

SK

Space

SKOLKOVO
INNOVATION PROJECTS

SPACE CLUSTER

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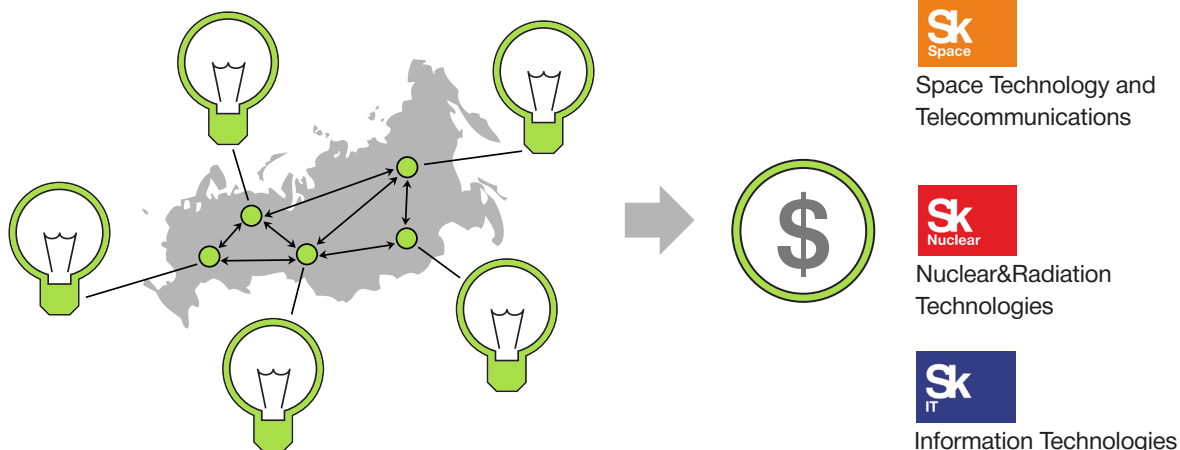
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ABOUT THE FOUNDATION

MISSION OF THE SKOLKOVO FOUNDATION

THE SKOLKOVO INNOVATION CENTER WAS ESTABLISHED BY FEDERAL LAW NO. 244 DATED SEPTEMBER 28, 2010 «ON THE SKOLKOVO INNOVATION CENTER» AS THE COUNTRY'S RESPONSE TO THE NEW CHALLENGES OF THE GLOBAL ECONOMY: ACCELERATING TECHNOLOGICAL PROGRESS AND RISING COMPETITION FOR KNOWLEDGE AND COMPETENCIES BETWEEN LEADING NATIONS.



The mission of the Skolkovo Innovation Center and the Skolkovo Foundation that established it, is to create an ecosystem in Russia conducive to the development of innovations to support cutting edge research and development and then to commercialize the results of such R&D in five priority fields of technological progress.



The Skolkovo Foundation aims to ensure that the Innovation Center can provide facilities for the full cycle of the innovation process including education, R&D, experimental research and design, and commercialization of the results.

The Skolkovo Foundation is creating a model for the development of an innovation-based economy for all of Russia. The Innovation Center serves as proving grounds to test the mechanisms for promoting the practical application of cutting edge ideas proposed by Russian academic and applied research institutions.

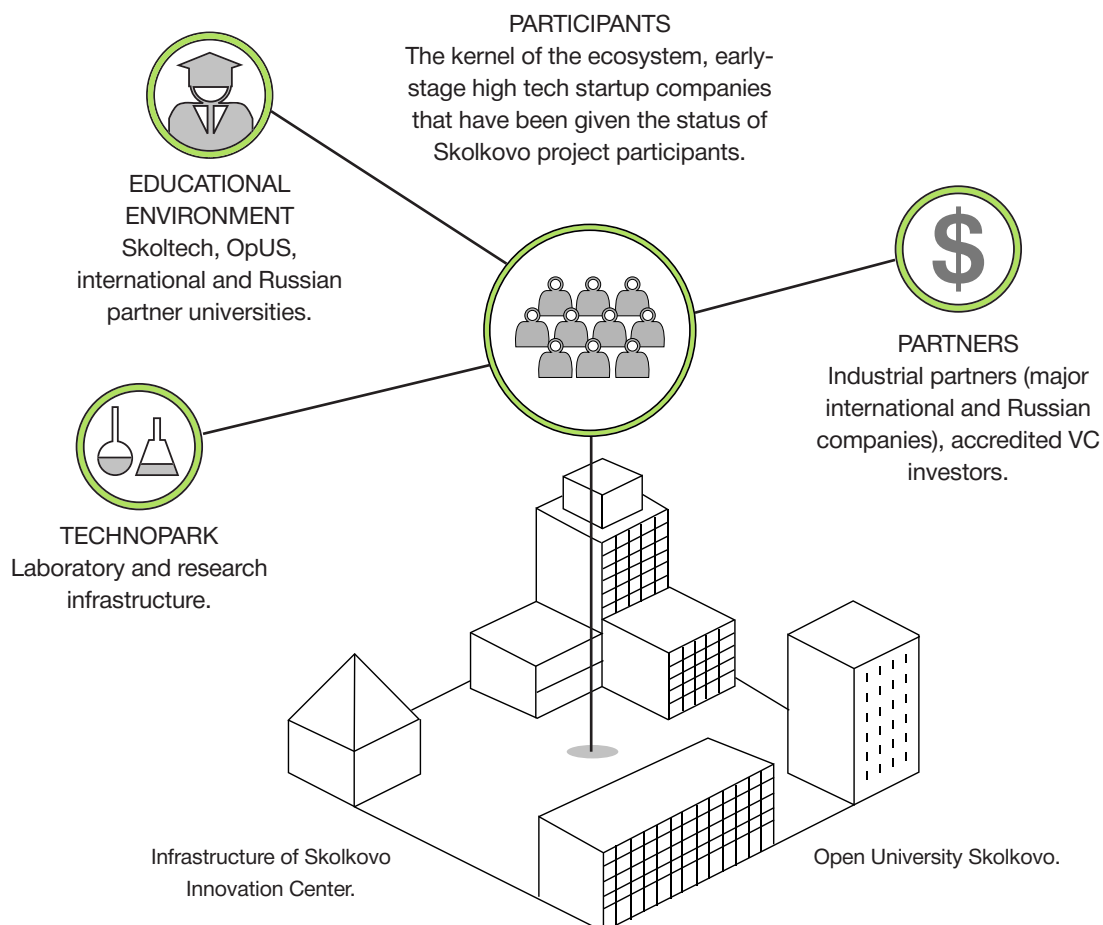
SKOLKOVO IS A KEY ELEMENT IN THE SYSTEM OF RUSSIAN DEVELOPMENT INSTITUTES that seeks to support innovation projects at every stage of development, from when it's just an idea all the way through sales and marketing, creating a system of continuous support that startups can draw upon as they work on their projects. The Skolkovo Foundation focuses on the pre-seed and seed stages of business development and some of the aspects of the launch stage. Subsequent stages such as business growth and development, IPO and financing are supported by RVC, RUSNANO and VEB, respectively.

SKOLKOVO'S GOAL IS TO CREATE AN INNOVATION ECOSYSTEM CONDUCTIVE TO RESEARCH AND ENTREPRENEURSHIP

ESTABLISHING AN INNOVATION ECOSYSTEM INCLUDES CREATING AND DEVELOPING EDUCATIONAL, RESEARCH AND ENTREPRENEURIAL ENVIRONMENTS, AS WELL AS THE PHYSICAL INFRASTRUCTURE OF THE SKOLKOVO INNOVATION CENTER.

The ecosystem consists of the following key elements: startups, R&D centers of the industrial partners, venture capital investors, the Technopark, the Skolkovo Institute of Science and Technology (Skoltech) and the infrastructure, i.e. the town of Skolkovo.

SKOLKOVO ECOSYSTEM



BENEFITS AND OPPORTUNITIES FOR PARTICIPANTS

TAX AND CUSTOMS BENEFITS:

- Social tax* - 14%
- Income tax - 0%
- VAT - 0%
- Property tax - 0%
- Customs tariffs on imported research equipment - 0 %

* Insurance premiums paid by the employer

GRANT SUPPORT

ACCESS TO INFRASTRUCTURE AND CONSULTING:

- R&D infrastructure and common use centers, consultations for applicants for Skolkovo participant status, office leases
- International and national events
- Education and mentoring (OpUS, Skoltech)

HELP WITH RAISING FINANCE AND ACCELERATION:

- VC and angel investors
- Infrastructure and technologies offered by industrial partners

HOW TO BECOME A PARTICIPANT:

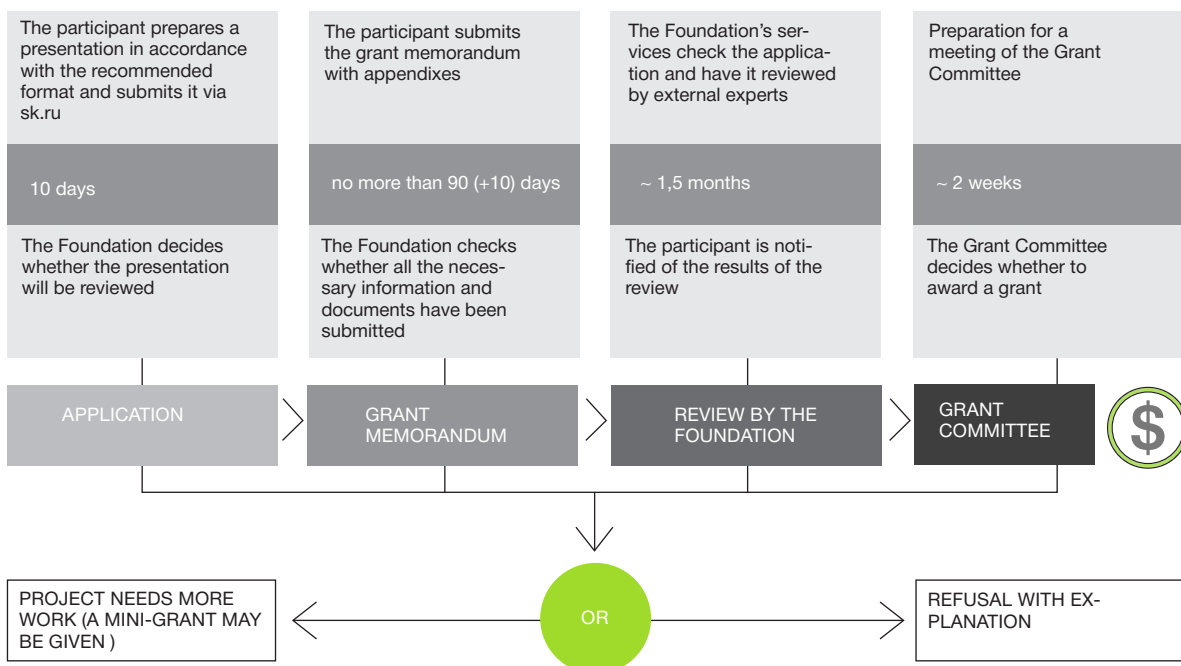


~ one month

KEY PRINCIPLES FOR GRANT FINANCING
BY THE SKOLKOVO FOUNDATION

		Grant Amount	Co-Financing Terms
Idea	A business plan and an R&D program are developed, the market is researched and a search for investors is initiated	up to 150 \$ K	Up to 100% Skolkovo
Seed	A working prototype is manufactured, a technical design is developed and the concept is tested	up to 850 \$ K	Up to 75% Skolkovo More than 25% Co-investor
Early stage	R&D is completed, an industrial prototype is developed and pre-clinical trials and phase I clinical trials are conducted	up to 4 \$ M	Up to 50% Skolkovo More than 50% Co-investor
Advanced stage	R&D and clinical trials are completed, pilot batches are manufactured and trialed	up to 9 \$ M	Up to 25% Skolkovo More than 75% Co-investor

HOW FINANCING IS ALLOCATED



STATISTICS AND FACTS



5540

applications from
2010 through 2013



484

applications
to register
intellectual property
in 2013



226

approved grants
in 2010-2013



1020

participating companies from
44 regions of the country
As of January 1, 2014



\$ 417 M

revenue earned by
participants
in 2012-2013



10000+

jobs
as of January 1, 2014



\$ 257 M

in approved
grants
in 2010-2013



\$ 91 M

in financing from
external investors
in 2013

SKOLKOVO INDUSTRIAL PARTNERS: FIRST SUCCESS STORIES

Industrial partners site their R&D centers in Skolkovo and act as startups customers, thereby integrating the R&D and business environment in the Skolkovo ecosystem.

Key Benefits of Skolkovo for Industrial Partners

- Access to the best human resources and cutting edge Russian science: Skolkovo is a good place to work and thus is a magnet for the best specialists from all over Russia and Moscow.
- It is easy to carry out research and experiments thanks to the concentration of technology and human resources and cooperation with Skoltech, Russian research institutes, Skolkovo partners.
- Access to cutting edge technologies developed by Skolkovo resident startups, some of which are being developed with state support.
- Simplified administrative procedures, no bureaucracy or red tape.
- The same tax and customs benefits as those enjoyed by Skolkovo participants.

SKOLKOVO INDUSTRIAL PARTNERS TODAY

> 40

industrial partners

> 3 500 people

estimated number of people to be employed by the R&D centers by 2015

> \$ 943 M

estimated total r&d budget through the end of 2015



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Innovation priorities

ABOUT THE CLUSTER

ABOUT THE CLUSTER



The space technologies and telecommunications cluster aims to create in Russia a commercial segment in the aerospace industry and support promising teams capable of laying the foundation for private enterprise in the Russian aerospace sector. Not only do we select, grow and support innovative companies specializing in the development of aerospace technologies, space applications and in telecommunications technologies, but we also make every effort to foster an institutional environment conducive to the development of the aerospace businesses in the country.

ALEXEY BELYAKOV

Vice President
Executive Director,
Space Technologies and
Telecommunications Cluster

- National space activity is an integral part of Russia's scientific, technological and spiritual heritage. For over fifty years, our country led the world in space exploration. Even today, Russia's aerospace industry remains one of several sectors in the country's economy still competitive on a global scale, and it is to a large extent thanks to our aerospace industry that Russia is still regarded as an equal among global economic leaders.
- Development of the aerospace industry not only speeds up the modernization of the economy, ensuring development in science and technology as well as in the social sphere, but it is also a key factor in the country's economic and social development, improvement in the living standards and national security.
- The space technologies and telecommunications cluster creates an environment for identifying, attracting and selecting the best innovations that seek to create and utilize space technologies and diversify the capabilities of the aerospace industry. The cluster seeks to promote interaction between companies and organizations operating in this sector to build a complete innovation process. Cluster participants carry out aerospace and telecommunications projects, working both on ways to utilize aerospace technologies in applied solutions offering innovative products and services to the general public and on the development of new dedicated aerospace solutions and diversification of the aerospace industry.
- The cluster counts on active and beneficial cooperation with Russia's research community and our foreign colleagues.

CLUSTER GOALS

- Develop the space and telecommunications sectors in Russia.
- Introduce new technologies in the aerospace and telecommunications sectors, transferring technologies to the adjacent sectors of industry.
- Attract and support participants in the Skolkovo project, develop the Skolkovo ecosystem.
- Create a national environment for advanced research and development, promote cooperation between the state and the private sector on aerospace projects.





INNOVATION PRIORITIES



Today space research is no longer just a matter of pride and prestige for the state. It's not just an expensive toy, but rather an industry just like the shipbuilding, automotive or aviation industries that also has its accepted rates of return, depreciation and profit.

DMITRY ROGOZIN

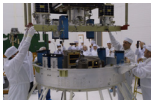
Vice Prime Minister of Russia.



SPACE APPLICATIONS



ELEMENTS AND SYSTEMS FOR GROUND AND ORBITAL SEGMENTS OF SPACE ACTIVITIES



INDUSTRIAL AND EXPERIMENTAL TECHNOLOGIES AND SOFTWARE FOR THE AEROSPACE INDUSTRY



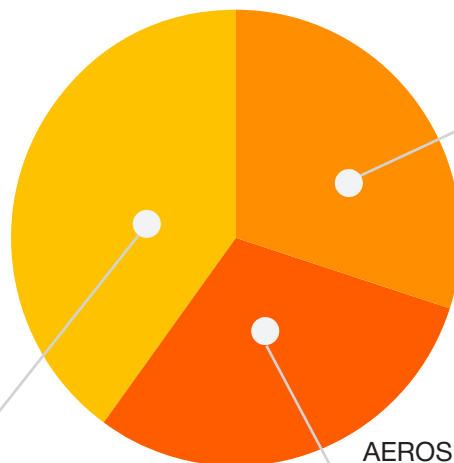
PRIORITIES FOR THE DEVELOPMENT OF TELECOMMUNICATIONS



INTEGRATED AEROSPACE TECHNOLOGIES

PRIORITY SPACE TECHNOLOGIES:

- Space products and services
- Space facilities and systems
- Industrial technologies



TELECOMMUNICATIONS TECHNOLOGIES

AEROSPACE TECHNOLOGIES

PROJECTS OF PARTICIPATING COMPANIES



SKOLKOVO GRANTEE

AEROB LLC

UAV INTELLIGENT CONTROL SYSTEM

COMPETITIVE ADVANTAGES /

Use of artificial intelligence algorithms in UAV automated control system (ACS);
A new approach to the formation of target UAV behavior during missions;
Ability to adapt to any type of UAV;
Small size.

ESSENCE OF INNOVATIONS /

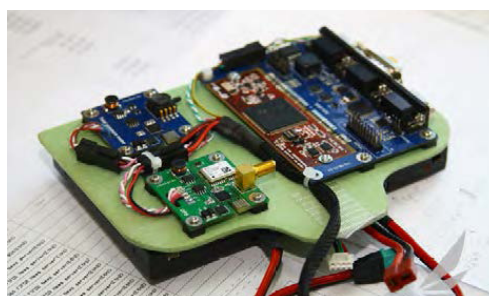
Algorithms for peer review of flight situations;
Use of defensive situational control technology;
Dynamic change of the UAV's control priorities.

RESULTS ACHIEVED /

A prototype of a UAV ACS has been developed;
A full-scale simulation model of the ACS has been produced;
Ground and flight testing has been performed;
A cooperation agreement has been signed with the manufacturer of SOLON robotic systems (France).

MARKET POTENTIAL /

Geography of development:
European Union, North Africa, Asia and the Pacific.
Launching production in 2014
Planned revenue is up to 100 million rubles in 2014.
The company plans to occupy a niche of up to 3% of the market by 2016.



THE TEAM /

ANDREY MAMONTOV,
CEO;
ALEKSANDR GORBACHEV,
Chief Designer;
DMITRY TELENKOB,
Lead Expert on Unmanned Aircraft Systems.

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AIR NAVIGATION SATELLITE TECHNOLOGIES AND SOLUTIONS IN AVIATION JSC

AN INTEGRATED VORTEX WAKE FLIGHT SAFETY SYSTEM BASED ON SATELLITE NAVIGATION AND COMMUNICATION TECHNOLOGIES.

COMPETITIVE ADVANTAGES /

By increasing the capacity of airports by 40%, the technology will increase the safety of air transportation and increase revenues for airlines and air navigation service providers.

ESSENCE OF INNOVATIONS /

The data is calculated onboard of each aircraft using numerical algorithms. Potential conflicts associated with getting into the vortex wake are graphically displayed to the flight crew.

RESULTS ACHIEVED /

The concept of ensuring vortex safety for flights has been developed. It has been recommended by ICAO for worldwide use. A prototype of an on-board module has been developed based on an electronic flightbag (EFB).

MARKET POTENTIAL /

The market for airport navigation equipment is up to USD 1.5 billion.



THE TEAM /

MIKHAIL KANEVSKY,
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ANDREY ANIKIN,
Dr. Tech. Sc., Prof.;;
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ASF LLC

ADAPTIVE NEXT-GENERATION LIGHT SHIELDING FILTERS AND ACTIVE STEREOSCOPIC FILTERS

COMPETITIVE ADVANTAGES /

Adaptive light-shielding filters (ALSF) provide local suppression of interfering bright light. Distance stereoscopic filters (DSF) allow building specialized high-resolution 3D-display systems. Multistandard stereo glasses (MSG) allow watching stereoscopic images from screens on a number of stereodisplays.

ESSENCE OF INNOVATIONS /

The novelty of ALSF, DSF and MSG is an innovative architecture (3 Russian Federation patents), optimized LCD structures, and its potential implementation on ultrathin optical substrates to minimize weight and form the desired configuration.

RESULTS ACHIEVED /

Experimental samples of light-shielding filters with integral adaptation have received positive feedback for use in ZVEZDA Scientific Production Enterprise's prospective space suits and by fighter pilots of Sukhoi design bureau.

MARKET POTENTIAL /

The projected volume of the national market in 2017 is 150 million rubles; the world market is over USD 1 billion.



THE TEAM /

VASILY EZHOV,
Project Manager and Chief Designer;
SERGEY STUDENTSOV,
Chief Technologist;
VLADIMIR MASLOV,
PhD Tech. Sc., Chief Engineer.

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BASTION LLC

DEVELOPMENT OF METAL - CERAMIC MATERIALS FOR PRODUCTION OF ECB INTEGRATED CIRCUITS PACKAGES FOR USE IN SPACE , INCLUDING GLONASS PROGRAM

COMPETITIVE ADVANTAGES /

The solution will increase reliability and availability of hardware components, and provide radiation protection for them; Reducing the radius of curvature of outputs from 3 to 1 mm; A significant decrease in low-temperature ceramics thermal shrinkage.

ESSENCE OF INNOVATIONS /

Generation of special ceramic materials based on aluminum oxide (AL₂O₃), silicon oxide (SiO₂) and others for the manufacture of special metal ceramics: package, substrates and multi-chip modules (MCM).

RESULTS ACHIEVED /

Technology for multilayer ceramic co-layering through hot molding and thermocompression bonding has been developed. Technology to produce ceramic materials is being developed.

MARKET POTENTIAL /

The global market of space microelectronics is at least EUR 2 billion.



THE TEAM /

EVGENY CHELNOKOV,
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CARBON CHG LTD

PRODUCTION OF SINGLE-WALL CARBON NANOTUBES AND DEVELOPMENT OF APPLICATIONS BASED ON MULTI - AND SINGLE-WALL CARBON NANOTUBES

COMPETITIVE ADVANTAGES /

By increasing the strength of carbon composites and using them to replace metal in some parts of launch vehicles, the weight of these parts has been reduced, including an approx. 20% reduction in the weight of three-layer composite frames for nose cones and dry bays on the Proton-M and Rokot launch vehicles.

ESSENCE OF INNOVATIONS /

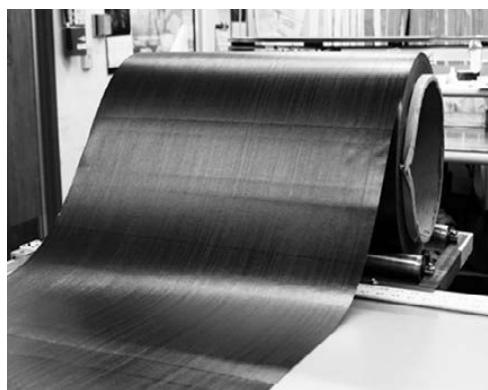
The insertion of nanofibers into a polymer in order to improve the structure at the nanoscale, and the transfer of the load from the polymer matrix to the reinforcing elements, which are carbon nanotubes.

RESULTS ACHIEVED /

A laboratory-scale production facility has been set up for production of nanomodifiers based on several types of epoxy binders. Work is underway with other types of polymers. Trial production of SWCNT and SWCNT-based products has been set up.

MARKET POTENTIAL /

The application of materials in engine systems of Soyuz- and Proton-M types launch vehicles – up to 30 launches a year in the Russian Federation and French Guiane; the material also has significant potential in a variety of industries where carbon composites are used; approx. \$5 billion annually in total.



THE TEAM /

ANATOLY KRESTININ,
Dr. Sc. in Physics and Mathematics, CEO;
VLADIMIR LEONIDOVICH SHESTAKOV,
Co-Founder, interaction with principal partners;
SERGEY ALDOSHIN,
Project Scientific Supervisor, Mentor;
VADIM ULYANOV,
Director of Development,
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CENTER OF MICROMECHANICS AND ADVANCED MATERIALS LTD

MICROMECHANICA SOFTWARE PACKAGE FOR ENGINEERING ANALYSIS AND PREDICTION OF PHYSICAL AND MECHANICAL PROPERTIES OF NANOSTRUCTURED MATERIALS

COMPETITIVE ADVANTAGES /

The system reproduces the complex conditions of using space materials and accounts for their varying structure at the microscopic level.

ESSENCE OF INNOVATIONS /

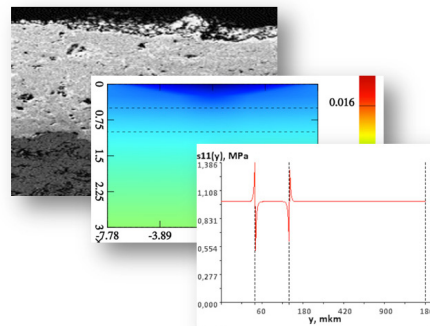
Advanced methods related to composite material mechanics and virtual experiment modeling technologies are used; these methods are being developed with the participation of leading researchers from the Russian Academy of Sciences (CC RAS, IAM RAS, IPM RAS etc.) and foreign colleagues.

RESULTS ACHIEVED /

Methods and mathematical models have been developed for the purpose of reliably describing and forecasting experiments with contemporary composite materials. Model testing has been conducted as part of projects dedicated to developing new structural materials. A team has been formed, and an investor has been found.

MARKET POTENTIAL /

The R&D market in composite materials is at least \$10 billion.



THE TEAM /

YURI SOLYAEV, CEO,
Ph.D. in Physical and Mathematical Sciences, Svorykin Award laureate and winner of the President of Russian Federation grant, Associate Professor at Moscow Aviation Institute;
SERGEY LURIE,
Director for Science, an expert in Mechanics of Materials, Professor, D.Sc. (Engineering).

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CENTER OF PLASMA AND VACUUM TECHNOLOGIES LLC

PLASMA NEUTRALIZER OF A SPACECRAFT 'S ELECTROSTATIC CHARGES

COMPETITIVE ADVANTAGES /

The proposed solution allows quick removal of a static charge from the materials both for short ($t \ll 1\text{sec}$) and long ($t > 1-100$ seconds) periods, adjusting the value of the potential and changing its polarity.

ESSENCE OF INNOVATIONS /

The original method and a device for a highly economical and multi-functional plasma neutralizer to protect the spacecraft from external influence have been developed to improve the reliability of electronic systems and satellites and to prolong their active life.

RESULTS ACHIEVED /

Theoretical and experimental studies have been conducted; an operating laboratory prototype of a compact plasma neutralizer of electrostatic charges has been designed and implemented. A hardware prototype that consumes only on-board power is being developed.

MARKET POTENTIAL /

Market is 35-40 spacecraft per year.



THE TEAM /

Yu. V. KUBAREV,
Dr. Phys.-Math.Sc., Prof., Vice President
of A. M. Prokhorov Academy of
Engineering Science, CEO of
CPVT LLC;
K.P. KIRDYASHEV,
Dr. Phys.-Math.Sc., Prof., Lead Research
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SKOLKOVO GRANTEE

DAURIA SATELLITE TECHNOLOGIES LLC

DEVELOPMENT OF A LOW-COST AND QUICKLY MANUFACTURABLE NEXT-GENERATION MINISATELLITE PLATFORM BASED ON ADVANCED PRODUCTION TECHNOLOGY AND A PATENTED PRODUCTION METHOD

COMPETITIVE ADVANTAGES /

Inexpensive components;
Patented thermal control technology and radiation protection technology;
Commercial off-the-shelf electronic assemblies.

ESSENCE OF INNOVATIONS /

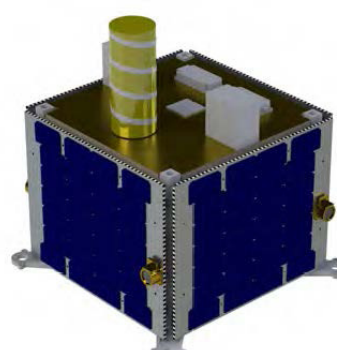
The price of a new satellite is 10 times lower than conventional models;
Active lifetime is 3-5 times longer;
Launching 10-100 times more spacecraft is possible, and large orbital constellations can be deployed in a short time.

RESULTS ACHIEVED /

Dauria Aerospace Group's parent company won a tender conducted by the Russian Space Agency to build two spacecraft for Earth remote sensing in 2012 (315 million rubles).

MARKET POTENTIAL /

The world market for microsatellites has reached USD 500 million and continues to grow rapidly.



THE TEAM /

MIKHAIL KOKORICH,
Company Founder;
SERGEY IVANOV,
CEO.

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DESIGN BUREAU DINAMIKA LLC

DEVELOPMENT OF A GAS GENERATOR BASED ON COMBUSTION OF HYDROCARBON FUEL IN A SYSTEM OF OPTIMAL TRIPLE CONFIGURATIONS OF SHOCK WAVES IN ACCORDANCE WITH THE HUMPHREY CYCLE

COMPETITIVE ADVANTAGES /

Significant increase (20-25%) in basic characteristics while reducing the cost (by at least 15-20%);
A new method of creating continuous detonation combustion.



ESSENCE OF INNOVATIONS /

To arrange the continuous circular detonation, the theory of optimal operational triple-configurations of shock waves was developed.

RESULTS ACHIEVED /

A block diagram of shock wave generation in an annular combustion chamber has been developed.

MARKET POTENTIAL /

The market for aircraft engines is approx. USD 62 billion; the detonation combustion chamber could be installed in 5% of the engines produced.

THE TEAM /

PAVEL BULAT,
Head of R&D;
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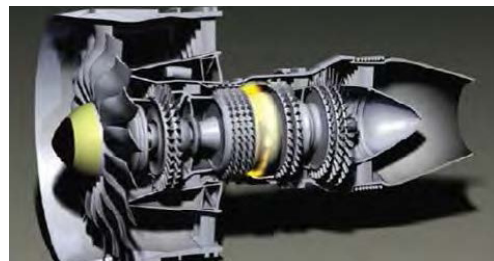
SKOLKOVO GRANTEE

EADS RUSSIAN TECHNOLOGY OFFICE SK LLC

DEVELOPMENT AND COMMERCIALIZATION OF TECHNOLOGIES TO CREATE AN ANNULAR DETONATION COMBUSTION CHAMBER

COMPETITIVE ADVANTAGES /

The efficiency of fuel combustion in the combustion chamber increases significantly;
Engine fuel efficiency increases significantly;
Reduces emissions of harmful substances;
Provides the greatest possible continuity of the jet engine design.



ESSENCE OF INNOVATIONS /

Development of technology for the realization of a detonation combustion chamber that uses the principle of a continuously rotating detonation wave in an annular combustion chamber channel.

RESULTS ACHIEVED /

The quantity of detonation waves in the combustion chamber channel has been determined. The results of the circuit analysis of the basic gas turbine engine, critical factors for the operation of the compressor and the turbine in conjunction with the detonation combustion chamber have been obtained.

MARKET POTENTIAL /

The market for aircraft engines is approx. USD 62 billion; the detonation combustion chamber could be installed in up to 5% of the engines produced.

THE TEAM /

D. A. BONDARENKO,
Project Manager;
S.A. ZHDAN,
Development of Computational-Analytical Detonation Models;
V.I. KOPCHENOV,
Mathematical Modeling of the Operation of Promising Jet Engines, Profiling Aircraft Power Installations.

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ENERGY STORAGE MANAGEMENT SYSTEMS (SUHE) LTD

DEVELOPMENT OF AN AUTOMATED ANALYTICAL SYSTEM TO OPTIMIZE THE ENERGY EFFICIENT USE OF AUTONOMOUS POWER SOURCES

COMPETITIVE ADVANTAGES /

Advantages: full control and diagnostics of a serviced battery;
- broad range of serviced battery parameters (capacity, type, number of elements);
- highly efficient balancing method (high balancing efficiency coefficient).

ESSENCE OF INNOVATIONS /

A highly efficient balancing method is used, based on the redistribution of energy among cells via the balancing bus with the help of bidirectional DC/DC transformers; a control method based on element-by-element control of battery cells; and a function of adaptive configuration enabling the use of the product for a variety of battery types.

RESULTS ACHIEVED /

The project team has been formed. Initial research, investor search, and marketing research for product implementation have been performed. The team is developing technical solutions to be used in space activities and telecom services.

MARKET POTENTIAL /

The global market for Li-Ion electric power accumulators grows by 27% annually and is \$4 billion. Control systems account for approx. 10% of the market.



THE TEAM /

SVETLANA BUZADZHI,
CEO, Management, Innovations and Finance;
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Technology and Design Researcher;
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SKOLKOVO GRANTEE

GEOSCAN TECHNOLOGIES CJSC

TWINSAT – UTILIZATION OF MICRO- AND NANOSATELLITES TO DETECT AND MONITOR PRECURSORS TO EARTHQUAKES (RUSSIAN-BRITISH SPACE PROJECT)

COMPETITIVE ADVANTAGES /

The use of a 2-satellite configuration ensures much more accurate detection and identification of precursors to earthquakes.

ESSENCE OF INNOVATIONS /

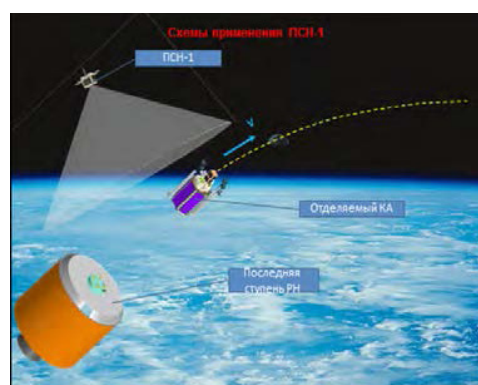
Use of synchronous measurements in three environments and a 2-satellite space segment structure, which makes it possible to identify signals related to seismics in non-seismic noise.

RESULTS ACHIEVED /

A license has been obtained from the Federal Space Agency.

MARKET POTENTIAL /

The global market for microsatellites has reached \$500 million and continues to grow rapidly. There is currently no market for early identification and monitoring of earthquake precursors.



АВИС-1: схема применения

THE TEAM /

VITALIY CHMYREV,
Dr. Sc. in Physics and Mathematics, CEO;
BORIS NESTEROV,
Director of Development, Chief Design
Engineer.

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GRANAT-T LTD

DEVELOPMENT OF AN INTELLIGENT TRAFFIC SAFETY SYSTEM BASED ON THE INTEGRATION OF SATELLITE SIGNALS AND ALTERNATIVE SOURCES OF NAVIGATION INFORMATION

COMPETITIVE ADVANTAGES /

For the first time ever, it is possible to anticipate accidents and give drivers advance warning. A cheap device (\$200) with position-finding capabilities with an accuracy of 1-1.5 meters.

ESSENCE OF INNOVATIONS /

Integration of satellite signals with existing sensors (odometer and video recorder) reliably ensures an accuracy of 1-1.5 meters in heavily urbanized city areas.

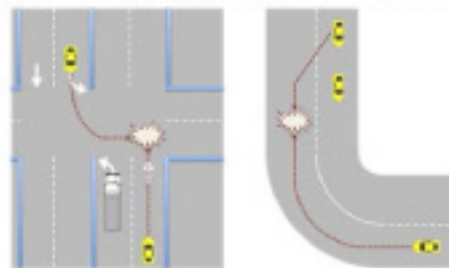
RESULTS ACHIEVED /

Components of the proposed integrated navigation solution (GPS, an inexpensive inertia-based system, and an automobile odometer) have been successfully tested together with Honda Company engineers in Detroit (USA).

MARKET POTENTIAL /

The market for automotive navigation equipment is approx. \$2 billion.

Prediction and prevention of car accidents



THE TEAM /

A. N. SOLOVYOV,
Dr. Sc. in Technical Sciences, Prof.;;
A. A. SOLOVYOV, PhD;
V. E. ALEKSEEV;
Yu. I. TITOV.

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ISKY TRACKER LLC

AUTOMATIC SYSTEM FOR MOBILE SATELLITE COMMUNICATIONS

COMPETITIVE ADVANTAGES /

The system works with GEO and LEO satellites in Ku- and Ka-bands. The antenna has a high gain ratio and the ability to rapidly control a beam pattern over a broad range.

ESSENCE OF INNOVATIONS /

The essence of iSky Tracker is a planar reflective antenna array produced using standard printing technology.

RESULTS ACHIEVED /

A prototype system operating in the Wi-Fi band has been developed; a conceptual model of a system for the Ku-band has been designed; digital simulation and testing of the system for the Ku- and Ka-bands has been performed.

MARKET POTENTIAL /

The total estimated market for satellite Internet access is USD 3-3.5 billion.



THE TEAM /

MAXIM SHURALEV,
Head of System Development and
Commercialization;

MAXIM SOKOLOV,
Development of Positioning and
Management Systems;

ANDREY YELTSOV,
Development of System and Interface
Units;

DIANA ARUTYUNOVA,
Organization and Development of
Relationships with Partners and
Customers.

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JSC ISS BASIC RESEARCH CENTER LTD

DEVELOPMENT, TESTING, AND PRODUCTION OF SPACECRAFT SOLAR PANELS WITH LINEAR LIGHT FLOW CONCENTRATORS

COMPETITIVE ADVANTAGES /

Specific power – at least 360 W/kg;
Output power – from 8-20 kW;
Galvanic decoupling of the output line
from the electric power supply lines.

ESSENCE OF INNOVATIONS /

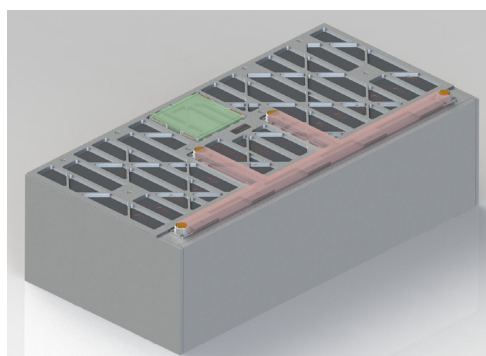
For the first time ever, schematic design of power units based on bridge resonance converters with galvanic decoupling will be used for spacecraft energy-transforming equipment. While simultaneously reducing the mass and improving power supply system performance, it will be possible both to allocate additional power to the payload or spacecraft platform, and increase the spacecraft's active lifetime.

RESULTS ACHIEVED /

Laboratory prototypes of power modules with bridge resonance converters have been produced;
power modules have been tested;
the claimed specifications have been confirmed.

MARKET POTENTIAL /

The market is 35-40 spacecraft annually.



THE TEAM /

EVGENY GETS,
CEO, M. Sc. In Physics, Support of
international contracts for spacecraft-
building projects (over 20 projects);
ROMAN KOZLOV,
Head of Design Department No. 1,
Spacecraft Control Systems Engineer,
M.Sc. in Information Sciences.

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Krai, Zheleznogorsk

KB ATLANT LTD

“ATLANT” (RUSSIAN ACRONYM FOR AEROSTATIC FLYING TRANSPORTATION DEVICE OF A NEW TYPE)

COMPETITIVE ADVANTAGES /

Key features:

- capability of delivering cargo and people to areas that have no runway for take-off or landing, mooring mast, or crew;
- all-season operation;
- high load-carrying capacity and large cargo bay dimensions.

ESSENCE OF INNOVATIONS /

An aerostatic hybrid flying machine that includes buoyant-force control technology. The apparatus will be adapted to enable it to land and stay without an airfield, and be operated in all seasons.

RESULTS ACHIEVED /

A project feasibility study and initial marketing research have been completed. An implementation strategy has been developed. Initial patent and licensing research has been conducted. 3 applications for Russian Federation patents have been filed.

MARKET POTENTIAL /

The potential aerostatic transportation market is approx. \$500 million.



THE TEAM /

GEORGY YUZHBYANTS,
CEO. Innovations and commercialization of innovations;
GENNADY VERBA,
General Manager. Commercialization and Sales;
IGOR ORESTOV,
Chief Design Engineer. Development and configuration of aircraft (airplanes and airships).

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MULTICLET OJSC

DEVELOPMENT, MASS PRODUCTION, AND MARKETING OF MULTICELLULAR PROCESSORS BASED ON HIGH-PERFORMANCE PROCESSOR CORES WITH A RADICALLY NEW ARCHITECTURE AND MINIMAL POWER CONSUMPTION

COMPETITIVE ADVANTAGES /

The use of a fault-tolerant chip based on a multicellular architecture will be financially and technically advantageous. Low power consumption of 1.5 W.

ESSENCE OF INNOVATIONS /

Development and deployment in existing space hardware of multicellular processors based on processor cores with a fundamentally new architecture. The possibility to use processor chips with manufacturing defects.

RESULTS ACHIEVED /

Research and development of two models of multicellular processor cores are complete.

MARKET POTENTIAL /

The global market for space microelectronics is at least EUR 2 billion.



THE TEAM /

BORIS ZYRYANOV,
Project Organizer;
NIKOLAI STRELTSOV,
Technical Project Management;
DMITRY KUKUSHKIN,
Head of the Development of SP Core
Setting, Integrating All the Hardware
Modules in the System.

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NANOTECH-EXPRESS LLC

INFORMATION CENTER FOR NAVIGATION CORRECTIONS FOR GPS AND GLONASS SYSTEMS

COMPETITIVE ADVANTAGES /

Assimilative model of the ionosphere, which allows real-time calculation of the ionospheric component of navigational error with up to 10% precision on a global scale.

ESSENCE OF INNOVATIONS /

The calculations are carried out using a model of the ionosphere, which uses data from a small number of reference stations.

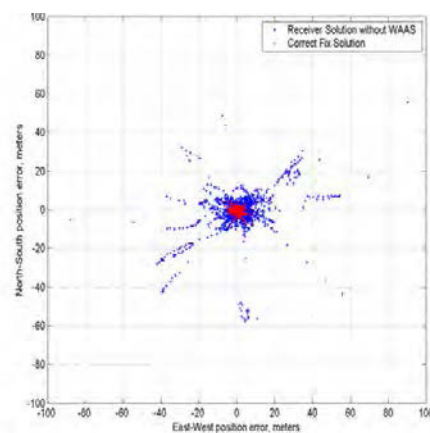
RESULTS ACHIEVED /

A three-dimensional version of the assimilation model of the ionosphere has been implemented. Experiments were conducted in order to compare the results obtained by using the developed technology with the results of independent observations.

MARKET POTENTIAL /

The main market segments:

- Differential correction networks
- Geodetic measurements
- High-precision navigation
- Civil aviation
- Geographic information services.



THE TEAM /

B. V. HATTATOV,
Research Manager, PhD;
D.V. SOLOMENTSEV,
PhD Phys-Math. Sc., Project Director;
E.N. LOGINOVA,
PhD Tech. Sc., Senior Research
Fellow, Associate Professor, Director of
NANOTECH-EXPRESS LLC.

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SKOLKOVO GRANTEE

NEW ENERGY TECHNOLOGIES LLC

MINIATURE ATOMIC CLOCK

COMPETITIVE ADVANTAGES /

A miniature atomic clock can replace precision quartz oscillators and rubidium standards, drastically reducing power consumption and providing high long-term stability.

ESSENCE OF INNOVATIONS /

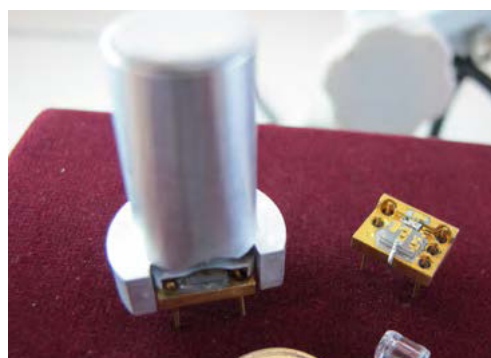
The miniature atomic clock works on a new physical principle: the quantum effect of coherent trapping of the energy level in atoms of rubidium-87.

RESULTS ACHIEVED /

A model of a quantum discriminator has been developed.

MARKET POTENTIAL /

The market for highly-stable source of reference frequencies and the exact time for radio- and electronic equipment is approx. USD 1 billion.



THE TEAM /

V. L. VELICHANSKY,
PhD Phys-Math. Sc., Associate Professor,
Research Manager;
A.N. KUZNETSOV,
PhD Tech. Sc., CEO;
A. ZIBROV,
PhD, Senior Research Consultant.

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SKOLKOVO GRANTEE

NPO ENERGOMASH OJSC CENTER OF INNOVATION LTD

ACETAM – NEW HIGHLY EFFICIENT ROCKET FUEL. CREATION OF ACETAM-BASED ENGINES

COMPETITIVE ADVANTAGES /

With the energy capacity of oxygen-hydrogen boosters, oxygen-acetam boosters are much cheaper and easier to handle. Ammonium and acetylene are basic chemicals produced on a large scale, and therefore accessible and cheap.

ESSENCE OF INNOVATIONS /

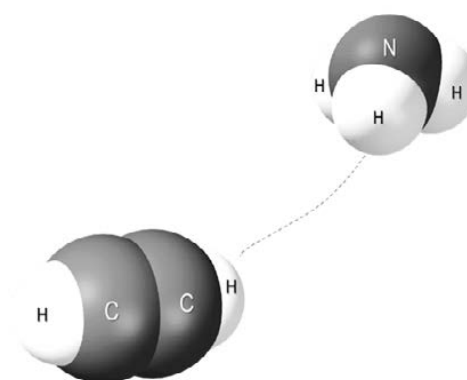
Development and implementation of a fundamentally new acetylene- and ammonium-based rocket fuel that provides significantly better energy capabilities for launch vehicles, with only the booster requiring a certain amount of adaptation.

RESULTS ACHIEVED /

Fuel development prototypes have been received. Calculations have been made for launchers and boosters that confirm the efficiency of the proposed fuel.

MARKET POTENTIAL /

The market for fuels for liquid propellant rocket engines is approx. \$100 million a year.



THE TEAM /

ANATOLY LIKHVANTSEV,
Director, an advocate of the use of liquefied natural gas in spacecraft;
VLADIMIR KHAZOV,
Project Manager, a leading industry expert in nuclear rocket engines;
LEONID STERNIN,
Project Scientific Supervisor.

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ORBITAL SYSTEMS RESEARCH AND PRODUCTION GROUP OJSC

ANTHROPOMORPHIC ROBOTIC SYSTEM FOR OPERATION IN SPACE

COMPETITIVE ADVANTAGES /

Application of a master-slave control system will facilitate performance of technical operations with efficiency comparable to that of an astronaut. The device's dimensions are less than those of an astronaut in a space suit.

ESSENCE OF INNOVATIONS /

An anthropomorphic device structure; use of a master-slave control system to ensure feedback is transmitted to the operator's sensory organs.

RESULTS ACHIEVED /

Pre-design work is complete. The basic principles of the mechanical system and control systems have been formulated. The calculations necessary to develop the primary assemblies have been performed. A patent has been obtained.

MARKET POTENTIAL /

The market for robotics products is approx. \$9 billion; special purpose robotics accounts for at least \$4 billion.



THE TEAM /

ALEKSANDR PERMYAKOV, CEO;
ILDAR KUTLUBAEV,
R&D and scientific oversight;
ALEKSEY BOGDANOV,
Chief Engineer.

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SKOLKOVO GRANTEE

PLASMA-SK LTD

NANOSTRUCTURED COATING TO SUPPRESS SECONDARY ELECTRON EMISSION ON METAL SURFACES IN TELECOMMUNICATION SATELLITES

COMPETITIVE ADVANTAGES /

The process of applying the nanocarbon coating does not require a vacuum chamber; Several cm² and more have been applied to experimental items; Highly durable coating; Comparatively low technology cost (EUR 0.8–1.2 million against competitors' EUR 3–6 million).

ESSENCE OF INNOVATIONS /

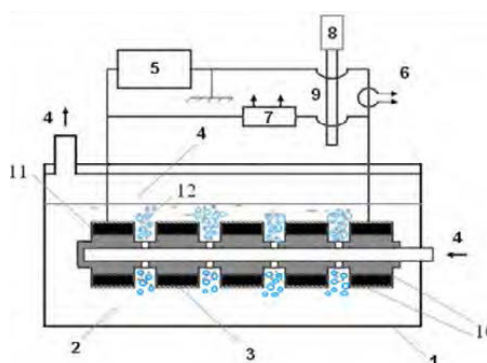
An original method of suppressing the secondary emission discharge in SHF-emitting equipment by means of applying a nanostructured carbon coating; the process to obtain the initial substance; the use of a nanocoating to obtain unique product features.

RESULTS ACHIEVED /

Technological approaches to obtaining a nano-sized substance and applying a nanocoating have been developed under laboratory conditions; a test bench for obtaining experimental nanocoating prototypes has been developed and tested.

MARKET POTENTIAL /

SHF emitters for spacecraft.
The market for spacecraft is approx. 35-40 items annually.



THE TEAM /

IGOR KOSSIY,
Dr. Sc. in Physics and Mathematics, Prof.,
Lead Researcher with IOF RAN;
EDUARD BARKHUDAROV,
Dr. Sc. in Physics and Mathematics,
Prof., Lead Researcher with IOF RAN.
Fundamental and applied research in the
field of low-temperature plasma
physics.

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POWER SYNTHESIS CJSC

FUNCTIONAL TECHNOLOGIES TO CREATE ONBOARD SPACECRAFT EQUIPMENT (SPACE RADIO ELECTRONICS, OPTOELECTRONICS, ON-BOARD ENERGY SYSTEMS: ACCUMULATORS, SOLAR BATTERIES ETC.)

COMPETITIVE ADVANTAGES /

Autonomy of thermoelectric supply with an overall efficiency of at least 80–85%; 100% reduction of NO_x, SO_x, CO, soot waste; Reduction of CO₂ emissions by more than a factor of 2.

ESSENCE OF INNOVATIONS /

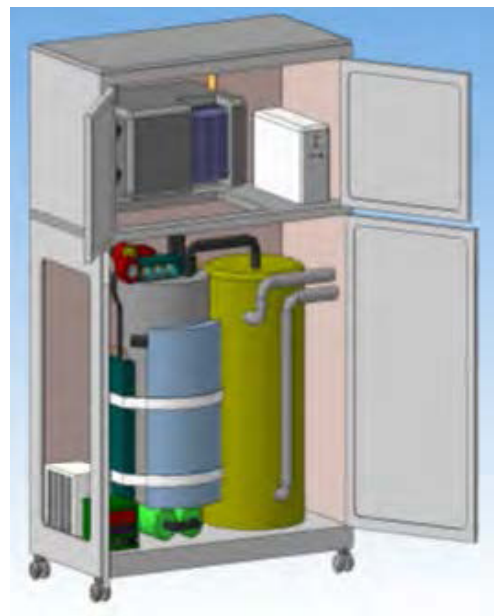
Machineless electrochemical transformation of fuel chemical energy into electric power. High speed and low energy consumption for power generation at elevated temperatures of 750–800° C in the absence of catalytic agents.

RESULTS ACHIEVED /

In cooperation with ISSP RAS, SOFC and bipolar wafer prototypes have been developed. SOFC calculation and modeling methods have been mastered. In cooperation with ISSP RAS, SOFC and bipolar wafer prototypes have been tested.

MARKET POTENTIAL /

Potentially, several hundred ground-based facilities in the Russian Federation; up to 20 launches a year in the Russian Federation and CIS countries if implemented on board of launch vehicles.



THE TEAM /

SERGEY BYCHKOVSKY,
PhD in Technical Sciences, Engineering
Group Manager;
SERGEY BREDIKHIN,
Dr. Sc. in Physics and Mathematics,
Project Scientific Supervisor.

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RADIO GIGABIT LTD

DEVELOPMENT OF RADIO-RELAY EQUIPMENT COMPONENTS AND ASSEMBLIES FOR THE 71-76 GHz AND 81-86 GHz BANDS

COMPETITIVE ADVANTAGES /

Millimeter range (60-80 GHz) radio-relay lines will be used as the basic technology to create a transport channel for smaller cells.

ESSENCE OF INNOVATIONS /

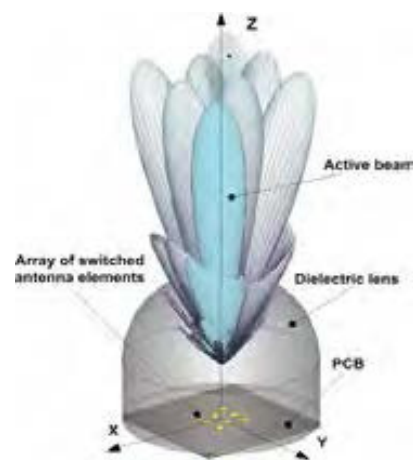
Controlled lens-type antennae make it possible to perform electronic-beam scanning at an angle of 10–20°.

RESULTS ACHIEVED /

Field testing has been conducted based on a telecom operator's cellular network.

MARKET POTENTIAL /

The market for transmission equipment and systems for cellular telephony in the Russian Federation exceeds \$1 billion.



THE TEAM /

ROMAN MASLENNIKOV,
PhD in Physics and Mathematics,
Technical Director;
GRIGORY NEMET,
PhD in Technical Sciences, business
development and international activities.

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RESEARCH AND PRODUCTION CENTER MAXTELCOM LLC

DEVELOPMENT OF AN INDUSTRIAL DESIGN FOR A PORTABLE FIELD DEVICE FOR AUTOMATIC WELDING OF QUARTZ FIBERS

COMPETITIVE ADVANTAGES /

The average cost of fiber welding devices is USD 7,000-8,000; the market price of device being developed will only be USD 3,000-4,000.

ESSENCE OF INNOVATIONS /

The innovative adjustment system, automatic fiber holders, and improved compact optical system will provide the connection of fibers with minimum losses at the junction position.

RESULTS ACHIEVED /

A first series prototype, the AFS-10, is ready. Assembly production is scheduled to launch in the 1st quarter of 2014.

MARKET POTENTIAL /

The market for equipment for fiber optic cable installation and related equipment is approx. USD 2 billion.

THE TEAM /

MAXIM GLADILOV,
Founder, CEO;
MIKHAIL KOLOSANKO,
Chief Designer, Head of the Development
Design Bureau.



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SKOLKOVO GRANTEE

ROBOCV LTD

AUTONOMOUS NAVIGATION SYSTEM FOR ROBOTIC TRANSPORTATION

COMPETITIVE ADVANTAGES /

Universal technological applications (all types of transportation);
Low-level security subsystem;
Ease and low cost of system implementation (2 times cheaper and faster than similar systems);
Payback period is 1.5 years.

ESSENCE OF INNOVATIONS /

Reasonably priced sensors installed on a vehicle are used, completely replacing an expensive laser scanner, thus reducing the system cost by a factor of 2-3.

RESULTS ACHIEVED /

An autonomous navigation system for automatically piloted vehicles has been developed.

MARKET POTENTIAL /

The volume of the target markets (warehouse machinery, local transport platforms, mining and heavy equipment) will reach USD 1.5 billion by 2017. RoboCV plans to reach 3-5% market share by 2017.



THE TEAM /

SERGEY MALTSEV,
Establishment and Overall Management of Research Objectives;
DMITRY SMIRNOV,
Management of User Requirements for the Product Line of Autopilot Systems;
ROMAN LIKANE,
Direct Coordination of the Operation of the Development Team for Autonomous Vehicle Navigation Algorithms.

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SKOLKOVO GRANTEE

SCIENTIFIC INNOVATION CENTER ATMOSPHERE JSC DEVELOPMENT OF ADVANCED PROPULSION TECHNOLOGIES (SPACE PROPULSION SYSTEMS, SUPERSONIC AND ADVANCED AIRCRAFT DESIGNS)

COMPETITIVE ADVANTAGES /

Now, there is no method to land the rocket stage after fuel depletion. The use of AeroSpace Parachute Systems (ASPS) made of heat-resistant materials to land the rocket stage will make it possible to replace impact areas with landing areas

ESSENCE OF INNOVATIONS /

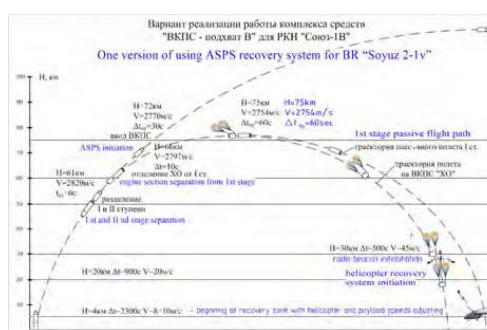
ASPS activation at high altitude, more than 60 km, immediately after the separation of a rocket stage. Use of modern mass-produced high-temperature and high-strength quartz and silica textile materials with operating temperatures up to 1,200 °C.

RESULTS ACHIEVED /

Evaluation testing of the samples of materials was completed at the test facilities of All-Russian Union Institute of Aviation Materials (ARIAM). ARIAM has issued an opinion dated March 31, 2013.

MARKET POTENTIAL /

The emerging market in Russia, CIS countries, and India is approx. USD 1 billion.



THE TEAM /

VLADIMIR CHIZHUHIN,
Project Manager;
YURI MEKHONOSHIN,
Chief Project Expert.

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SKOLKOVO GRANTEE

SCIENTIFIC PRODUCTION COMPANY INDUSTRIAL GEODETTIC SYSTEMS LLC

EARTH -BASED INFRASTRUCTURE FOR GLONASS/GPS GLOBAL NAVIGATION SATELLITE SYSTEMS ALLOWING PRECISE POSITIONING

COMPETITIVE ADVANTAGES /

Other methods that allow getting coordinates with high accuracy are more labor intensive and their scope is much narrower. Versatility and scalability of solutions.

ESSENCE OF INNOVATIONS /

Proprietary mathematical algorithms for signal processing. Proprietary circuit design solutions and software.

RESULTS ACHIEVED /

Hardware prototypes and an alpha version of the software has been developed. Several pilot projects were implemented jointly with the Institute Of Petroleum Geology And Geophysics of the Siberian Branch of Russian Academy of Sciences, Institute of Biology and Soil Science of Far East Branch of Russian Academy of Sciences, and divisions of Russian Railways and Gazprom.

MARKET POTENTIAL /

The domestic market for highly accurate positioning infrastructure is estimated at USD 500 million.



THE TEAM /

SERGEY SOROKIN,
Founder and Director;
ALEKSANDR MAMUTIN,
Design Engineer;
ANTON BELOKRYLOV,
Lead Developer

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SKOLKOVO GRANTEE

SCIENTIFIC RESEARCH COMPANY KASKAD LLC

DEVELOPMENT AND IMPLEMENTATION OF LONG-RANGE QUANTUM COMMUNICATION TECHNOLOGY

COMPETITIVE ADVANTAGES /

Quantum distribution of system's key is characterized by absolute resistance to various attacks, in other words, its security does not depend on the computing capacity of classical or prospective quantum computers.

ESSENCE OF INNOVATIONS /

The mechanism of quasi-synchronism along with the use of a resonator; Combination of spatial and temporal multiplexing methods.

RESULTS ACHIEVED /

R&D plans have been worked out and a grant has been obtained.

MARKET POTENTIAL /

The world market for optical data transmission equipment is USD 3.4 billion.



THE TEAM /

HERMAN RAMALDANOV, CEO;
ALEKSEY KALACHEV,
Dr. Phys.-Math.Sc., Research Manager;
ALEKSANDR KALINKIN,
PhD Phys-Math. Sc., Research Assistant;
ILNUR LATYPOV,
PhD Phys-Math. Sc., Research Assistant.

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SKOLKOVO GRANTEE

SENSEPACE LTD

TECHNOLOGY FOR RENDEZVOUS AND DOCKING OF SMALL SPACECRAFT

COMPETITIVE ADVANTAGES /

Product combines software for ballistic and navigation calculations, machine vision, and hardware components. The product uses satellite platform resources as much as possible, reducing its own mass and production cost.

ESSENCE OF INNOVATIONS /

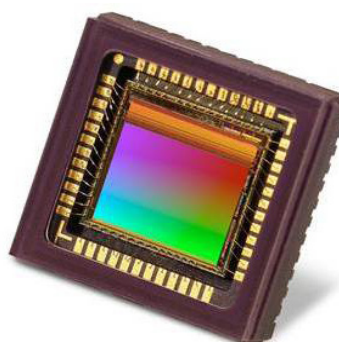
Efficient and task-optimized software algorithms are used.

RESULTS ACHIEVED /

Market research, partner pool formation, technical solution modeling to confirm the technological feasibility are under way.

MARKET POTENTIAL /

The global market for microsatellites has reached \$500 million and continues to grow rapidly.



THE TEAM /

SERGEY SEDYKH,
CEO, Co-Founder;
PAVEL SHAROV,
Marketing, Partner Relations,
Co-Founder.

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SKOLKOVO GRANTEE

SPECTRALASER LTD

LASER IGNITION FOR ROCKET ENGINES

COMPETITIVE ADVANTAGES /

Small weight and size. Expected saving in weight for one laser ignition system on a RD0146 engine of Angara-A7B launch vehicle booster is 40 kg, saving about \$0.88 million per launch.

ESSENCE OF INNOVATIONS /

Diode pump lasers based on photonic crystals:

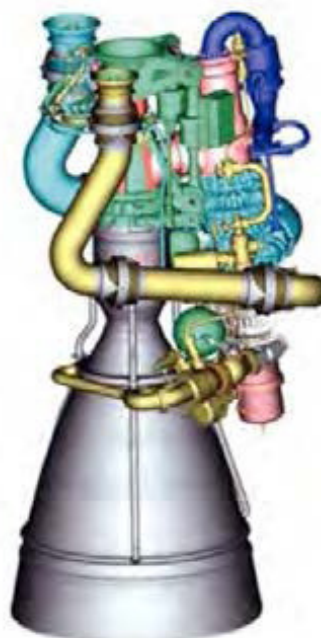
- manifold reduction in the cost of 1W of pump energy;
- higher efficiency and service life;
- reduction of manufacturing and operational costs.

RESULTS ACHIEVED /

Development prototypes have been manufactured according to specifications agreed on with the largest Russian space engine manufacturers. Testing has begun at customer facilities.

MARKET POTENTIAL /

If implemented in engine systems on Soyuz-type launch vehicles – up to 20 launches a year in the Russian Federation and French Guiane.



THE TEAM /

D. TSEITLIN, CEO;
S. REBROV,
Dr.Sc. in Technical Sciences, CTO

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SKOLKOVO GRANTEE

SPIRIT NAVIGATION LTD

HYBRID NAVIGATION RECEIVER FOR SEAMLESS INDOOR- AND OUTDOOR POSITIONING

COMPETITIVE ADVANTAGES /

Indoor accuracy of 1 meter. No installation of special emitters required.

ESSENCE OF INNOVATIONS /

A set of technologies providing a solution for highprecision indoor positioning. A mathematical tool for integrating measurements from a smartphone's detectors and sensors.

RESULTS ACHIEVED /

A prototype using mobile device resources and postprocessing algorithms has been developed.

MARKET POTENTIAL /

The potential global market that remains untapped due to a lack of high-precision indoor positioning products for mobile devices, and location-based services and location-based advertising is estimated at \$13 billion per year.



THE TEAM /

VLADIMIR SVIRIDENKO,
Dr.Sc. in Technical Sciences, Prof.,
SPIRIT
Navigation Ltd Technical Director;
RUSLAN BUDNIK,
PhD in Law, MBA, SPIRIT Navigation Ltd
CEO;
GENNADY BERKOVICH,
PhD in Technical Sciences.

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SKOLKOVO GRANTEE

SPUTNIX LTD

ONBOARD SYSTEMS FOR MICROSATELLITES, MICROSATELLITE - BASED TECHNOLOGIES AND SERVICES

COMPETITIVE ADVANTAGES /

Less assembly and a shorter test period for the satellite. Reduction of launch costs by avoiding adaptation to the launch vehicle. Guaranteed piggyback launch of a finished satellite within a period of several weeks to several months.

ESSENCE OF INNOVATIONS /

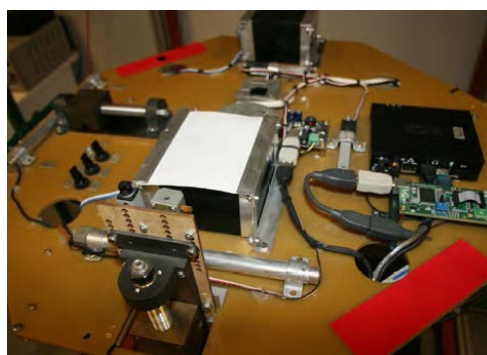
Use of open specifications and standards for onboard micro-satellite interfaces. Use of Plug-and-Play architecture. Use of own developments in the field of on-board systems and micro-research platforms. Use of a universal orbital deployment system.

RESULTS ACHIEVED /

Prototypes of on-board micro-satellite service systems have been developed and tested. Preliminary design of an Earth remote sensing satellite to demonstrate the technology is under development (weight of 20 kg).

MARKET POTENTIAL /

The global market for microsatellites has reached \$500 million and continues to grow rapidly.



THE TEAM /

ANDREY POTAPOV,
CEO, Marketing, Development strategy,
Sales strategy;
STANISLAV KARPENKO,
General technical concept, Technical
supervision, Software development.

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SKOLKOVO GRANTEE

SUPERPOSITION LTD

DEVELOPMENT OF A METHOD TO GENERATE LASER RADIATION THAT IS MAGNETIC DIPOLAR IN NATURE IN ORDER TO REALIZE NOISE-RESISTANT DATA TRANSMISSION IN EARTH -TO-SATELLITE AND SATELLITE -TO-EARTH ROUTES

COMPETITIVE ADVANTAGES /

The principal infrastructure is located on the Earth, making it possible to cut the operational costs of a laser communication system and increase its service life. Divergence of MM-radiation is 10 times less than that of diffraction radiation.

ESSENCE OF INNOVATIONS /

The novelty of the solution is based on the selforganization of an electron-ion nanoparticle ensemble in molecular gas at a previously-prepared MMelectronic passage.

RESULTS ACHIEVED /

A conceptual mathematical model has confirmed the reliability of the innovative approach to MM-radiation generation. An automated MM-laser simulator has been tested. An MM-laser prototype will be produced in 2015.



THE TEAM /

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TECHCOM-ELECTRONIC LTD

UNIFIED MULTI-FUNCTIONAL MICROELECTRONIC MODULE FOR SPACECRAFT CONTROL

COMPETITIVE ADVANTAGES /

Active lifetime – 15 years.
Reprogrammable during
flight. Best suited to microsatellites.
No similar products in Russia.

ESSENCE OF INNOVATIONS /

The module uses digital platform ideology
with advanced schematic design
solutions based on a highly integrated,
intelligent, and high-speed hardware
component base.

RESULTS ACHIEVED /

The project prototype is the redundant
reprogrammable M22PC, which has been
tested onboard the Glonass-K spacecraft
since 2010. Weight: 1.9 kg.

MARKET POTENTIAL /

The global market for microsatellites has
reached \$500 million and continues to
grow rapidly.



THE TEAM /

VLADISLAV BOYKACHEV,
CEO, computer technology and
management systems expert;
VADIM KHOMENKO,
Chief Manager, specialist in development
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spacecraft, and implementation of IT
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TECHCOM-MINITHRUSTER LTD

ELECTRIC PROPULSION ENGINE FOR MICROSATELLITES WITH INTELLIGENT POWER AND CONTROL UNITS

COMPETITIVE ADVANTAGES /

Engine allowing efficient control of spacecraft with a mass of 50–200 kg and ensuring an active spacecraft lifetime of 5 years.

ESSENCE OF INNOVATIONS /

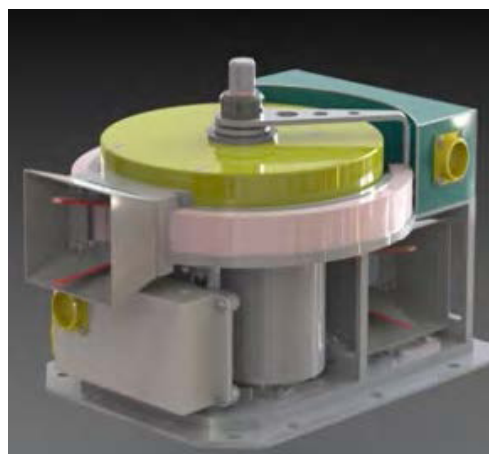
The minithruster will be based on an ablative pulsed plasma propulsion system for a railgun design with side propellant injection; it will possess higher propelling efficiency, overall- and unit propulsion impulses, and lower propulsion cost.

RESULTS ACHIEVED /

The developed minithruster is the most powerful in its class. The main technical solutions are patent protected.

MARKET POTENTIAL /

The global market for microsatellites has reached \$500 million and continues to grow rapidly.



THE TEAM /

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SKOLKOVO GRANTEE

TECHNOLOGY TRANSFER CENTER KULON LTD

TECHNOLOGY TO BUILD CONTROLLABLE GASOSTATIC SUPPORTS FOR HEAVY ROTORS ON SPACE AND AIRCRAFT POWER PLANTS

COMPETITIVE ADVANTAGES /

Operation of gasodynamic bearings has a high risk of hard lubricating surfaces wearing down in high temperatures, which may cause a fire. Another disadvantage is the low carrying-capacity, which is limited by the lifting force created by the Bernoulli effect. The carrying capacity of a gasostatic bearing depends only on the pressure of the supplied air. Thus, the increased air consumption in a gasostatic bearing is luckily offset with absolute fire safety and a resource that is independent of the number of starts and brakings.

ESSENCE OF INNOVATIONS /

The combination of two approaches to the creation of the lifting force in one device. The control system ensures the absence of contact with the rotor at any rotation rates, including close to zero, suppression of vibrations, shocks and overloads related to aircraft maneuvering.

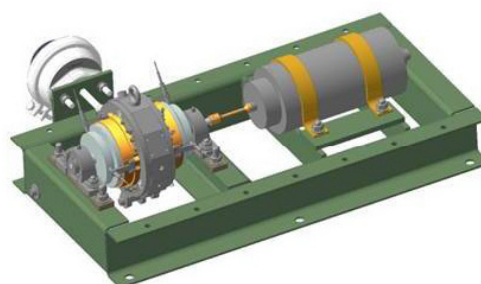
RESULTS ACHIEVED /

Hybrid gasostatic bearing shoes have been designed and developed; several jet-control system options have been evaluated; a demonstration and research test bench has been designed.

By 2015, a working transmission unit prototype is planned to be in production.

MARKET POTENTIAL /

The global market for support bearings for maximum loads of 300 kg is approx. \$400 million.



THE TEAM /

IRINA VLADIMIROVICH,
CEO. 15 years of experience in implementing innovation projects;
PAVEL BULAT,
Head of R&D. Over 20 years of work experience in the field of gas dynamics, R&D management, and implementation of research projects;
VLADIMIR BESCHASTNYKH,
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TECHNOMICRON LTD

COMPACT EMITTER FOR AN ON-BOARD LASER-BASED SPACE COMMUNICATION SYSTEM BASED ON A PHASED DIODE LASER LINE

COMPETITIVE ADVANTAGES /

Use of an emitter based on a phased diode array makes it possible to radically simplify and reduce the size of the onboard emitter, as a whole, in a laser space communication system, while simultaneously increasing its reliability.

ESSENCE OF INNOVATIONS /

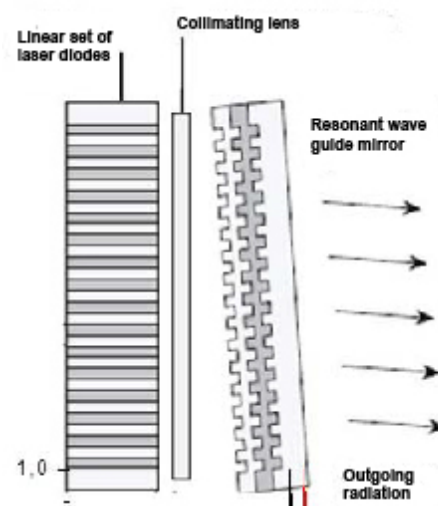
The novelty and originality of the proposed phased diode laser array consists in the application of integral optics, specifically a multi-layer diffraction structure forming a resonant waveguide mirror.

RESULTS ACHIEVED /

Single-mode generation of an array of 100 laser diodes has been stabilized through phasing, using a resonant waveguide mirror. The output is the interference peak with near diffraction divergence containing virtually all of the beam's power (~ 1.5 W continuous, ~ 5 W by impulse).

MARKET POTENTIAL /

The market for laser space communication is just beginning to take shape; it is expected to grow rapidly in the next 5 years. According to indirect estimates, the annual volume of this segment of the communications equipment market may be several billions of dollars.



THE TEAM /

SERGEY DERZHAVIN,
Project Scientific Supervisor. Key experience: development of powerful diode lasers, research in the field of semiconductor laser phasing;
VALERY TIMOSHKIN,
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WAYRAY LLC

WAYRAY INTELLIGENT NAVIGATION SYSTEM PROJECTS INFORMATION USEFUL TO THE DRIVER ONTO THE WINDSHIELD AS AUGMENTED REALITY

COMPETITIVE ADVANTAGES /

The first augmented reality technology for vehicles that combines the benefits of a smartphone, a navigator, and a HUD. Image covers 70% of the windshield. Drivers do not need to look away from the road.

ESSENCE OF INNOVATIONS /

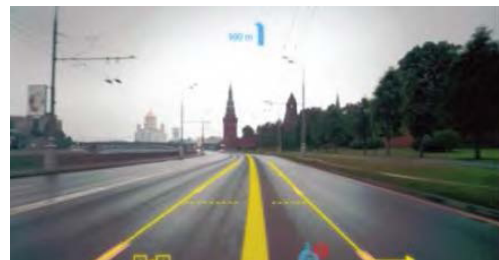
A device featuring a head-up display and navigation in the form of augmented reality;
Universal platform for car applications;
Integration with the urban infrastructure.

RESULTS ACHIEVED /

A major part of the research, development, and engineering work on the construction of the electronic devices and the development of an innovative optical design is completed. Development of a product prototype is in progress.

MARKET POTENTIAL /

The main countries of sale according to WayRay estimates are the United States of America, Western European countries, the market in China and Japan, Russia, and the CIS countries. The potential buyers will be 20% of all car owners.



THE TEAM /

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