HOW DO ROBOTICS AND AUTOMATIZATION INFLUENCE ECONOMY?

Chiril CERVINSCHII

Departamentul Robotică și Mecatronică, grupa RM-231 Facultatea Calculatoare, Informatică și Microelectronică, Universitatea Tehnică a Moldovei, Chișinău, Republica Moldova

Autorul corespondent: chiril.cervinschii@iis.utm.md

Îndrumător/coordonator științific: **Ala ȘIȘIANU**, asistentă universitară, FTA, DLS

Abstract. *The aim of this article is to describe how does robotics influence our lives, especially our wellbeing. Technological development was always essential for both mankind's survival in nature and countries' dominance. From production to science, healthcare and other domains of our lives robots are used and here you will see how are they changing us as both individuals and nations. A lot of researches related to this topic have been already done, so here you will read the compilation and conclusions made out of them. Also, you may find some historical events attached as the evidences of truthfulness of surveys. The overall result shows, that as technologically advanced any country is, as better its economy and living conditions are. The article below will let you understand the mentioned topic better and more precisely.*

Keywords: *robotics, economy, science, bio-medical engineering, GDP, semiconductor*

Introduction

It is obvious that technology itself and robotics in particular can be useful in solving both daily problems, such as washing the dishes and clothes, and complex ones, such as mass production, massive calculations for space programs, etc. A lot of pieces of technology had been created and produced by the mankind, from transistors to massive super-computers, that are still in use and help us make our lives easier and better [1]. Economy is not an exception and it is influenced by technical progress and from this perspective you will see how this development reshapes the fate of countries and peoples and how the automatization process has begun.

Technologies that can be useful in economy. I am going to focus a lot on industrial domain of technology, so here I will describe some devices used in it. Firstly, manipulators and other assembly robots are used in order to replace manual labor in process of building a product using prepared parts. Such technology leads to a higher quality of final product [2]. Secondly, sensors are essential for controlling production steps in order to make production process as effective as possible and prevent it from any flaws. Examples: infrared sensors, used to measure length and detect an object's place on a production line. Finally, computers and controllers are used as means of decision making that can decrease the need in workers due to its ability to be effective by taking proper decisions that influence production.

First steps, first mistakes. The first appearance of automotive systems used in goods production can be noticed in period of Industrial Revolution in England, when the textile manufactory chiefs had started replacing manual labor by automotized one. The first steam engines made transportation of rough materials and products easier when the first railroads and trains had appeared, while weaving machines replaced manual work and thus decreased the cost of final product without loosing its quality. On the other hand, due to replacement by cheap machine work, workers were not needed anymore and they had no other means of supporting themselves and their families financially, so the "luddism" has appeared. This idea proclaimed, that machines had to be destroyed so workers could take their jobs back, but the movement was destroyed by the British Government [3].

From the 3rd world to the first one. The drastic society and economy changes can be seen in history of several Asian countries, such as Taiwan, Japan, Singapore, China and South Korea and these countries have one thing in common – their economy was improved due to accelerated industrialization and implementation of high technologies, for instance: robotization of factories and introducing heavy industry, that requires a lot of oil, iron and other fossil resources.

Japan: In the nineteenth century Japan had gone through a tough path from an isolated island state that had been preserving its old government and economy system to an industrialized country, that was and is able to compete with other economically developed countries. One of the reasons of such success is ability to absorb and insert new technologies and ideas: „Foreigners brought new ideas, technology and systems which the Japanese began to absorb very rapidly" [1]. Fast economical development can be proven by the fact, that initially Japan had been importing cotton production made by Britain, that was the most powerful nation in this trading domain, but at the beginning of the 20th century Japan started importing only rough cotton and exporting production to the United States and India. "In the early twentieth century, Japan became a major exporter of cotton clothes" [1].

An another example of influence of robotics and high technology in production is semiconductor production. Due to post-war cheap labor force Japan was able to escape economic problems and, especially, unemployment, caused by World War 2 by starting semiconductor production, what not only prevented the problem mentioned above, but also gave Japan a chance to compete with America and Europe in this domain.

Taiwan: This country is an another example of how high technologies help the economy. Taiwan doesn't possess large amounts of natural resources but it is developed due to production of complex pieces of technology, especially semiconductors. Due to cheap labor force, American and European countries placed their productions on this island, but Taiwan didn't want just to assemble hardware, but to develop it, so the Industrial Technology Research Institute (ITRI) was founded as a research facility, engineers had been sent to the U.S.A. [2]. in order to develop their skills and improve Taiwanese economy. Such actions let this country compete with others and be a key producer of semiconductor-based devices.

Not only national interests, but also personal ones. Robotics, especially as a part of biomedical engineering (BME) gives us the ability to replace missing body parts and take valuable measurements. Even though they may cause medical risks [4], they give back the ability to live and work normally to injured, disabled or sick people. So the impact of BME on economy is obvious: people are able to come back to normal life and get employed, while this industry increases the requirement of educated and qualified professionals.

We can not deny the drawbacks of using implants: bruising at the surgical site, pain, swelling and redness, infestation, so people that are using implants have to beware of such risks and draw attention to their health.

R&D and economical development. Research and development (R&D) is essential for economical growth. Such activities have positive impact on production efficiency that leads to higher wages, less work hours needed for accomplishing any tasks or higher quality of the final product: "When a company invests in research and development, it can develop new ideas, intermediate products, cost-reducing methods and final consumer products, thereby making the company more efficient and profitable" [5]. On the other hand, some researchers found out, that R&D led by private organizations could have bad impact on them, but we must not forget, that such activity brings long-term progress to any country that does this but it is not sustainable: "In the OECD (The Organisation for Economic Co-operation and Development) and non-OECD countries, there is a positive correlation between innovation created by the R&D sector and GDP per capita; however, innovation will not lead to sustained economic growth" [5].

Influence on economy and society. As I have mentioned earlier, economy and society depend on technology:

- For a short period of time higher unemployment may be caused. The example of British workers that tried to destroy production machines is the most noticeable one.
- Shift from "blue" to "white collars" – nowadays, unemployed workers are able to get a degree at any domain, that requires engineering skills, so ex-workers can become engineers, programmers, etc.
- People are able to afford more goods due to cheap products assembled by automotive systems that don't require wage and welfare that are included in products' prices.
- Implementing of biomedical devices is able to give disabled people new work places, so the tension on welfare can be decreased, whereas personal well-being, as well as company's income and country's GDP, can be improved.

Conclusion

In conclusion, robotics and automotive systems are changing society through economy and production. As you can see in the examples above, they can even change nations and give them a chance to prosper and improve their peoples' lives. The only thing that we can do is to learn constantly in order to stay competitive on the job market due to replacement of manual labor by machines.

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