: coherent radiation is sent to the skin. As the rays are reflected, they will change their readings. The glucometer receiver itself will record the parameters of the secondary radiation. A special unit analyzes the measurement data obtained, and then displays them on the screen for review.
6. Romanovsky type glucometer also does not need blood and skin puncture of the patient for the

measurement procedure. It works thanks to spectral analysis. A sensor unit reads the reflected radiation from the skin area being scanned. The module processes the result and shows it to the patient.

A tonometer is a medical device designed to measure a patient's blood (blood) pressure at home and in medical institutions. Tonometers are divided into the following basic types:

- Mercury tonometer: is one of the first devices for measuring blood pressure. The device is structurally simple, consisting of a vertical glass tube through which a column of mercury moves under pressure. The glass column itself is marked in millimeters. That is why, traditionally, blood pressure is measured in millimeters of the mercury column. This measurement is considered very accurate and is used in various medical and scientific research. Despite this, the domestic use of this device is quite dangerous. This is due to the large amount of mercury that can leak if the device is damaged. Therefore, the mercury column is placed in a metal or plastic case and is carried strictly in a vertical position.
- The mechanical tonometer, or aneroid, is the next in the history of sphygmomanometer development. The device is a circular digital scale marked from 0 to 300. Inside the body itself is the mechanism that drives the hand of the digital scale. Such tonometers are very common in home applications. Their main disadvantage is that the pressure gauge is subjected to frequent physical impact. Therefore, it should be regularly checked and handled carefully.
- Semi-automatic shoulder tonometer consists of an electronic unit, cuff and pneumatic blower (bulb). These tonometers determine the pressure without human assistance, are usually not large in size and have only the simplest and most necessary functions. They consume few batteries and one battery charge is capable of over 2000 measurements.
- Automatic shoulder tonometers: more complicated in design, but the most convenient to use. In order to measure your blood pressure, this tonometer, you only need to properly install the cuff on your hand and press the trigger. Such a device will automatically measure your blood pressure and show the result. Automatic tonometer - the best choice for domestic use, because the "human factor" is minimized, and the additional features and functions will help you to monitor your blood pressure most effectively. Automatic and semi-automatic electronic tonometers determine the pressure without human intervention, by catching the brief spikes in pressure in the cuff, occurring at the moment of pulsation of the artery. This method of automatic pressure measurement is called oscillometric.
- The Wrist Automated Tonometer is a compact tonometer that measures pressure at the wrist. In medical practice, pressure measurement at the wrist (radial artery) is not used due to the lower accuracy of measurement. This is due not only to possible cardiovascular diseases, but also to normal anatomical and physiological features of the body. The arteries are thinner in the wrist area, so the amplitude of the pulse wave is lower. Wrist tonometer is not suitable for those people whose pulse is felt poorly, as well as for people over 40 and the elderly (over 60), because the walls of the arteries are no longer as elastic as at a young age: sclerosis (hardening) of blood vessels occurs, so they begin to be difficult to the pulse wave. As a consequence, the device may fail to detect or inaccurately detect a pressure jump in the cuff due to arterial distension.

Electrocardiography (ECG) is a method of examining and recording the electrical activity of the heart. The result of electrocardiography is an electrocardiogram (ECG), a graphical representation of the difference in electrical potentials arising from the heart's work and projected onto the surface of the body. The ECG reflects the averaging of all vectors of action potentials arising at a certain moment of the heart's work. ECG is the simplest and, at the same time, the most informative method of examination. ECG is a recording on a film (or monitor) of the electrical activity of the heart. ECG allows you to diagnose various types of heart disease. According to the ECG it is possible to:

- Determination of the heart rhythm driver (sinus rhythm, nodal rhythm, etc.);
- determination of heart rate;
- Detection of intracardiac conduction abnormalities like sinoatrial-blockade, atrioventricular-blockade, GIs bundle branch blockade;
- Diagnose rhythm disorders: unscheduled heartbeats (extrasystoles), atrial fibrillation (or atrial fibrillation), atrial flutter, nodal tachycardia, WPW syndrome, etc.;
- to diagnose ischemic heart disease, acute or chronic myocardial damage; to obtain information about extracardiac pathology (pulmonary embolism, etc.).

A pedometer is a mechanical, electronic-mechanical or electronic measuring device for counting the number of steps taken while walking or running, a step and calorie counter for health, and allows you to synchronize data on steps taken and calories spent. It is not uncommon for the pedometer function to be incorporated into other portable devices such as watches, music players and cell phones.

A contact lenses as a diabetes monitoring tool. A contact lens-based diagnostic device allows a biosensor to be placed in close proximity to eye tissue and to use tear fluid, which is known to reflect pathophysiological changes in certain systemic and eye diseases, to monitor diabetes. Biochemical reading technology for biomarkers in tears is rapidly evolving, allowing future diagnostic contact lenses to incorporate either electrochemical or optical reading technologies. This approach has distinct advantages over direct tear sampling, as the contact lens allows cumulative detection of biomarkers during wear, potentially increasing the sensitivity of the assay. At the same time, the relative large area occupied by contact lenses carries the potential to measure concentrations of different biomarkers simultaneously. Future research will likely focus on identifying and refining key biomarkers for these conditions, determining the specificity and sensitivity of biomarkers for specific diseases, and developing technologies to collect tears and measure biomarkers in them so that such analysis can be truly diagnostic. This will enable simple contact lens-based technologies that can provide early diagnosis of systemic diseases, such as diabetes, at an early stage, allowing for rapid management and improved clinical outcomes.

"Smart Home". Your home will be functional and flexible with smart home devices. They will take it to a higher level of comfort, safety, and energy savings. The term "smart home" refers to a comprehensive solution for automating the activities that take place on a daily basis. It includes both control systems and appliances controlled through wireless communication.

- If you are going to make your house "smart", it is necessary to have an idea at least about the most popular and available systems:
- Climatic appliances. They adjust the heating and air conditioning in rooms, taking into account the presence/absence of people in them and the weather conditions.
- Lighting devices. Turns lights on and off automatically by the presence or absence of people. Adjusts the level of light based on the state of natural light. Allows to realize various scenarios for a comfortable stay in the house depending on the circumstances - work, rest, sleep, receiving guests.
- Security equipment. Protects your home from unauthorized access, fire, flooding, gas leaks.
- Energy saving and energy consumption systems. Controls devices connected to the power grid, distributes loads based on load.

A smart Family Hub unit that can be controlled via Wi-Fi. A large portrait-oriented touch screen is located on the upper right door. The display sends messages to each other, reminds about important things, makes notes. You can also view videos, photos, listen to music through the built-in speakers. By constantly monitoring the availability of food in the refrigerator, you can replenish it when you return home. The built-in Bixby virtual voice assistant is able to analyze the owner's repetitive daily actions and adjust to them. The presence of Bixby with its deep learning algorithm, allows you to give commands by voice. This assistant allows you to quickly play images from the cameras, find the right recipe, listen to music and perform other voice commands the user. It has a function that supports video door calls. As a result, if the doorbell rings, the camera will display the image on the refrigerator display.

Vacuum robot cleaner is controlled remotely through a mobile app, i.e. it is IoT-connected. Using a mobile device it can be activated or stopped, set the time. If necessary, you can see the history of cleaning. The robot vacuum cleaner is compatible with a smart speaker, so it is possible to control it by voice commands. The unit is equipped with a set of sensor microsensors, so it can automatically create a map of the room. This makes cleaning faster. The wheels are designed so that they are raised while overcoming obstacles. The battery allows the cleaner to function for half an hour or an hour, depending on the mode selected.

SkyCam. This surveillance gadget lets you see what's going on in your home, cottage or garage while you're miles away. SkyCam can also be a video nanny. While most devices just capture the picture on a memory card and then broadcast it to a special screen, SkyCam transmits the image in real time to your smartphone. Built-in microphone allows you to not only see but also hear what is happening. An infrared filter allows you to take quite a discernible image in the dark.

SkyKitchen Multicooker. This "smart" device is an innovative development and visually resembles a classic multicooker. The lifting technology transforms the device into a single-burner programmable stove. The device is equipped with program modules. You can access the possibilities of the device directly from the control panel, as well as through a smartphone or tablet. The device has a non-volatile memory. When the power is turned off during operation, the stove keeps in memory not only the current settings, but also the last temperature value.

SkyKettle. The device supports the Ready for Sky app for Android, iOS. Through it you can set the backlight and then the kettle bulb will turn into a light in any mode, even in the stage of waiting for the

command. The app involves creating an account on the Redmond server. After that, the kettle is added to the list of controlled devices. Heating can be accompanied by music, and children can play educational games while waiting for tea. They are also in the app. The app allows you to program a schedule, then the kettle will start heating water at a predetermined time.

Wi Fi Coffee Machine. This Wi-Fi enabled coffee machine is controlled from a tablet or smartphone. You can brew up to 12 cups of drink at a time while adjusting the strength. To get what you want by a certain time, you can use different modes. Intelligent coffee machine not only brews coffee, but also pre-mixes it. On command from the smartphone it will prepare a drink and notify the user about it through the phone. Provided quality beans and purified water are loaded, Coffee Machine will make a beverage as good as the one made by the most skilled barista.

SkyScale. It can be operated manually and through the Ready for Sky platform, which extends the capabilities of the device. Ready for Sky is compatible with all Apple devices with iOS version as well as Android devices. Synchronized with your cell phone, the scale lets you know the balance and combinability of the ingredients in the food you're going to use for a particular dish. Calorie content and nutritional value, both of an individual component and of the dish as a whole, can also be assessed. All this data is quickly displayed on the smartphone screen. With such a gadget it is easy to maintain a balanced diet.

SkyIron. The smart device SkyIron can be turned off remotely when you are very far from your apartment. The app on your smartphone will let you know its status at any time. The Ready for Sky app can turn it off over the phone or even lock it, to keep your kids safe when they are not around. The app communicates with the device via Bluetooth. The app "sees" the device when it's plugged in. You can always check the spatial position of the iron through the app.

Sherlock Smart Lock. This lock will not open by an unauthorized person. The feature is available only to the homeowner and people with access rights. All entrances and exits are notified to the homeowner's phone. Lockitron Bolt functions based on the Mi Home app. Using Wi-Fi, it is possible to give digital keys for access to the house to relatives or friends. The innovative device has the form of a special polycarbonate overlay. It is fixed to the already existing door lock on the inside. The new device is merged with the old one and blocks it. Then the opening/closing can be done with a normal key. For increased home security, the user has the option of locking the lock completely via a smartphone via the Mi Home app.

Environment. The environment has always been essential to the health and well-being of people, endowing them with the many benefits of its ecosystems, clean air and potable water. It is both a source of health and a source of disease, as well as a major resource for the survival and development of people and society as a whole. A number of environmental factors negatively affect human health to a much greater extent than previously thought. By proving this connection, there is the potential to make significant advances in public health by reducing harm and eliminating risk factors, and by using electronic devices to monitor people's health. There are many electronic devices aimed at controlling and protecting the environment, such as: smart environment, smart climat, air humidifier, air purifier, electronic filter jug - home appliance for drinking water treatment, smart sneakers with air pollution sensors, blankets with climate control, sensory soap dispenser, digital radiation meter, plant sensor - moisture and soil temperature sensor, etc.

Table 1. Classification of electronic devices

Myself (healthcare)	Smart-house	Environment
<i>smartphone</i>	<i>smart family hub</i>	<i>smart environment</i>
<i>smart-watch</i>	<i>vacuum robot cleaner</i>	<i>smart climat</i>
<i>smart-bracelet</i>	<i>video surveillance gadget (SkyCam)</i>	<i>air humidifier</i>
<i>glucometer</i>	<i>multicooker (SkyKitchen)</i>	<i>air purifier</i>
<i>tonometer</i>	<i>smart kettle (SkyKettle)</i>	<i>electronic filter jug</i>
<i>heart rate meter</i>	<i>Wi Fi Coffee Machine</i>	<i>smart sneakers with air pollution sensors</i>
<i>pedometer</i>	<i>SkyScale</i>	<i>blankets with climate control</i>
<i>biosensor contact lens</i>	<i>SkyIron</i>	<i>sensory soap dispenser</i>
<i>electronic floor scales</i>	<i>Sherlock</i>	<i>digital radiation meter</i>
<i>thermal underwear</i>	<i>heated blanket</i>	<i>moisture and soil temperature sensor (plant sensor)</i>

Source: elaborated by the authors

Conclusions.

All modern gadgets - medical, for home, for monitoring and environmental protection - are aimed at

improving the quality of life of people. Modern gadgets for the elderly can make life easier for the elderly and relieve their relatives of health worries.

Even today, improvements are being made in medical equipment and services, software, and the promotion of human health research in today's environment. The widespread use of wireless devices in the medicine of the future will lead to patients monitoring their own health, for example, using a smartphone or various medical electronic devices. A doctor will be needed, mostly as a consultant and partner. Patients will keep their own health records and take an active part in their own treatment. Routine health care measures will increasingly devolve to patients. Queues in hospitals and clinics will be reduced, and specialists' time will be freed up to care for patients who do require the personal presence of a physician.

Some companies are equipping their employees with wearable devices to improve overall productivity, manageability, and workplace safety. Devices that can analyze a company's air and report pollution, elevated concentrations of certain substances or radiation levels have been around for decades. So have smart passes that provide customization for specific employees' access to authorized areas and facilities.

Corporate fitness tracker projects have been practiced relatively recently. For example, smart watches that track time spent on work tasks.

Wearable devices build analytical graphs of the productivity of both individual employees and company departments. And with the help of geolocation services, they show the position of each employee and the specifics of their movements. Together with productivity, employee health parameters are monitored.

For task and time management purposes, the wearable devices of employees or supervisors can automatically synchronize and exchange data. The analysis of the data from the devices helps to draw practical conclusions, e.g. from the usage patterns of the company premises by the employees. If some rooms are used much more often than others, which may be difficult to access, and the former may run out of consumables more often.

Forecasts of all companies engaged in analyzing the global market of wearable electronics indicate a further increase in their production and sales. According to CCS Insight: "Like several other technology product categories such as laptops and tablets, smart wearable devices were winners in 2020 despite the problems thrown up by the Covid-19 pandemic" - Marina Koytcheva, Vice President of forecasting at CCS Insight." This contrasts with other products such as mobile phones which recorded a 13% drop in global demand in 2020." [3]. According to Gartner, as device makers focus on improving sensor accuracy, the performance gap between medical- and nonmedical-grade wearables is closing, driving growth in multiple wearable devices categories. "The capability of embedded sensors is often a determining factor in the reliability and usefulness of a wearable product," said Mr. Atwal. "Given the sensor improvement trend seen over the last several years, sensors built into wearable devices will be increasingly capable of more accurate readings, driving market growth over the next 3-5 years." [5].

References:

1. Waltzer Steven. Global Wearables Vendor Market Share: Q4 2020. Strategy Analytics. Publication Date: Mar 15 2021. – 10 p. <https://www.strategyanalytics.com/access-services/devices/wearables/market-data/report-detail/global-wearables-vendor-market-share-q4-2020>
2. Arleen Denque, Matt Hester, Joy Ganvik. COVID-19 Tracking Changing Consumer. Strategy Analytics. Publication Date: May 12 2020. – 38 p. <https://www.strategyanalytics.com/access-services/devices/connected-home/smart-home/reports/report-detail/covid-19-tracking-changing-consumer-behaviors-and-implications-for-brands-in-us-uk-and-china?slid=1068838&spg=3>
3. Healthy Outlook for Wearables As Users Focus on Fitness and Well-Being. London, 24 February 2021. <https://www.ccsinsight.com/press/company-news/healthy-outlook-for-wearables-as-users-focus-on-fitness-and-well-being/>
4. Consumer Enthusiasm for Wearable Devices Drives the Market to 28.4% Growth in 2020. IDC. NEEDHAM, Mass., March 15, 2021 <https://www.idc.com/getdoc.jsp?containerId=prUS47534521>
5. Gartner Forecasts Global Spending on Wearable Devices to Total \$81.5 Billion in 2021. STAMFORD, Conn. January 12, 2021. <https://www.gartner.com/en/newsroom/press-releases/2021-01-11-gartner-forecasts-global-spending-on-wearable-devices-to-total-81-5-billion-in-2021>