

ROBOT FIRST

**Inspiration and incentives to think
about the near future**

ROBOT FIRST Inspiration and Incentives to Think About The Close Future

ISBN 978-80-88576-55-6

First edition. Published in 2026 in Prague, Czech Republic.

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Published by: Ivan

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Content

INTRODUCTION	5
LECTURES, SEMINARS AND CONSULTATIONS	8
ROBOT FIRST	11
HOW TO PROVE THE STAFF'S OFFICER'S OFFICER'S OFFICE AND CHANGE	19
ROBOT INVESTIGATION	22
NUMBER OF AUTOMOBILITIES AND NUMBER OF ROBOTS	25
ROBOT VS AUTOMOBILE	29
24 / 7	39
WORKING INSTALLATIONS AND USE OF ROBOTS.....	46
TYPE OF HUMANOIDAL ROBOTS	52
HUMANOID ROBOT FOR THE CABLING AND CONTROL OF THE SUBMARIAGE CABLES	60
HUMANOID ROBOT FOR ASFALT CABLING.....	68
MULANOID ROBOT OF DEVORUBEC	77
HUMANOID ROBOT FOR SEARCH OF DIAMANTS AND NERVOUS RATES	87
HUMANOID ROBOT	99
HUMANOID ROBOT FOR THE PLAYING AND LEARNING OF CHILDREN	112
HUMANOID ROBOT IN CERAMIC PRODUCTION AND PORCELLENE	124
HUMANOID ROBOT OF THE BUKER	138
HUMANOID ROBOT IN LABORATORY	151
HUMANOIDAL ROBOT IN NUCLEAR HAVARY	166
HUMANOID ROBOT OF THE DOCTOR	178
HUMANOID ROBOT FOR LOCK WORK	195
HUMANOID ROBOT IN THE STEEL AND HUMANOID	209
HUMANOID ROBOT FOR THE CONSTRUCTION OF OROPONES AND GAS	225
HUMANOID ROBOT FOR TRADING	242
PERMANOID ROBOT OF THE PARASHUTIST.....	260
HUMANOID ROBOT IN THE BAKERY	273
HUMANOID ROBOT ON ROLE PLATURE	287
HUMANOID ROBOT FOR AID TO PEOPLE WITH HEALTH IMPACT	305
HUMANOID ROBOT FOR WORK IN THE WEDDING.....	321

HUMANOID ROBOT IN NATURAL CATASTERROPHES	338
PYROTECHNIC HUMANOID ROBOT	355
HUMANOID ROBOT FOR THE ASSISTANCE OF SENIORIES	371
HUMANOID ROBOT AND SPORT	388
ROBOT LOOKING FOR NATURAL CATASTERROPHES	407
ROBOT OF HORN SERVICES	423
ROBOT SULMISTER.....	443
ROBOT FOR CONDUCTING	468
ROBOT IN THE TOVINE.....	498
ROBOT TEACHER	538
ROBOT FOR THE CLAIM	575
ROBOT FOR WORK ON HIGH-TYRES COLUMN	641
ROBOT GARDENER.....	682
ROBOT RESCUER	707
ROBOT OF THE WEAPONS	727
Robot contests.....	755
ROBOT AND ROBOTIC FIREM CATALOGUE.....	775
CONCLUSION.....	778

INTRODUCTION

Ladies and gentlemen,

humanoid robots will no longer appear in science fiction films only. We will gradually meet them in production plants, warehouses, hospitals, shops, hotels, restaurants, construction sites and in our homes.

Until a few years ago, humanoid robots acted as a distant idea of the future. However, the development of artificial intelligence, sensors, batteries, robotic systems and automation progresses extremely quickly. What we could only watch in films or technological demonstrations until recently can become a normal part of our everyday life within a few months or years.

Humanoid robots will be able to walk, carry objects, operate machines, communicate with people, identify their surroundings and learn new activities. They can help elderly people and people with health restrictions, work in dangerous plants or interfere in fires, natural disasters and industrial accidents. They can also find their applications in mines, quarry, steel plants, laboratories, oil platforms, under the sea or in space.

Their importance will not only be that they can replace a person in physical labour. They can take over mainly recurrent, health harmful, dangerous or extremely precise activities. This will allow one to take more care of decision making,

creativity, interpersonal relationships and work, where experience, empathy and personal responsibility are important.

The arrival of humanoid robots will not only bring new possibilities. It will significantly affect the labour market, education, economy, business, security and our privacy. Some professions will change fundamentally, others can gradually disappear. At the same time, new jobs will be created, which today do not have their name. We will need engineers, programmers, service technicians, operators, instructors, security specialists, lawyers and experts dealing with ethics and the relationship between man and machine.

We will also have to ask ourselves a number of important questions. Who will be responsible for the robot's error? What rules will apply to its use? Who will have access to the information that the robot receives in our home or in the workplace? Can we use robots as helpers without becoming too dependent on them? Where will the line between effective automation and maintaining human decision-making be?

This book does not represent humanoid robots only as technical news. It describes the world in which robots become our collaborators, helpers, rescue workers, drivers, production workers, carers or domestic partners. It shows possible areas of their use, opportunities, benefits, risks and changes that we should start preparing for today.

The idea is therefore not to compete between man and robot. We should look for ways for people and robots to cooperate safely and in a meaningful way. Technology itself is neither good nor bad. It will be decisive who controls it, for what purpose it is used and what rules we will create for its use.

The future of humanoid robots will not begin for decades. Its first chapters are being written right now. Some changes will come gradually, others may surprise us at their speed. It is therefore important to talk about them before the robots become a completely normal part of our world, and in time to prepare for this change.

This book invites you to think about what life, work and society will look like in a world where humanoid robots will work next to people every day. It is not just a question of what robots can do. More important is how we can use them - and whether we can use their abilities to benefit the human and the whole society.

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LECTURES, SEMINARS AND CONSULTATIONS

For several years I have been engaged in lectures, seminars and consultations on artificial intelligence, digital addiction and the impact of modern technologies on man, companies and society. I always try to choose the current topics that go beyond the future and help participants prepare for the changes that are yet to come.

Technology developments are progressing extremely quickly. Artificial intelligence already affects our work, education, communication, business and private life. At the same time, the importance of digital dependency is increasing, because modern technology does not only bring us new possibilities, but also risks associated with excessive use of mobile phones, social networks, computers and other digital devices.

Another important change will be the gradual arrival of humanoid robots. Until a few years ago, we knew them mainly from sci-fi films and technological demonstrations. However, in the near future they can become a normal part of production plants, warehouses, hospitals, hotels, restaurants, shops, buildings, transport systems and our households.

Lectures and seminars on humanoid robots can present the future to the listeners, which is gradually becoming a reality. Their aim is not only to show new technologies, but above all to explain how humanoid robots will affect everyday

life, the labour market, education, business, safety and the functioning of the whole society.

People and companies can already start preparing for the transformation of requirements for work skills, the creation of new professions and changes in the way of cooperation between man, artificial intelligence and robots. Companies can think in time about what activities humanoid robots could help them, what processes can be automated and how to prepare employees for a new working environment.

For example, the following topics may be included in the lectures:

- current possibilities and future developments of artificial intelligence,
- practical use of AI in working and private life,
- digital addiction and its impact on attention, health and interpersonal relations,
- the possibilities for the use of humanoid robots in production, health, services and households,
- the deployment of robots in hazardous and physically demanding activities,
- the future of employment and the emergence of new professions,
- cooperation between man, artificial intelligence and robot,
- security, legal and ethical issues related to humanoid robots,

- preparation of companies, schools and individuals for technological change.

Lectures, seminars and consultations can be adapted to different target groups. They are suitable for companies, schools, public institutions, professional organisations, working groups, managers, personnel, educators, students and the general public. They can be conducted in person or online and their length and content can be adjusted according to the specific needs of participants.

It is important to discuss these issues openly: technologies are being developed, whose real possibilities and future impacts are often not yet fully understood. What we now find unusual or remote may become a normal part of our lives within a few months or years.

The sooner we start thinking about the changes that are coming, the better we can prepare for them. The future is not only passive to expect. We can learn new skills, discuss opportunities and risks and look for ways to use new technologies safely, responsibly and for the benefit of man.

I look forward to meeting with you personally or online at some of the lectures, seminars or consultations dedicated to artificial intelligence, digital addiction and the future of humanoid robots.

ROBOT FIRST

The ROBOT FIRST strategy should become one of the essential components of almost every company's decision making in the future. Its aim is not to automatically replace robot employees, but to objectively assess whether it is preferable to use man, robot, or their cooperation in the first place when occupying a particular job.

Before creating a new job or accepting another employee, the management of the company should ask itself some important questions. Does the activity actually have to be carried out by a person? Is the work physically demanding, dangerous, monotonous or harmful? Could it be fully or partially taken over by a robot? Would such a solution be safe, economically advantageous and sustainable?

The principle of ROBOT FIRST means that the company will first carefully assess all available options. It is only on the basis of specific data that it decides whether to entrust the task to a human, humanoid robot, a specialized robotic system, or a joint team of humans and robots.

Such decisions must always be objective and responsible. It is not enough to follow the cost of a robot or the amount of the employee's salary. It is necessary to evaluate the total costs, productivity, safety, reliability, quality of work,

possibilities for further use, energy consumption, service, maintenance, availability of spare parts and life of the equipment.

What should the company assess

When deciding on the deployment of a robot, the company should evaluate in particular:

- the nature and complexity of the work carried out,
- the degree of danger to human health and life,
- frequency and repeatability of individual operations,
- the required accuracy, speed and quality of work,
- the number of working hours and exchange operations;
- the purchase and operating costs of the robot,
- the cost of service, maintenance, software and updating,
- the necessary adjustments to the working environment,
- the possibility of training staff,
- data protection, security and responsibility for any errors,
- economic return on investment,
- social, legal and ethical impacts.

The company should also determine which activities can be fully automated and for which human control must be maintained. Not every job is suitable for the robot. Some professions require empathy, creativity, the ability to understand the difficult human situation, to bear personal responsibility or to react flexibly to unforeseen circumstances.

Benefits of using robots

Humanoid and specialized robots can bring a whole range of benefits to companies. They can work in dangerous, dusty, noisy, too cold or very hot environments. They can perform physically demanding and repetitive activities in which people are threatened with fatigue, overload or work injury.

Their potential advantages include, in particular:

- reduction of accidents at work and health risks,
- the possibility of working in a hazardous environment,
- high accuracy and repeatability of activities;
- stable working performance,
- the possibility of continuous operation;
- reduction in the number of fatigue errors,
- rapid adaptation to certain new tasks,
- the acquisition and evaluation of operational data,

- addressing the shortage of workers in certain professions,
- a gradual reduction in certain operating costs.

Robots can be extremely useful, for example, in mining, quarrying, steel plants, chemical plants, warehouses, laboratories, construction sites or oil platforms. They can also intervene in fires, industrial accidents, floods, earthquakes and other crisis situations.

The Commission shall adopt implementing acts laying down the rules on the application of the Union rules on the application of the Union rules on the financial rules applicable to the general budget of the Union.

The application of robots is not an automatic solution to all problems. It is associated with high initial costs, technical constraints and new safety risks. The company can become dependent on manufacturers, software suppliers, regular updates or availability of spare parts.

Possible disadvantages and risks include:

- high cost of purchase,
- the cost of service and maintenance,
- technical disturbances and interruptions;
- the risk of cyber attack or abuse of the system,
- misguided decisions of artificial intelligence,

- limited response capability to unexpected situations,
- the need to adjust the workplace and corporate processes,
- the need to train staff,
- legal issues related to liability for damage,
- the staff's concerns about job losses,
- excessive dependence of the company on technology.

Every decision to use a robot should therefore be based on a thorough analysis of a particular job position. The company should not acquire a robot simply because it is modern technology. The robot must solve the real problem, increase safety, improve the quality of work or bring a demonstrable economic and operational benefit.

A human, a robot, or a joint team?

The future of work is unlikely to be based on replacing people with robots. In many professions, the most effective solution will be to the cooperation of man and robot. The robot can take on a physically demanding, accurate, repetitive or dangerous part of the work.

Therefore, the basic decision-making under the ROBOT FIRST strategy may have several results:

1. The job will continue to be done by a man.

2. A robot will take over part of the work.
3. Man and robot will work together.
4. The robot will take over the entire work under human supervision.
5. The working process will be completely redesigned and adapted to automation.

The number of robots owned by the company is not important, but the way in which it can be involved in its operations.

New corporate strategy

Companies should develop their own robotics implementation plan. This plan should be based on the real needs of the company, not just on the current technological trend. Management should gradually analyse individual workplaces, jobs and activities and divide them depending on whether they are suitable for humans, robots or their cooperation.

The pilot project can be a reasonable start in one particular position. It will help the company to verify the real benefits, costs, technical constraints and reactions of employees. The experience gained can then be used to decide on further expansion of robotic systems.

The strategy must also include open communication with employees. People should know why the robot company introduces, how their work changes and what new options this change can bring them. Some employees can be trained to

operate robots, service technicians, instructors, automated process coordinators or security specialists.

About this book

In this book you will find a number of practical tips, recommendations, examples and suggestions to reflect on the future of humanoid and specialized robots. The book describes various types of robots, their potential capabilities and areas of use. It also represents professions in which robots can become a normal part of the working environment within months or years.

The aim of the book is not to say that robots must replace a person at all costs. Its aim is to help individuals, companies, schools and public institutions better understand the changes that are coming and prepare for them in time.

The ROBOT FIRST strategy is not a challenge to remove people from the working environment. It is a challenge to a new way of thinking. In every work activity we should take responsibility for assessing who can do it most safely, best and most efficiently - man, robot, or both together.

The name ROBOT FIRST does not mean that robots are to be more important than humans. It expresses above all the fact that robots can be deployed first where there is danger to man. They can enter the burning building, infested space, deep

mine, damaged power plants or areas affected by natural disaster. They can work in conditions that are too difficult for human health or life.

HOW TO PROVE THE STAFF'S OFFICER'S OFFICER'S OFFICE AND CHANGE

If the company is looking for a new employee, it will usually first publish a job offer on the job portals. On some portals, a job advert can be placed for free, others offer paid services, such as highlighting the offer, targeted promotion or access to the candidate database.

Another option is cooperation with the staffing agency. It is for employers to seek suitable candidates, to make their pre-selection and sometimes also to provide interviews, testing or verification of qualifications. For successful job vacancies, the staffing agency usually charges a remuneration that can be approximately twice to three times the monthly salary of the employee recruited.

What happens if the employer does not find a suitable worker through work portals or with the help of a staffing agency? For example, it can be a physically demanding, dangerous, repetitive or long-term vacancy. If the company finds out that the activity can be performed by a humanoid or specialised robot, it can start to consider acquiring it.

In addition to the classic work and personnel agencies, specialized robotic agencies will also be created. Their task will not be to look for employees, but to recommend and ensure a suitable robot according to the specific needs of the company. The robotic agency can offer robots from various manufacturers and

suppliers from around the world, compare their capabilities, price, reliability and usage options.

Robotic agencies may provide employers with, for example:

- analysis of the job and activities,
- an assessment of whether a person, robot or their cooperation is more appropriate for the work in question,
- selection of the appropriate robot type,
- purchase, hire or short-term rental of a robot,
- transport, installation and entry into service,
- programming a robot for specific tasks,
- training of staff working with him,
- regular service, updating and technical support,
- replacement of a robot in the event of failure or change of requirements of the company,
- assistance with security, insurance and responsibility for its operation.

The company will therefore not only compare the individual candidates. It can also compare the cost of employees with the cost of purchasing or renting a robot. It will be necessary to include in the decision the wage, contributions, training,

working hours, morbidity, fungibility, service, energy consumption, the lifetime of the robot, the safety and quality of the work carried out.

It does not mean that a robot will automatically replace a person in the whole job position. In many cases it will only take over dangerous, physically strenuous or repetitive tasks while one will be responsible for controlling, deciding, communicating and dealing with non-standard situations.

Robot agencies will become a new type of job supplier. Like staffing agencies, they are now looking for people, helping companies to find, select and introduce robots. It will be increasingly important for employers to be able to objectively assess the tasks to be performed by the person who has the robot and where their cooperation is most advantageous.

ROBOT INVESTIGATION

If a company accepts a new employee for a professional or specific job, its training may take several weeks to months. This applies, for example, to welding, work in smelters, engineering, automotive, production, logistics, servicing of specialised equipment or other fields.

During this period, the employer must provide the instructor, protective equipment, training, security courses and ongoing control of the work. The new employee usually does not initially reach the required speed, accuracy or quality. Therefore, the company invests a considerable amount of time, energy and funds in its preparation.

At the same time, there is a risk that the employee will leave during or shortly after training. The company may lose not only the worker but also part of the investment put into his recruitment and training. The whole process of finding and training a new person must then start again.

In some cases, preparation for a specific task may be significantly faster. If there is already an appropriate program, digital workflow or model created by the manufacturer, supplier or other establishment, the loading and basic setting may take only a few hours. The robot can then repeatedly perform a specified function according to specified parameters.

Such "training" may include:

- recording of the work programme and production documentation,
- setting of movements, speed, strength and accuracy,
- familiarisation of the robot with the working environment,
- calibration of cameras, sensors and working tools,
- setting of safety zones and emergency stop;
- test operation and quality control,
- interconnection with the production line and information systems,
- establishing rules for cooperation with people.

The robot can also be taught by an example. An experienced worker performs the desired activity and the robot records, evaluates and then repeats its movements. For some systems, the robot can be controlled remotely, guided by its shoulders by the desired trajectory or passed on to it the experience through data obtained from another robot.

The great advantage is the possibility of once created and verified procedure to save, update and then transfer to other compatible robots. The company does not need to teach each robot from the very beginning. If it uses more of the same equipment, it can expand the new knowledge to the entire production much faster than in individual training of more employees.

This does not mean that every robot can handle a new profession within a few hours. The preparation time depends on the complexity of the activity, the working environment, the availability of the appropriate program, the tools used and the required level of safety. For simple and repetitive tasks, it can actually take hours. For complicated activities, for example in metal, welding of different materials or in a variable environment, integration, testing and approval may take weeks or months.

Moreover, the robot may not go to competition and its "knowledge" can be preserved in the company for a long time. However, it requires regular service, updates, technical support, safety check and staff who will be able to manage and evaluate its work.

Training robots can therefore significantly change the way companies pass on working experience. Knowledge-how of an experienced worker will be possible to convert to digital form, save and use in multiple workplaces. Thus, it will not only be important for businesses to get a suitable robot, but also to build a system for creating, verifying and sharing its work skills safely.

NUMBER OF AUTOMOBILITIES AND NUMBER OF ROBOTS

When the first cars started to appear on the roads, few people could imagine that one day the car would be owned by almost every household and that companies would operate whole car parks. The first roads, parking and cities were not designed for such significant growth of car transport.

In August 2026 it is estimated that around 1.7 billion motor vehicles are in the world. Automobile has become a normal part of working and private life. It allows people to travel, transport employees and goods and companies and companies to function faster and more efficiently. What was more than a hundred years ago luxury and technological news is now almost a matter of course for many people and businesses.

Can robots repeat the development of cars?

We can also see similar developments in the coming years for industrial, service and humanoid robots. Today, most people still consider them expensive technology intended primarily for large production companies. However, it is likely that with the development of artificial intelligence, serial production, sensors, batteries and robotic systems, their price will gradually decline and their capabilities will expand rapidly.

Robots will become a normal part of factories, warehouses, buildings, hospitals, hotels, shops, farms and households. They will perform physically demanding, dangerous, repetitive and long-term vacant jobs. Some will be designed for only one specific activity, while others will be able to learn new tasks and hold several job roles.

It is possible to assume that companies will not own just one robot. Like some companies now run dozens, hundreds or thousands of cars, they can use the entire robotic teams in the future. One robot will work in production, another in stock, another will perform quality control, maintenance, cleaning or handling of material.

Does the number of robots exceed the number of cars?

My forecast is that over the next ten years, i.e. by around 2036, the total number of different types of robots can exceed the number of cars.

The direction of development is clear: robots will be gradually more accessible, more capable and easier to use. Just as a car changed traffic, trade and everyday life, robots can fundamentally change production, services and the form of the labour market.

Will you be part of this change?

Companies today stand before important decisions. They can only observe or start preparing for it. Some companies will develop and produce robots, others will sell, rent, program, service or train their operations. Other companies will start using them in their day-to-day activities.

Those who start in time can gradually gain experience, prepare staff, adjust operations and find out for which activities the use of the robot is really advantageous. They may not immediately replace the entire working teams. They may begin with one particular task, such as handling material, welding, quality control, cleaning or working in a dangerous environment.

Companies that ignore this change for too long can lose part of their competitiveness. Their competitors can produce faster, cheaper, more accurate and continuous thanks to robots. They can also manage the shortage of workers more easily and reduce the risks associated with dangerous physical work.

Robot as a common company equipment

In a few years, when creating or expanding a company, it may not only solve the number of employees, cars and computers, but also the number of robots. The question may not be: "How many people do we need to accept?" More and more, companies will ask: "What tasks is the person who is to perform the robot and where will the best of their cooperation be?"

Owning or using a robot in the future will be as common as using a car, mobile phone or computer today. A company without appropriate robotic

technology can then be in a similar situation to a company today that does not have a car, internet or modern information system. It can work, but its possibilities, speed and competitiveness will be significantly limited.

The robotic revolution will not come at a single moment. It will be carried out gradually but very quickly. The important question is not only how many robots will be in the world in 2036. More importantly, whether you will be part of this change or whether your competitors will use it earlier.

ROBOT VS AUTOMOBILE

With a growing number of humanoid robots, a wide range of accompanying services will also develop. Like cars, a large system of financing, insurance, service, sales of spare parts and technical controls will be created, a similar market will also be created around robots.

The robot will no longer be a technological device that the company will buy once it has been purchased. It will become part of its operation and therefore it will be necessary to deal with its financing, safety, maintenance, liability for damage caused, regular updates and possible replacement.

Buying a robot for instalments

The price of a modern robot can be too high for a smaller company or business operator. Manufacturers, banks and specialised financial companies will therefore start offering the possibility of purchasing a robot on a payment basis.

The company will pay only part of the purchase price and the remaining part will be paid gradually. This will allow the robot to start using it to create revenue before paying the whole price.

However, only the amount of the monthly payment will be of no importance when deciding. The employer will also have to calculate the costs of:

- transport and installation of robot,

- its programming and adaptation of operations,
- necessary working tools and accessories,
- electricity consumption,
- software updates and license fees,
- regular service and repairs,
- insurance and security controls,
- training of staff who will control the robot.

Robot Leasing

Like companies now use operating or financial leasing of cars, they will also be able to rent robots, so they do not have to invest a large amount in their purchase and they will bear a smaller risk of rapid technological ageing.

In the context of financial leasing, the company will gradually repay the robot and can acquire it after the contract is terminated. In the case of operating leasing, the robot will remain the property of the leasing company and the company will use it for a regular monthly fee.

The following may be part of the operating lease:

- regular service and preventive maintenance,
- replacement of damaged components,
- software updates,

- technical support,
- replacement robot during repair,
- insurance,
- exchange of equipment for a more modern model.

For many companies, renting can be more advantageous than buying, because technology will evolve rapidly. A robot acquired today can be overcome in a few years by a newer, faster and more economical model.

Robot as a Service

The next model will be Robot as a service - a robot as a service. The company will not buy the robot or rent it for long term, but will only pay for its actual use.

The price may be determined according to:

- the number of hours worked,
- the number of pieces produced,
- the work carried out,
- consignments moved or quantities of material,
- length of lease,
- the result achieved.

The robotic agency or service provider will provide the robot, its transportation, setup, service and exchange. The customer will only pay for the agreed performance. This model can be suitable for seasonal work, short-term production orders, warehouses, agriculture, construction or emergency.

Obligatory Robot Guarantee

A car can cause a car accident, damage foreign property or harm a person. Similar risks will also exist when operating robots.

A robot can, for example:

- damage the product or work equipment,
- bump into a person,
- cause an accident at work,
- drop the material transported,
- damage the building or vehicle;
- misassessment of the situation,
- execute an incorrect command;
- cause production to be interrupted.

Therefore, a special liability insurance for robot operations can be expected. For selected categories of robots that will move separately between humans or perform dangerous activities, such insurance may even be mandatory in the future.

As with the mandatory car liability, insurance would not cover damage to the robot itself, but, above all, damage caused by the robot to other persons or to foreign property.

The insurance of the robot itself

Besides liability for damages, it will be possible to insure the robot itself. It will be a certain equivalent of car insurance.

Insurance may include, for example:

- damage at work,
- crash, impact or roll-over of the robot,
- an electronic, engine or sensor failure;
- water, fire or extreme temperature damage,
- vandalism or theft,
- operator error,
- damage during transport,
- the cost of repair or replacement.

For enterprises, business interruption insurance may also be important. If a key robot breaks down and the production line stops, the insurance company may, under certain conditions, pay part of the financial losses incurred or the cost of securing the replacement installation.

Cyber insurance

The robot will not only be a mechanical machine. It will contain software, artificial intelligence, sensors and connection to corporate systems or the Internet. As a result, it can become a target of cyber attack.

The attacker can disable the robot, change its settings, steal the operating data or use it to damage the company. Therefore, new forms of cyber insurance will be created that can cover:

- assault of control software,
- data theft,
- unauthorised taking over of the control;
- a blackmail attack,
- the interruption of operations;
- costs of renewal of systems,
- technical assistance in the resolution of the incident.

Insurance companies will probably require regular updates, security of access, data backup and records of robot activity. A company that does not comply with the security rules may pay higher insurance premiums or may not receive insurance at all.

Services and technical checks

With increasing number of robots, specialized robotic services will be created. Some will be operated directly by manufacturers, other independent companies or robotic agencies.

The services will provide in particular:

- Diagnostics of failures
- replacement of engines, joints, batteries and sensors,
- the repair of cameras and working tools,
- software updates,
- calibration of movements,
- security controls,
- cleaning and preventive maintenance,
- Upgrading older models.

For robots working in high-risk plants, regular technical controls similar to car controls may be introduced. It will be verified whether the robot responds correctly to obstacles, respects safety zones, has functional sensors and can stop immediately in a dangerous situation.

Record of robot activity

Automotive systems may be equipped with a tachograph, a onboard camera or an accident recording device. Robots will also be likely to keep operating records.

They may contain information on:

- Who assigned the robot a mission,
- what software program and version he used,
- the instructions received,
- How he moved,
- What his cameras and sensors have detected,
- whether it has been properly serviced,
- why there was an error or an accident.

These data will be important in the investigation of damage and the determination of liability.

Who will be responsible?

In the case of a car, it is usually possible to identify the driver, operator or owner.

For an autonomous robot, the situation may be more complicated.

The following may be responsible for the damage caused:

- the owner or operator of the robot,

- an employee who gave the robot the wrong order,
- the manufacturer of the equipment,
- the author of the control software,
- the company that programmed the robot,
- service which has incorrectly performed the repair,
- a data provider or artificial intelligence system.

Therefore, contracts, operating records, certification and precise allocation of responsibilities between the various bodies will be very important.

New market around robots

The car industry did not create only jobs in the production of vehicles. Insurance companies, leasing companies, car services, service stations, car rental companies, car rental companies, spare parts vendors and technical inspection stations were created around it.

A similar ecosystem will also be created around robots.

- Robotic leasing companies,
- robot insurance companies,
- robotic services and technical checks,
- robot rental companies,

- spare parts dealers,
- training and certification centres,
- robotic agencies,
- software providers and updates,
- specialised charging stations,
- Bazars and marketplaces with used robots,
- companies providing the recycling of robots.

The robot will become a working tool, not only a separate category of property that can be bought, financed, rented, insured, serviced, modernised and subsequently sold.

As today, when buying a car, we do not only deal with the purchase price, we will not only assess the price of the device itself. The total cost for the whole period of use, service quality, availability of spare parts, safety, insurance, energy consumption and speed of technological ageing will be decisive.

With increasing numbers of robots, it will not only create a new market for robots. It will create a whole new economic service ecosystem that can be one of the size and importance of services built around cars.

Currently, a number of activities are carried out continuously or are caused by an emergency. This can include rescue work, the removal of the consequences of accidents, fires, floods and industrial accidents, repairs of energy networks or rapid strengthening of production and logistics.

Many companies also need to operate 24 hours a day, 7 days a week to meet customers' demand and ensure continuous operation. This applies in particular to factories, power plants, smelters, warehouses, logistics centres, hospitals, airports, ports, transport companies, security services or data centres.

Insufficient staff for continuous operation

Ensuring sufficient staff for two-shift, three-shift or continuous operations is not easy. Companies are struggling with a shortage of qualified workers, morbidity, holidays, fluctuations and indifference of people's interest in night shifts, weekends and holidays.

Working at night or in irregular mode can be difficult for a person in the long term physically and mentally. Fatigue can gradually reduce attention, speed of reactions and accuracy of work. In some professions, it also increases the risk of accidents at work, damage to equipment or interruption of operation.

At the same time, the employer must ensure the rotation of workers, legal breaks, overtime at night, weekends and holidays, fungibility and the necessary reserve in case a worker does not show up for the shift.

Impact and unexpected activities

Even more difficult situations occur in sudden events, whose time, range or length cannot be established in advance. In minutes or hours, it may be necessary to provide a large number of people, technology and protective equipment.

This may be, for example:

- rescue work after a transport or rail accident,
- removal of debris after the building has been collapsed,
- interventions in fires and industrial accidents,
- the removal of the effects of floods and other natural disasters,
- repair of electrical lines, pipelines and water pipelines,
- disposal of hazardous substances,
- missing persons search,
- rapid increase in production during special orders,
- seasonal work in agriculture, warehouses and logistics,
- cleaning and restoration of operations after an emergency.

People designated for such an intervention may not be immediately available. They may be far from the event site, may not have the necessary qualifications or protective equipment and may take too long to move them.

Robots as a solution for continuous operation

Robots can be a suitable solution for many of these activities. They can work during the day, night, weekends and holidays. They do not need classic work breaks, they are not affected by night mode and, when properly serviced, they can perform the same activity repeatedly with constant accuracy.

This does not mean that one robot will work continuously without any breaks. Also robots need recharging, maintenance, replacement of working tools, updates and regular security checks. Continuous operation can therefore be ensured by switching multiple robots or automatically changing batteries.

The robot can operate for example:

- Manipulate the material,
- replenish the production line,
- Welding, grinding or cutting;
- control the quality of products,
- transport of goods in storage,
- carry out regular inspections of the establishment;

- clean and maintain the workplace,
- monitor temperature, smoke, gas leak or other hazards,
- to alert the human operator to any disturbances.

Robotic intervention units

In the future, specialised robotic intervention units may be created ready for immediate deployment.

These units can be operated by fire-fighters, police, military, rescue services, energy companies or private robotic agencies. Like the company today, it can order a specific number of robots with the necessary equipment.

The robotic agency may ensure:

- selection of suitable robots by type of event,
- their fast transport to the place,
- necessary working tools and accessories,
- remote operators and professional supervision;
- programming of a specific task,
- service, recharging and battery replacement,
- replacement robots in case of failure.

Working in a dangerous environment

The advantage of robots is to deploy them where human life or health would be at high risk. They can enter burning buildings, contaminated spaces, mine shafts, flooded buildings, chemical plants or high temperature and radiation sites.

A robot can first map the situation, find injured persons, measure the concentration of dangerous substances, transfer material or prepare a safe path for the rescue workers. A person can drive the robot from a safe distance and decide on the next course of action.

The goal may not be to replace firefighters, medical workers, technicians or rescue workers. The robot can become their working partner, who will take over the most risky, physically demanding or repetitive tasks.

Robotic labor per order

In addition to the classic labour market, the market for robotic labour available 24 / 7 may be gradually established. The company will not have to own any robot. It will be able to rent it for several hours, days or weeks in the short term, depending on the current needs.

The price may be determined according to:

- number of robots ordered,
- the number of hours worked,
- the difficulty and risk of action;
- necessary equipment,

- the distance and speed of transport,
- levels of autonomy,
- the need for remote human driving.

This model may be suitable for seasonal tiptoe, unexpected contracts, failures, accidents or temporary staff shortages. The company will obtain the necessary capacity without long recruitment and training of new workers.

New competitive advantage of companies

In the future, it will not only decide how many employees the company has. It will also be important how quickly it can acquire, program and deploy robots.

A company that has its own robotic team or a contract with a robotic agency can respond more quickly to increased demand, staff outages and emergencies. It can flexibly increase or reduce capacity and better ensure continuous operation.

Robots can therefore be one of the important solutions for the future economy 24 / 7. The biggest benefits will be offered where it is difficult to provide enough workers, where immediate response is needed or where the performance of the activity would pose a high risk to man.

The future of continuous operation will not be based solely on the work of humans or on the work of robots. The most successful is the thought-through cooperation in which people manage, decide and resolve non-standard

situations, while robots ensure continuous performance, rapid deployment and work in a dangerous environment.

WORKING INSTALLATIONS AND USE OF ROBOTS

Work accidents occur in almost all fields. However, the biggest risk exists in construction, metallurgy, mining industry, agriculture, transport, energy, chemical plants, work at heights or operating heavy machinery. The injury may occur despite compliance with safety regulations, use of protective equipment and regular training of employees.

Some accidents at work cause only short-term incapacity, others may have serious or permanent consequences. In worst cases, a work accident can result in a person's death.

Human life cannot be replaced

The most important is the health and life of a person. Serious injury affects not only the employee himself, but also his family, colleagues and other people around him. The consequences can be physical, psychological, social and economic and can persist throughout his life.

Unlike a machine or robot, human health cannot always be fully restored. A damaged robot component can be replaced, but the lasting consequences of a person's work injury can sometimes not be corrected.

It is therefore the protection of human health and life that should be one of the main reasons for introducing robots into dangerous operations.

Impact of work accident on the company

The employer can also solve important organisational, legal and financial problems for the company.

stopping or restricting operations;

investigating the causes of the accident,

compensation of wages and other compensation,

the cost of treatment and rehabilitation,

increase in insurance costs,

legal disputes or penalties,

recruitment and training of a replacement worker,

failure to meet contractual terms,

damage to customer relations,

loss of trust between employees and business partners,

damage to the good name of the company.

The actual costs may be significantly higher than the immediate costs associated with a specific accident. The company may lose its contracts, experience, production capacity and the stability of the work team.

Injury to a key employee

A particularly serious situation may arise if a person is injured or dies, whose knowledge and experience is significantly dependent on the company. It may be the owner, the principal engineer, the producer, the experienced welder, the programmer, the service worker or any other expert who cannot be replaced quickly.

In some smaller businesses, the important knowledge can be concentrated on only one person. If this person falls out of the work process for a long time, production can be stopped, orders can be delayed or key customers can be interrupted. In the extreme case, the company's very existence can be compromised.

Therefore, no company should be built on only one irreplaceable worker. It should document its procedures, transfer knowledge to other employees, create fungibility and store important knowhow safely.

Robot in a hazardous working environment

The robot can take over activities where there is a high risk of injury. It can work in high temperature environments, toxic substances, radiation, dust, noise, pressure or dangerous machines. It can enter burning buildings, mine shafts, contaminated spaces or work under water and at heights.

A robot can perform for example:

handling heavy and hot materials,
welding, grinding and cutting,
work in smelting and foundry,
control of pipelines and electrical equipment,
exploration for fires, explosions and accidents,
working with chemical or radioactive substances;
the disposal of dangerous goods,
rescue and rescue operations;
activities at altitudes, underground or underwater;
repeated lifting of heavy loads.

This can reduce the duration of the exposure to workers and limit the number of situations in which serious occupational injury may occur.

The damage to the robot is not a human tragedy.

The robot can also be damaged, overturned, fell or completely destroyed at work. However, the difference lies in the consequences. The breaking of the robot is a technical and financial problem, not a loss of human health or life.

The damaged robot can be according to the extent of the defect:

Diagnosing and correcting;

to replace the damaged component;

replace the replacement robot,

reprogram,

to recover from the advance;

replace it with a more modern model.

If the company has a replacement robot ready and stored its programs, working procedures and settings, the operation can be restored relatively quickly. The new device can be loaded with the necessary software and working data without the recruitment and training of a new person for several months.

Even a robot doesn't eliminate all risks

However, using a robot does not automatically mean safe operation. A poorly programmed, damaged or inadequately secured robot can hurt a person, damage the device or cause a cut to production.

Therefore, firms must ensure:

correct installation and programming,

safety zones and security features,

regular service and technical checks,

software updates,

emergency stop,

protection against cyber attacks,

training of human operators,

clear identification of the responsibility for operation.

The robot should be used primarily where it actually reduces the risk to humans, not where it creates new dangers without adequate security.

The priority must be to protect the human

When deciding on the use of robots, the company should not only assess the speed of work, productivity or return on investment. Equally important is whether a robot can reduce the risk of serious work injury.

If a robot can do dangerous work while being controlled from a safe place, it is advisable to assess this possibility thoroughly. Economic savings can be significant, but the greatest value is protecting human health and life.

A human being is neither consumable nor replaceable spare part. A damaged robot can be repaired or replaced, but human life cannot be replaced. That is why robots can be one of the most important tools for preventing accidents at work in the future.

TYPE OF HUMANOIDAL ROBOTS

In the following chapters you will find a number of practical examples of professions and activities in which humanoid robots can operate. We will focus on their use in production, construction, agriculture, logistics, health, gastronomy, safety, rescue, services and households.

The humanoid robot is adapted to the environment created for humans by its construction and manner of movement. It usually has a hull, head, two hands and two legs, or uses a mobile chassis. It can open doors, walk up stairs, use elevators, work with tools and operate equipment originally intended for people. It is the possibility of working in the current environment that can be a great advantage of it.

Various types of humanoid robots

Humanoid robots will not form one universal category, they will differ in design, size, performance, abilities and environment in which they can work safely.

They will be created, for example:

- **production humanoid robots for assembly, welding, machine operation and quality control,**
- **warehouse humanoid robots for material transfer, sorting and restocking,**
- **construction humanoid robots for masonry, drilling, grinding, painting or assembly of structures,**
- **health and care humanoid robots for support of patients, elderly and healthcare professionals,**
- **service humanoid robots for hotels, restaurants, shops, airports and customer centres,**
- **rescue humanoid robots for work in burning buildings, rubble and hazardous plants,**
- **humanoid robots for household use intended for cleaning, simple repair, supervision or day-to-day assistance,**
- **Specialised humanoid robots for mines, smelters, laboratories, oil platforms, energy and other risk workplaces.**

Each type will be constructively adapted to its purpose. A robot designed for the smelting will need different heat resistance than a robot working in a hospital. A building robot will require higher load capacity, while a care robot will have to

place emphasis on the fineness of movements, communication and safe contact with humans.

Cheaper and professional models

As in the automotive industry, humanoid robots will be available in various price and quality categories. Some models will be easier, cheaper and designed for basic repetitive activities. Others will be highly efficient professional machines capable of working in demanding conditions.

Individual models will vary for example:

- physical force and load capacity,
- speed, stability and accuracy of movement,
- the vertebrae of hands and fingers,
- the time of operation per charge,
- ability to learn new working methods,
- the degree of autonomy,
- water, dust and high temperatures resistance;
- ability to communicate with people,
- security systems levels,
- software quality and artificial intelligence,

- the availability of service and spare parts,
- the cost of purchasing and operating.

The most expensive humanoid robot may not always be the best solution. The company should choose according to the activities that the robot is actually supposed to perform. For simple material transfer, a basic model may suffice, while a much more durable and safer robot will be needed for working in high-risk industrial operations.

Universal worker or expert?

Some humanoid robots will be designed as universal workers. The company will be able to use them during the day for several different activities. For example, the robot can replenish the material in the morning, then operate the production facilities and perform a check or cleaning of the workplace at the end of the shift.

Other models will be specialised in one profession. They can be equipped with specific tools, sensors and protective features needed for, for example, welding, working in smelters, rescue operations or handling dangerous substances.

The decision between universal and specialized humanoid robot will depend on the type of operation. Universal robot can offer greater flexibility, but the specialized model can be faster, safer and more accurate in specific activities.

Competition will accelerate development

More and more technological companies, manufacturers, research institutions and start-ups are entering the development of humanoid robots. There will be strong competition among manufacturers, as in the automotive industry.

Manufacturers will compete for who will offer a robot that will:

- cheaper and more reliable,
- faster and more accurate,
- easier to control,
- capable of learning more work,
- safer in cooperation with people,
- energy-efficient,
- more durable and easier to service,
- capable of longer operation without recharging.

This competition will not only lead to significant technical improvements of humanoid robots, but also to a gradual decrease in their prices. Serial production will lower the cost of engines, batteries, sensors, cameras, processors and other important components.

The importance of software and working skills

The value of a humanoid robot will not be determined by its body, structure and performance. More and more important will be the software and the amount of skills it can use.

Like we are installing apps on our phone today, it may be possible to upload programs to a robot for specific professions and activities in the future. The company will buy a robot and then make it available for example a module for storage, product control, machine operation or basic maintenance.

This will create a new market for programs, motion databases and digital skills for humanoid robots. One learned and verified procedure will also be possible to transfer to other compatible robots.

Price is not the only criterion

When selecting a humanoid robot, it will not be enough to compare the cost of the humanoid robot. The company should evaluate the total costs associated with its use.

For example, the following shall be taken into account:

- the purchase, hire or leasing price,
- programming and training costs,
- electricity consumption,
- software licenses and updates,

- regular service,
- availability of spare parts,
- insurance,
- expected life,
- the rate of technological ageing;
- the duration of any failure weaning.

A cheaper robot can have limited capabilities, shorter service life or more expensive service. On the contrary, higher purchase prices can be justified by greater reliability, versatility and the possibility of continuous use.

Market for used humanoid robots

With the gradual expansion of humanoid robots, the market for used models is likely to develop. Large companies will regularly restart their robotic teams and older devices can sell to smaller companies, schools, households or service organisations.

The robot will be able to be repaired, replaced by battery, replenished with new sensors and uploaded with current software. As with cars, it will be important to know its age, technical condition, history of failures, number of hours worked and the way it was used.

Robotic bazaars, authorized services, rental companies, leasing companies and independent control centres can therefore be created to verify the technical condition of used robots.

The number of humanoid robots can overcome the number of cars

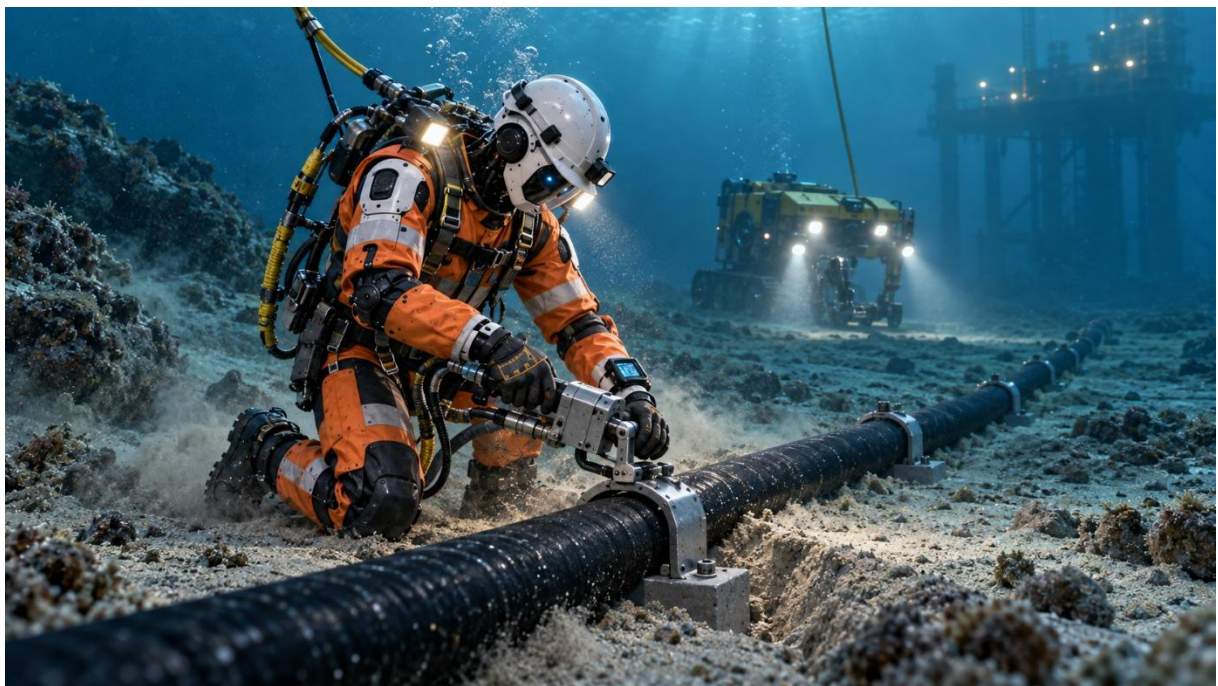
I believe that over the next ten years humanoid robots will start to expand mass and exceed the number of cars. One household can own one or more robots and large production, logistics or service companies can use hundreds or thousands of them.

Humanoid robots can be expected to gradually penetrate most areas of human activity. Like a car, they have changed transport, business and everyday life, humanoid robots can fundamentally change the labour market, production, services and the functioning of households.

Today we choose the car according to price, performance, size, brand, colour and purpose. In the future, companies and households will choose the humanoid robot in a similar way according to its ability, quality, working orientation and operating costs.

HUMANOID ROBOT FOR THE CABLING AND CONTROL OF THE SUBMARIAGE CABLES

At the bottom of the seas and oceans there is a large network of underwater cables through which data are transmitted between states and continents. These cables are an important part of the world's communication infrastructure. They enable the Internet, international telephone calls, bank transactions, cloud services, media and communication between companies and state institutions.



Most people use the Internet every day, but few can imagine how technically, financially and organizationally challenging it is to produce, transport to the site, lay on the sea floor, regularly check and in case of damage also correct.

Compulsory conditions below sea level

The work on the seabed is one of the very complex and risky activities. The cable can lead over several thousand kilometres and pass through areas with different depth, temperature, pressure and structure of the seabed.

Workers and technicians may encounter, for example:

high water pressure;

low temperature and full darkness,

strong sea currents,

an uneven or unstable day,

rocks, moats and slopes of the sea,

limited visibility,

shipwrecks and other obstacles,

the risk of damage to technical equipment,

complex communication with the control centre.

In some depths, direct work is virtually impossible for a person. Divers can only operate in limited conditions and for a limited period of time. It is therefore necessary to use remote controlled or autonomous equipment.

Carrying of marine cable

The underwater cable is usually transported on a special cable ship. Before its location it is necessary to plan the route thoroughly, explore the seabed and identify places where the cable could be exposed to increased risk of damage.

A humanoid or specialized underwater robot may assist in laying, for example, by:

It maps the route and checks the surface of the seabed,

seeking obstacles and dangerous places,

direct the cable in the correct direction,

checks its tension and position,

stores the cable into the ready-to-dig,

removes minor obstacles,

fastens cable to the ground,

Install protective features and covers;

The Commission shall adopt implementing acts laying down the rules for the implementation of this Regulation.

confirms the correct completion of the individual sections.

In areas with intensive shipping or fishing, it is often necessary to bury the cable under the seabed. The robot can operate or accompany the device that creates the

kickoff, store the cable and then cover it. This reduces the risk of damage to the anchor, fishing nets or other activities.

Regular cable check

The cable is not finished by laying the work. Undersea cables must be monitored, checked and maintained. Damage can cause a slowdown or failure of the data link between states and continents.

The robot can regularly walk along the cable route and check:

change in cable position,

damage to the protective cover,

excessive bending or tension,

the exposed parts originally stored under the day,

the effect of sea currents and slides,

corrosion of connections and fasteners,

contact with anchorages, nets or shipwrecks,

suspicious objects and unauthorised activity in the vicinity,

the technical parameters of the transmitted signal.

Using cameras, sonars and other sensors, the robot can create an accurate digital recording of the cable state. The artificial intelligence will then compare new

records with previous checks and alert changes that could mean a developing malfunction.

Search for a site of disorder

If a problem occurs, it is necessary to determine the exact location of the damage as quickly as possible. Each hour of blackout can mean significant economic losses.

The robot can be sent to an estimated location of failure where the cable is checked by cameras, sensors and measuring instruments. It can determine whether the cable has been interrupted, damaged by anchor, landslide, fishing technique or other event.

The data obtained is immediately sent to the control ship or to the remote operating centre. The technicians can assess the extent of damage and prepare the most appropriate repair procedure.

Repair of underwater cable

The repair of the underwater cable is an extremely complex operation. The damaged cable may need to be located, released from the bottom, captured and pulled aboard the service ship. Subsequently, the damaged part is removed, the cable reconnects, tested and stored back to the bottom.

The underwater humanoid robot can help in the future for example:

the uncovering of the cable stored under the sediment,

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