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# Implementation of International Telemedicine Network with Rapid Coronavirus Registration by Resonant Technology to Neutralize the Pandemic

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**Abstract:** The World Health Organization calls for better use of evidence and information from COVID-19 surveillance systems to optimize the only approach at our disposal to minimize transmission: to identify, isolate, test and treat each case of the disease. Track and quarantine each contact. Digital technologies play a leading role in contact tracking. Digital technology and artificial intelligence are well established in the fight against the pandemic. In many countries, telemedicine is used alongside traditional care, especially in rural areas, and is now actively used in the context of COVID-19. Telemedicine has proved to be a very effective tool for combating telemedicine to counter the virus. We have not yet realized the full potential of telemedicine. It should open up opportunities for all people to develop an international culture of health and neutralize the pandemic. COVID-19 Various technologies are used to identify COVID-19. Researchers from George Washington University have created a miniature device that allows you to almost instantly detect the presence of COVID-19 (MedicalXpress) in human blood. The operation of the device is based on the color spectroscopy method, and the analysis results can be obtained using a mobile application. The author of the article proposes to use resonant technology for detecting COVID-19. Resonance technology is implemented by a micro-device, designed in the form of a pendant, which is convenient to wear to everyone. The micro-device for detecting COVID-19 is connected to the telemedicine center, which promptly fixes the morbid patient and provides him with the necessary services. Telemedicine centres of various countries are connected to the international medical network for the prompt registration of coronavirus, the exchange of information, decision-making and the provision of services to foreign citizens.

**Keywords:** Coronavirus COVID-19, Vibration Approach, Resonance Technology, Telemedicine, International Medical Network

## 1. Introduction

The spread of coronavirus infection has become a challenge for health systems around the world. Doctors faced an unprecedented burden, and digital solutions that could make it easier became more relevant than ever. Dmitry Lisogor, director of the department of digital medicine, medical monitoring and analytics at Philips in Russia and the CIS, said that telemedicine will help to cope with the pandemic.

Telemedicine, as a service, is based on the use of digital technologies to provide medical care at a distance, and to connect doctors with each other. The possibilities of this technology have been known and have been developing for a relatively long time. It allows you to expand the list of affordable health care services in remote regions, provide patients with remote consultations in non-urgent situations, and conduct online consultations - and this is only a few of its benefits. The introduction of telemedicine in the world is one of the priorities of World Health Organization projects.

The pandemic has COVID-19 forced us to look at telemedicine from a new angle and significantly accelerate its implementation around the world. The most important condition for containing the virus was the restriction of social contacts: today literally everyone can contribute by simply staying at home. Technology allows people experiencing

moderate-intensity symptoms not to visit a doctor and receive help remotely. With the spread of the virus, telemedicine takes on triple significance. Patients who suspect COVID-19 may not endanger other people by visiting a doctor. Patients with chronic diseases who need to get to a scheduled consultation can get it from home and limit their contacts. Health workers who provide care at this difficult time are the least protected. Many of them become infected from patients, others are forced to follow quarantine after contact with people who have been confirmed to be diagnosed. All this not only puts doctors at risk, but also repeatedly increases the burden on clinics and on the health system as a whole. By avoiding going to the clinic, the patient reduces the number of dangerous interactions for doctors.

The purpose of the study of the article is to develop a way to neutralize the pandemic with the help of means of rapid detection of each person's coronavirus, as well as means of quick assistance to its healing, regardless of the place of its stay.

For the prompt detection of coronavirus, resonance technology is proposed. Telemedicine becomes an effective aid in reducing the spread of coronavirus. Connecting telemedicine centers of various countries can help neutralize the coronavirus pandemic, as well as use to neutralize other epidemics.

## 2. Detection of Coronavirus COVID-19 in the Body by Resonance Technology

Coronavirus COVID 19 lay on the human population. Hundreds of thousands of people in the world get infected every day. The rapid detection of coronavirus in every person on the planet earth is a pressing problem.

The NATURAL INFORMATICS Research Center is developing a technology for detecting coronavirus COVID-19 in the body by a resonance method. The development represents Know-How. The detection of coronavirus COVID-19 in the body can be carried out by a micro-device consisting of a microresonator for detecting coronavirus in the body based on resonance at its own frequency of electromagnetic waves of the biofield, and from a microprocessor for notifying a citizen's disease to a network medical platform. There is a technology for making optical microresonators with an accuracy of 0.17 angstrom [1]. The size error of the microresonators is less than the diameter of the hydrogen atom. The ability to create simple microresonators with an accuracy of 0.17 angstrom allows them to be used to detect the coronovirus [2-3] of each person. Such a significant leap in microresonator and artificial intelligence technologies allows them to be used to detect coronavirus in infected people anywhere on the planet.

The design of the micro-device is in the form of an amulet. An amulet with a micro device is assigned a number in a network medical platform. A sensitive micro device for detecting coronovirus COVID-19 in the body provides detection of infected people throughout the world through the World Health Organization's international medical platform. The international medical platform for identifying the amulet number with the host and a micro device for detecting coronovirus COVID-19 in the body will help eliminate the presence of infected patients at all objects of mass accumulation of people in all points of the world in open and closed areas and premises. This requires legislation to require citizens to wear an amulet with a micro coronavirus detection device. An amulet with a micro device is worn from the chest at the level of the thymus gland. The technology provides rapid detection of people infected with coronavirus, helps in their neutralization from public places and, thereby, does not spread coronavirus.

## 3. International Medical Network for Rapid Coronavirus Registration and Neutralization

The International Medical Network for the Prompt Registration of Human Coronavirus is a distributed telemedicine network that provides access to interconnected virtual telemedicine centers located on various digital services in different countries. The international medical network for the rapid registration of coronavirus is formed by hundreds of millions of 5 G network servers located around the world, using computer and telecommunication technologies and smart artificial intelligence systems for medical communication [4-5]. Intelligent artificial intelligence solves problems, implements processes, develops and makes decisions by interaction of virtual essential agents hierarchically performing actions according to rules and based on experience [6].

### *3.1. Functional Structure of Telemedicine Network*

As part of the network, four types of functional elements can be distinguished, the interaction of which forms a telemedicine network: a channeling environment, a consultation center, a control center, and remote points.

A channelization environment is a set of hardware, software, storage media and technological solutions (protocols and standards) that ensure the transfer of heterogeneous information in a geographically distributed environment.

The consultation center is a medical institution with a staff of highly qualified doctors in various areas of medicine and appropriate equipment for conducting remote consultations, consultations and treatment and diagnostic procedures, as well as organizing training (seminars, lectures) for doctors at remote stations.

The control room is a dedicated or functioning structure within other elements of the telemedicine network that performs the functions of filtering requests for advice, planning and providing consultations, organizing consultations, and collecting and disseminating information about the capabilities of consultation centers. It also contains an administration service that performs network structure

maintenance functions.

Remote points - a specially equipped medical institution, whose staff directly interacts with patients and performs a set of medical, diagnostic, preventive and rehabilitation procedures. If necessary, temporary cells are formed in the network structure - for example, a complex of remote medical units in places of hostilities or man-made disasters. Such stations are deployed and connected to TMS in order to involve groups of experienced specialists of leading centers in solving operational problems arising in such places. Consultation is possible 24 hours a day due to time differences in different time zones. Another necessary element of the telemedicine network is mobile telemedicine services, for which remote stations are deployed on the basis of vehicles - cars, aircraft, water and rail vehicles.

### *3.2. Telemedicine Network Hardware Structure*

In structure of the hardware of telemedicine systems 4 main components stand out: infrastructure of transfer of multimedia information, computer equipment of the general profile, specialized computer equipment, specialized medical equipment.

The TMS channelization medium (multimedia transmission infrastructure) is independent of the storage medium - these can be cable wire structures, fiber optic channels and satellite and radio communication channels. Equipment and channels provide the transmission of heterogeneous information: alphanumeric and graphic, video and audio streams, as well as digital and analog signals taken from sensors and transmitted to the controls of diagnostic and medical equipment.

Terminal equipment converts and reconciles signals, transcoding them from one format to another, and compresses/decompresses them. It should be noted that modern video conferencing systems can work efficiently in various network topologies built on the basis of standard protocols IP, ISDN, ATM and others.

Distributed application and archiving servers act as service providers. Multi-point videoconferencing, consultation schedules and remote training and testing services are maintained on application servers. Archiving services provide long-term storage, cataloging, and retrieval of large amounts of information.

General computer equipment is used to organize the jobs of a consultant and attending physician, central monitoring consoles, as well as for equipment of conference rooms. It includes computers of various architecture and purpose (desktops, workstations, Notebook and PDA class mobile and portable computers, specialized and embedded systems). In addition to computers, this includes various peripheral equipment - video conference codecs, video cameras, audio systems, various digitizers and printers.

The composition of specialized computer equipment is determined based on the needs of specific medical applications. These can be specialized scanners, control devices, specialized video display systems, as well as interfaces of computer and specialized medical equipment.

Diagnostic, treatment and rehabilitation equipment can be connected to the telemedicine network directly and through interfaces. If such a connection is not possible or feasible, information from such equipment can be digitized using special equipment - scanners, digitizers, etc., or entered from the keyboard.

For use in telemedicine networks, specialized medical equipment with visual or acoustic feedback from a doctor, as well as built-in network support, is optimal. For cardiology, these can be angiographic installations and various echographs, in pulmanology - these are bronchoscopes, in gastroenterology - gastroscopes, in dermatology and endoscopy - dermatoscopes and video cameras with endoscopic nozzles. It can also be wide-ranging diagnostic equipment - ultrasound machines, NMR tomographs, microscopes, stethoscopes and other equipment.

Protection of stored and transmitted information, authorization of access to the telemedicine network, and finally, ensuring the survivability of the network in various modes of operation forms a complex of software and hardware and management solutions of the telemedicine network security system.

Hardware and software cryptographic tools are used to protect information stored in archives and transmitted over communication channels.

The authorization of doctors' access to telemedicine network equipment is relevant both when conducting teleconsultations to confirm the authority of a specialist, and when working with terminals to prevent unauthorized access to medical data. Electronic signature tools are used to verify documents that record the results of teleconsultations, remote testing, etc. Access to telemedicine network resources from external communication networks is closed using firewalls.

The company "STEL - Computer Systems" has developed a software and hardware system for supporting teleconsultations - "STEL TK," which was created by us as the basic "brick" of the telemedicine network, as an effective tool that, in our opinion, should be possessed by medical personnel of almost any medical institution. Such a complex can be equipped both with a telemedicine consultation center of a large specialized medical institution, and a telemedicine center of a small district wide-range hospital. With this solution, it is possible to build a variety of telemedicine complexes and distributed regional, departmental and specialized telemedicine networks. The survivability of the telemedicine network is ensured both by a topology having a structure of duplicate channels of different physical nature and intelligent switches, and by measures for distributed archival storage of information.

### *3.3. Telemedical Network Services*

To identify participants, a single authentication system will be used, Information exchange will be carried out using a single system of interdepartmental electronic interaction. It is possible to monitor the patient's state of health remotely, based on the obtained patient data.

The coronavirus epidemic COVID-19 gave a powerful

impetus to the development and implementation of telemedicine both in Russia and around the world:

1. "Online Doctor" (Mobile Medical Technologies LLC) - free online consultations 24/7 on the prevention of coronavirus, as well as the actions of applicants if they have one of the symptoms of the disease or if they are already in quarantine;
2. "Здоровье.ру" - free online program "Stop coronavirus" for free testing for the risk of infection;
3. MedAi - determination of the probability of coronavirus disease;
4. "Doctis" - consultations of the infectious disease on duty on the symptoms of coronavirus 24/7;
5. TeleMed - consultation on any issues related to coronavirus Covid-19 and SARS;
6. ONDOC, the patient's personal room company, has simplified clinic access to telemedicine during the pandemic.

Large health technology companies and medical startups have mobilized all their forces to fight coronavirus. For example, Philips has created a new technology that allows online screenings and processes large volumes of COVID-19-related requests. This decision provides that the patient first completes an online questionnaire about his condition. Then, based on the results, doctors determine how serious the symptoms are and take the necessary actions. People who are at high risk are called by call center specialists to clarify additional information. If an employee determines that a person needs urgent medical care, he is sent to the clinic. This technology is already used in various countries, including the Groene Hart Hospital in the Dutch city of Gauda. An example of a successful technology created by a startup can be the Curatess telemedicine platform, which is used in the United States. The decision gives doctors the opportunity to conduct audio and video consultations, can synchronize with FDA-approved Bluetooth gadgets, for example, with a stethoscope, and also integrate with electronic medical records of American citizens.

It is important to use digital technology to share data between physicians inside and outside health facilities. In the context of COVID-19, the digitalization of resuscitation comes to the fore here.

In many patients, the new coronavirus causes a risk of complications in the form of severe forms of pneumonia. In this regard, people often require hospitalization, many are transferred to intensive care and intensive care units. The number of such cases worldwide has exceeded expectations. The authorities were not only concerned about the limited number of beds and vital equipment. Staff shortages and professional burnout are equally critical. Digitalization can help here. Intelligent information systems for the intensive care unit enable resuscitators to provide remote support to colleagues who work directly in the unit. For example, Philips' comprehensive intensive care and intensive care solution uses high-resolution cameras, telemetry, predictive analytics, data visualization, and automatic reporting. Special algorithms track possible deterioration of patients. Thanks to this, specialists begin to take action more quickly in critical cases. And if, on the contrary, improvements are observed, doctors may notice that the resuscitation bed can be released for other patients.

Such solutions provide an opportunity to assist more patients with COVID-19. Clinics around the world are now implementing and testing similar systems and supporting each other in this process. For example, Northwell Health, the largest healthcare provider in New York, organized a webinar in which doctors shared their experiences using digital intensive care and intensive care units in a COVID-19-spreading setting. New York State, USA, has become one of the territories most affected by coronavirus in the world. No one expected a situation of such gravity here. The telemedicine solution for the intensive care unit allows you to optimize part of the processes in overloaded clinics.

Digital resuscitation is not the only telemedicine technology important for the fight against coronavirus. For high-quality diagnosis of COVID-19, ultrasound, CT and X-ray studies are necessary. Therefore, experts in the field of radiology also face an increased load. If the medical institution does not have enough staff, television and radio science comes to the rescue. For example, when the main focus of the epidemic was in Wuhan (PRC), local hospitals used a smart solution that recognizes signs of pneumonia caused by COVID-19 in CT images of the lungs. The program, created using artificial intelligence, helped screen patients and prioritize direct inspection of those with anxiety symptoms. Of course, the application is not able to make a diagnosis on its own. However, with its help, doctors can isolate the patient on time, as well as conduct diagnostics faster.

Teleradiology helps minimize contacts between doctors. For example, in the Sakhalin Region, a platform has been introduced and is actively used that accumulates and processes medical images obtained in radiation diagnostics departments throughout the region. A single repository was created with the ability to access all the results of mammography, CT scans, MRI and radiological studies from one workstation. During the epidemic, such a system allows doctors to seek remote advice from colleagues from the competence center, contacting them only remotely, get a "second opinion" and gain more confidence when making a diagnosis.

The new technology for operative resonance fixation of coronavirus is able to significantly expand the capabilities of monitoring patients with the help of the international medical network for prompt registration of each person's coronavirus. Image analyzing programs are being developed that will measure the body temperature and heart rhythms of patients from a distance of several meters. Artificial intelligence can use the collected data to predict changes in a person's condition much earlier than a nurse will. If the doctor is far enough at the time of deterioration, a remote monitoring system will turn on - a treatment plan can be prescribed remotely.

This approach can also be used to care for patients who are at home. There are smart wearables that periodically check

the vital indicators of the patient and control his sleep condition. For example, they are able to notice a fall in time while walking and urgently transmit this information to medical facilities - this is especially important for older and single people.

Many people have become aware of the importance and prospects of telemedicine only now. The pandemic has spurred a number of innovative ideas and strategies, many of which are already being tested. It is likely that in the near future we will see how digital services will become increasingly used for consultations and prescriptions, drones will be able to deliver medicines to patients, and robots will disinfect territories. Apps and chat bots will be able to check symptoms and provide users with up-to-date tips. People will make more use of wearable devices integrated with medical records in clinics. There will be new working methods that are convenient and safe for doctors: for example, in China, an ultrasound technique is being tested, where the procedure is carried out by a robot with minimal human participation.

The current situation showed the viability of telemedicine and demonstrated that there are situations when it is simply irreplaceable. The difficult experience that the whole world is experiencing today turns the idea of telemedicine and makes the whole world finally take it seriously. It is now that the potential of this sphere can be fully realized.

Resonant technology of operative detection of coroavirus in human body, artificial intelligence, telemedicine and 5 G global network will play a role in fight against pandemic COVID-19 and will become the key to creation of medicine of the future for healthy longevity using biopolitical spectral analysis technologies [6-15].

# 4. Development of Telemedicine in the World

The first country to put telemedicine on practical rails was Norway, where there are a large number of places difficult to access for traditional medical care. The second project was carried out in France for sailors of civilian and military fleets.

Numerous telemedicine projects are currently being developed in many countries and international organizations. The volume of the global telemedicine market in 2016, according to P & S Market Research, amounted to about $18 billion.

International networks of medical telecommunications aimed at various purposes are also being developed: the "Satellife" system - for the dissemination of medical knowledge in developing countries and training, the "Planet Heres" - the system of global scientific telecommunications proposed by WHO, international scientific expertise and coordination of scientific programs, other systems and networks.

The European Community has funded more than 70 international projects aimed at developing various aspects of telemedicine, from ambulance (HECTOR project) to home-based treatment (HOMER-D project). The main objective of the projects is to develop methods of medical informatics aimed at recording and formalizing medical data, their preparation for transfer and reception. Information compression algorithms, standard forms of information exchange are being developed and tested both at the level of initial data (images, electrical signals, for example, electrocardiograms, etc.) and at the level of medical history. Automated workplaces are being developed in various medical and diagnostic specialties (ultrasound diagnostics, computed tomography, radiology, biochemistry). In addition, there are projects that integrate all specific developments (for example, ITHACA), as well as projects that evaluate the effectiveness of private projects and disseminate the best solutions (STAR). Almost all projects are duplicated, that is, the UES obviously goes to increase costs in order to get the best solutions.

Currently, more than 250 telemedicine projects are known in the world, which by their nature are divided into clinical (the vast majority), educational, informational and analytical [16-17]. By geographical distribution, projects fall into: local (local within one institution, 27% of them), regional (40%), national (16%) and international (17%). Many projects are multi-purpose, in half of cases (48%) they are associated with tele-education and tele-education. In every fourth project, new information transmission channels are used for the needs of management and administration. In 23% of telemedicine is used for medical care of residents of rural and remote areas.

To date, telemedicine has received the greatest development in Europe and the United States. Both legislative and economic aspects of this issue are developed there. One of the main reasons for the development of telemedicine in Europe and the USA is economic aspects. Almost half of the entire telemedicine market (46%) is now in the United States. Next are Canada, China, the countries of Scandinavia. By the way, one of the reasons that served as the driver of the development of telemedicine in the countries of Scandinavia is the geographical factor.

Today, the most developed market for telemedicine consultations is the United States. According to statistics from the American Telemedicine Association, remote consultations and monitoring reduce the number of hospitalizations by 19%, and the number of requests for face-to-face consultations by 70%. Savings on the transportation of seriously ill people thanks to online consultations reach $500 million annually.

The World Health Organization is developing a project to create a global telecommunications network in medicine, which includes electronic exchange of scientific documents and information, its accelerated search with access through telecommunications networks, video conferences, correspondence discussions and meetings, and electronic voting.

# 5. Conclusion

Telemedicine, unlike remote diagnostics, requires the possibility of dialogue and the provision of any audio-visual

information. Accordingly, the videoconferencing system allows users to view the materials of other participants: photographs, graphics, including information coming directly from equipment connected to computers, or after scanning paper media or radiographs, video and audio fragments. In this way, full baseline information is provided to advise on the diagnosis and treatment of patients, to discuss new methods of clinical and functional diagnosis and therapy or operative treatment of diseases. In other words, a videoconferencing system is a complex that provides increased "accessibility" of highly specialized care for almost any patient, regardless of their location.

Like any young field of science, telemedicine has a number of unresolved problems. Such problems include the almost complete absence of a legal framework for teleconsultations, including the licensing of telemedicine services; Lack of standards for the transmission and exchange of medical data (both textual and visual); establishing long-term contacts with foreign teleconsultation clinics.

Now the international network of medical telecommunications Planet Heres, proposed by WHO, has been developed as a system of global scientific telecommunications and international scientific expertise and coordination of scientific programs. Telemedicine makes it possible to get all the necessary help without leaving home and exposing yourself and others to the risk of infection with coronavirus. Resonant technology for the rapid detection of coroavirus in the human body, telemedicine, a global network of telecommunications medical centers, an international communications network 5G and smart artificial intelligence will be able to solve the problems of the pandemic and strengthen health systems in the future. Smart artificial intelligence will help implement processes, develop and make decisions by interacting virtual essential agents, hierarchically performing actions according to rules, laws, criteria and based on the developed practical experience of telemedicine centers [18]. International network telemedicine will provide remote forms of health monitoring anywhere in the world.

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