Educational service robotics in the Russian Federation

A N Kazak¹, N N Oleinikov¹, D V Gorobets¹, M A Ryndach¹ and N P Shamaeva²

¹ V.J. Vernadsky Crimean Federal University, Prospekt Vernadskogo 4, Simferopol, 295007, Russia
² Udmurt State University, Universitetskaya St. 1, Izhevsk, 426034, Russia
Introduction

- Russia has the potential to become a significant player in the educational service robotics market. Unfortunately, this potential remains unrealized. The capacity of the domestic Russian market is still insignificant, and for the sustainable development of domestic developers and manufacturers of robotic systems, it is necessary to focus efforts on foreign markets.

- However, in our opinion, it is this approach that makes it possible to determine the direction that will ensure a more energetic start and sustainable development of robotics in Russia.
Educational service robotics in the Russian Federation

• The world market of robots for education and entertainment is actively developing. The volume of this market may increase from $0.5 billion in 2018 to $2 billion in 2021 and reach 5 million pieces.

• Educational robotics is a cycle of events in secondary school or educational institutions of additional education, in which programming and design, when combined, allow the formation of technical creativity skills, motivate schoolchildren to study the exact sciences and provide their early vocational guidance.
Educational service robotics in the Russian Federation

- Educational robotics is a relatively new phenomenon for our country. Nevertheless, in recent years it has been increasingly developing and spreading to remote corners of the country.
Educational service robotics in the Russian Federation

• Educational robotics is a relatively new phenomenon for our country. Nevertheless, in recent years it has been increasingly developing and spreading to remote corners of the country.

• Today on the Russian market there are designers from almost all well-known world manufacturers of Lego, FischerTechnik, RoboRobo, WeX IQ, Bioloid STEM, ITS ROBOT and others. Russian developers and manufacturers of constructors for assembling robots, as well as robots for teaching robotics, teaching aids, teaching methods for teaching robotics.
## SWOT analysis of the Russian robotics industry

| Strengths                                                                 | Weaknesses                                                                 |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1. Ability to solve complex and unique technical problems;               | 1. Deficit of capacities of the domestic advanced production;              |
| 2. Domestic inventions have an advantage;                                | 2. Product scaling is a barrier to product cost reduction;                |
| 3. Ease of adaptation of the population to new technologies;             | 3. Low culture of industrial design;                                      |
| 4. Positive attitude towards robots;                                     | 4. Difficult to create attractive for the consumer product;               |
|                                                                          | 5. Weak penetration of the best world practices of robotization into the national economy; |
|                                                                          | 6. Decision makers do not have the necessary knowledge to make informed decisions about technological modernization and robotization; |
## SWOT analysis of the Russian robotics industry

| Opportunities                                                                 | Threats                                                                 |
|-------------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1. Companies that lose the race vacate a niche for new applicants;           | 1. Accelerating brain drain;                                            |
| 2. Opportunities for radical improvement labor productivity;                 | 2. Emigration of qualified specialists;                                 |
| 3. Ability to produce and implement lower cost robotic solutions;            | 3. Rapid development of disruptive technologies / acceleration technology race; |
| 4. Expanding the fields of application of robotics;                          | 4. Acceleration of the life cycle of a startup, product;                |
| 5. Significant potential for development, implementation and export of robotic solutions for mining industry, agriculture, nuclear energy, aircraft and shipbuilding; |                                                                       |
| 6. Huge territory and small population;                                      |                                                                       |
| 7. Capacious niche for retail robotics and services;                        |                                                                       |

**Opportunities:**
- Companies that lose the race vacate a niche for new applicants;
- Opportunities for radical improvement labor productivity;
- Ability to produce and implement lower cost robotic solutions;
- Expanding the fields of application of robotics;
- Significant potential for development, implementation and export of robotic solutions for mining industry, agriculture, nuclear energy, aircraft and shipbuilding;
- Huge territory and small population;
- Capacious niche for retail robotics and services;

**Threats:**
- Accelerating brain drain;
- Emigration of qualified specialists;
- Rapid development of disruptive technologies / acceleration technology race;
- Acceleration of the life cycle of a startup, product;
Conclusions

• Educational programs are rapidly becoming obsolete due to the accelerating technology life cycle, on the one hand.

• On the other hand, the current generation of teachers is not interested in the transition to new training programs, as this will lead to the rewriting of already created programs.

• For example, in Russia there is nothing like strategic plans for science, technology, engineering and mathematics education (STEM Education, USA). In particular, only two national universities have training programs in the field of collaborative robotics: Skoltech and Innopolis.