



Artificial Intelligence in Russia Issue 18, January 15, 2021

The Russia Studies Program

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Abstract

This report, the eighteenth in a series of biweekly updates, is part of an effort by CNA to provide timely, accurate, and relevant information and analysis of the field of civilian and military artificial intelligence (AI) in Russia and, in particular, how Russia is applying AI to its military capabilities. It relies on Russian-language open source material.

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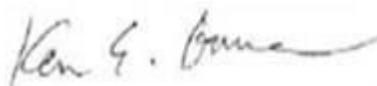
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Cover image credit: Vitaly V. Kuzmin, "100th Anniversary of the Russian Air Force - Air defence systems of Russian origin are shown," Aug. 10, 2012, <http://vitalykuzmin.net/?q=node/469>.

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January 2021



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Governance and Legal Developments

1. Russian government develops initial list of AI projects for implementation

In December, the Russian Ministry of Digital Development released a preliminary list of AI projects for implementation in four Russian ministries and three government departments. The list, which details projects for implementation from 2023 to 2024, will not be final until the relevant government agencies approve all proposed projects.

The proposed projects include using AI to aid the following agencies with certain endeavors:

- The Ministry of Internal Affairs with searching for serial criminals and drawing composite images
- The Ministry of Emergencies with analyzing photographs and images to, for example, assess natural disasters
- The Ministry of Health with identifying neoplasms and signs of COVID-19 on CT images, images from microscopes, and information obtained through radiation diagnostics
- The Ministry of Industry and Trade with building a chat bot based on neural networks that can consult users, as well as with analyzing applicant documents
- Rosreestr (the government department for registration and cartography) with distributing documents by type and analyzing images to find capital construction objects
- The Federal Tax Service with developing a voice assistant for use in consultations, and with creating classifiers for new questions and product names
- The Federal Fund for Compulsory Health Information with building a service to formulate tariffs for the provision of medical care, and with building a voice assistant to collect feedback from the public.

The government will distribute funds to the government agencies implementing AI projects as part of their digital transformation programs. The total cost of the agency digital transformation programs can go into the tens of billions of rubles. For example, the Ministry of Internal Affairs' AI project will cost an estimated 55 billion rubles.

Source: Elyas Kasmi, "AI will appear in Russian ministries and government departments to search for criminals and work with documents" (В российских министерствах и госведомствах появится ИИ для поиска преступников и работы с документами), *C-News*, Dec. 16, 2020, https://www.cnews.ru/news/top/2020-12-16_v_ministerstva_i_gosvedomstva.

2. Russian officials report on AI to Putin

On December 10, members of the Russian government met with Putin to discuss high-tech development, with a focus on AI weaving through much of the conversation. Deputy Prime Minister Dmitry Chernyshenko stated that it is necessary to add a section on digital transformation to all strategic documents released at both the federal and local levels, which would include information on the introduction of AI technologies. He also noted that, while the deputy heads for digital transformation had already begun to systematically implement AI technologies, they must develop at least two departmental datasets for training AI programs by the end of the year. He emphasized that this work needs to be scaled to the regions and industries managed by federal executive authorities as well.

First Deputy Prime Minister Andrei Belousov reported on progress in developing certain high-tech areas, stating that the government has chosen partners in almost all relevant areas and has concluded partnership agreements with them. In the field of AI, the governmental partners are Sberbank and the Russian Direct Investment Fund (RDIF). Belousov also highlighted the financing of AI technologies for 2021-2024 to the tune of 24.6 billion rubles from the state budget and about 62 billion rubles from partner companies, leaving out funding from private companies.

Denis Manturov, head of the Ministry of Industry and Trade, stated that this year the government began to fund development work on AI laboratories and two collaborative centers for computer-aided design, which will allow microelectronics developers to switch to domestic software in the future. He also said that the government allocated funds for the development of AI systems.

Source: "Deputy Prime Minister proposed to add a section on AI implementation to all strategic documents" (Вице-премьер предложил добавить во все стратегические документы раздел о внедрении ИИ), *D-Russia.ru*, Dec. 10, 2020, <https://d-russia.ru/vice-premer-predlozhit-dobavit-vo-vse-strategicheskie-dokumenty-razdel-o-vnedrenii-ii.html>.

3. Government approves unmanned systems development measures

In the last two months of 2020, Russian Prime Minister Mikhail Mishustin signed two government decrees impacting the development of autonomous systems. On November 7, Mishustin approved the roadmap titled “New types of entrepreneurship based on the introduction of advanced technologies,” written as part of the National Technology Initiative. As part of the roadmap, the Russian government plans to impose restrictions of government purchases of foreign-made unmanned aircraft systems, which will require the government to carry out a detailed analysis of the domestic Russian UAV production market.

In addition, on December 10, Mishustin gave approval for a decree related to the operation of autonomous ships, which will stay in force through the end of 2025. The document provides information on how owners of autonomous ships can launch their vessels, and states that owners will participate in the experiment voluntarily and at their own expense. In addition to the ship owners, other participants in the experiment include the Ministry of Transport, the Ministry of Industry and Trade, and Rosmorrechflot (the Federal Agency of Maritime and River Transport). The signing of this decree makes Russia the first country in the world to develop national legislation for the operation of autonomous ships, and the government agencies mentioned are currently developing federal laws and legal norms related to the use of such unmanned vessels.

Source: Igor Korolev, “How the authorities will help domestic manufacturers of UAVS and owners of electric vehicles” (Как власти помогут отечественным производителям беспилотников и владельцам электромобилей), *C-News*, Dec. 25, 2020, https://www.cnews.ru/articles/2020-12-25_kak_vlasti_pomogut_otechestvennym; “The government officially launched an experiment on the use of unmanned vessels in Russia” (Правительство официально дало старт эксперименту по использованию беспилотных судов в России), *Glonass* (Глонасс), Dec. 14, 2020, http://vestnik-glonass.ru/news/vo_vlasti/pravitelstvo-ofitsialno-dalo-start-eksperimentu-po-ispolzovaniyu-bespilotnykh-sudov-v-rossii/.

4. Putin signs personal data bill into law

On December 30, Russian president Vladimir Putin signed a law that prohibits the use of publicly available personal data without the subject’s consent, and states that consent cannot be granted by default or without action on the part of the subject. The subject can also revoke consent at any time, requiring a data operator to suspend use of the data. In addition, the law gives the subject the right to request the deletion of one’s personal data from an operator without proving that the processing is illegal. The new procedure for deleting data would require the operator to delete the requested information within three business days and, if the

operator does not fulfill the citizens' request, the law provides for the imposition of a fine. According to C-News, the passage of this law means that "the concept of publicly available personal data will no longer exist," since the subject's consent is the "exclusive legal basis" for the processing of publicly available information. According to the explanatory note provided for the bill prior to it becoming law, the purpose of the initiative is to restrict uncontrolled collection of personal data published online for purposes beyond those originally intended.

All of the above stipulations apply to citizen data contained in state information systems as well. Russian citizens will have the ability to give or revoke consent to the use of their data in state information systems, and government agencies/organizations will only be able to receive information contained in these systems with the consent of the subject.

Source: Irina Peshkova, "Russians will be able to prohibit the authorities from working with their data" (Россияне смогут запрещать властям работать с их данными), *C-News*, Dec. 31, 2020, https://www.cnews.ru/news/top/2020-12-31_rossiyane_smogut_zapreshchat; "The State Duma adopted a law prohibiting the dissemination of citizens' personal data without their consent" (Госдума приняла закон, запрещающий распространять персональные данные граждан без их согласия), *X-Compliance*, Dec. 23, 2020, https://xco.news/article/2020/12/23/gosduma-prinyala-zakon-zapreschashchii-rasprostranyat-personalnye-dannye-grazhdan-bez-ih-soglasiya?utm_source=email&from=email.

5. AI working group approves 2021-2024 standardization program

In December, the AI working group, part of the "Digital Economy" organization, approved an AI standardization program strategic planning document for 2021-2024, which aims to develop AI standards over the next four years in order to remove existing regulatory and technical barriers. The goals for the standards include ensuring that AI is safe for humans and the environment, enabling objective comparison of AI systems, providing access to data for a wide range of developers, and simplifying the integration of AI systems into the existing information infrastructure.

The program was developed by the Russian Ministry of Economic Development in collaboration with experts from the technical committee on AI standardization and was approved by 164 organizations, including government bodies, companies, and development institutions. It contains over 70 sectoral metrological standards and 66 standards establishing requirements for sectoral datasets. The sectors range from government and health care to transport, environment, and energy.

Source: Vladimir Bakhur, “The Russian government approved an AI standardization program for 2021-2024” [Утверждена перспективная программа стандартизации по направлению «Искусственный интеллект» на период 2021-2024 годы], *C-News*, Dec. 22, 2020, https://www.cnews.ru/news/line/2020-12-22_utverzhdena_perspektivnaya.

6. Government allows use of anonymized medical data for AI systems training

On December 23, the Russian government signed and published a new decree amending the regulations for the Unified State Information System in the healthcare sector. The decree introduces functionality for storing sets of anonymized medical data necessary for creating algorithms and machine learning methods that will feed into AI-based technological solutions to medical issues. In addition, the document provides for the following:

- Support for the markup and preparation of anonymized medical data and its verification for use in solving specific problems, including through the use of machine learning methods
- Support for the development of AI solutions
- Storage, operation, and verification of AI solutions
- Access of medical organizations to AI solutions

Source: “The Russian government allows for the use of anonymized medical data for training AI systems” [Правительство разрешило использовать «обезличенные медицинские данные» для обучения ИИ-систем], *D-Russia.ru*, Dec. 23, 2020, <https://d-russia.ru/pravitelstvo-razreshilo-ispolzovat-obezlichennye-medicinskie-dannye-dlja-obuchenija-ii-sistem.html>.

7. Federal and regional governments employ AI-enabled systems

On December 30, Roskomnadzor, the Russian government agency responsible for media and telecommunications censorship, announced that it is using AI to increase the speed and accuracy by which it identifies illegal information online, including child pornography and information about drugs and suicide. The agency said that the use of AI allows it to check more than 11.7 million pieces of text per day, and that the system is 85 percent accurate at detecting illegal information. A human expert makes the final decision on whether a piece of information is illegal, but the use of AI has increased these experts’ efficiency by 14 times.

In December, the Russian Central Election Commission announced that it is using AI to verify the signatures of subscription lists; specifically, it is using a new hardware-software complex based on neural networks. In the first stage, the AI system will check the signatures to make a preliminary finding of authenticity, which a handwriting expert will then verify in order to come to a final decision of validity. The system is currently operating in a trial period with training of the neural network ongoing to minimize the need for humans in the process. In addition to signature verification, the system will also be able to compare the data on the subscription list against the electronic voter register, and will check a signatory's name, place of residence, passport data, and date of birth.

In December, the app for the Khanty-Mansi region's public service began to utilize a neural network as part of the regional project on "Digital Public Administration," a subset of the national program on the "Digital Economy of the Russian Federation." The neural network, titled Vika, serves as a universal assistant to advise residents on obtaining public services; currently it has more than 10 types of services integrated into the system. The services include advice on fuel prices, help in choosing social support measures, aid for regional entrepreneurs, and documents for registering the birth of a child. In addition to the mobile app, residents can utilize Vika on municipal administration and medical institution websites, and the neural network widget is also available on the official websites of regional authorities and institutions.

Source: "Roskomnadzor announces the use of AI to identify illegal information on the internet"

[Роскомнадзор объявил об использовании искусственного интеллекта для выявления незаконной информации в Интернете], D-Russia.ru, Dec. 30, 2020, <https://d-russia.ru/roskomnadzor-objavil-ob-ispolzovanii-iskusstvennogo-intellekta-dlja-vyjavlenija-nezakonnoj-informacii-v-internete.html>; "The Russian Central Election Commission is using artificial intelligence to check subscription lists" [ЦИК РФ задействует искусственный интеллект в проверке подписных листов], *Krasnaya Vesna*, Dec. 8, 2020, <https://rossaprimavera.ru/news/e0c75701>.

Military and Security Developments

8. Putin says AI use in C2 will determine future battle outcomes

At a meeting of the country's Ministry of Defense (MOD) Board on December 21, 2020, Russian president Vladimir Putin said he is certain that the use of artificial intelligence in controlling weapons in the future will largely determine the outcome of battles. The Russian head of state noted that weapons and hardware with AI elements should be more actively integrated, tested, and employed in combat training.

At this meeting with military officials, Vladimir Putin also identified five major Russian MOD priorities for the near future to counter perceived American and NATO threats. The fifth priority is to develop weapons and equipment with artificial intelligence elements, including robotic systems, unmanned aerial vehicles, and automated control systems. The other four priorities are as follows: to maintain high combat readiness of nuclear forces and develop all components of the Russian nuclear triad; to develop nonnuclear deterrents, primarily high-precision weapons; to re-equip the ground and maritime forces, with timely fulfillment of the state defense order; and to develop military science, a study of the experience of modern armed conflicts, and future analytical forecasts.

The Russian president also noted that the nation's military technical modernization requires an emphasis on military science to analyze the course of future threats to the Russian Federation. According to Putin, it is vital not only to study the experience of modern armed conflicts and local wars but also to make predictions for the future, especially considering the emergence of weapons based on new physical principles in foreign armies.

Source: "AI use in controlling weaponry in future will largely determine battle outcome — Putin," Tass.com, Dec. 21, 2020, <https://tass.com/defense/1237863>; Roman Kretsup, Aleksei Ramm, "'Avangards' are on the march: the Russian president has identified five tasks for the Ministry of Defense" (Идут «Авангарды»: президент определил пять задач для Минобороны), Iz.ru, Dec. 21, 2020, <https://iz.ru/1102784/roman-kretcul-aleksei-ramm/idut-avangardy-prezident-opredelil-piat-zadach-dlia-minoborony>.

9. Defense official outlines major UAV development and acquisition plans

On December 30, 2020, Russian deputy defense minister Alexey Krivoruchko spoke with *Krasnaya Zvezda* (Red Star), an MOD daily online newspaper, about Russian military modernization. Krivoruchko devoted a lot of time to speaking about domestic military UAVs. He noted that by the end of 2021, the Russian armed forces will obtain long-range systems multifunctional drones with enhanced flight duration, adding that the drones would carry both air-launched weapons that are used on operational tactical aircraft, and special munitions. The Russian defense official said that these drones will make it possible to deliver precision strikes against the enemy's stationary and mobile targets.

Krivoruchko also noted that in order to increase the capabilities of Russian forces, the military needs to create complexes with multifunctional unmanned aerial vehicles of various classes, capable of solving problems as part of a swarm in cooperation with manned aircraft, as well as in conjunction with ground and sea-based robotic complexes. He identified the small unmanned aerial vehicles in the nation's military as key to its future operational success, noting that their use has become firmly established in practice from tactical to strategic levels.

He also said that Russian troops have already received the first samples of medium-range reconnaissance and strike UAVs and loitering munitions, which are being tested in combat conditions. Krivoruchko highlighted that Russian drones currently in development are capable of conducting missions in the face of countermeasures by adversary EW and air defense systems. In addition, such UAVs not only are equipped for reconnaissance and strike missions, but also can conduct special assignments, including using high-precision air, sea, and land strikes.

Krivoruchko noted that the spectrum of Russian UAV capabilities is constantly expanding. At the initial stages, small UAVs were used for optoelectronic reconnaissance; today, they are performing EW missions, relaying communications, delivering supplies, providing target designation to guided weapons, and conducting strike missions. Specifically, the widespread use of small drones allows Russian forces to reduce the use of ammunition to destroy targets, increasing the artillery forces' accuracy, flexibility, and efficiency. Of note, Russian military writers often speak of integrating platforms, such as UAVs, into a single reconnaissance and information space, which would ensure that data are acquired and used in real time.

The deputy defense minister noted that MOD is assigning great importance to the development of large attack UAVs. At this point, "Altius," "Inokhodets" (Orion), and "Forpost" drones are equipped with guided weapons, and their tests using small guided munitions have shown their high efficiency in potential combat. Curiously, Krivoruchko did not mention the Okhotnik heavy UCAV that is currently undergoing testing and evaluation, and that has flown

autonomously in a loyal wingman configuration with a Su-57 fifth-generation fighter. Okhotnik is also supposed to be AI-enabled for autonomous operation. However, he alluded that Altius, Orion, and Forpost drones will serve as the basis for a new generation of UAVs that will be equipped with strike weapons and satellite communications, to be tested in 2021.

Krivoruchko concluded the interview by highlighting the following priorities for military UAV development: expanding the range of missions conducted by UAVs, increasing their flight performance, equipping such drones with long-range reconnaissance and strike systems, introducing elements of artificial intelligence into the UAV control systems, and integrating UAVs into common airspace with manned aircraft. It should also be noted that the MOD is planning to test air-to-air missiles on the Okhotnik UCAV in the second half of 2021; presumably, such missiles were previously tested on the Su-57. Following these tests, Okhotnik will be tested with air-to-surface weapons. At this point, the Okhotnik UCAV is expected to become a long-range unmanned fighter-interceptor.

Source: Roman Biryulin, "Interview with Alexey Krivoruchko, Deputy Minister of Defense of the Russian Federation" [Интервью заместителя Министра обороны Российской Федерации Алексея Криворучко], Redstar.ru, Dec. 30, 2020, <http://redstar.ru/oruzhie-rossii-operezhaet-vremya/>; "Long-range UAVs of enhanced endurance to be provided for Russian army by end of 2021," Tass.com, Dec. 23, 2020, <https://tass.com/defense/1241331>; "Using weapons for the first time: the media revealed plans for "Okhotnik" tests" [Первое применение оружия: СМИ раскрыли планы испытаний "Охотника"], RadioSputnik.ria.ru, Dec. 27, 2020, <https://radiosputnik.ria.ru/20201227/okhotnik-1591090737.html>.

10. ARF tests wheeled Marker UGV in off-road autonomous setting

According to Russia's Advanced Research Foundation (ARF – Russia's "DARPA" equivalent), its "Marker" wheeled experimental robotic platform traveled for 30 kilometers in a fully autonomous mode. The ARF test team designated the difficult terrain, having the vehicle travel through a forest-steppe with a snow cover. The Marker's motion control system, having received a route assignment, ensured the platform's arrival in an hour and a half, relying on neural network algorithms. This control system provided route designation and obstacle self-correction, such as getting around trees, hills, ravines, and bushes.

ARF noted that this Marker wheeled platform provides for autonomous operation of up to 48 hours on paved roads, and up to 24 hours on rough terrain. In future tests, the Marker platform will have to cover 50, 100, and 200 kilometers.

The Marker wheeled platform is one of five test beds build by the ARF as part of the "Marker" autonomous vehicle project intended for military applications. The project was launched in 2018 to facilitate full-scale development of technologies and basic elements for ground

robotics, with the Marker platform serving as a test bed for a number of military and civilian technology applications and uses. Previously, ARF conducted tests on a tracked Marker platform to test the concept vehicle's technical vision, autonomous capability, and potential manned-unmanned teaming (MUM-T) with soldiers in the field. (Please see *AI in Russia Issue 11, September 25, 2020*.)

Source: "Marker experimental wheeled robotic platform" [Экспериментальная робототехническая платформа «Маркер» на колесном шасси], Official ARF webpage, Dec. 30, 2020, <https://fpi.gov.ru/press/news/marker-preodolel-30-kilometrov-po-peresechennoy-mestnosti-v-avtonomnom-rezhime>.

11. Rostec to control production through machine vision and machine hearing

In 2021, the Roselectronics Holding (part of the Rostec State Corporation) will begin implementation of an automated control system, based on machine vision and machine hearing technologies. The project will supervise manual labor and will cost 50 million rubles (approximately \$676K). The system carries out comprehensive control of manual work, checking the actions of employees for compliance with technological documentation and requirements. According to Rostec, this minimizes the human factor and the likelihood of errors in production. Each workplace would be equipped with a tablet, a video camera with a microphone, and a set of various sensors that check temperature, humidity, dustiness, and room illumination, along with pressure, heart rate, and body temperature of each worker. The system will monitor production facilities and workplaces. It will purportedly automatically conduct biometric identification of workers, check for protective clothing, and monitor compliance with safety regulations.

The solution was developed by NPP Almaz (part of Roselectronics). Test implementation will begin in the second quarter of 2021. As part of the pilot operation, 95 workplaces will be equipped with this technology. According to Mikhail Apin, director general of NPP Almaz, applying this system to production processes leads to the reduction of scrap material, while increasing the output per employee by at least 5 percent per year; as a result, it reduces the cost of overall production by 5 percent. After pilot tests, the company intends to equip workplaces at other industrial enterprises with this AI-enabled system. Earlier, CNA noted that Rostec is implementing AI-based solutions to control and monitor its various production facilities and manufacturing processes, including at its defense enterprises.

Source: "Rostec will control production processes using machine vision and hearing" [«Ростех» будет контролировать производственные процессы с помощью машинного зрения и слуха], CNews.ru, Dec. 29, 2020, https://www.cnews.ru/news/line/2020-12-29_rosteh_budet_kontrolirovat.

12. Defense ministry shows Orion strike drone with armament

Russia's Defense Ministry (MOD) unveiled two 2021 calendars, one of which shows the Orion long-range combat drone in its strike and reconnaissance version for the first time. The Orion UAV is part of the "Inokhodets" project by Kronshtadt enterprise to produce mid- and long-range military drones for the nation's armed forces. In the calendar photo (below), the drone is shown with beam holders under the wings for fastening the armaments, and with the KAB-20 bombs attached. It has a desert camouflage color in the image.

Figure 1. Orion strike drone



Source: Russian MOD calendar, 2021, accessed Jan. 7, 2021, <https://xn--80ahclcogc6ci4h.xn--90anlfbebar6i.xn--p1ai/multimedia/photo/gallery.htm?id=85909@cmsPhotoGallery>.

The Orion MALE UAV is a medium-altitude, long-duration unmanned aerial system with a maximum take-off weight of 1 tonne and a maximum payload weight of 200 kg. The drone has a service ceiling of 7.5 km, and its flight endurance is 24 hours with the standard payload. It can develop a speed of up to 200 km per hour.

Earlier, the MOD admitted that Orion was tested in Syria with missiles and ammunition, and announced that the military would acquire this UAV in December 2020. At this point, Orion remains the only combat UAV in Russian service, although other combat UAVs are expected this year. In December 2020, the MOD confirmed that Orion launched small guided missiles and has practiced the use of guided gliding bombs. The MOD calendar is free and can be downloaded on the ministry's website.

Source: "Russia's top brass shows Orion strike drone with armament for first time," Tass.com, Dec. 28, 2020, <https://tass.com/defense/1240391>; "Russian drone used guided missiles for the first time" [Российский беспилотник впервые применил управляемые ракеты], Ria.ru, Dec. 28, 2020, <https://ria.ru/20201228/bespilotnik-1591191802.html>; "Russian MOD unveils combat version of the Orion UAV for the first time" [Минобороны впервые показало беспилотник "Орион" в ударном варианте], Ria.ru, Dec. 28, 2020, <https://ria.ru/20201228/orion-1591162329.html>

13. Defense ministry tests AI-enabled target UGVs for military training

TVZvezda, MOD's official news channel, recently discussed a unique test of the modern targeting complex at the Patriot Park near Moscow—the site of the annual ARMY military expo. During the test, Russian military intelligence officers trained to hit targets at distances of 150, 300, and 350 meters.

Their targets were human mannequin dummies on a tracked platform, "armed" with a machine gun. These target robots are an unnamed self-initiated project by a domestic defense company. Officially, the product is called "autonomous target with artificial intelligence algorithms." The product's main feature is the use of AI elements that enable a robot to use terrain as cover. Each target robot analyzes the combat situation and the resulting environment with the help of sophisticated terrain orientation mechanisms, laser sensors, and navigation systems. If necessary, the tracked targets can also work as a swarm.

According to Pavel Ikomasov, lead software engineer at the company developing these robotic targets, the tracked systems can mimic allied forces or enemy troops, conducting different scenarios, such as getting out of an ambush, bypassing friendly forces, or organizing an ambush. If the target's "wound" is not fatal, the robot continues to advance and act according to its parameters, simulating a real human soldier's abilities. Apparently, the MOD's Main Directorate of Combat Training is interested in this system.

According to TVZvezda, in the future, groups made up of dozens of such robotic targets can be used to simulate the defensive and offensive battle conditions for tactical exercises up to battalion strength. The Patriot Park test also demonstrated that such independent, mobile targets will not allow shooters to get used to the familiar target environment by always

challenging the training forces. Given several thousand exercises and drills that the MOD conducts annually across all its forces and services, this AI-enabled targeting platform potentially has mass application across the Russian military.

Source: Konstantin Isaev, ““Rise of the Machines”: the first tests of target robots took place in the Patriot Park” [«Восстание машин»: в парке «Патриот» прошли первые испытания роботов-мишеней], TVZvezda.ru, Dec. 19, 2020, <https://tvzvezda.ru/news/opk/content/20201219844-UZq97.html>; “Russia to hold 4,000 military exercises in 2019,” AA.com.tr, Dec. 4, 2018, <https://www.aa.com.tr/en/todays-headlines/russia-to-hold-4-000-military-exercises-in-2019/1329426>.

14. Tu-95MS strategic bomber flew in “loyal wingman” formation with drone

According to the Russian TASS state news agency, the crew of the Tu95MS strategic missile bomber practiced controlling a UAV from their aircraft. The TASS article indicated that the Tu-95 bomber was modified with equipment to control the drone. The article did not specify which drone was involved in the tests but did not exclude the possibility of additional tests in the future. Such manned-unmanned teaming (MUM-T) with Russia’s strategic bombers could enable reconnaissance and protection of the aircraft during its mission. In addition, the drone could be used as an air decoy to distract adversary air defense forces.

Given the Tu-95 bomber’s operational and mission requirements, the MUM-T tests were probably made with a relatively heavy drone capable of flying at longer distances and greater altitudes. Up until now, only the Okhotnik heavy combat drone has flown in such a formation with the Su-57 fifth-generation aircraft; it did so back in September 2019. At this point, the Russian military operates an Orion MALE UAV (ranging up to 250 km), and is currently testing Okhotnik and Altius long-range heavy drones. The heavy Altius UCAV also flew in 2019 for the first time, although it did not fly in formation with a manned fighter. Another potential candidate for such Tu-95 teaming would be a Forpost-R MALE UAV with a range of up to 250 km. Currently, the Russian military is expanding the MUM-T scope beyond fighters to strategic bombers and even helicopters, delivering additional ISR and defensive capabilities to its combat aircraft. The current set of Russian UAVs would not be able to support the longer ranges of typical strategic air patrols.

Source: "Strategic missile carrier Tu-95MS completed drone control tests" [Стратегический ракетоносец Ту-95МС отработал управление беспилотником], Iz.ru, Dec. 23, 2020, <https://iz.ru/1103388/2020-12-23/strategicheskii-raketonosets-tu-95ms-otrabotal-upravlenie-bespilotnikom>; "Russia's latest attack drone performs 1st joint flight with Su-57 fifth-generation plane," Tass.com, Sept. 27, 2019, <https://tass.com/defense/1080201>; "Russian Air force is taking delivery of Inokhodets and Forpost UAVs" [В ВКС начали поступать беспилотники "Иноходец" и "Форпост"], Ria.ru, Dec. 21, 2020, <https://ria.ru/20201221/bespilotniki-1590218034.html>; "Russian Defense Ministry works on helicopter support and attack drone," Tass.com, Aug. 27, 2020, <https://tass.com/defense/1194691>.

15. Military testing new monitoring system in Black Sea

Tests of the newest system for automated maritime surface analysis took place in the Black Sea on December 17, 2020. The technology is being developed by the Scientific Research Institute for Long-Range Radio Communication (NIIDAR). NIIDAR representatives noted that the new tracking complex was given the working designation "Strategy" and is now monitoring the Black Sea surface. The NIIDAR company is a Russian manufacturer of radar systems supplied to the military.

According to the company, the system uses satellite and ground-based information systems, data from different radar stations, and internal channels for transmitting information. The complex has the ability to interact with different technical systems from which it receives information. In addition, the "Strategy" receives data from over-the-horizon radars capable of detecting surface targets at ranges of several hundred kilometers. The system can also analyze and evaluate abnormal changes in the operational environment. The developers noted that "Strategy" automatically processes information about the vessels that have entered the Black Sea, determines the parameters of the target, and records the approach of ships to the Russian borders or prohibited areas. Using a system such as Strategy can add another significant ISR capability to the MOD and the Russian Navy.

Source: "Russia began testing a new monitoring system for ships in the Black Sea" [РФ начала испытания новой системы наблюдения за кораблями на Черном море], Iz.ru, Dec. 17, 2020, <https://iz.ru/1101025/2020-12-17/rf-nachala-ispytaniia-novoi-sistemy-nabliudeniia-zakorabliami-na-chernom-more>; official NIIDAR webpage, <https://www.niidar.ru/about/history/>.

Corporate and Market Developments

16. Russian execs discuss AI at Sber conference

Highlighted in the previous issue of AI in Russia, a three-day international conference, AI Journey, was held in Moscow on December 3-5. The annual event is the largest conference on AI in the world, with 30,000 virtual attendees from 87 countries listening as 200 speakers discuss different aspects of AI. Prominently, President Vladimir Putin welcomed participants to the conference himself, underscoring the importance of the gathering for the Russian state and arguing that AI will be a powerful means by which to increase social well-being and quality of life for national states.

Researchers and presenters from the state-owned bank Sber and its digital cloud service SberCloud played a prominent role in the conference, as well as AI specialists from Cognitive Pilot, Microsoft, Intel, IBM, SAS, Huawei, NVIDIA, and several universities. Conference presentations focused primarily on developments in machine learning and AI neural networks. Russian deputy prime minister Dmitry Chernyshenko suggested a particularly rosy outlook for AI in global markets, accounting to perhaps 14 percent of global GDP by 2030 and therefore "...a very serious prize, there is something to fight for," as far as national economies are concerned.

Many speakers noted labor savings and efficiency gains from greater integration of AI into new market sectors. The deputy chairman of Sber, Alexander Vedyakhin stated, "AI is called the new electricity today. Indeed, we turn on the light bulb and do not notice the movement of electrons. So, AI is able to imperceptibly change entire areas of business, industries and perhaps, even the face of civilization." Similarly, the Microsoft president of global sales, marketing, and operations, Jean-Philippe Courtois, noted that the COVID-19 pandemic has only further accelerated the movement from AI R&D to practical implementation.

The chief technology officer of Sberbank Group, David Rafalovsky, noted as well that this ever-increasing demand especially focuses on machine learning platforms, which can be used to train algorithms for medical and public health applications. MLSpace, the new AI development platform hosted by SberCloud and housing the new supercomputer "Christofari," was prominently discussed as an important advantage for the Russian AI field.

In addition to new AI model testing capabilities, other Russian AI ventures were also showcased, including Cognitive Pilot's automated agricultural combines that are now being deployed and Sberbank AI Lab's CT scan algorithm to detect COVID-19 cases using imagery.

Source: "AI Journey: Who Will Help Artificial Intelligence Save the World?" ["AI Journey: кто поможет искусственному интеллекту спасти мир"], *RBC*,
<https://trends.rbc.ru/trends/industry/cmrm/5fd0c2f79a794752740f786a>.

17. Russia's IT sector continues to grow during economic crisis

The Russian Association for Electronic Communications reports that the IT sector of the Russian economy is projected to slightly decrease its growth rate compared to previous years, sitting at around 15-16 percent. Most growth this year comes from e-commerce expansion and new digital content offerings. Other sectors, such as communications infrastructure, will also grow substantially. Marketing and advertising will see much less growth, and may even see slightly negative rates. The significant increase in e-commerce and digital content is due to behavioral changes in purchasing since the beginning of the pandemic, when a great deal of consumption was moved online. Russian companies are diversified across all segments of the IT industry (e-commerce, digital content, marketing, and infrastructure) and have thus weathered the crisis better than was expected, according to one analyst. State support of the IT sector through relieving tax burdens and continuing subsidies has helped maintain considerable stability given the uncertain economic environment. The Russian state's interest in AI in particular has been noticeable this year (an example is an AI federal project within the "Digital Economy" national project), and it is expected that growth in AI as part of the IT sector will continue.

Source: "Digital Companies Show Crisis Resilience" ["Компании цифрового контура показали устойчивость к кризису"], *Rossiiskaya Gazeta*, Dec. 28, 2020,
<https://rg.ru/2020/12/28/kompanii-cifrovogo-kontura-pokazali-ustojchivost-k-krizisu.html>.

18. AI-enabled systems continue to make advances into medical field

A number of recent articles have noted the increasing use of AI technology in the medical field. Most advances have been related to greater processing and storage capabilities through shared platforms for AI algorithm testing, the use of computer vision technologies to automatically process images and scans, and the integration of AI into new treatments that connect human thoughts to robotic assistance in terms of assisted speech or locomotion. Speedy algorithm

testing is seen as a particularly important element in new drug and vaccine development, especially in the wake of the ongoing COVID-19 pandemic.

Some writers have been quick to note that while AI technology and implementation in the healthcare industry is obviously growing in importance, it remains a limited source of help in most parts of medical care. Yet the coronavirus crisis has already led to new uses for AI, including developing automated COVID-19 hotlines, the redeployment of image scanning algorithms to diagnose the severity of lung infections, and quick predictive calculators for the likelihood of COVID-19.

Major state-affiliated organizations are spearheading further support to develop AI for the medical field, most notably the Skolkovo Institute, Sberbank, and NTI. The former two are developing “SberMedIT” as a new platform that hosts supporting apps and libraries for testing and diagnostic purposes. Deployment of systems has continued in key Russian regions, and government officials have discussed AI-enabled approaches in contact tracing. The continued focus by the Russian state on creating permissive and capacity-increasing platforms for AI research is a way to ensure that small AI startups can move into markets easily rather than having to focus on building up their own capacity.

Source: “Sberbank and Skoltech create an artificial intelligence ecosystem for medical needs” [“«Сбер» и «Сколтех» создают экосистему искусственного интеллекта для нужд медицины”], *CNews*, Dec. 28, 2020, https://www.cnews.ru/news/line/2020-12-28_sber_i_skolteh_sozdayut; “Robot to counter COVID-19 began work in the Novgorod region” [“Робот по противодействию COVID-19 начал работу в Новгородской области”], *CNews*, Dec. 29, 2020, https://www.cnews.ru/news/line/2020-12-29_robot_po_protivodejstviyu; “Skolkovo resident registered a computer vision system for radiation diagnostics” [“Резидент «Сколково» зарегистрировал систему компьютерного зрения для лучевой диагностики”], *CNews*, Dec. 21, 2020, https://www.cnews.ru/news/line/2020-12-21_rezident_skolkovo_zaregistroval; “Artificial intelligence (AI) will not become the main help for doctors at least in the near future,” [“Искусственный интеллект (ИИ) не станет основным подспорьем врачей как минимум в ближайшее время”] *AI-News.ru*, Dec. 17, 2020, https://ai-news.ru/2020/12/iskusstvennyj_intellekt_ii_ne_stanet_osnovnym_podsporem_vrachej_ka.html; “A neural network for the diagnosis of COVID-19 has been created in Russia” [“В России создана нейросеть для диагностики COVID-19”], *CNews*, Dec. 15, 2020, https://www.cnews.ru/news/top/2020-12-15_sozdana_otechestvennaya_nejroset; “Vice Prime Minister Chernyshenko recommended replicating the AI solution for the COVID-19 contact center throughout Russia” [“Вице-премьер Чернышенко рекомендовал тиражировать ИИ-решение для контакт-центра по COVID-19 на всю Россию”], *TA Adviser*, Dec. 28, 2020, <https://www.tadviser.ru/>; “NTI venture fund invests in a platform for medical diagnostics based on AI ‘Celsus’,” [“Венчурный фонд НТИ инвестирует в платформу для медицинской диагностики на базе ИИ «Цельс»”], *CNews*, Dec. 29, 2020, https://www.cnews.ru/news/line/2020-12-29_venchurnyj_fond_nti_investiruet.

Education and Training Developments

19. ETU “LETI” hosts youth autonomous vehicle competition

In December, the St. Petersburg Electrotechnical University (ETU “LETI”) held the finals of the Autonomous Driving Olympics on December 6. Six teams of schoolchildren and university students ages 14-21 participated in the online competition, which tested written coding algorithms on robotic models that needed to successfully merge lanes, turn corners, and observe traffic code. The competition was jointly hosted by ETU “LETI,” the Finist Foundation, and JetBrains Research.

“There is a huge gap between school robotics and real, industrial robotics,” Kirill Krinkin, head of the Software Engineering and Computer Applications Department, is quoted as saying. “Competitions like the Autonomous Driving Olympics allow schoolchildren and university students to acquire the competencies needed to solve serious problems in the field of driverless transportation and autonomous robots.” ETU “LETI” is part of a joint robotics education program with PNRPU and the Kazan Aviation Institute, as covered in issue 12 of *AI in Russia*.

Source: “ETU “LETI” Held Russia’s First Olympics in AI for Self-Driving Cars,” *India Education Diary*, Dec. 19, 2020, <https://indiaeducationdiary.in/etu-leti-held-russias-first-olympics-in-ai-for-self-driving-cars/>.

20. First Russian AI institute at Innopolis University

According to a CNews article on December 10, Russia’s first Artificial Intelligence Institute has opened at Tatarstan’s Innopolis University. Different laboratories and departments within the university had been producing various AI technologies since 2014, and were later merged under a single center in 2019. The official creation of the AI Institute in December 2020 was initiated by the order of the deputy prime minister of the Russian Federation, Dmitry Chernyshenko, who instructed Innopolis University leadership to develop educational programs on AI and to clearly synchronize large-scale project activities with indicators of Russia’s national goals. The institute will develop educational programs at the bachelor’s, master’s, and postgraduate levels, offering instruction on topics including data science, AI microelectronics, and machine learning. According to the article, the institute’s scientists are

already working on digital solutions related to aerial survey data for forestry and agriculture, medical tools to enhance disease diagnosis, and digital solutions for Gazprom, Rosatom, and Aeroflot.

Among other projects, the institute is working on a digital solution to forecast demand for packaging supplies. Teaming up with Danaflex, a sustainable packaging company, the institute will create a neural network using prior customer data, seasonal trends, and supply cycles to increase productivity. The solution will be funded by a 121 million ruble grant which Russia's Ministry of Digital Development awarded jointly to the institutions during a competition earlier in 2020. According to Aydar Safin, Danaflex CEO, it was natural that they chose Innopolis's Institute of Artificial Intelligence as a partner. "Innopolis University is the largest R&D center in the Russian Federation in the field of digital economy. The Russian IT University's project portfolio includes numerous projects in all aspects of end-to-end digital technologies."

Source: Vladimir Bakhur, "The first AI Institute in Russia was created at Innopolis University campus" [Первый в России Институт ИИ создан на базе Университета Иннополис], *CNews*, Dec. 10, 2020, https://www.cnews.ru/news/line/2020-12-10_pervyj_v_rossii_institut; Vladimir Bakhur, "Innopolis University will develop an AI platform for demand forecasting" [https://www.cnews.ru/news/line/2020-12-24_universitet_innopolis_razrabotaet], *CNews*, Dec. 24, 2020, https://www.cnews.ru/news/line/2020-12-24_universitet_innopolis_razrabotaet; "Danaflex and Innopolis to develop a platform for forecasting demand" [«Данафлекс» и Иннополис разработают платформу для прогнозирования спроса], *Plastinfo.Ru*, Dec. 25, 2020, https://plastinfo.ru/information/news/46803_25.12.2020/.

21. MIPT engineering CEO discusses Engineering Center

Marking seven years since the Moscow Institute of Physics and Technology's (MIPT's) Engineering Center was founded, Timur Tavberidze discusses its progress and development in a December 21 ComNews article.

Tavberidze notes that the center was originally created to develop complex engineering software, utilizing Big Data processing and machine learning, for the oil and gas sector. "Our experience shows that the value of a lot of data that companies receive in the course of their activities is greatly underestimated, and this leads to serious operational costs. With the help of our algorithms in the field of Big Data, we can solve several of the client's problems at once." Notable clients include Gazprom, Gazprom Neft, Novatek, and Lukoil.

After several years of success, clients from other sectors began to ask about using the center's technologies in their fields, which allowed the center to expand its reach. "As a result, the Center tries to orient almost all development towards end-to-end intersectoral technologies:

based on hybrid approaches, we find the best practices in one industry and apply their algorithms in others. For example, we used the algorithms for processing the heart rate on the MRI image to identify complications in the operation of a downhole [oil] pump.” Currently, according to Tavberidze, the center is also prioritizing the development of ecosystem technologies that work synergistically.

According to Tavberidze, about half of the center’s staff are graduates of the Moscow Institute of Physics and Technology. “[The] creative thinking of our team is our invaluable, intangible asset.” As covered in past issues of *AI in Russia*, MIPT is one of the premier institutes dedicated to building Russia’s future capacity of science and tech experts.

Source: Timur Tavberidze, “IC MIPT harmonizes the physics of processes and ML algorithms” [ИЦ МФТИ подружил физику процессов и алгоритмы ML], *ComNews*, Dec. 21, 2020, <https://www.comnews.ru/content/212236/2020-12-21/2020-w52/ic-mfti-podruzhil-fiziku-processov-i-algoritmy-ml>.

22. National Technological Initiative hosts middle school student competition

According to an article in *Rossiiskaya Gazeta* on December 22, the winners of the NTI Circle Movement’s Junior Olympiad were announced. More than 28,000 students in grades 5-7 participated in the engineering competition, which was held online from September 1 to December 20. The competition had five technological focus areas: virtual, robotic, space, habitat, and neurotechnologies. According to the article, the competition engaged students on projects that included “space rockets, helicopters, artificial intelligence, human-machine interfaces, computer vision, and virtual and augmented reality.” This was the second iteration of the competition.

According to the article, the competition was held jointly with the Agency for Strategic Initiatives, with the support from the Ministry of Education of the Russian Federation. It differs from their main competition for grades 8-11, which was covered in issue 7 of *AI in Russia*.

Dmitry Glushko, First Deputy Minister of Education, was quoted as saying:

The main goal of the Olympiad is to awaken interest in breakthrough technologies in schoolchildren, to involve them in engineering education. Thanks to such competitions, participants, finalists, and winners can each assess their own capabilities and analyze their interests. The children are shown that it is not necessary to go to a metropolis to do what you like, even if the student lives in a distant village, but would like to launch space rockets. We often hear criticism of online formats, but it is events such as [the NTI Junior Olympiad] that highlight the strengths of virtual competitions, primarily accessibility.

Russia commonly utilizes online formats for AI hackathons, training programs, and virtual competitions so that the initiatives can be accessed widely across the country.

Source: “About the olympiad” [ОБ ОЛИМПИАДЕ], NTI Circle Movement Olympiad.Junior [Олимпиада Кружкового движения НТИ.Junior], accessed Jan. 7, 2021, <https://junior.nti-contest.ru/>; Ksenia Kolesnikova, “The winners of the Olympiad of the NTI Circle Movement were announced” [Названы победители олимпиады Кружкового движения НТИ.Junior], *Rossiiskaya Gazeta*, Dec. 22, 2020, <https://rg.ru/2020/12/22/nazvany-pobediteli-olimpiady-kruzhkovogo-dvizheniia-ntijunior.html>.

23. Competition to create classroom AI assistants

On December 21, a CRN article reported that 180 teams recently participated in a Russian competition titled “Up Great PRO // Reading” to create AI assistants for the classroom. These AI assistants are designed to help teachers identify logical, factual, stylistic, and semantic errors in students’ essays, written in either English or Russian. The winning developers, mostly scientists from MIPT and Lomonosov MSU, divided a prize fund of 20 million rubles. Participants will also be able to compete in the second round of the competition, scheduled for spring 2021. According to the article, the competition was organized by RVC, the Skolkovo Foundation, and the Agency for Strategic Initiatives (ASI) as part of the implementation of the National Technology Initiative, with the support of the ANO School League Rusnano and FEFU.

Source: “Up Great PRO contest // READING: Russian AI developers shared 20 million rubles” [Конкурс Up Great ПРО//ЧТЕНИЕ: российские ИИ-разработчики разделили 20 млн рублей], *CRN*, Dec. 21, 2020, <https://www.crn.ru/news/detail.php?ID=150741>.

24. Moscow schoolchildren take hands-on robotics course taught by robot

According to a CNews article on December 17, a robotic assistant named “Promobot” will teach students about computer programming, robotics, and artificial intelligence. Instruction will take place at the Naukograd technology park’s Robotics and Neurotechnology Laboratory. The robot will assist in teaching two courses: one for students up to the age of 12, and a more advanced version for high school students. Both courses will include hands-on assignments.

As part of the program, students will be encouraged to brainstorm new ideas about where robots could be particularly useful, and tech experts at Promobot will help develop those ideas into real-life solutions. Promobot Development head Oleg Kivokurtsev said, “Our idea is that any successful solution can go from the laboratory directly to our developers, and then appear

on a robot, say, at an American airport. Children need to know that their skills can be applied to real work.” The program was arranged with support from the local government.

Source: “Robotics will be taught to Moscow schoolchildren by a robot” [Робототехнику московским школьникам будет преподавать робот], *CNews*, Dec. 17, 2020, https://www.cnews.ru/news/line/2020-12-17_robototekniku_moskovskim.

25. 10-day AI course for Russian high school students

According to an NIA article, the Sirius education center hosted an intensive science and technology program on December 13-23, 2020. During the program, called “Big Challenges-2020,” high school students trained artificial intelligence to write news, develop new drugs, analyze CAT scan images, and analyze social media profiles of business school applicants. Experts from Yandex, BIOCAD, VTB Bank, Innopolis University, and the Graduate School of Management of St. Petersburg State University assisted the teams of students. Participating were 28 eleventh graders from 18 regions of Russia. In the final portion of the program, the students presented their ideas for AI solutions to improve the township of Sirius, located within Sochi in Southwestern Russia.

Source: : “Russian schoolchildren will teach artificial intelligence to write news and develop new drugs” [Российские школьники научат искусственный интеллект писать новости и разрабатывать новые лекарства], *NIA*, Dec. 15, 2020, <http://www.23rus.org/index.php?UID=33380>.

26. Online neural network training for children of all ages

According to an article on the Vesti Tula website, the second series of the “Digital Lesson” courses were available to Russian schoolchildren from November 23 to December 13. The focus of this series of lessons was on neural networks and communications, partnered with @Mail.ru. The program used examples of weather forecasting, self-driving cars, medical diagnostics, and voice assistants to help explain how neural networks function. The “Digital Lesson” project was first implemented in 2018, and is presented in the form of online games targeted for three student age groups: elementary, middle, and high school. This year’s coursework also includes lessons on cybersecurity (February 2021, partnered with Kaspersky Labs), unmanned vehicles (March 2021, partnered with Yandex), and digital production (April 2021, partnered with 1C Programmers’ Club). At the end of each course, students receive a certificate.

According to the website, the program is implemented in all 85 districts of Russia and was recently made available in 100 countries with Russian-speaking students. The project is organized by the Ministry of Education, the Ministry of Digital Development, Communications and Mass Media of Russia, and the ANO “Digital Economy.” Issue 11 of *AI in Russia* covered the first course of “Digital Lessons,” which was focused on artificial intelligence and machine learning.

Source: “Tula schoolchildren will be told how artificial intelligence is created” [Тульским школьникам расскажут, как создаётся искусственный интеллект], *Vesti Tula*, Dec. 8, 2020, <https://vestitula.ru/lenta/47178>; “всероссийский образовательный проект в сфере цифровой экономики” [All-Russian educational project in the field of digital economy], УРОК ЦИФРЫ, urok@data-economy.ru.

27. Three-year grants to be issued to select AI students

In late December, the Ministry of Education reportedly prepared a decree to award grants in line with the “Artificial Intelligence” federal project. The *Daily Storm* accessed a copy of the decree, which has not yet been published. According to the article, undergraduate and graduate students at public Russian universities will be eligible to apply for project funding. Applicants need to lay out a schedule for their proposed project, which will undergo competitive selection. According to the article, “The exact financial support has not yet been determined, but it will be provided over three years.”

Source: Pavel Panov, “They will think for you. Universities will be allocated money to create artificial intelligence” [Подумают за вас. Вузам выделят деньги для создания искусственного интеллекта], *Daily Storm*, Dec. 30, 2020, <https://dailystorm.ru/vlast/podumayut-za-vas-vuzam-vydelyat-dengi-dlya-sozdaniya-iskusstvennogo-intellekta>.

International Collaboration

28. VisionLabs seeks to expand international cooperation

According to Alexander Khanin, the founder of VisionLabs, Russia is seeking to expand international cooperation in order to maintain its leadership in the fields of computer vision and machine learning. He says that in the current environment, Russian companies such as VisionLabs are known around the world and their products are competitive on global markets and in international competitions. Russia's state policy on AI has made it clear that this is a priority area for development; Russia even creates favorable tax and financial conditions for startups in this field.

These startups tend to begin by focusing on specific niches; for example, VisionLabs originally focused on biometric analysis for banks. Then they expand to other related products and to foreign markets. In recent months, VisionLabs has started two major collaboration projects. The first is international, with Huawei, in which VisionLabs algorithms will be integrated into Atlas products. The second is with Sberbank, in which VisionLabs' facial biometrics and gesture recognition systems will be incorporated into the Sber Portal smart display. The launch of these projects allowed VisionLabs to expand by 50 employees in 2020. The company now has offices in Amsterdam, Singapore, and Dubai. Its clients include banks, retailers, transport companies, and technology companies.

The coronavirus pandemic has further increased demand for some of the company's products, such as contactless payments, facial recognition in the retail sphere, and remote identification systems. Going forward, it expects to expand contextually based visual recognition systems, which will examine not just faces but also behavior and other aspects of physical appearance.

Source: "Discern by the walk: interview with VisionLabs founder" [Распознаю по походке: интервью с основателем VisionLabs], bloomchain.ru, Dec. 9, 2020, <https://bloomchain.ru/people/raspoznaju-po-pohodke-intervju-s-osnovatelem-visionlabs-aleksandrom-haninym>.

29. Skoltech cooperates with EU research organizations

Russian researchers working at Skoltech-affiliated institutes are engaged in extensive cooperation with EU researchers in the field of artificial intelligence. In one such project, scientists from the Skolkovo Institute of Science and Technology, the French INRIA institute, and the Japanese RIKEN institute are using AI algorithms to analyze brainwaves through electrical activity in order to understand people's emotional state and level of mental stress. They are conducting this research using brain-computer interface technology combined with neural networks that assist in classifying subjects' mental states through machine learning algorithms that use Riemann geometry and convolutional neural networks. Neural networks based on Riemann geometry were able to classify both emotional states and mental stress, while regular neural networks were not able to classify emotional states properly.

In a separate effort, researchers from the same Skoltech institute are working with scientists from Graz University and the Kanzelhöhe Solar Observatory in Austria to develop a new deep learning method for consistently classifying and quantifying the quality of solar images from ground-based solar observatories. As solar physics has increasingly focused on analysis of big data, it has come to depend on advanced systematic computer analysis, including through AI techniques. In a recently published study, scientists from the project used neural networks to analyze the characteristics of high-quality images and assess the deviation of real observations from the ideal standard.

The scientists' approach is based on generative adversarial networks (GANs), which are commonly used to generate synthetic images for applications such as creating realistic human faces or translating street maps to satellite imagery. This is achieved by approximating the distribution of real images and taking samples. The neural network first extracts important characteristics of a high-quality image, such as the position and appearance of solar cells, and then generates an original image from this compressed description. When the same procedure is applied to images with reduced quality, the network re-encodes the content of the image, but in reconstruction it misses the low quality characteristics. The study showed that this technique results in a 98.5 percent match to human observation.

The method was developed at Skoltech as part of the SPRING solar physics integrated networked research group, which provides autonomous monitoring of the sun using the latest technologies in the field of observational solar physics. SPRING is part of the SOLARNET project that is developing the European Solar Telescope (EST). The project is supported by the European Union Science and Innovation Horizon 2020. Skoltech (Russia) also participates in the initiative and is one of 35 international partners. The authors of the study are now working on developing image processing methods to provide a continuous stream of data with the

highest possible quality, and on the development of software for continuous and automatic tracking of solar activity.

Source: “Skoltech is training a computer to understand human emotions” [В Сколтехе компьютер обучают понимать эмоции людей], *ComputerWorld*, Dec. 29, 2020, <https://computerworld.ru/news/V-Skoltehe-kompyuter-obuchayut-ponimat-emotsii-lyudey>; “AI helps to watch the sun” [Искусственный интеллект помогает наблюдать за Солнцем], *ComNews*, Dec. 14, 2020, <https://www.comnews.ru/digital-economy/content/212176/2020-12-14/2020-w51/iskusstvennyy-intellekt-pomogaet-nablyudat-za-solncem>.

30. Russia-Saudi cooperation in use of AI for energy exploration progresses

According to Russian vice-premier Alexander Novak, Russia and Saudi Arabia’s Saudi Aramco energy company are discussing partnering for work in energy projects, including some in the nuclear field, under the auspices of the bilateral strategic cooperation program agreed on by both countries in October 2019. Plans include the use of artificial intelligence technologies to improve oil extraction capabilities for both partners.

Source: “Saudi Aramco reviews possibility of participating in projects in Russia” [Saudi Aramco рассматривает возможность участия в проектах в России], *Vesti*, <https://www.vesti.ru/finance/article/2501550>.

31. Russian AI cooperation with Africa remains limited

Russian ventures in Africa remain relatively limited, with a focus on commercial sales of AI-enabled products and the education of African students at Russian higher educational institutions focused on technology. In the education sphere, there is a long history of African students being educated at Russian universities such as the Patrice Lumumba University for Friendship of the Peoples. The total number of African students studying in Russia in all fields is over 27,000. The largest percentage are in technical and engineering fields, including artificial intelligence, though exact numbers are not available.

In terms of commercial sales, Russian AI technologies are particularly in demand in mining and other natural resource extraction industries in Africa. One example is Tsifra Group, which develops and supplies high-tech solutions for digitalization of the mining, oil and gas, chemical, and engineering industries. Its ZIIoT platform for working with production data uses artificial intelligence and the industrial internet of things. Its products are used around the world, including in a number of countries in Latin America and Africa. It recently received 1 billion

rubles in investment from VEB Ventures, the investment arm of VEB.RF, for the purpose of expanding its sales in international markets.

Source: Юрий Кукин, Ирина Мандрыкина, Вадим Белозерцев, “За знаниями и снегом: что притягивает африканских студентов в учебе в России,” Dec. 29, 2020, <https://tass.ru/obschestvo/10353061>; “VEB Ventures инвестирует 990 млн рублей в разработчика решений для цифровизации промышленности Группы «Цифра»,” *Rubezh*, Dec. 23, 2020, <https://ru-bezh.ru/press-releases/38953-veb-ventures-investiruet-990-mln-rublej-v-razrabotchika-reshenij>.

Article: General Staff Journal Discusses Military AI, AI in Nuclear Weapons

The Russian military establishment has been debating the use of advanced technologies for a number of years, and discussions of the development of unmanned and autonomous systems, as well as artificial intelligence (AI), are becoming more frequent.

In a January 2021 article in *Military Thought*, several authors with military ranks, affiliated with the Russian Ministry of Defense or Bauman Moscow State Technical University, discussed the current state and future trends of the employment of AI in military affairs. *Military Thought* (*Voennaya Mysl*), published by the Russian General Staff, is one of the oldest Russian-language military periodicals, dating back to the 1930s. For decades, Soviet, and later Russian, military officers, scientists, and contributors have used the journal to explore the conduct of war and its relationship to technology RDT&E.

The article provides an overview of key points of US and foreign discussions on AI in the military area. Interestingly, it does not offer a discussion of similar points when it comes to China; nor does it analyze Chinese AI-enabled military systems. The article discusses the employment of AI in the following areas:

- Command and control systems, particularly for air and missile defense
- Robotic systems, for various purposes
- Improvements in electronic warfare systems
- Systems in cyberspace
- Military logistics
- Training
- Munitions
- Biometric, health, and other sensing and forecasting data

The article also discusses US debates about the role of AI in nuclear weapons. The authors note that most studies suggest that AI could launch a nuclear strike if it saw an advantage. They point out contrasting perspectives in the United States on this matter, citing a 2018 RAND report by Edward Geist and Andrew John titled *How Might Artificial Intelligence Affect the Risk of Nuclear War?* and a 2019 *War on the Rocks* article by Adam Lowther and Curtis McGiffin titled “America Needs a Dead Hand.” They point out that Russia “would need to support

decision-making on the employment of nuclear forces, definitely using AI as an instrument of analyzing the dynamically changing geopolitical and military environment, and leaving the appropriate decision-makers to make final employment decisions.”

In conclusion, the authors make three points:

- “First, applied tasks solved through the employment of AI, are constantly increasing in complexity in accordance with the achieved at the particular moment in time level of scientific-technical progress. Things that just a few years ago could fall under the AI rubric are already not considered that today, and understood as only another means to automate a process of any kind. It is obvious that, in the future, present-day AI advances will be viewed as trivial and, possibly, not accord with our future understanding of AI.”
- “Second, the basis of any modern armament system with AI is hardware and software specially developed for the specific system and the task it is trying to solve. There is currently no single organizational environment that provides automatic centralized command by many diverse armament systems that have their own AI. But even now in militaries of developed states there are experiments on the group employment of robotic means of various basing. Thus, the development of [an] intellectual system of centralized combat command of various means of AI-enabled armaments is a matter of time. The appearance of such AI command systems, able to create quick kill chains by optimally organizing various sensors and shooters, will lead to further changes in the methods of combat because it may make unnecessary the direct participation of a human in the organization and conduct of combat.”
- “Third, all the aforementioned AI-enabled military systems initially had civilian prototypes. Generally, this is a tendency in employing AI in the military sphere—developed and tested commercial systems are adapted for military purposes, and this allows to significantly decrease the time and costs of the development of military systems with AI.”

The article further notes that the number of directions and approaches of employing AI in the military sphere will continue to grow, and may, over the long term, potentially fully replace armaments at the tactical and operational-tactical ranges guided by humans. The authors reiterate that any discussion of full or partial delegation of employment of strategic weapons, such as nuclear weapons, to AI-enabled systems is hotly debated at present. They conclude with Putin’s quote about leadership in AI translating to global leadership.

Source: Col. D.V. Galkin, Col. P.A. Polyandra, Col. A.V. Stepanov, “The state and prospects of employment of AI in military affairs” [Состояние и перспективы использования искусственного интеллекта в военном деле], *Military Thought [Voennaya Mysl]* magazine, Jan. 2021, pp. 113-124.

Spotlight: S-500 Prometey

On December 30, 2020, Russian Deputy Defense Minister Alexei Krivoruchko announced that Russia plans to complete tests of the S-500 Prometey (Prometheus) missile system and will officially acquire it in 2021. The S-500 is produced by Almaz-Antey Defense Corporation. Earlier, Lieutenant General Yuri Grekhov, the Deputy Commander-in-Chief of the Russian Aerospace Forces, remarked that the S-500 is being developed with domestic electronic components, and with maximum automation of all combat processes and operations.

Figure 2. S-500 – Early warning radar 92N6A (upper left), All-altitude detector 96L6 (upper right), SAM S-400 “Triumph” (bottom)



Source: Vitaly V. Kuzmin, Многофункциональная РЛС 92Н6А ЗПК С-400 (92N6A radar for S-400 system), 2017, accessed Jan. 7, 2021, <https://www.vitalykuzmin.net/keyword/air%20defence/i-MtJwptD/>; Vitaly V. Kuzmin, “100th Anniversary of the Russian Air Force – Air defense systems,” Aug. 10, 2012, accessed Jan. 7, 2021; and Alexander Nemenov, ЗПК С-400 “Триумф” (SAM S-400 “Triumph”), AFP via “TV-Novosti”, accessed Jan. 14, 2021, <https://russian.rt.com/russia/article/645906-s-500-chemezov-proizvodstvo>.

The proposed automation is part of a broader MOD effort to automate multiple functions in Russian military systems that include combat vehicles of all types, unmanned and autonomous systems, and supporting complexes like the S-500. CNA has highlighted such initiatives in previous newsletters, as the MOD argues for faster and more efficient operational capacity with the help of automation to address perceived threats from the West and NATO. *We have not seen any reporting indicating elements of AI are used in its design, but include it in the Spotlight due to its increasingly autonomous systems.*

Producers claim that the S-500 is capable of destroying all air targets within a radius of 400 kilometers. Additionally, they claim it can destroy incoming hypersonic missiles at a distance of 600 kilometers. The system is also intended to intercept intercontinental ballistic missiles (ICBMs) towards the end of their trajectory. S-500 missiles can purportedly reach space-based objects in low orbits, possibly targeting reconnaissance and telecommunication satellites. In addition to addressing the adversary ICBM threats, the S-500 will also be able to effectively target high-altitude drones, especially given Russian MOD concerns that NATO long-range UAVs constantly conduct surveillance along Russian borders.

Source: "The S-500 anti-aircraft missile system will be acquired in 2021" (Зенитную ракетную систему С-500 планируют принять на вооружение в России 2021 году), Tass.ru, Dec. 30, 2020, https://tass.ru/armiya-i-opk/10382387?fbclid=IwAR1uCwv6mjd9VcspmEphVEMW-TQpuYR3ub7cncF6oRW8T_VzC1bj3yiCQVI; "The "five hundred" approaches" (Пятисотка на подходе), Rg.ru, Mar. 5, 2020; <https://rg.ru/2020/03/05/v-armiiu-rf-postupil-pervuj-komplekt-zrk-srednej-dalnosti-s-350.html>; "S-500 is almost ready" (С-500 оказался почти готов), Lenta.ru, Dec. 4, 2019, <https://lenta.ru/news/2019/04/12/s500/>; Aleksandr Karpov, Elizaveta Komarova, "The frontier of space defense: how the elements of the latest Russian S-500 systems are being tested" (Рубеж космической обороны: как проходят испытания элементов новейших российских комплексов С-500), Russian.rt.com, Mar. 27, 2020, <https://russian.rt.com/russia/article/732179-s-500-rossiya-ispytaniya-oruzhie>; "Russian radars track 30 foreign spy planes and 6 drones over week," Tass.com, Dec. 11, 2020, <https://tass.com/defense/1233957>; "Russian radars track 30 foreign spy planes and 6 drones over a week," Tass.com, Dec. 11, 2020, <https://tass.com/defense/1233957>.

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