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SPECIFICATION OF INNOVATIVE MEDICAL TECHNOLOGIES: A PORTFOLIO OF INTELLECTUAL PROPERTY OBJECTS

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Abstract

The article presents a specification of innovative projects in the field of medicine covering a wide range of technologies for remote monitoring, diagnostics, and therapeutic influence on human biological systems. Each project is based on the principles of magnetic resonance, nanoscale metrology, and modern spectral–optical methods, ensuring high precision and sensitivity in diagnosis and treatment. The proposed technologies are aimed at contactless research and regulation of the condition of blood, bones, muscles, subcutaneous fat, arteries, and internal organs, as well as disease prevention and early diagnostics. The implementation of these projects creates opportunities for developing mass-use medical devices with high social significance.

Keywords: *magnetic resonance diagnostics, nanoscale metrology, contactless monitoring, preventive medicine, spectral–optical exposure, innovative medical technologies, early diagnostics, blood condition monitoring, subcutaneous fat removal, bone tissue diagnostics, muscle tissue control*

Introduction

Modern medicine requires the integration of highly accurate and safe technologies for diagnostics and therapy that minimize invasiveness and increase treatment efficiency. The presented portfolio of innovative projects offers a comprehensive set of solutions based on magnetic resonance principles, spectral–optical methods, and nanoscale metrology, enabling diagnostics and therapy with high precision and sensitivity.

The projects cover a wide range of applications – from monitoring and assessing

blood parameters to non-surgical subcutaneous fat removal, from early cancer diagnostics to bone and muscle condition control. Each project is built upon the use of physical phenomena and advanced materials to create devices capable of operating online, ensuring safety and accuracy of measurements.

The purpose of this article is to systematize and present the specification of innovative projects, reveal their key distinctions, advantages, and potential application areas, and demonstrate opportunities for scaling and implementing these developments in practical medicine.

Project Descriptions

Project 1. Intelligent Monitoring Systems

This project focuses on the development of intelligent monitoring systems providing continuous tracking of critical parameters in biological and industrial processes in real time. The systems integrate sensor data and large-scale data analysis algorithms, enhancing prediction accuracy and reducing error risks. In medicine, the technology is applied for continuous observation of blood parameters, arterial pressure, pulse, and other key physiological indicators, enabling early detection of abnormalities and rapid response to critical conditions.

Project 2. Adaptive Hardware–Software Solutions for Process Automation

The second project introduces adaptive hardware–software platforms for data flow management and resource distribution optimization. The technology processes large data volumes in real time, analyzes information, and constructs optimal routes for logistics and medical systems. In healthcare, the solution is used for patient flow management, access control to diagnostic and therapeutic equipment, and automated allocation of clinical and laboratory resources.

Project 3. Integrated Quality Control Systems Using Resonance Spectroscopy

This project is devoted to creating integrated quality control systems for liquid and gaseous media using resonance spectroscopy. The system enables contactless analysis of biological and technological fluids, identifying anomalies and defects at early stages. In medicine, this allows highly accurate blood, saliva, and other biofluid analyses, determination of component concentrations, and tracking physiological dynamics without invasive intervention.

Project 4. Development of Innovative Materials and Composites

The fourth project focuses on creating new materials and composites with enhanced operational properties – combining strength,

durability, and functional adaptability. In medical and engineering practice, this opens opportunities for producing high-precision sensor elements, functional device components for monitoring and therapy, and lightweight durable casings capable of operating in complex environments. The use of composites improves measurement accuracy, reliability, and equipment longevity.

Project 5. Smart Devices and Intelligent Energy Management Systems

The fifth project covers smart devices and energy management systems that optimize the operation of medical instruments, control energy load, and integrate with existing infrastructures. In practice, this enables the development of autonomous diagnostic and therapeutic stations characterized by minimal energy consumption, high operational stability, and suitability for conditions with limited access to external resources.

Project 6. Platforms for Multibrand Distribution and Data Flow Management

This project is dedicated to developing platforms for data flow coordination and activity management in multibrand and multi-profile systems. The platform's architecture provides centralized process control, adaptability to various business models, and rapid decision-making based on data analytics. In healthcare, this enables integration of data from multiple devices and laboratories, ensuring comprehensive health monitoring and unified diagnostic information flow.

Project 7. Integration of Medical, Engineering, and Information Technologies

The seventh project focuses on the creation of intelligent diagnostic and monitoring systems that integrate medical, engineering, and IT approaches. The use of modern sensor platforms, data processing algorithms, and machine learning methods allows early detection of critical patient conditions, disease progression prediction, and improved coordination of medical personnel. These systems enhance diagnostic precision, reduce response times, and

strengthen interaction within complex medical infrastructures.

Project 8. Analytical Platforms for Managing Complex Ecosystems

The eighth project targets the development of analytical platforms for managing complex ecosystems that include automated lines and intelligent devices. The platform's main objective is to coordinate and control active system components, ensure operational efficiency, and provide scalability at the infrastructure level. In medical applica-

tions, this allows integration of multiple diagnostic, therapeutic, and monitoring devices, centralized data analysis, and improved management of comprehensive treatment processes.

All eight projects demonstrate a systematic approach to developing and implementing innovative technologies, combining fundamental scientific research with practical application. Each contributes to improving diagnostic precision, therapeutic effectiveness, and the creation of new tools for mass monitoring and treatment.

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