

# MODERN TRENDS IN THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE

A.D. VISLOVA

Federal public budgetary scientific establishment «Federal scientific center  
«Kabardin-Balkar Scientific Center of the Russian Academy of Sciences»  
360002, KBR, Nalchik, 2, Balkarova street  
E-mail: [kbncran@mail.ru](mailto:kbncran@mail.ru)

*The article is devoted to pressing issues of creating artificial intelligence (AI). Definitions are given to the concepts of "intelligence" and "artificial intelligence". The main scientific schools that have made a significant contribution to the study of AI are described. The main trends associated with the introduction of artificial intelligence technologies in the socio-economic life of society are analyzed. The content of social and economic problems due to the transition to a new technological structure and the role of intelligent systems in this context is disclosed. The review of new AI technologies used in economics, healthcare, transport, etc. is presented. Special emphasis is placed on the development of applied and universal AI. The questions of the relationship between natural and artificial intelligence are raised. The author considers not only the positive potential of AI, but also draws attention to the possible risks and threats of the impact of technological developments on the development of modern society. It is emphasized, that these risks must be studied and warned about in a timely manner. The key role of AI in cyborgization and hybridization is noted. The importance of the ethical and legal examination of AI models for their safety for humans is shown. The idea of increasing the social responsibility of both researchers and the engineering corps in the creation and use of AI technologies in all areas of the socio-economic system is substantiated.*

**Keywords:** artificial intelligence, psychology of artificial intelligence, intelligent robotic systems, technological structure, innovative technologies, digital technologies, superintelligence, neural networks, cyborgization, hybridization, risk, ethics, interdisciplinary paradigm.

## REFERENCES

1. Toffler E. *Tret'ja volna: per. s angl. K.Yu. Burmistrova i dr.* [The Third Wave: trans. from English K.Yu. Burmistrova et al.]. M., 2009.
2. Bell D. *Grjadushhee postindustrial'noe obshhestvo tehnotroniki* [The Coming Post-Industrial Society]. M.: Academia, 2004. 944 p.
3. Bzhezinski Z. *Mezhdu dvumja vekami: rol' Ameriki v eru tehnotroniki* [Between two centuries: the role of America in the era of technotonronics]. M.: Progress, 1972. 307 p.
4. *Prognоз развития рынка робототехники. Общий обзор рынка.* <http://www.bytemag.ru/articles/detail.php?ID=6470>. Доступ 19.12.2019.
5. *Microsoft Robotics Studio – robototekhnika dlja vseh* / BYTEMAG.RU. <https://www.bytemag.ru/articles/detail.php?ID=6470>. Доступ 11.12.2019.
6. Odegov V.N., Pavlova V.V. *Transformacija truda: 6-j tehnologicheskij uklad, cifrovaja jekonomika i trendy izmenenija zanjatosti* [Labor Transformation: 6th Technological Order, Digital Economy and Employment Change Trends] // *Uroven' zhizni naselenija regionov Rossii.* № 4. 2017. Pp. 19-25.
7. Klyuev Yu.B. *Celi i sredstva ekonomiceskogo razvitiya Rossii v kontekste perehoda k shestomu tehnologicheskому ukladu* [The goals and means of economic development of Russia in the context of the transition to the sixth technological order] // *Journal of new economy.* 2018. № 6. Pp. 33-50.
8. *Novaja tehnologicheskaja revoljucija: vyzovy i vozmozhnosti dlja Rossii: ekspertno-analiticheskij doklad / pod ruk. V.N. Knyaginina* [A new technological revolution: challenges and opportunities for Russia: expert-analytical report / headed by V.N. Knyaginin]. M.: CSR, 2017. <http://csr.ru/wp-content/uploads/2017/10/novaya-tehnologicheskaya-revolutsiya.pdf>. Available 30 March, 2020.

9. Ladyman J., Ross D., Spurrett D., Collier J. Every Thing Must Go: Metaphysics Naturalized. Oxford, Oxford Univ. Press, 2007.
10. Nagoev Z.V. *Intellektika, ili Myshlenie v zhivyh i iskusstvennyh sistemah* [Intelligence, or Thinking in living and artificial systems]. Nal'chik: KBSC RAS Publishing House, 2013. P. 232.
11. Nagoev Z.V., Nagoeva O.V. *Izvlechenie znanij iz mnogomodal'nyh potokov nestrukturirovannyh dannyh na osnove samoorganizacii mul'tiagentnoj kognitivnoj arhitektury mobil'nogo robota* [Extraction of knowledge from multimodal flows of unstructured data based on the self-organization of multi-agent cognitive architecture of a mobile robot] // News of KBSC RAS. № 6 (68). 2015. Pp. 73-85.
12. Nagoev Z.V., Gurtueva I.A. *Bazovye elementy kognitivnoj modeli mehanizma vosprijatija rechi na osnove mul'tiagentnogo rekursivnogo intellekta* [Basic elements of the cognitive model of the mechanism of speech perception based on multi-agent recursive intelligence] // News of KBSC RAS. № 3 (89). 2019. P. 14.
13. Zhdan A.N. *Tvorchestvo O.K. Tihomirova: istoriko-psihologicheskij vzgljad* [Creations of O.K.Tikhomirov: historical-psychological view] // Vestnik Mosk. universiteta. Serija 14. *Psichologija*. 2008. № 2. P. 21.
14. Vislova A.D. *Potencial psihologii intellekta v kontekste modelirovaniya iskusstvennogo intellekta* [The potential of psychology of intellect in the context of modeling artificial intelligence] // News of KBSC RAS. 2019. № 6 (92). Pp. 32-48.
15. Veber M. *Izbrannoe. Obraz obshhestva* [The image of society]. M.: Centr gumanitarnyh iniciativ, 2017. 768 p.
16. Toffler E. *Tret'ja volna* [The third wave]. M.: OOO «Izdatel'stvo ACT», 1999. P. 224.
17. Dubrovsky D.I. *Soznanie, mozg i iskusstvennyj intellect* [Consciousness, brain and artificial intelligence]. M.: Strategija-Centr, 2007. P. 2.
18. Sokolov I.A. *Teoriya i praktika primenenija metodov iskusstvennogo intellekta* [Theory and practice of the application of artificial intelligence methods] // Vestnik Rossijskoj akademii nauk. RAS Herald , Volume 89. № 4. 2019. P. 368.
19. *Psichologija. Slovar'* [Psychology. Dictionary] // General Editors: A.V. Petrovsky, M.G. Jaroshevsky. M.: Politizdat, 1990. P. 142.
20. Holodnaja M.A. *Psichologija intellekta* [Psychology of intelligence]. Saint-Petersburg: Piter, 2002. 272 p.
21. Tihomirov O.K. *Psichologija myshlenija* [The psychology of thinking]. M.: Akademija, 2005.
22. Kravchenko A.I. *Psichologija i pedagogika* [Psychology and pedagogy]. M.: Vysshee obrazovanie / High Education, 2008.
23. Petrunin Yu.Yu., Rjazanov M.A., Savel'ev A.V. *Filosofija iskusstvennogo intellekta v konceptijah nejronauk* [The philosophy of artificial intelligence in the concepts of neuroscience]. M.: MAKS Press, 2010. P. 84.
24. Pospelov D.A. *Fantazija ili nauka: na puti k iskusstvennomu intellektu* [Fantasy or Science: Toward Artificial Intelligence]. M., 1982.
25. *Iskusstvennyj intellect* [Artificial intelligence]. <https://ru.wikipedia.org/wiki/.> Dostup: 07.04.2020.
26. Ilyin A.S., Panchenko G.M., Kovaleva M.V. *Rol' iskusstvennogo intellekta v upravlenii* [The role of artificial intelligence in management] // Academy. № 12 (39). 2018. <https://cyberleninka.ru/article/n/roliskusstvennogo-intellekta-v-menedzhmente>. Dostup 16.01.2020.
27. *Strategija razvitiya informacionnogo obshhestva v RF na 2017-2030 gody* (utv. Ukazom Prezidenta RF № 203 ot 09.05.2017 g. [The development strategy of the information society in the Russian Federation for 2017-2030 (approved by Decree of the President of the Russian Federation No. 203 dated 05/09/2017]. <http://www.garant.ru/products/ipo/prime/doc/71570570/>. Available 07.04.2020.
28. Turing A. *Mozhet li mashina myslit'*? [Can a machine think?]. M., 1960. P. 57.
29. Pavlov K.A. *Sushhestvuet li neiskusstvennyj intellect?* [Is there non-artificial intelligence?] // Voprosy filosofii. / Problems of philosophy, 2005. № 4. Pp. 76-85.

30. Kaljaev I.A. *Iskusstvennyj intellekt i superkomp'juternye tehnologii* [Artificial Intelligence and Supercomputer Technologies] Mat. 5-j Vseross. nauchno-tehnich. konferencii: v 2-h tomah. / Annals of the 5<sup>th</sup> All-Russia scientific-practical conference in 2 volumes. Rostov-on- Don. Southern Federal University. 2018. Pp. 36-38.
31. Pavlov K.A. *Sushhestvuet li neiskusstvennyj intellekt?* [Is there non-artificial intelligence?] // Voprosy filosofii. / Problems of philosophy, 2005. № 4. P. 81.
32. Bostrom Nik. *Iskusstvennyj intellekt. Etapy. Ugrozy. Strategii* [Artificial Intelligence. Stages Threats. Strategy] / Translated fro English S. Filin. M.: Mann, Ivanovand Ferber, 2016.
33. *London - stolica II.* [London is the capital of AI]. <https://credits.ru/news/novosti-fintech/london-stolitsa-fintekha-i-iskusstvennogo-intellekta/>. Available 28.11.2019.
34. Kamolov S.G., Korneeva A.M. *Tehnologii budushhego dlja «umnyh» gorodov* [Future technologies for smart cities] // Vestnik Moskovskogo gosudarstvennogo oblastnogo universiteta. Serija: Ekonomika/MSU Herald/Economics. № 2. 2018. P. 100-114.
35. *Bazovye i dopolnitel'nye trebovaniya k «umnym» gorodam* (vedomst. standart Minstroja Rossii «Umnyj gorod») [Basic and additional requirements for “smart” cities (departmental standard of the Ministry of Construction of Russia “Smart City”)]. <http://www.minstroyrf.ru/docs/18039/>. Dostup: 10.12.2019.
36. Shannon C.E. Development of communication and computing, and my hobby / Kyoto lecture, 1985. [http://www.kyotoprize.org/wp/wp-content/uploads/2016/02/1kB\\_lct\\_EN.pdf](http://www.kyotoprize.org/wp/wp-content/uploads/2016/02/1kB_lct_EN.pdf). Available 07.04.2020.
37. Sokolov I.A., Drozhzhinov V.I., Rajkov A.N. i dr. *Perspektivy primenenija II v Rossii dlja gosudarstvennogo upravlenija* [Prospects for the use of AI in Russia for public administration] // International Journal of Open Information Technologies. 2017. <https://cyberleninka.ru/article/n/iskusstvennyy-intellekt-kak-strategicheskiy-instrument-ekonomiceskogo-razvitiya-strany-i-sovershenstvovaniya-ee-gosudarstvennogo-1>. Available 02.04.2020.
38. *V Ermitazh prinyali na rabotu iskusstvennyj intellekt.* AI working in Hermitage <https://www.popmech.ru/editorial/558724-v-ermitazh-prinyali-na-rabotu-iskusstvennyy-intellekt/>. Available 22.03.2020.
39. Turchin A., Batin M. *Futurologija. XXI vek: bessmertie ili global'naja katastrofa?* Futurology. XXI century: immortality or a global catastrophe? M.: BINOM. Laboratoriya znanij, 2013. 263 p.
40. Clark Andy. Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence. New York: Oxford University Press, 2003.
41. Radkowska-Walkowicz M. Od Golema do Terminatora. Wizerunki sztucznego człowieka w kulturze. Warszawa: WaiP, 2008. P. 84.
42. Grinin L.E., Grinin A.L. *Kiberneticheskaja revoljucija i shestoj tehnologicheskij uklad* [The cybernetic revolution and the sixth technological order] // *Istoricheskaja psihologija i sociologija istorii.* 2015. Tom 8. № 1. Pp. 172-197.
43. Brooks Chuck. Four Emerging Technology Areas That Will Help Define Our World In 2019. Forbes, 2018. <https://www.forbes.com/sites/cognitiveworld/2018/12/24/four-emerging-technology-areas-thatwill-help-define-our-world-in-2019/#71f1f49358dd>. Available 21.03.2020.
44. *V 2019 g. Alibaba planiruet predstavit' nejronnyj chip* [In 2019, Alibaba plans to introduce a neural chip] / ChinaPRO. 2018. <http://www.chinapro.ru/rubrics/1/17762/print>. Available 07.04.2020.
45. Brynjolfsson E., Rock D., Syverson Ch. Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics. NBER Working Paper No. 24001 Issued in November 2017.
46. Finland's Age of Artificial Intelligence. Turning Finland into a leading country in the application of artificial intelligence. Objective and recommendations for measures. Publications of the Ministry of Economic Affairs and Employment. Helsinki, № 47/2017.
47. Parlett N., Foyster R., Ho P. Will robots really steal our jobs? An international analysis of the potential long term impact of automation. PwC, 2018. <https://www.pwc.co.uk/services/economics-policy/insights/the-impact-of-automation-on-jobs.html>. Available 07.04.2020.

48. Emelin V.A. *Kiborgizacija i invalidizacija tekhnologicheski rasshirennogo cheloveka* [Cyborgization and disability of a technologically advanced person] // Nacional'nyj psihologicheskij zhurnal /National Psychology Journal № 1(9). 2013. Pp. 62-70.
49. Nazaretyan A.P. *Intellekt vo Vselennoj* [Intelligence in the Universe]. M., 1991.
50. *SOINN - samoobuchajushhijsja algoritm dlja robotov* [SOINN - a self-educating algorithm for robots]. <https://www.pvsm.ru/algoritmy/39726>. Available 07.04.2020.
51. Viner N. *Tvorec i robot* [Creator and robot]. Moscow, 1966.
52. Laslo E. *Vek bifurkacii: postizhenie izmenajushhegosja mira* [Century of bifurcation: comprehension of a changing world] // Put'. № 1. 1995. Pp. 3-129.
53. *Tri zakona robototehniki* [Three laws of robotics]. <https://ru.wikipedia.org/wiki/>. Available 07.04.2020.
54. Tishchenko P.D. *Chto takoe chelovek?* [What is a man?] // Chelovek/ A Man 2018. № 5. Pp. 5-17.
55. Ableev S.R. *Modelirovanie soznanija i iskusstvennyj intellekt: predely vozmozhnostej* [Modeling of consciousness and artificial intelligence: limits of possibilities] // Vestnik ekonomicheskoy bezopasnosti. № 3. 2015. <https://cyberleninka.ru/article/n/modelirovanie-soznaniya-i-iskusstvennyy-intellekt-predely-vozmozhnostey>. Available 07.04.2020.
56. Castells M., Kiseleva E. *Rossija v informacionnuju epohu* [Russia in the information era] // Mir Rossii. / The World of Russia № 1. 2001. P. 3.

**Vislova Aminat Danyalovna**, Doctor of Psychological Sciences, Leading Researcher, Laboratory of Neurocognitive Autonomous Intelligent Systems, Federal State Budgetary Establishment “Federal Research Center “Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences”.

360002, KBR, Nalchik, 2, Balkarov street.

Ph. 8-928-693-90-07.

E-mail: avislova@mail.ru