Інформаційні технології

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ORGANIZATION OF CORPORATE PROTECTION SYSTEMS

Organization of Corporate Protection Systems and Additional Devices and Systems That Can Be Created Based on the Same Fundamental Technological Solutions

Summary. *The proposed technology for organizing an information flow protection system within a corporation ensures multi-level system security, including real-time tracking of the status and location of each disk available within the corporation.*

Applying the proposed encoding methods for protecting information on mobile external storage devices is expected to achieve the same advantages as when used on optical storage media and information carriers.

Thus, based on similar solutions, at least two projects with numerous applications can be developed:

- *A technology project for encoding optical disk-based storage media, which includes an appropriate analytical-sensor device that, in turn, can have multiple applications across various fields and industries.*
- *A project for encoding and protecting information on mobile external storage devices, which includes an appropriate mobile or stationary sensor-based measuring, analytical, and comparative device, also featuring multiple applications and design models.*

Key words: *Cybersecurity, Information Flow and Data Protection Systems, Additional Devices, Additional Systems, Multi-Level System Protection, Encoding Methods, Mobile External Storage Devices, Encoding and Decoding Technologies, One-Time Tool Identification, Laser Medical Instruments, Electromagnetic Resonance Method, Electromagnetic Resonance Spectroscopy, Resonance Circuit, Servo-Marking System.*

Organization of Corporate Protection Systems

The proposed technology for organizing an information flow protection system within a corporation ensures multi-level security, encompassing real-time tracking of the status and location of each disk available within the corporation.

Utilizing the proposed encoding methods for safeguarding information on mobile external storage devices is anticipated to yield the same advantages as when applied to optical storage media and information carriers.

Changes in the Structure and Scope of Product Use Resulting from Project Implementation

Thus, based on similar solutions, a minimum of two projects with diverse applications can be developed:

A technology project for encoding optical disk-based storage media requires an appropriate analytical-sensor device that can have numerous applications across various fields and industries.

A project for encoding and safeguarding information on mobile external storage devices, which necessitates a suitable mobile or stationary sensor-based measuring, analytical, and comparative device, also featuring multiple applications and design models.

Additional Devices and Systems That Can Be Created Based on the Same Fundamental Technological Solutions

Upon customer request, projects may include a section dedicated to additional or specialized devices that contribute to forming a comprehensive corporate system for securing and protecting information flows within a single corporation, a group of corporations, or individual research institutions, academic institutes, and major healthcare facilities organizations.

As a specialized product, an information protection system can be developed not only for data storage but also for operational security, ensuring the secure transmission of commands and signals within military units and formations—particularly in naval operations.

In today's environment, where vast amounts of information are concentrated in relatively small storage devices, the potential damage from unauthorized or criminal access to these data arrays can be prevented or localized by establishing a specialized infrastructure for such protection systems. This infrastructure can be standardized according to the specific requirements of a particular ministry, central administration, or lower-level corporate structures and enterprises.

A series of illustrations—Figures 1 through 7—demonstrate, as an example, the application of encoding and decoding technologies for identifying disposable instruments in laser medical devices.

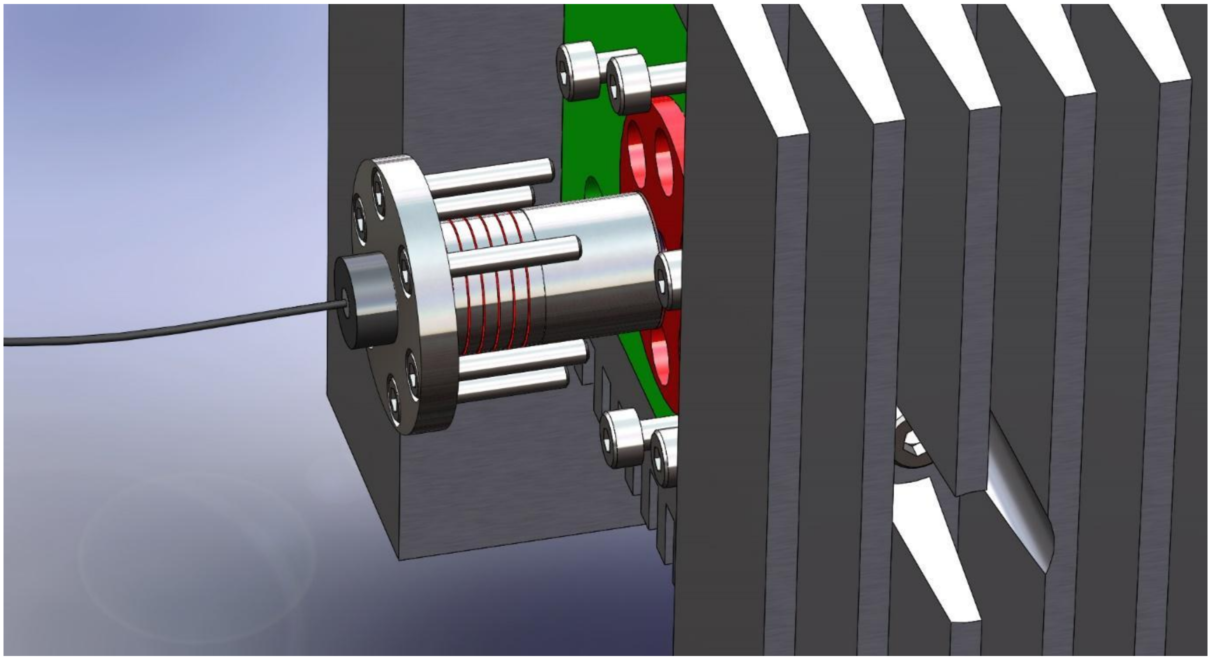

Fig. 1. The illustration shows a three-dimensional model of the docking unit of a laser endoscope for the installation and identification of a disposable instrument

This combination of functions enhances the efficiency of the system and significantly simplifies the design of the unit, which, in turn, reduces its cost and operational and maintenance expenses.

Furthermore, the reduction of costs while improving quality provides additional guarantees for more confident marketing of the new product.

Confidentiality of Information

In more detail (in volumes beyond the scope of this publication and its illustrative materials), all necessary information can be provided upon the formal documentation of the intentions of a potential customer or partner, after signing confidentiality agreements (in a mutually agreed, acceptable legal form for both parties).

For a more comprehensive understanding of the physical principles behind encoding and decoding optical disks, the magnetic-resonance method is applied, with a brief description provided below.

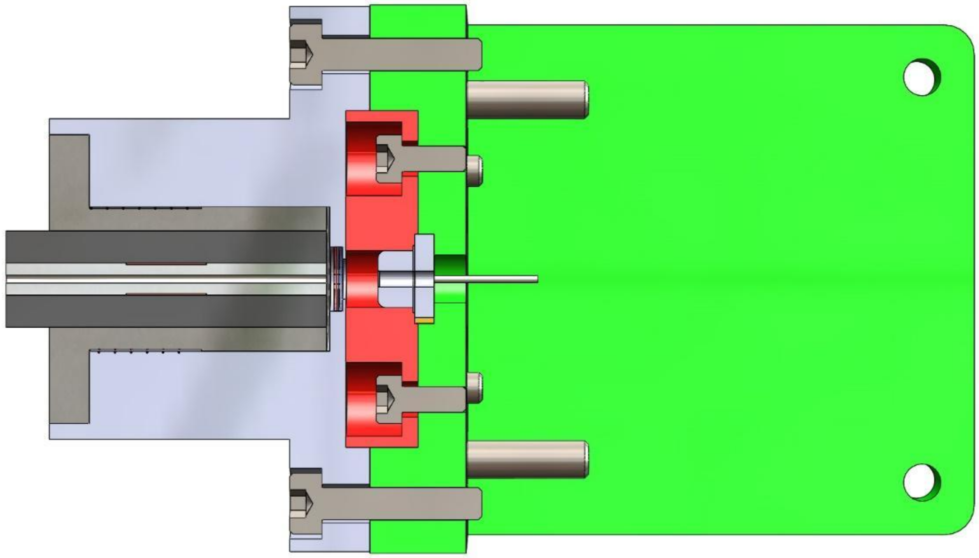

Fig. 2. The illustration also shows a three-dimensional model of the docking unit of a laser endoscope for the installation and identification of a disposable instrument. The model is presented in an axial cross-section, where the system of functional interaction between the laser diode and the optical cable is visible, acting as the axis of the disposable instrument.

The system is extremely simple to reproduce and operate.

Brief Description of the Resonance Method:

The method involves creating a variable electromagnetic field in the space where the sample being studied is located. This field serves as an intermediary between the resonance circuit and the sample being tested.

On one side, the resonance circuit acts as the emitter (radiator) of this field, while on the other side, it serves as the acceptor (sensitive element) of the changes in the electromagnetic field introduced by the sample.

Even in the absence of the sample, the alternating electromagnetic field created by the solenoid is a sum of two electromagnetic fields that change in opposition to each other.

One field is generated by the change in magnetic induction of the solenoid and results in a swirling electric field (Maxwell-Faraday equation). The other field is generated by the change in the electric field created by the potential difference between the most distant turns of the solenoid (if the sample is placed inside the solenoid) or by the potential difference between the closest turn of the solenoid to the surface of the measured sample and the sample itself (if the sample is positioned opposite the solenoid's end), resulting in a swirling magnetic field (Ampère's circuital law with Maxwell's correction).

Under the influence of an external alternating electromagnetic field, depending on the nature of the sample, electrical phenomena such as linear and vortex conduction currents, linear and vortex displacement currents, as well as linear and vortex ionic currents (ordered ion motion) can be induced.

Following the principle of superposition of fields, these electrical phenomena cause distortions in the external alternating electromagnetic field.

These distortions are detected by the solenoid of the resonance sensor. The resonance circuit, which includes this solenoid, changes its behavior like how it would if additional elements—such as a capacitor, inductance, and resistor—were added to it.

The combination of additional capacitive, inductive, and active resistances forms an additional impedance introduced into the system by the sample being tested, and this attribute is measured by the resonance sensor.

Changes in the resonance circuit's parameters are reflected in the alteration of its amplitude and frequency characteristics, specifically, the resonance frequency and amplitude of the circuit.

By studying these changes, one can infer the impedance of the sample under investigation.

Principle of Data Processing from Resonance Sensors:

The resonance sensor allows the determination of the total impedance of the sample being tested at the working frequency of the sensor (see "Brief Description of the Resonance Method").

By itself, this value is of limited informational value.

However, everything fundamentally changes when we have a set of sensors with different working frequencies.

In this case, the opportunity arises to use a unique natural phenomenon observed in all types of substances: inorganic, organic, and biological. This phenomenon is that a substance changes its specific impedance depending on the frequency of the electric field applied to it, and this change is dependent on the composition of the substance being tested.

This phenomenon is actively researched and applied in the rapidly developing scientific field known as **Magnetic Resonance Spectroscopy – Impedance Spectroscopy (MRS-IS)**.

In English-language sources, this technique is more commonly referred to as **Electrochemical Impedance Spectroscopy (EIS)**.

Magnetic Resonance Spectroscopy – Impedance Spectroscopy is a method for studying various objects by measuring and analyzing how impedance depends on the frequency of an alternating current.

Different objects and processes are characterized by different relationships between active and reactive impedance and frequency, which makes it possible to solve the inverse problem—obtaining information about these objects and processes by analyzing the frequency characteristics of their response to alternating current.

The fact that the change in impedance with frequency change depends on the composition of the substance allows the identification of changes and the influence of each component on the total impedance of the substance at different frequencies.

After determining the coefficients that represent the influence of the respective components on the total impedance of the substance at each working frequency of the resonance sensors, it is possible to obtain information about the concentration of the components being studied by solving a system of linear equations based on the sensor readings.

The accuracy of this method is greatly influenced by the correct selection of the working frequencies of the sensors.

By scanning a wide frequency range, it is necessary to identify the frequency ranges most characteristic for each component, i.e., the frequencies at which the component gives the greatest response.

Traditional electromagnetic resonance spectroscopy in its research uses an alternating voltage source, which contacts the sample being studied. An electric current is generated in the circuit, the magnitude and phase shift of which depend on the sample's impedance.

The results are usually displayed in the form of Nyquist plots or diagrams.

In such studies, it is difficult to achieve high sensitivity and measurement accuracy. The proposed method, where impedance is measured using resonant circuits, has significantly higher sensitivity and accuracy, and it is also non-contact.

There are certain technical challenges in creating an oscillatory circuit with a resonance frequency that can be adjusted over a wide range. Therefore, to identify the "characteristic" frequencies of the components, traditional magnetic resonance spectroscopy (impedance spectroscopy) will need to be used.

Once the characteristic frequencies are determined and the resonance sensors for these frequencies are created, the monitoring system based on these sensors will possess exceptional sensitivity and accuracy.

Interference Protection

Mechanical parameters such as VISCOSITY, DENSITY, TRANSPARENCY and PRESSURE (if the medium is incompressible) should not have any effect on the measured electrical parameters of the substance.

FLOW VELOCITY in the pipeline and TURBULENCE – these phenomena are too slow to affect the "megahertz" impedance measurement processes. HARDNESS – this is a chemical parameter, which is entirely determined by the components entering the substance.

Temperature generally affects the impedance value; however, measuring temperature and accounting for it in impedance measurements is not a technically challenging task.

The fundamental principles of protective coding for optical storage media primarily apply to disks that are transparent to the light emitted from the output optical system of a laser diode. These disks conform to standard dimensions:

- **Outer diameter:** 120 millimeters
- **Thickness:** 1.2 millimeters

The disk is composed of two bonded halves, each with a thickness of 0.6 millimeters. A coating is applied to one of the halves in the form of a ring with the following dimensions:

- **Outer diameter:** 120 millimeters
- **Inner diameter:** 118 millimeters
- **Coating thickness:** Ranges from 1 micron to 10 microns, with an increment of 100 angstroms

Such precision is fully ensured by the properties and parameters of high-speed electrochemical coating technology. Additionally, during operation, it guarantees high identification accuracy, preventing errors related to coding measurement inaccuracies.

The conceptual basis of encoding is based on the following principle: the encoding signal is generated from the response of a sensor or a group of sensors to the thickness of the ring-shaped coating on the disk. This signal is then compared with a statistical reference standard, which corresponds to the resonant response of the sensors to the coating thickness, as well as to the specific properties of the coating material, including its conductivity, density, and electrical resistance.

In the servo-marking system of the formatted disk, which typically consists of grouped servo points on the disk's data tracks, a signal from the decoding sensor of the security encoding system is introduced instead of one of the points in the group. If the integrated signal from three sensors matches the predefined signal parameters, the drive's servo system aligns the laser focus on the data track, allowing the system to initiate the reading or writing process on the optical disk.

If the signal from the sensors does not match the statistical reference signal stored in the drive processor's memory, the servo system of the drive does not align or stabilize the trajectory of the laser diode's focus on the data track of the disk. As a result, reading or writing on the disk becomes impossible.

VARIANTS OF DISC IDENTIFICATION IN THE DRIVE

Identification of the disc in the drive can be carried out by measuring the coating thickness in real-time, comparing the measurement results with the statistical value of this parameter stored in the drive's processor, and sending a signal to the comparison unit within the processor of the drive. This ensures the authenticity of the disc by verifying that the physical properties of the coating match the expected characteristics.

The identification process can take place while the disc is spinning or when the disc is inserted into the drive.

During identification when the disc is inserted into the drive, negative identification results prevent the activation of any structures within the drive, while a positive identification signal enables the necessary structures of the drive.

The same logic and operational sequence apply in the coding and decoding system of a single-use tool in various devices and technical systems of any level.

This constructive interconnection significantly standardizes all technological transitions in the processes of identification, coding, and decoding, regardless of the specific type and application area of the product, but solely depending on the design features and characteristics of the specialized unit for coding and decoding.

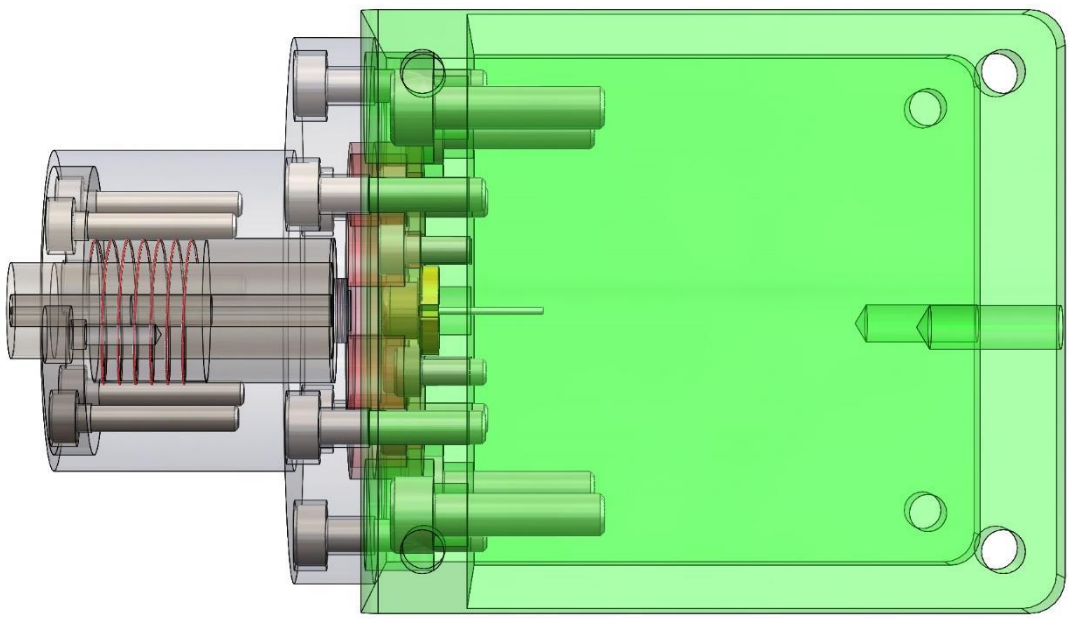

Fig. 3. The illustration shows a three-dimensional model of the docking unit of a laser endoscope for the installation and identification of a single-use instrument. The model is presented in a transparent version, top view, where the functional interaction system between the laser diode and the optical cable, serving as the axis of the single-use instrument, is visible. Also visible is the solenoid sensor, whose signal is used for the coding and decoding of the single-use instrument

CONSTRUCTIVE VARIANTS OF DISK DRIVES

The elements of the protective system for resonance encoding-decoding can be integrated into any existing disk drive design today, without any constructive or schematic limitations, implementing all known optical memory technologies.

Existing disk drives can also be modified to accommodate the installation of a micro-sensor system by embedding the sensor micro-module into the supporting structure of the disk drive's casing.

If necessary, the coating can be applied to already existing disks.

SAMPLE TECHNOLOGICAL ROUTE FOR MANUFACTURING A DISC WITH A CODING COATING

No special technologies or equipment are required for the production of an optical disc with a protective coding coating.

The manufacturing process can use modernized technological equipment that is currently in use.

The application of the encoding coating can be combined with the process of making a disc copy in a mold using a master disc with an identification point in the formatted servo-marking system. These points will thus be imprinted on each information track—there are over 37,000 such tracks in a standard optical disc.

OPTIONS FOR USING DISCS WITH PROTECTIVE COATINGS IN OPTICAL MEMORY SYSTEMS FOR CORPORATE CLIENTS

A typical scheme for using discs with protective encoding-decoding in corporate clients' optical memory systems involves manufacturing a specific number of discs for each client, with parameters such as thickness and micro-sensor coordinates unique to that client.

The design and technical specifications of the sensor micro-module can also be customized based on the client's preferences but must align with the control parameters of the protective encoding coating on the discs.

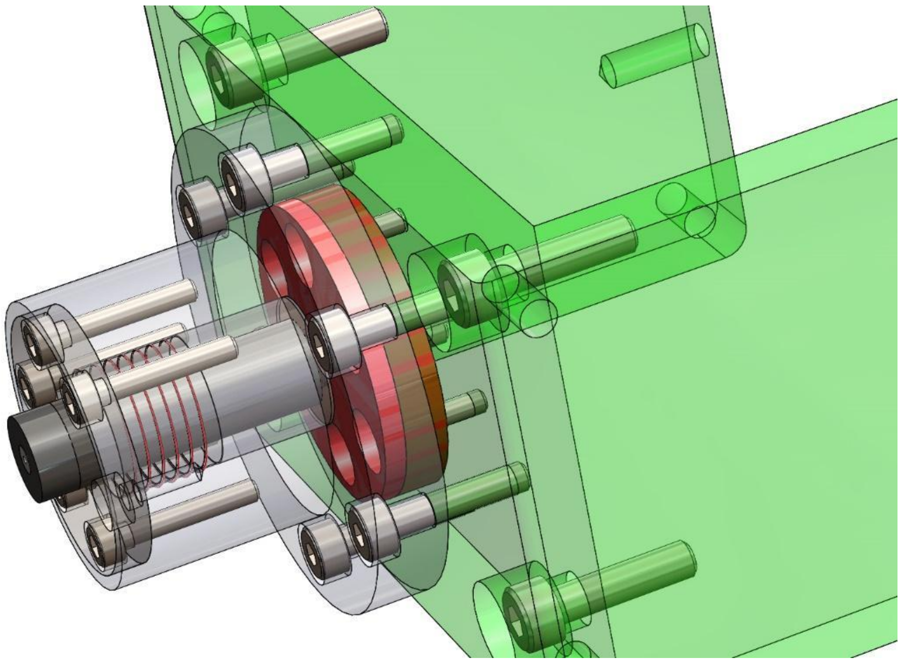

Fig. 4. The illustration also shows a three-dimensional model of the docking node of the laser endoscope for the installation and identification of a disposable tool. The model is shown in a transparent version, isometric view, where the system of functional interaction between the laser diode and the optical cable, as the axis of the disposable tool, is visible. The solenoid sensor is also visible, from which the signal is used for the encoding and decoding of the disposable tool

VARIANTS OF USING DISKS WITH PROTECTIVE ENCODING IN HOUSEHOLD RADIO ENGINEERING SYSTEMS

Disks with protective encoding can be used in Blu-Ray and HD DVD systems.

In addition, the protective encoding system can be applied in new developments and technologies of optical digital memory, including disks with exceptionally high recording density, multi-layer disks, and monolithic optical disks with a memory capacity of 1 terabit or more.

During the manufacturing of disks, the necessary indication in the servo-marking can be introduced during the pressing process.

The disc drive's servo system begins the orientation of the laser beam's focal point only when the encoding signal from the encoding and decoding system matches. This signal is generated by a system of three micro-sensors that, using magnetic resonance methods, compare the thickness of the coating with a reference. When the signal parameters match the reference for at least two sensors, the signal is added to the system of symbols and marking points in the servo-marking. By reading these points, the drive's servo system begins to stabilize the laser's focus on the required track on the disc's recording field.

VARIANTS OF USING DISCS WITH PROTECTIVE COATING IN PERSONAL COMPUTERS

The technology for manufacturing discs for personal computers is similar to the technology used for making discs for other types of optical memory systems.

The methodology for using disks with protective encoding is formed based on the type of computer, its level of saturation and power, performance, etc.

An especially important aspect is the possibility of using protective encoding techniques and technology in the creation of hybrid disks, combining a hard disk with an optical disk.

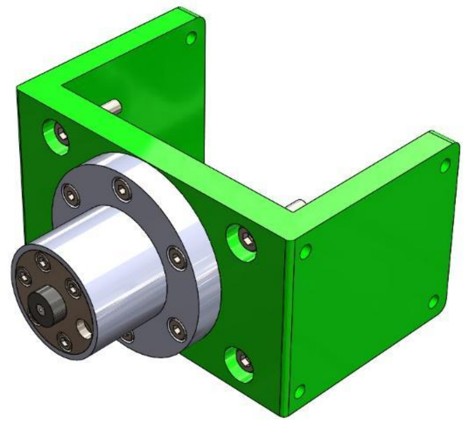

Fig. 5. The image shows a three-dimensional model of the housing of a plug connector attached to the main supporting laser diode component (highlighted in green on the diagram)

Proposal for a system for obtaining professional information from the internet

The primary tool is the optical disc, on which the encoding coating is applied in the annular zone where no information is recorded.

The auxiliary tool is a micro-sensor, which is integrated into the disk drive.

The signal from the micro-sensor is generated when measuring the thickness of the coating; the measurement accuracy is 100 angstroms, and this is the value by which each group of disks differs from another group.

The signal from the micro-sensor serves as a code for accessing information arrays stored on the internet.

The software must be capable of identifying the signal from the micro-sensor, and in the case of a match with the reference signal, it should open the information arrays. During the download process, the software must continue to verify the signal's accuracy until the information download is complete.

This allows for preventing the replacement of the disk during recording with an unauthorized one.

It is impossible to counterfeit such a disk, as the thickness of the coating is determined during manufacturing, and even having such a disk, it is impossible to use it without a micro-sensor tuned to a strictly specific signal pattern.

Disks and sensors can be produced at any existing optical disc manufacturing facility today; the disks can be produced in batches of 100 to 250 pieces with the same thickness of the encoding layer and a set of sensors.

Each user can purchase one or more batches of disks and use them while working with the internet.

Programs and other information can be sent to users in the same way, but in reverse order, which guarantees complete confidentiality and protection from unauthorized messages and viruses while being online.

This is, of course, very general information. If you, the readers, find it worthy of attention, the author could provide more details on this project.

Since the mechanical part of the project is essentially implemented, this project is about software, which could potentially become the foundation for further development in this area.

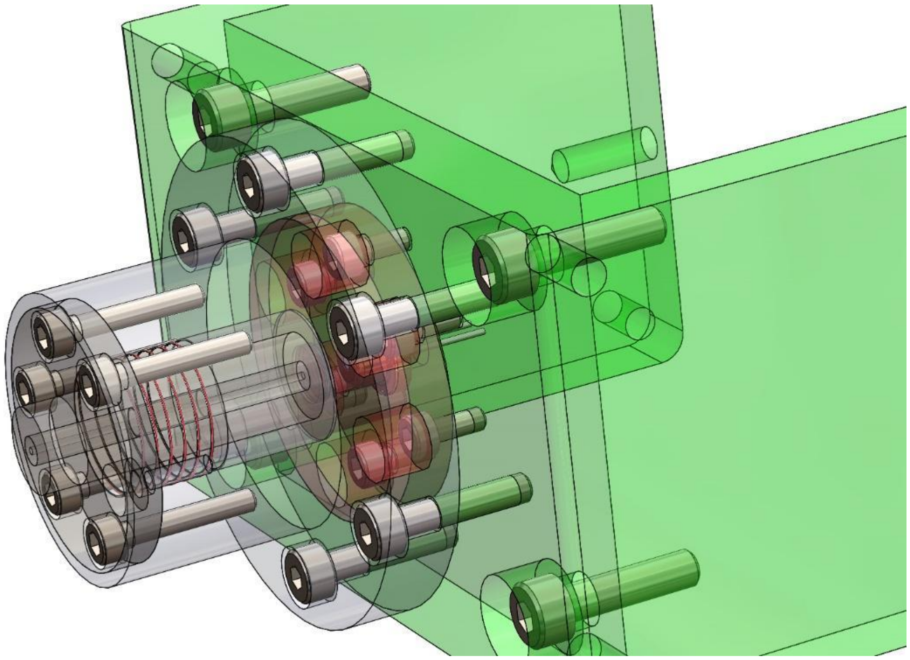

Fig. 6. The illustration shows a coaxial plug housing with a coding and decoding device in the form of a coaxially mounted solenoid, which, together with an impulse generator, forms a coding or decoding signal. After passing through, it sorts and transmits the resonance signal to the analytical block

Advantages of the proposed technology addressing the essence of the problems identified in the optical data storage systems market:

1. There are multiple thickness variations of encoding coatings, which allow for a variety of protective codes, unlike known technologies that have only one code variation.

2. In the coating application process, the control technology used is identical to the decoding technology, which allows for full monitoring of the encoding quality during the disc manufacturing process, without removing the disc from the conveyor. This is in contrast to existing technologies, where the disc must be removed from the conveyor and placed into a testing device for quality control. Thus, the control in the proposed technology is 100%, whereas in existing technologies, it

is selective, which eliminates the production of defective discs that in current technologies are only discovered during the operation.

3. The proposed technology allows for the encoding of all categories and types of discs, regardless of the recording and reading format, unlike existing technologies where encoding depends on the disc's recording and reading format.

4. In the proposed technology, the encoding coating can serve as the basis for a personal secret code or cipher, which is not present in existing technologies.

5. In the proposed technology, the decoding and identification sensor is mobile and can have several supply options, including an autonomous version that is not linked to the disk drive. In existing technologies, the decoding system is only installed in the disk drives; thus, the presence and correctness of the encoding can only be controlled during the installation of the disk into the drive. In contrast, the proposed technology allows for the control and identification of the code outside of the disk drive, such as in stores or at the entrances to enterprises and institutions, which is particularly important for ensuring complete information confidentiality.

6. In the proposed technology, decoding eliminates any dependence on the optical systems of the disk drive, but the decoding results can influence the operation of optical systems, such as the servo-drive for the orientation and control of the reading or writing laser focus. This contrasts with existing technologies, where the decoding process is entirely dependent on the optical elements of the drive, which complicates its design and significantly reduces its reliability.

7. The proposed technology has multiple hierarchies of its fundamental working scheme, a flexible algorithm, and can be integrated into any optical memory security system, including hybrid information carriers that combine optical components with other basic principles. Existing technologies lack this level of flexibility.

8. The proposed technology allows the use of the disk code as an entry password to access professional information arrays on the internet, a feature not available in existing technologies.

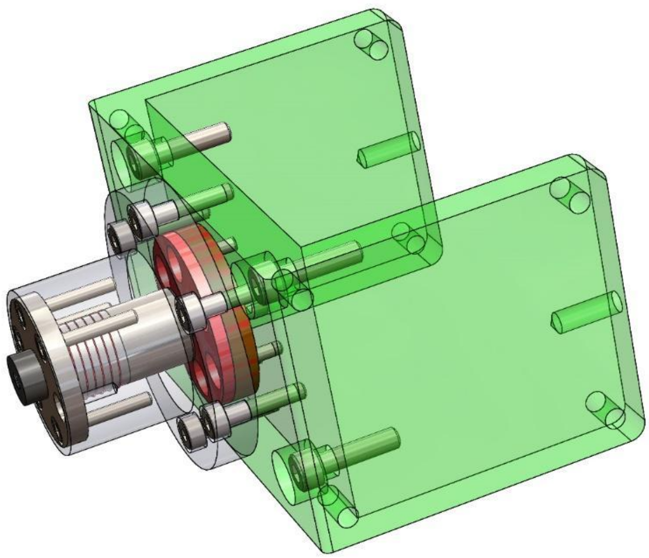

Fig. 7. The illustration shows a laser diode module with a coding and decoding sleeve containing a sensor-solenoid, positioned coaxially to the plug of a single-use tool. The plug is designed as a sleeve, the wall thickness of which serves as the key to the encryption code, identified through resonance spectroscopy

The technological and structural solution of such an integrative sensor allows its integration into virtually any technical system where the connection, for example of a single-use tool, is made via a plug connector.

Based on the results of a comprehensive analysis using patent and licensing strategy algorithms, the following general marketing strategy is preliminarily developed:

The preliminary definition of the project's base product and its functional and operational features and characteristics:

1. The main market sector is corporate clients:

- Banks and financial companies
- Industrial corporations
- Research laboratories
- Transportation companies, railway stations, airports, and seaports
- Large retail chains
- Municipal services
- Government organizations and institutions
- Large medical institutions
- Insurance companies
- Branches of the armed forces
- Police and special services

2. Product Characteristics (as an Example):

The main project product is an optical disc with a coding ring and a disc drive with a built-in sensor module, usually consisting of three micro-sensors.

If necessary, the sensor module can be supplied without the disc drive.

If necessary, the company leading the project can provide services for corporate clients, organizing the implementation of the coding and information protection system on a turnkey basis.

LIST OF USED LITERATURE, PATENT, AND LICENSE INFORMATION

APPENDIX 1

United States Patent Application	**20190182503**
Kind Code	**A1**
Tsai; Yi-Ting ; et al.	**June 13, 2019**

METHOD AND IMAGE PROCESSING APPARATUS FOR VIDEO CODING

Abstract

A method and an image processing apparatus for video ***coding*** are proposed. The method is applicable to an image processing apparatus and includes the following steps. A current ***coding*** unit is received, and the number of control points of a current ***coding*** unit is set, where the number of control points is greater than or equal to 3. At least one affine model is generated based on the number of control points, and an affine motion vector corresponding to each of the at least one affine model is computed. A motion vector predictor of the current ***coding*** unit is computed based on the at least one motion vector so as to accordingly perform inter-prediction ***coding*** on the current ***coding*** unit.

APPENDIX 2

United States Patent Application	**20190190578**
Kind Code	**A1**
Mittal; Udar ; et al.	**June 20, 2019**

CODING MAIN BEAM INFORMATION IN CSI CODEBOOK

Abstract

Apparatuses, methods, and systems are disclosed for preparing a channel state information ("CSI") codeword. One apparatus includes a processor and a transceiver configured to communicate 805 with a transmit-receive point ("TRP") over a radio access network using spatial multiplexing, wherein multiple transmission layers are transmitted at a time, each transmission layer comprising multiple beams. The processor identifies a main beam for each of the multiple transmission layers and determines whether the main beams of each transmission layer are the same. The processor prepares a CSI codeword, wherein the CSI codeword comprises a first bit indicating whether the main beams of each transmission layer are the same, a first set of bits ***coding*** the main beams, and a second set of bits ***coding*** the remaining beams. The transceiver transmits the CSI codeword to the TRP.

APPENDIX 3

United States Patent Application	**20190200025**
Kind Code	**A1**
Li; Bin ; et al.	**June 27, 2019**

CODED-BLOCK-FLAG CODING AND DERIVATION

Abstract

Techniques for ***coding*** and deriving (e.g., determining) one or more coded-block-flags associated with video content are described herein. A coded-block-flag of a last node may be determined when coded-block-flags of preceding nodes are determined to be a particular value and when a predetermined condition is satisfied. In some instances, the predetermined condition may be satisfied when log.sub.2(size of current transform unit) is less than log.sub.2 (size of maximum

transform unit) or log.sub.2(size of current ***coding*** unit) is less than or equal to log.sub.2(size of maximum transform unit)+1. The preceding nodes may be nodes that precede the last node on a particular level in a residual tree.

APPENDIX 4

United States Patent Application	**20190222863**
Kind Code	**A1**
HANNUKSELA; Miska Matias ; et al.	**July 18, 2019**

VIDEO CODING AND DECODING

Abstract

There is disclosed a method, an apparatus, a server, a client and a non-transitory computer readable medium comprising a computer program stored therein for multi view video ***coding*** and decoding. View random access (VRA) pictures or access units are coded into a multiview bitstream. VRA pictures enable starting the decoding of a subset of the views present in the bitstream. The views selected to be accessible in VRA pictures are alternated in successive VRA pictures so that all views are gradually reconstructed when two or more VRA pictures have been decoded.

APPENDIX 5

United States Patent Application	**20190200026**
Kind Code	**A1**
LAINEMA; Jani ; et al.	**June 27, 2019**

APPARATUS, A METHOD AND A COMPUTER PROGRAM FOR VIDEO CODING

Abstract

There is disclosed an apparatus, a method and a computer program for video ***coding***. The apparatus comprises a selector configured for selecting a pixel for prediction; a projection definer configured for determining a projection of said pixel to a set of reference pixels; and a prediction definer configured for selecting one or more reference pixels from said set of reference pixels on the basis of said projection, and using said selected one or more reference pixels to obtain a prediction value for said pixel to be predicted.

APPENDIX 6

United States Patent Application	**20190208222**
Kind Code	**A1**
UGUR; Kemal ; et al.	**July 4, 2019**

APPARATUS, A METHOD AND A COMPUTER PROGRAM FOR VIDEO CODING AND DECODING

Abstract

There are disclosed various methods, apparatuses and computer program products for video ***encoding*** and decoding. In other embodiments, there is provided a method, an apparatus, a computer readable storage medium stored with code thereon for use by an apparatus, and a video encoder, for ***encoding*** a scalable bitstream, to provide indicating an ***encoding*** configuration, where only samples and syntax from intra coded pictures of base layer is used for ***coding*** the enhancement layer pictures. In other embodiments, there is provided an apparatus, a computer readable storage medium stored with code thereon for use by an apparatus, and a video decoder, for decoding a scalable bitstream, to receive

indications of an ***encoding*** configuration, where only samples and syntax from intra coded pictures of base layer is used for ***coding*** the enhancement

APPENDIX 7

United States Patent Application	**20190222859**
Kind Code	**A1**
CHUANG; Tzu-Der ; et al.	**July 18, 2019**

METHOD AND APPARATUS OF CURRENT PICTURE REFERENCING FOR VIDEO CODING

Abstract

A method and apparatus for a video ***coding*** system with the current picture referencing (CPR) mode enabled are disclosed. According to one method, the luma and chroma blocks of the current image are jointly coded using a same ***coding*** unit (CU) structure if the CPR mode is selected for the luma and the chroma blocks. Alternatively, if the luma and chroma components are partitioned into the luma and the chroma blocks separately using separate CU structures, the luma and chroma blocks are encoded or decoded using a ***coding*** mode selected from a ***coding*** mode group excluding the CPR mode. According to another method, the luma and chroma blocks of the current image are coded separately using a different CU structure if the CPR mode is selected for the luma and chroma blocks. In yet another method, reconstructed reference data is disclosed for the CPR mode with CU equal to PU.

APPENDIX 8

United States Patent Application	**20190230365**
Kind Code	**A1**

Tanner; Jason ; et al.	**July 25, 2019**

VIDEO CLUSTER ***ENCODING*** FOR MULTIPLE RESOLUTIONS AND BITRATES WITH PERFORMANCE AND QUALITY ENHANCEMENTS

Abstract

Techniques related to video cluster ***encoding*** are discussed. Such techniques include ***encoding*** the video at a first resolution and first bitrate, translating block based ***coding*** parameters corresponding thereto to block based encode controls for encode of the same video at a second resolution or a second bitrate, and ***encoding*** the video at the second resolution and/or bitrate using the encode controls.

APPENDIX 9

United States Patent Application	**20190246126**
Kind Code	**A1**
Abbas; Adeel ; et al.	**August 8, 2019**

APPARATUS AND METHODS FOR VIDEO COMPRESSION USING MULTI-RESOLUTION SCALABLE CODING

Abstract

Apparatus and methods for digital video data compression via a scalable, multi-resolution approach. In one embodiment, the video content may be encoded using a multi-resolution and/or multi-quality scalable ***coding*** approach that reduces computational and/or energy load on a client device. In one implementation, a low fidelity image is obtained based on a first full resolution image. The low fidelity image may be encoded to obtain a low fidelity bitstream. A second full resolution image may be obtained based on the low fidelity bitstream. A portion of a difference image obtained based on the second full resolution image and the first full resolution may be encoded to obtain a high fidelity bitstream. The low fidelity bitstream and the high fidelity bitstream may be provided to e.g., a receiving device.

APPENDIX 10

United States Patent Application	**20190246118**
Kind Code	**A1**
YE; Jing ; et al.	**August 8, 2019**

METHOD AND APPARATUS FOR VIDEO CODING IN MERGE MODE

Abstract

A method for video ***coding*** using a merge mode by a decoder or encoder. An embodiment of the method includes receiving a current block having a block size, setting a grid pattern based on the block size of the current block, wherein the grid pattern partitions a search region adjacent to the current block into search blocks, and a size of the search blocks is determined according to the block size of the current block, and searching for one or more spatial merge candidates from candidate positions in the search blocks to construct a candidate list that includes the one or more spatial merge candidates.

APPENDIX 11

United States Patent Application	**20190034583**
Kind Code	**A1**
Kartalov; Emil P. ; et al.	**January 31, 2019**

SIGNAL ***ENCODING*** AND DECODING IN MULTIPLEXED BIOCHEMICAL ASSAYS

Abstract

This disclosure provides methods, systems, compositions, and kits for the multiplexed detection of a plurality of analytes in a sample. In some examples, this disclosure provides methods, systems, compositions, and kits wherein multiple analytes may be detected in a single sample volume by acquiring a cumulative measurement or measurements of at least one quantifiable component of a signal. In some cases, additional components of a signal, or additional signals (or components thereof) are also quantified. Each signal or component of a signal may be used to construct a ***coding*** scheme which can then be used to determine the presence or absence of any analyte.

APPENDIX 12

United States Patent Application	**20170236521**
Kind Code	**A1**
Chebiyyam; Venkata Subrahmanyam Chandra Sekhar ; et al.	**August 17, 2017**

ENCODING OF MULTIPLE AUDIO SIGNALS

Abstract

A device includes an encoder and a transmitter. The encoder is configured to determine a mismatch value indicative of an amount of temporal mismatch between a reference channel and a target channel. The encoder is also configured to determine whether to perform a first temporal-shift operation on the target channel at least based on the mismatch value and a ***coding*** mode to generate an adjusted target channel. The encoder is further configured to perform a first

transform operation on the reference channel to generate a frequency-domain reference channel and perform a second transform operation on the adjusted target channel to generate a frequency-domain adjusted target channel. The encoder is also configured to estimate one or more stereo cues based on the frequency-domain reference channel and the frequency-domain adjusted target channel. The transmitter is configured to transmit the one or more stereo cues to a receiver.