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Research Article

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A Novel and Unique Neuroengineering Method-Introduction to "Applied Medi Brain Energy Tronic Treatment Method" for SMA Spinal Muscular Atrophy Disease, Paralyzed Patients, ALS Patients, MPS, SSPE, DMD Patients

Emin Taner Elmas

Assistant Professor Dr, Vocational School of Higher Education for Technical Sciences, Division of Motor Vehicles and Transportation Technologies, Department of Automotive Technology, Iğdır University, Turkey & Graduate School of Natural and Applied Sciences - Major Science Department of Bioengineering and Bio-Sciences, Iğdır University, Turkey

***Corresponding author**
Emin Taner Elmas, Assistant Professor Dr, Vocational School of Higher Education for Technical Sciences, Division of Motor Vehicles and Transportation Technologies, Department of Automotive Technology, Iğdır University, Turkey & Graduate School of Natural and Applied Sciences - Major Science Department of Bioengineering and Bio-Sciences, Iğdır University, Turkey.

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ABSTRACT
This article is a scientific study introducing "A Novel Unique Neuro-Physical Medical Treatment Method for SMA – Spinal Muscular Atrophy Disease, Paralyzed Patients, ALS patients, MPS, SSPE, DMD Patients and for Similar Neurological Muscle Diseases" It will be called as "Applied Medi-Brain Energy-Tronic Treatment Method".

This is a non-surgical neuro - treatment method in medicine and neurology, called as "Applied Medi-Brain Energy-Tronic Treatment Method", named by Emin Taner ELMAS who is the author of the fundamental study of this current article "Emin Taner ELMAS; System Design and Development of a Novel Unique Neuro-Physical Medical Treatment Method for SMA - Spinal Muscular Atrophy Disease and for Similar Neurological Muscle Diseases. Collect J Neurol. 2024; 1: ART0037. https://doi.org/10.70107/ collectjneurol-art0037. This "Applied Medi-Brain Energy-Tronic Treatment Method" is completely original and unique to the author of this article, Emin Taner ELMAS.

This "Applied Medi-Brain Energy-Tronic Treatment Method" is not a treatment that has been applied so far, it was invented, first thought and designed by the author of this article, Emin Taner ELMAS, and can be put into practice with step-by-step development stages.

Energy transfer process with a thermodynamical interaction stated by "ELMAS's Theory of Thermodynamics" may partially or totally contribute this unique treatment method. ELMAS's Theory of Thermodynamics" introduces a scientific approach for 5th Law of Thermodynamics which is a theoretical application example for medical thermodynamics and is revealed by Emin Taner ELMAS who is the author of this article [1-60].

Keywords: SMA, Spinal Muscular Atrophia, Atrophy, SMA Patients, Paralyzed Patients, ALS Patients, MPS, SSPE, DMD Patients, Muscle Disease, Neuro-engineering, Neuralengineering, Neuro-Science, Motor Neuron, Neuron, BCI, Brain-Computer Interface, Baringate, EEG–Electroencephalography, EMG-Electromyography, Neural Conduction, Pediatric Disease, Energy, Energy Transfer, Thermodynamics, Fluid Mechanics, Heat Transfer, Energy Conversion, Energy Efficiency, Mathematics, Medicine, Bioengineering, Health Science, ELMAS's Theory of Thermodynamics, Medical Thermodynamics; Medical Technique; Medical Engineering

Introduction
This article is a scientific study introducing "A Novel Unique Neuro-Physical Medical Treatment Method for SMA – Spinal Muscular Atrophy Disease, Paralyzed Patients, ALS patients,

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MPS, SSPE, DMD Patients and for Similar Neurological Muscle Diseases" It will be called as "Applied Medi-Brain Energy-Tronic Treatment Method".

This "Applied Medi-Brain Energy-Tronic Treatment Method" is completely original and unique to the corresponding first author of this article, Emin Taner ELMAS and then the system is integrated with the "Applied Medi-Brain Energy-Tronic Treatment Method". This "Applied Medi-Brain Energy-Tronic Treatment Method" is not a treatment that has been applied so far, it was invented, first thought and designed by the author of this article, Emin Taner ELMAS, and can be put into practice with step-by-step development stages.

The project contains the theory of a method tried to be developed that can treat SMA (Spinal Muscular Atrophy)disease and other similar neurological diseases. In the study, brain data will be examined with a 14-channel EEG Electroencephalography device. With this device, the signals in the brain will be examined and these signals will be transmitted to the patients' muscles. Many physical and sensory functions cannot be performed in SMA patients. Coughing, swallowing, breathing, chewing, walking, hand, arm, leg and other muscle movements cannot occur. With this EEG device, the signals in the brain will be able to be seen as waves. By means of the special software of EEG device it is possible to manipulate the cube on the computer screen just by brain thinking and it is possible to simulate facial movements and facial expressions on the computer screen, as well.

SMA (Spinal Muscular Atrophy) is a muscle disease that affects the anterior horn motor nerve cells (neurons) in the spinal cord, restricting mobility and preventing the signals from the brain from being transmitted to the muscles. While the incidence is 1/10000 in the world, this rate is 1/6000 in Turkey. Due to the mutation in the SMN gene, not enough SMN protein can be produced. In these patients, brain functions work, but since the production of SMN protein is not sufficient, the signals produced in the brain cannot be transmitted to the muscles. SMA is inherited. The occurrence of the disease in children depends on both parents carrying the mutation gene. When parents carry the mutated gene, there is a possibility that ¼ of the children will have SMA. The symptoms of the disease vary depending on the type of disease. In general, these symptoms are as follows: symptoms include weak muscles, weakness, difficulty in moving, poor head control, poor sucking and swallowing difficulties, hoarse voice and twitching of the tongue, unusually frequent falls after starting to walk, and decreased ability to walk.

Type 0, symptoms appear before birth, it is the rarest and severe form of SMA. Type 1 is the most common and most severe type of SMA patients.

In Type 1 patients, symptoms are observed before 6 months.

In Type 2 patients, symptoms appear after the 6th month, previously, baby development was normal.

Type 3 patients are normal at birth, symptoms begin after the 18th month.

Type 4 occurs in adulthood, the onset and progression of the disease is slow.

Energy transfer process with a thermodynamical interaction stated by "ELMAS's Theory of Thermodynamics" may partially or totally contribute this unique treatment method. ELMAS's Theory of Thermodynamics" introduces a scientific approach for 5th Law of Thermodynamics which is a theoretical application example for medical thermodynamics and is revealed by Emin Taner ELMAS who is the author of this article.

Medical Technology and Biomechanics are disciplines that aim to understand the structure, functions and movements of the human body and to combine this information with engineering solutions to improve people's quality of life. Biomechanical engineering and medical technique examines the interactions between physical and biological sciences, thus designing medical devices and prosthetics by modeling the structural integrity, force dynamics and movement capabilities of the human body. Studies in this field aim to produce solutions that best mimic the natural functions of the human body and adapt to the biological structure. As a result, biomechanical devices developed through the combination of medicine and engineering help individuals regain the functions they have lost.

For many people, artificial limbs are devices that replace a lost organ or limb. The purpose of artificial limbs is to replace the lost limb and perform functions in daily life and increase the individual's quality of life. These limbs use advanced mechanisms, sensors and motors to mimic natural limbs. While traditional prosthetics often offer limited flexibility and functionality, artificial limbs are becoming more personalized, functional and aesthetically better thanks to 3D printers. 3D printing technology has revolutionized the field of medicine, allowing customized prosthetics to be produced at low cost.3D printers are used to produce structures, especially those with complex geometries, more quickly and efficiently.

These printers have the ability to create a physical model directly from a computer-aided design (CAD) file. This allows designers to produce prosthetics that are not only theoretically perfect, but also personalized, realistic and functional. This advantage is especially important in the design of prosthetics used to meet individual needs. With 3D printers, customized prosthetics can be designed according to the body structure, biomechanical requirements and aesthetic preferences of the users.

As a result of SMA symptoms, people consult a neurologist and the disease is diagnosed. EMG (electromyography) is performed to measure the person's nerves and muscles. If the findings are normal, a blood test is performed and suspicious gene structures are examined. In the light of the findings, the person is diagnosed with SMA disease. There are other neurological diseases that have similar characteristics to this disease. For example, in paralyzed patients, in cases where there is no damage to the brain, brain signals cannot be transmitted to the muscles due to the damage to the spinal cord. In this article, the main purpose of the study within the scope of current project to treat SMA and similar neurological diseases, to help make the living conditions of these patients easier, to prevent children from being at risk of death due to their inability to access expensive treatment methods, and to relieve the sadness of families. Since there are not enough studies in this context, this project study will also help enrich the literature on such topics.

SMA has become a disease heard about frequently in recent years. It is estimated that there are approximately three thousand SMA patients in Turkey. This disease progresses as a very difficult process for both the patient and his/her family. Especially babies with Type 1 suffer from the disease very severely. They live connected to approximately 6 - 7 devices, and most of them live until the age of two. Treatment with the use of conventional drugs is provided for a price of approximately 2.5 million dollars. It is not possible for everyone to afford such a high fee. Financial aid is provided by the state - government provided that certain criteria are met. Patients who do not meet these conditions and cannot afford treatment costs are left to die. Unfortunately, there are very little and restricted medical and technical information on this subject. This article explains a project which aims to develop a treatment method integrated with electrical-electronic and computer systems based on neuro-engineering, which is much more economical and accessible to all patients regarding the treatment of the disease. That is, by the realization and implementation of the methodology to be developed, it may be possible to treat individuals who are suffering from with other neurological diseases without applying expensive treatment methods. BCI – Brain Computer Interface applications will also be used for the project.

This Braingate-based technology which is planned to develop by this article can also be used especially for paralyzed patients, ALS patients, MPS, SSPE and DMD patients as well as SMA patients.

There is no previous study related this methodology to be developed for the treatment of SMA and similar neurological disease within the scope of the current project introduced here.

Thus, the project entitled as “A Novel Unique Neuro-Physical Medical Treatment Method for SMA – Spinal Muscular Atrophy Disease, Paralyzed Patients, ALS patients, MPS, SSPE, DMD Patients and for Similar Neurological Muscle Diseases” is completely original and unique to the authors of this article. It will be called as “Applied Medi-Brain Energy-Tronic Treatment Method” [1-60].

Method, Findings and Discussion

As it is explained in the article “Emin. T. Elmas, M. Şimşek (2025). Bionic Prosthetic Robotic Artificial Hand Design and Biomechanics Analysis. Journal of Medical Discoveries. RPC Publishers. 2(1); DOI: https://www.doi.org/rpc/2025/rpc.jmd/00311”; a “Bionic Prosthetic Robotic Artificial Hand” has been manufactured and then the system is integrated with the “Applied Medi-Brain Energy-Tronic Treatment Method”.

The project contains the theory of a method tried to be developed that can treat SMA (Spinal Muscular Atrophy) disease and other similar neurological diseases. In the study, brain data will be examined with a 14-channel EEG device. With this device, the signals in the brain will be examined and these signals will be transmitted to the patients’ muscles. Many physical and sensory functions cannot be performed in SMA patients. Coughing, swallowing, breathing, chewing, walking, hand, arm and other muscle movements cannot occur. With this EEG device, the signals in the brain will be able to be seen as waves. By means of the special software of EEG device it is possible to manipulate the cube on the computer screen just by brain thinking and it is possible to simulate facial movements and facial expressions on the computer screen, as well.

This article explains a project which aims to develop a treatment method integrated with electrical electronic and computer systems based on neuro-engineering, which is much more economical and accessible to all patients regarding the treatment of the disease. That is, by the realization of the method to be developed, it may be possible to treat individuals with other neurological diseases without applying expensive treatment methods. BCI – Brain Computer Interface applications will also be used for the project.

With the implementation of this methodology introduced by this study, it is also possible to treat individuals who are suffering from other neurological diseases without applying expensive treatment methods. This Braingate-based technology which is planned to develop by this article, can also be used especially for paralyzed patients, ALS patients, MPS, SSPE and DMD patients as well as SMA patients.

By use of Braingate technology it is aimed to detect signals belonging to muscles and related functions from the brain motor cortex and transmit them as electrical signals to the muscles where these signals cannot be transmitted. This treatment is based on the principle of activating muscles that cannot work or weakly work with the implementation of electrical current. The project described in this article aims to improve the quality of life and treat SMA patients by artificially stimulating muscles using internal or external devices and systems. Energy will be given to inactive points with brain power, or rather brain energy. SMA patients will only need to think about this to move any limb they want. When neurons become active, movement will occur spontaneously. For example, if the patient manages to raise his/her arm, it becomes obvious that muscles such as the breathing muscle, eating muscle, etc. can also be stimulated. The thought energy taken from the brain will be used for this work.

At the beginning stage of the project, the brain wave signals of two people who are not sick and two people who are sick will be examined and compared. These brain waves are actually electrical signals with voltage, current intensity, wavelength and frequency, and they carry a certain amount of energy. This energy will be evaluated as electrical energy and will first operate a mechanism containing a small electric motor, and the theory described in this article will be confirmed. As the ultimate goal, a limb of an SMA patient will be moved with this electrical energy. This energy will be sent to the motor cortex or to each muscle separately, depending on the requirement. Special “Nerve Cables” will be used as the signal and energy transmission tool here. Nerve Cable is the electrical cable drawn from the brain to any part of the body.

The design to be discussed in this project will be an artificial hand prototype produced with PLA filament using 3D printers. The artificial hand design will aim to fulfill basic functions such as independent movement of the fingers, holding and grasping in a way that will comply with the biomechanical structure of the human hand. In addition, PLA, the material used in the design of the prosthetic hand, is a biodegradable and environmentally friendly material. The mechanics, durability and flexibility of PLA make it suitable for this design. The use of PLA filament in this prosthetic design provides both an environmentally friendly option and cost-effectiveness in the production process.

From a biomechanical perspective, each component of the artificial hand must be meticulously designed and must work in harmony with the human body. The natural mobility of the human hand must be mechanically provided in the prosthetic hand. The motors, gears and joints used to allow the fingers to move independently of each other must be designed correctly. In addition, the artificial hand must be able to carry various forces, be resistant to environmental factors and exhibit high performance in long-term use. Biomechanical analysis performed in line with these goals helps to ensure that each component is designed correctly and the entire system works properly.

Another important factor to consider in artificial hand design is material selection. PLA is one of the most suitable materials for 3D printers due to its low melting point and biocompatibility. However, the durability of PLA and whether it will be flexible in long-term use will be a critical factor in the biomechanical analysis of the design. The motors and gear systems used in the prosthetic hand should also be designed to operate at high performance, and the energy efficiency of the design should also be considered.

Energy efficiency and force balance are vital for the proper functioning of prosthetics. The motors and moving components used in the design of the artificial hand must provide maximum force production with minimum energy. At this point, the correct transfer of movement and minimizing energy losses will increase the efficiency of the design. In addition, thermal management and material durability are also important factors so that the artificial hand is not affected by external factors (such as temperature and humidity).

Biomechanical analysis aims to integrate all the necessary engineering disciplines in each stage of the design of the prosthetic hand. This includes fields such as material engineering, mechanical engineering, thermodynamics, energy management, force balance. In this assignment, the biomechanical analysis of the design will be performed in terms of each engineering discipline and it will be evaluated whether the artificial hand offers a functional, durable and easy-to-use solution. At the same time, this analysis will also reveal the necessary improvements to make the design more efficient, safe and sustainable.

In summary, the biomechanical analysis performed on the artificial hand design in this project aims to evaluate an artificial hand prototype obtained using 3D printer technology and PLA filament material from an engineering perspective. The design of the artificial hand will be analyzed in terms of engineering parameters such as functionality, ergonomics, durability, energy efficiency and comfort, and the contribution of biomechanical engineering to human health will be discussed. In addition, the advantages offered by 3D printers in the development of prostheses will provide important information on how future prosthetic technologies will take shape.

The implementation method of the project shall be realized by using Braingate technology, the signals in the brain will be detected, the signals will be amplified to certain values, classified them by extracting attributes, and then these electromagnetic wave signals will be converted into digital signals. Later, these digital signals will be converted into electrical energy. This electrical energy will be produced in the form of electrical signals and it is predicted that the signals will have the characteristics of AC-alternating current. Then it is aimed to transmit the produced electrical energy to the muscles. Braingate technology enables detecting brain signals through a sensor placed in the brain. Evaluations are made after these signals are transmitted to the computer. In the light of these evaluations, it is aimed to control the muscles only with the ability to think. The produced signals will be detected and to be transmitted at the required value to the muscles for muscle stimulation. Through these stimulations, the muscles will be able to perform their functions. The muscles mentioned here are the muscles that enable the body's hand, arm, leg, head, neck and skeletal movements, the muscles that affect the respiratory system, the muscles that perform swallowing, sucking, eating and drinking functions, and the muscles that concern other body functions.

A kind of EEG–Electroencephalography equipment with 14 channels named as EMOTIV / EPOCX and also an oscilloscope device were already provided and they are ready for the development stages of current study. The serial number of existing Emotiv /Epoc x EEG device is E2020730. Figure 1 and Figure 2 shows the EMOTIV/EPOCX EEG equipment with 14-channel. Figure 3 shows the official serial number of existing EMOTIV / EPOCX EEG equipment. Figure 4 shows the USB oscilloscope device. The EEG equipment will allow to examine the brain data. This device will allow examining the signals in the brain and these brain signals will be transmitted to the patients' muscles. Many physical and sensory functions cannot be performed in SMA patients. SMA Disease is a hereditary muscle disease caused by a gene disorder. Patients are unable to cough, swallow, chew, and unable to perform hand, arm, leg, neck and other muscle movements. With this EEG device, it is possible to see the signals in the brain as waves.

For example, it is possible to simulate the same facial movements on the computer screen. The oscilloscope device will provide to process the signals in the brain as waves.

By use of Braingate technology it is aimed to detect signals belonging to muscles and related functions from the brain motor cortex and transmit them as electrical signals to the muscles where these signals cannot be transmitted. If the muscles are stimulated with the right signals, the desired action can be performed. As a matter of fact, Electrical Muscle Stimulation treatment is already used in physical therapy. This treatment is based on the principle of activating muscles that cannot work or weakly work with the implementation of electrical current.

The project described in this article aims to improve the quality of life and treat SMA patients by artificially stimulating muscles using internal or external devices and systems. Energy will be given to inactive points with brain power, or rather brain energy. SMA patients will only need to think about this to move any limb they want. When neurons become active, movement will occur spontaneously. For example, if the patient manages to raise his/her arm, it becomes obvious that muscles such as the breathing muscle, eating muscle, etc. can also be stimulated. The thought energy taken from the brain will be used for this work. This energy can be sent to a special computer and processed with an oscilloscope, the computer in question can be mounted on the SMA patient, and the brain wave energies (delta waves (δ), theta waves (θ), alpha waves (α), beta waves (β), gamma waves (γ)) taken from the brain can be processed and converted into electricity in this computer, and this electrical energy can be transmitted to the movement centers by placing a nerve cable through surgical intervention. To prove that the system is working, a small movement mechanism, arm, etc. can be operated first, and a small electric motor that drives this mechanism can be started. In this way, even the spine can be moved. Signals detected with EEG will be obtained as digital signals. Then, these digital signals will be converted to analog signals via a digital-to-analog converter. Sensed analog signals will also be transmitted to the nerve connections [1-60].

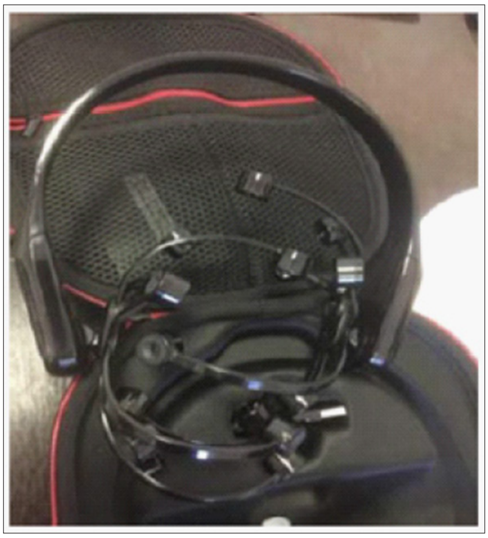


Figure 1: The EMOTIV/EPOCx EEG equipment with 14 -channel. The serial number is E2020730

Figure 2: The EMOTIV/EPOCx EEG equipment with 14 -channel. The serial number is E2020730

Figure 3: The official serial number of existing EMOTIV/ EPOCx EEG equipment

Figure 4: The USB oscilloscope device

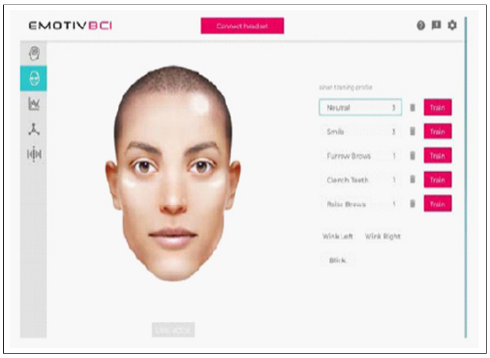


Figure 5: The data obtained by using the EMOTIV/EPOCx EEG equipment with 14 -channel and with equipment serial number E2020730

At the beginning stage of the project, the brain wave signals of two people who are not sick and two people who are sick will be examined and compared. These brain waves are actually electrical signals with voltage, current intensity, wavelength and frequency, and they carry a certain amount of energy. This energy will be evaluated as electrical energy and will first operate a mechanism containing a small electric motor, and the theory described in this article will be confirmed. As the ultimate goal, a limb of an SMA patient will be moved with this electrical energy. The signals and data obtained with the EEG device will be connected to Arduino, a code will be written and a transformation will be created on the computer. By taking advantage of this energy coming from the brain signals, the electric motor will be operated through thought. The signals here will be taken from both the brains of healthy people and the brains of SMA patients, and the results will be compared. If the electric motor can be started with the energy resulting from the brain signals of the patient with SMA, the limbs of the patient with SMA can also be moved with this energy. The brain energy obtained will be stored in an energy storage system such as a capacitor or battery and will be added to the electric motor from there.

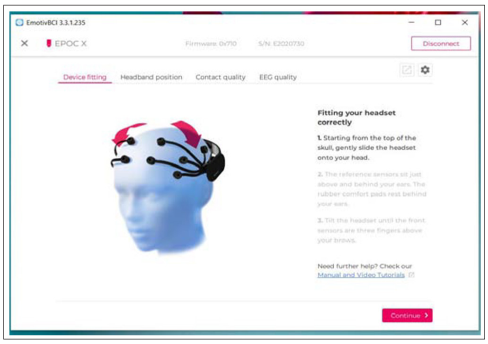


Figure 6: The data obtained by using the EMOTIV / EPOCX EEG equipment with 14-channel and with equipment serial number E2020730

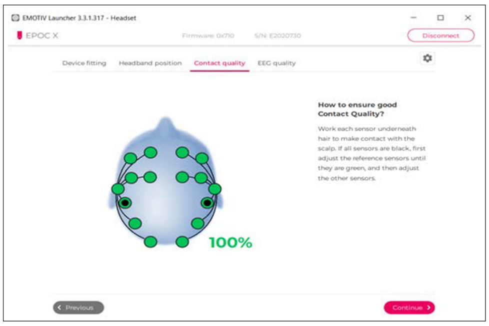


Figure 7: The data obtained by using the EMOTIV / EPOCX EEG equipment with 14-channel and with equipment serial number E2020730

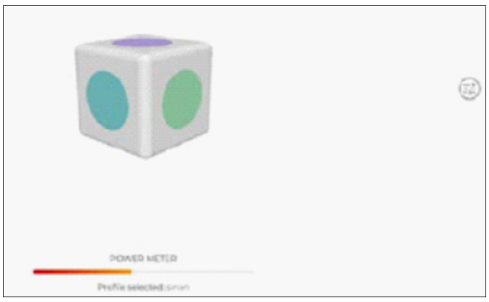


Figure 8: The data obtained by using the EMOTIV / EPOCx EEG equipment with 14-channel and with equipment serial number E2020730. Note: By means of the special software of EEG device it is possible to manipulate the cube on the computer screen just by brain thinking and it is possible to simulate facial movements and facial expressions on the computer screen, as well

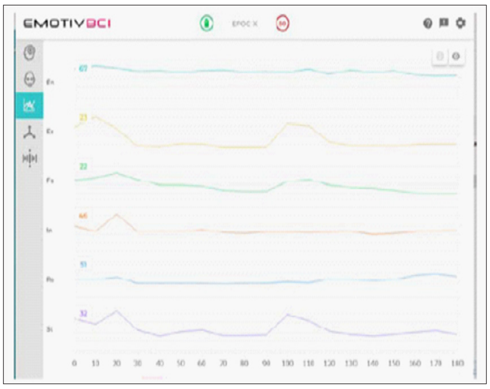


Figure 9: The data obtained by using the EMOTIV / EPOCx EEG equipment with 14-channel and with equipment serial number EQ20730

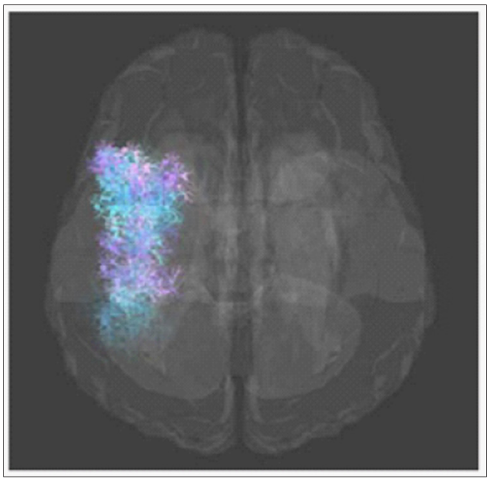


Figure 10: The data obtained by using the EMOTIV / EPOCx EEG equipment with 14-channel and with equipment serial number EQ20730

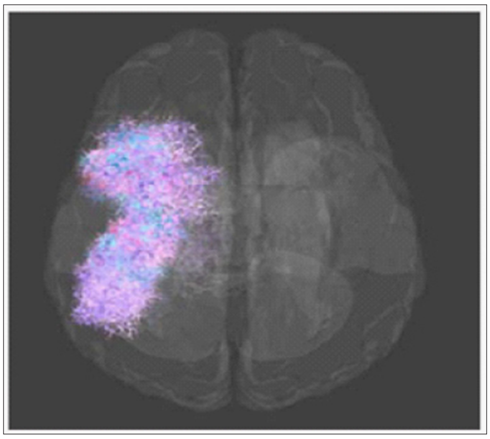


Figure 11: The data obtained by using the EMOTIV / EPOCx EEG equipment with 14-channel and with equipment serial number EQ20730

If the electric motor can be operated with the energy of the signals received from the brain, the muscles of the hands, arms, legs, neck, swallowing, chewing and breathing can also be energized and these muscles can be moved. This energy will be sent to the motor cortex or to each muscle separately, depending on the requirement. Special "Nerve Cables" will be used as the signal and energy transmission tool here. Nerve Cable is the electrical cable drawn from the brain to any part of the body [1-60].

Therefore, as a basic principle, these muscles and their connected systems, which cannot perform their movement functions because they cannot receive the necessary electrical stimulation from the brain, will gain movement ability thanks to the neurophysiological treatment to be designed.

Ultimately, SMA patients who lack these features will regain their health thanks to the medical treatment method developed within the scope of project which is introduced by this article. The project entitled as "System Design And Development of a Novel Unique Neuro-Physical Medical Treatment Method for SMA-SPINAL MUSCULAR ATROPHIA-Disease and for Similar Neurological Muscle Diseases" is completely original and unique to the author of this article.

The physical parameters to be studied and determined during the development process of the current treatment method can be stated as follows; It is predicted that there will be current intensity, potential difference, voltage, frequency, period, wavelength, band width, amplitude, duration, time, action potential and related physical parameters.

Measurements have been realized successfully and the data obtained by using the EMOTIV/EPOCX EEG equipment with 14-channel are shown by Figure 5, Figure 6, Figure 7, Figure 8, Figure 9, Figure 10 and Figure 11.

Biomechanical Analysis of the "Bionic Prosthetic Robotic Artificial Hand"

Material Selection and Mechanical Strength

Properties of PLA Filament

Polylactic Acid (PLA) is one of the most widely used materials for 3D printers. It is preferred in medical and biomechanical applications due to its biodegradability and environmental friendliness. PLA is a polymeric material, especially notable for its low cost and processability. However, its mechanical properties have some limitations.

Density: 1.24 g/cm³, indicates that PLA is a lightweight • material. This feature provides a significant advantage for daily use of prosthetics. Weight can directly affect the comfort of the user, so choosing a lightweight material allows long-term use without tiring the user.

Tensile Strength: 60 MPa (average value) gives an idea • of the resistance of PLA to static forces. Tensile strength indicates how much force the material can stretch without breaking under tension. This value is thought to be sufficient for static loads on the fingers and hinge points of the artificial hand. However, under continuous dynamic loads, PLA's resistance may decrease over time.

Elastic Modulus: 3.5 GPa defines the elasticity of the • material, that is, its ability to resist deformation. This material, which can deform under load, can be reinforced with reinforced material or different polymer mixtures in some components in the design to make it more flexible and durable.

Advantages and Disadvantages

Advantages

Lightweight: Since PLA has a low density, it is possible to keep the total weight of the artificial hand to a minimum. This prevents hand fatigue during long-term use and keeps the user comfortable.

Easy Processing: PLA can be easily shaped with 3D printers. It can be easily used in the production of high-precision prototypes, making it easier to realize complex prosthetic designs.

Biodegradable: Being an environmentally friendly material, PLA is a more ecologically sustainable option.

Low Cost: PLA, an affordable filament for 3D printers, offers an economical solution for wide-scale use and production.

Disadvantages

Brittleness: PLA is generally considered a brittle material. It carries a risk of cracking, especially under impact or sudden loading. The moving parts and hinge points of the artificial hand may experience weakening over prolonged use due to impacts.

Low Impact Resistance: Impact resistance is a crucial factor, given that prostheses are often used under frequent and demanding conditions. This limitation in certain areas of the artificial hand can negatively affect user comfort.

Risk of Permanent Deformation Under Load: PLA tends to undergo permanent deformation when subjected to prolonged static loads. Over time, this may lead to deformation or loss of function, particularly at the fingers and hinge regions of the prosthesis.

Durability Analysis

Durability analysis is the most important step after material selection to ensure the longevity of the artificial hand. Although PLA filament has some limitations, these can be mitigated through durability analyses and design optimizations.

Static Load Analysis: The fingers and connection points of the artificial hand are designed to withstand forces from the servo motors. These areas have optimized material thicknesses to resist forces applied by the user. For example, the material thickness is increased in load-bearing regions of the finger joints to minimize the risk of breakage. Consequently, the prosthesis can maintain durability even during prolonged use.

Dynamic Load Analysis: As the fingers move, they are continuously subjected to dynamic forces. Although PLA has a risk of deformation under such forces over time, this effect can be reduced by incorporating reinforced regions in the design and by setting appropriate motor torque levels. The hinge designs, in particular, facilitate correct force transmission during movement and mitigate the harmful effects of dynamic loads.

Ergonomic Tests: Ergonomic tests were conducted to ensure that the prosthesis does not deform during use. These tests aim to evaluate the prosthesis's performance under both static and dynamic loads. The ergonomically designed artificial hand is optimized to fit compatibly with the user's palm, thereby minimizing material deformation and wear even during long-term usage.

Connection Points and Joints: The joints and connection points of the artificial hand must be highly durable and capable of mimicking natural user movements. PLA material in these regions is supported by reinforced design features to withstand demanding loads. Additionally, screws and gears used at the connection points are selected for their wear resistance.

Movement Mechanism and Kinematics

In artificial hand design, movement mechanism and kinematic analysis are very important for the fingers to gain movement ability similar to natural human hands. The functionality of the human hand is based on the flexibility of the fingers and their ability to move freely. In artificial hand design, imitating these movements is a critical element in terms of both functionality and biomechanics.

Finger Movement Angles

The fingers of the human hand can move independently • at various angles. Capturing the accuracy of these movements is one of the most challenging aspects in artificial hand design.

In the artificial hand design, a specific angular range of • motion is defined for each finger. These angles typically vary between 0° and 90°.

The angular movement of the fingers is controlled by • servo motors. The rotation angle of the servo motors is converted into linear motion via cords attached to the finger segments. This linear actuation enables the fingers to flex and close in a natural and flexible manner.

The degrees of freedom between each finger segment • in the artificial hand are carefully calculated to imitate the natural opening and closing movements of a human finger. While not replicating the full range of multi-angular motions of a human finger, certain segments can be made more flexible using 3D printing technology.

Mechanical Design and Motion Transmission

Servo motors generally rotate to fixed angles, and these • rotational movements are transformed into linear actuation through cords. This mechanism mimics the articulation movement at the finger joints.

Each servo motor is assigned to actuate one segment • of a finger. Since fingers consist of multiple segments, movements between segments are controlled independently.

The cords used for finger closure are pulled by the • servo motors. Tensioning these cords causes the fingers to close naturally, while the servo motors rotate in the opposite direction to achieve finger opening.

Kinematic Analysis and Dynamic Performance

Kinematics deals with the forces and moments caused • by motion. In the design of the artificial hand, kinematic analysis is essential to understand the forces interacting during finger movements.

Movements of each finger segment are connected

- through joints and driven by forces provided by servo motors. The joints allow for appropriate angles and motions that replicate natural finger movements.
- using three primary kinematic parameters: joint angles, direction of motion, and velocity. These parameters are programmed to optimize servo motor efficiency. In the kinematic modeling, each finger segment's.
- movement is considered a type of 'manipulative' motion. This enables the fingers to perform functions such as grasping or holding objects.

Cable Tension and Force Distribution

The tension in the cables between finger segments is

- crucial for ensuring the fingers close correctly. The tension directly affects the force applied by the motors and, consequently, determines the force distribution in the hand.

In the prosthetic hand, the closing force of the fingers is • calculated based on cable tension, and the servo motors are adjusted accordingly. When the fingers reach the end of their movement, the motors operate at low speed to provide precision and close the fingers evenly.

This tension analysis is a critical step to enable more • efficient finger operation and to prevent the motors from being overloaded.

Flexibility and Opposing Movements

The flexibility of the fingers makes this prosthetic hand • more realistic and functional. Like in the human hand, the fingers do not only move in one direction but also perform opposing movements such as flexion and extension.

The mechanism that provides finger flexibility in the • prosthetic hand relies on cable systems supported by servo motors. However, an important parameter to consider during the tensioning of each cable and segment is to ensure the correct level of flexibility.

Opposing movements require each finger segment to • move independently; therefore, an independent servo motor is assigned to each finger. This allows one finger to be open while others close more tightly, enabling more complex movements.

Physical Constraints and Design Optimization

Physical constraints and manufacturing limitations • may affect the movement capability of the fingers in the prosthetic hand design. PLA filament has some limitations in terms of flexibility. Therefore, the materials and structural details used in the movement mechanism design have been optimized as much as possible.

All finger segments are carefully positioned to provide • the necessary freedom of movement. Fine adjustments have been made in the kinematic design to better mimic the natural movement of the fingers.

As a result, the movement mechanism and kinematic analysis of the artificial hand have been meticulously planned and implemented from both an engineering and biomechanical perspective. The accuracy of the movement has been supported by the servo motors, ropes and finger segments used, and the opening and closing movements of each finger have been designed efficiently. The movement capability of the artificial hand has been brought to a level that can mimic the functions of a real human hand, and this design is an important step in prosthetic hand applications.

Thermodynamics and Heat Management

Thermodynamics is the branch of science that studies energy transformations and related concepts such as heat, work, and temperature. In the design of the prosthetic hand, thermodynamics and heat management are important factors affecting the device's performance and durability. The heat generated during the operation of moving components like servo motors, and the proper management of this heat, play a critical role in the efficiency and safety of the design. Additionally, how the materials and motors respond to temperature changes is a key parameter for the sustainability of the design.

Heat Generation and Thermal Load

One of the fundamental components forming the basic movement mechanism in the prosthetic hand is the servo motor. Servo motors consume electrical energy to rotate to a specific angle. During the conversion of electrical energy to mechanical motion, some of this energy is converted into heat.

Servo Motors and Heat Generation: Servo motors are typically DC motors. As they operate, electrical energy is converted into mechanical energy, but some energy is lost as heat. Heat is generated due to friction and resistance within the motor's wires, brushes, and magnetic fields. Accumulation of this heat can reduce motor efficiency and eventually cause overheating.

Effects of Heat: When servo motors overheat after operating for some time, their efficiency decreases, motors begin to wear, and overheating shortens the motor's lifespan. Therefore, each motor must operate within a certain temperature range for efficient performance.

Heat Distribution and Cooling Systems

Proper distribution and management of heat is an important aspect in prosthetic hand design. Suitable cooling solutions must be developed to prevent heat generated by the servo motors from damaging other components of the hand.

Passive Cooling: Passive cooling relies on the principle of dissipating heat directly into the air. Materials capable of dispersing heat placed around the servo motors are an example of passive cooling. This often involves ventilation holes around the motor or conductive materials that absorb and dissipate heat. Thermoplastic materials like PLA filament are sensitive to temperature and may deform when overheated. Therefore, passive cooling methods may be used in the prosthetic hand design to effectively manage heat.

Active Cooling: Active cooling uses external systems like fans or liquid cooling to remove heat. Especially in environments where the motor operates at high temperatures, adding a fan can increase motor efficiency and prevent overheating. Liquid cooling systems provide more effective cooling but add complexity and weight to the design. For this reason, active cooling is generally preferred for systems requiring higher performance.

Material Selection and Thermal Conductivity

The thermal conductivity of the material used in the prosthetic hand design is an important parameter for heat management. PLA, ABS, and other 3D printing filaments each have different thermal properties.

PLA Filament's Response to Heat: PLA filament is a heat-sensitive material and typically deforms at temperatures between 60°C and 70°C. Therefore, when using PLA filament, careful temperature control must be maintained to prevent overheating of the motors. Otherwise, heat from the motors could cause deformation of the PLA filament, impairing the prosthetic hand's functionality. Since PLA has limited heat resistance, it may be beneficial to reinforce areas around the motors with more heat-resistant materials.

Thermal Conductivity and Heat Dissipation: The thermal conductivity of materials used in the design facilitates faster heat spreading and easier dissipation of heat generated by the motors. Materials like aluminum, copper, or carbon fiber have high thermal conductivity and can be preferred for cooling around the motors.

Energy Efficiency and Thermal Balance

Energy efficiency in prosthetic hand design is important both for the efficient operation of motors and for keeping heat generation to a minimum. Heat production is a side effect of energy consumption. Efficient motors do the same work while consuming less energy, which results in less heat generation and longer motor lifespan.

Energy Consumption and Heat Production: High energy consumption causes motors to generate more heat, which reduces motor efficiency and can negatively impact the prosthetic hand's performance. High energy use can make motors run continuously at high speeds, leading to overheating. Therefore, energy efficiency must be ensured to control heat production.

Thermal Balance: To keep all components of the prosthetic hand working within thermal balance, the relationship between motor temperatures and energy consumption must be analyzed. Motors should operate within their optimal temperature ranges to prevent overheating. Thermal balance also helps prevent servo motors from short-circuiting or malfunctioning due to overheating.

Thermal Management for the Longevity of the Prosthetic Hand

Heat management is critical not only for the efficient operation of the motors but also for ensuring the long lifespan of the prosthetic hand. Thermal management helps maintain material durability and ensures components function properly over time.

Temperature Limits and Overheating: In the design of the prosthetic hand, motors and other components have specific temperature limits that must not be exceeded. Overheating can cause material degradation, motor failures, and performance loss.

Continuous Monitoring: To enhance the longevity of the prosthetic hand, temperature monitoring systems can be integrated. This allows cooling systems to activate when motors reach a certain temperature threshold to prevent overheating. Additionally, real-time monitoring with temperature sensors can detect any overheating situation early.

In conclusion, thermodynamics and heat management in prosthetic hand design are critically important to ensure motors operate efficiently, increase the durability of components, and guarantee the device's long service life. Heat generation and dissipation must be properly managed through the use of appropriate materials and cooling systems. This is important not only for motor functionality but also for the overall sustainability of the prosthetic hand.

Energy and Force Balance

Energy and force balance is a fundamental principle for the efficient operation of any mechanism. In the design of a prosthetic hand, great importance must be given to the proper transmission of energy, correct distribution of forces, and effective functioning of each component. The energy and force balance of every element, from servo motors to moving parts, should be examined both mechanically and electrically. This balance not only increases design efficiency but also ensures a long-lasting and safe system.

Energy Conversion and Efficiency

For the prosthetic hand to use energy efficiently, energy must be transferred effectively from one component to another. Servo motors are the primary components that convert electrical energy into mechanical energy. However, some energy loss occurs during this conversion.

Electrical to Mechanical Energy Conversion: When servo motors receive electrical energy, they convert it into mechanical energy through rotation. However, a portion of the electrical energy is converted into heat, which affects motor efficiency. Energy loss decreases motor efficiency and produces heat. Therefore, every motor should operate as efficiently as possible.

Efficiency Analysis: In the design of the prosthetic hand, an efficiency analysis of the motors and the overall system should be conducted to ensure optimal operation. This analysis helps keep motors operating within ideal temperature ranges, minimizes energy loss, and enables movement to occur most efficiently. It may also reveal the need for cooling systems to counteract power loss (heat generation).

Force Transmission and Distribution

The movement of the prosthetic hand relies on the proper transmission and distribution of forces. Servo motors generate the necessary force to simulate finger movements. This force is transferred from the motors to the mechanisms. Forces must be transmitted correctly, and each component must respond appropriately.

Force Transmission from Servo Motors to Other Components: The rotational motion of servo motors is transmitted via gears or linkages. These mechanisms convert the motor's motion into forces applied to the fingers. However, losses can occur during force transmission, such as friction in gears or material properties of components. To minimize these losses, low-friction materials and proper gear ratios can be used.

Force Distribution: It is important that forces are distributed evenly to each finger in the prosthetic hand design. Each finger should receive an equal share of force from the servo motors and move as needed. Proper force distribution is critical for accurate finger bending and release. Additionally, it prevents unnecessary strain on motors, improving energy efficiency.

Structural Forces and Mechanical Balance

The durability of the materials used in the design of the prosthetic hand ensures effective distribution of forces. The structural integration of each finger affects the design's resistance to forces. Additionally, the balance of forces between motors and other components is crucial for the safety and functionality of the design.

Load Distribution and Structural Durability: The force distribution among fingers, motors, and connecting elements in the prosthetic hand must be properly balanced. If any part is overloaded, it may experience fatigue over time and compromise the overall functionality of the design. Load distribution analyses should be conducted to ensure that each component carries the appropriate amount of load.

Internal Forces and Deformation: In the prosthetic hand design, while each finger moves independently, the internal forces must be carried by the structural elements. When the force from the servo motors is transferred to the finger mechanism, elastic deformation may occur in the components. This deformation is proportional to structural durability and depends on the material's elasticity. For example, PLA filaments provide limited flexibility and carry a risk of breaking under excessive force. Therefore, material selection should be done carefully, and reinforced materials should be preferred when necessary.

Energy Consumption and Force Requirements

The energy consumption of the prosthetic hand is determined by the force requirements. Each finger needs a certain amount of energy to apply the correct force. The relationship between this force and the energy reflected back to the motors should also be considered.

Force Requirement and Motor Selection: The force applied by the prosthetic hand's fingers is related to the torque provided by the servo motors. More powerful finger movement requires higher torque. Servo motors must balance torque and speed to provide the necessary force. Therefore, the motor's torque capacity is very important for the hand's functionality.

Relationship Between Torque and Force: The torque values of motors directly determine their force application capacity. Each motor operates within a specific torque range, and this torque must be sufficient to apply the correct force by the fingers. If torque is adequate, motors can perform their tasks with less energy consumption.

Energy Consumption: To meet the force requirements, the motors and mechanisms of the prosthetic hand must have sufficient energy. Energy efficiency allows more force to be applied with less energy, which is important for the hand's longer operating time.

System Balance and Performance Optimization
The energy and force balance of all components in the prosthetic hand directly affects the system's performance. Minimizing force and energy losses ensures efficient operation and prevents overloading of components.

System Integrity and Performance: Each component of the prosthetic hand works together as part of a system. The force balance and energy transfer among servo motors, gears, fingers, and other components should be properly optimized. This optimization ensures both high performance and increased energy efficiency.

Force and Energy Losses: Force loss is related especially to friction in gears, material deformation, and motor efficiency. These losses can be minimized by using high-quality gears and appropriate materials.

In conclusion, energy and force balance in prosthetic hand design is critical for both efficient operation and safety. Efficient energy conversion and correct force transmission increase the device's lifespan and functionality. Each component of the prosthetic hand should be designed and analyzed to maintain this balance. Consequently, the balance of energy and force in artificial hand design is critical to ensure both the efficient operation of the design and its safety. Efficient conversion of energy and accurate transmission of force increase the longevity and functionality of the device. Each component of the artificial hand must be designed and analyzed to achieve this balance.

Fluid Mechanics (For Future Applications)
Haptic Feedback: In more advanced versions of the prosthetic hand, tactile feedback can be provided using pressure sensors and fluid-filled systems.

Pneumatic Mechanism: Finger movements can be supported by a system operating with air pressure.

From Figure 12 to Figure 28 "Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method" can be examined in detail.

Successfully Achieved Outcomes
Human-Like Movement Capability
The prosthetic hand was designed to mimic the natural movements of the human hand. Precise control and smooth movement between the fingers were achieved using servo motors, with each finger programmed to work with optimal freedom of movement. The prototype demonstrated the ability to grasp real-life objects effectively. In particular, parallel finger motion during gripping and the independent movement of each finger were ensured to replicate the natural functionality of the hand. This provided users with a practical, usable prosthetic hand experience for everyday life.

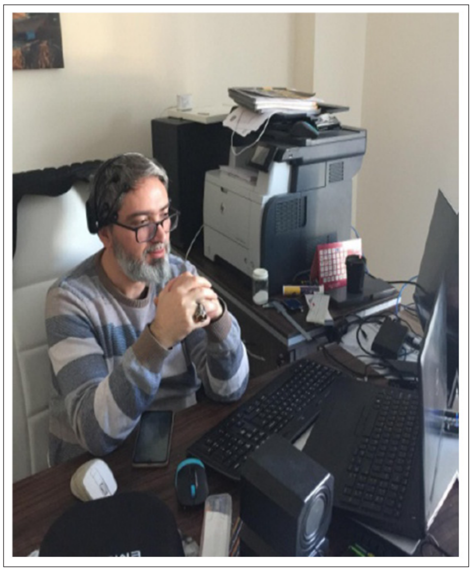


Figure 12: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

Figure 13: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

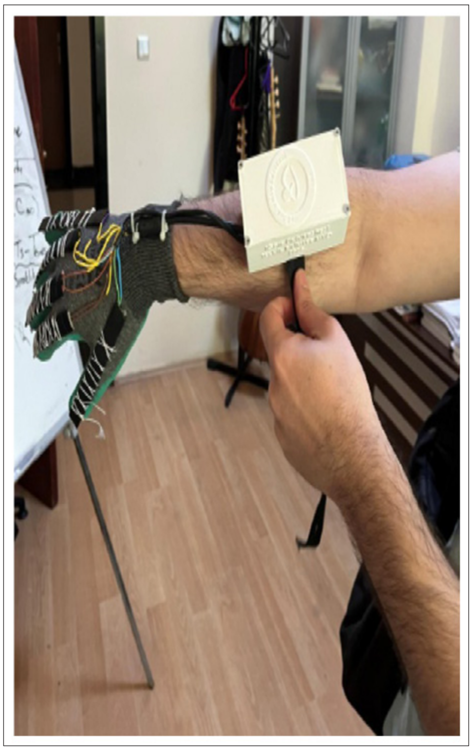


Figure 14: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

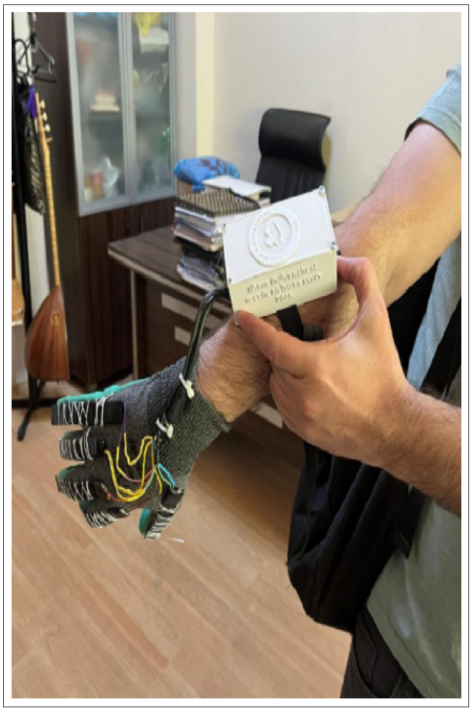
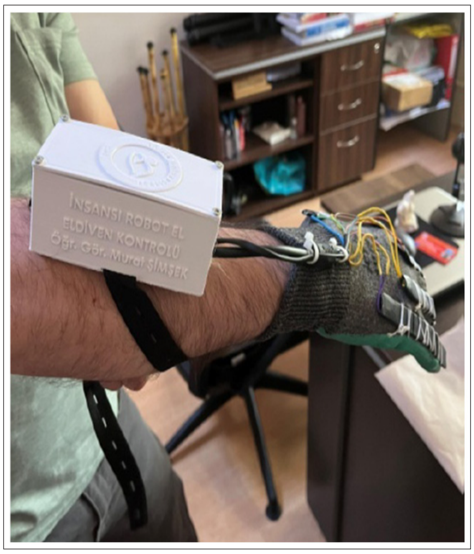


Figure 15: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"



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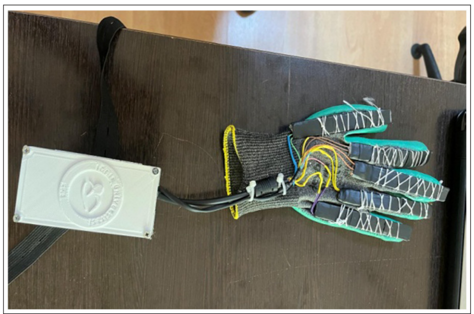

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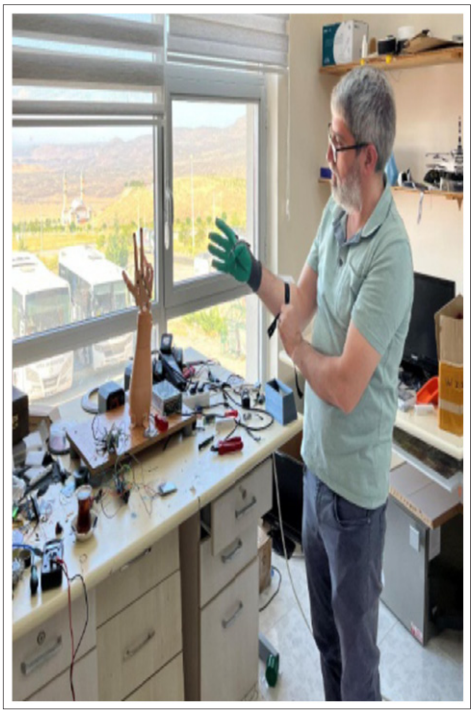

Figure 18: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

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Figure 20: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

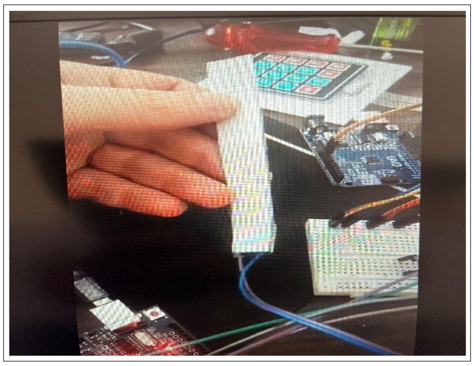


Figure 21: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

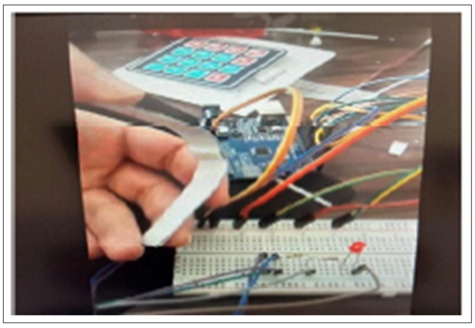
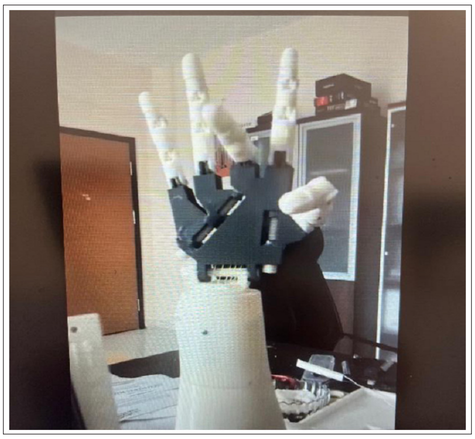


Figure 22: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"



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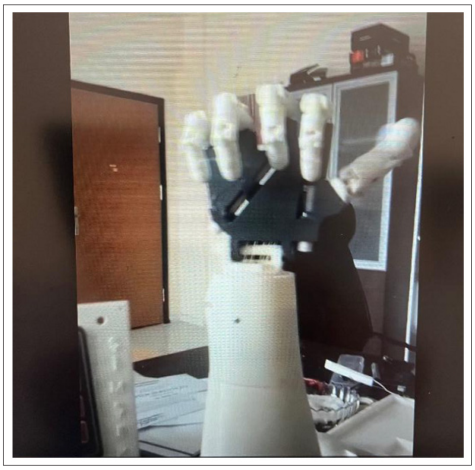

Figure 24: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

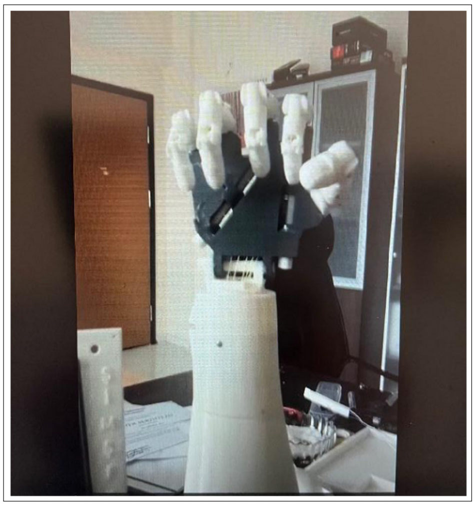

Figure 25: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

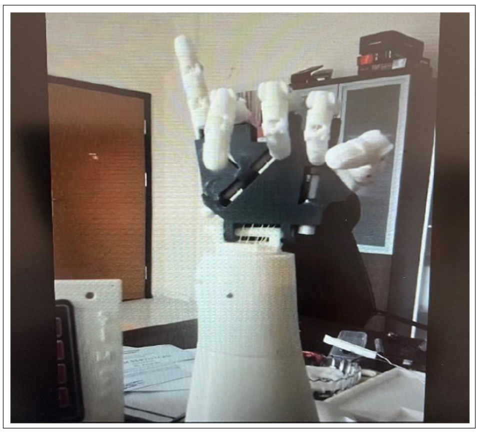

Figure 26: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

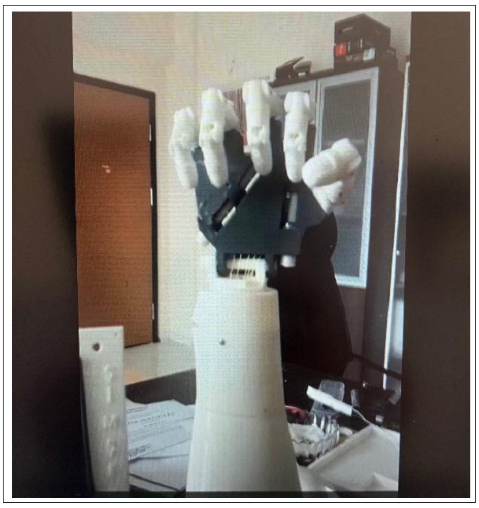

Figure 27: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

Material Efficiency

PLA filament was an ideal choice for this project in terms of both cost and functionality. Its low density contributed to a lightweight prosthetic hand, increasing comfort for long-term use. Additionally, PLA's ease of processing allowed for high-precision prototyping during the design phase. PLA's biodegradability and environmental friendliness also present significant advantages for environmentally conscious users. While PLA has some limitations in durability, these were minimized through design reinforcements and durability analyses.

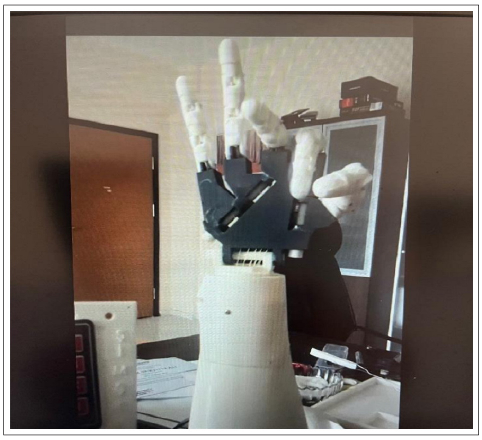

Figure 28: Scientific and Technical activities for the Project of "Applied Medi-Brain Energy-Tronic Treatment Method"

Energy Efficiency
By utilizing the Arduino platform and servo motors, low energy consumption was achieved. This feature made the prototype advantageous in terms of energy efficiency for extended use. The system's low power consumption allowed for more efficient use of energy throughout the day, enhancing battery life. Servo motors only consume energy when necessary, leading to further energy savings. This improved portability provides users with a more practical solution and ensures the system remains effective in outdoor and various other environments.

Ergonomic Design and User Comfort
During the design phase, the ergonomic structure of the prosthetic hand was also taken into consideration. The artificial hand was shaped in accordance with human anatomy to provide a comfortable user experience. The placement of the fingers was designed to mimic the natural structure of the hand, ensuring maximum efficiency during grasping motions. Additionally, the overall size and weight of the prototype were optimized so that the user could carry and use the hand comfortably. This ergonomic design helped minimize discomfort during prolonged use of the prosthesis.

Low Cost and Easy Production
The project offers a low-cost and highly efficient solution. The affordability of PLA filament has significantly reduced production costs, making it an accessible option for a wide range of users. The use of 3D printing enabled the rapid production of prototypes and allowed for iterative testing of the design. This shortened the overall production time and facilitated quick improvements based on user feedback. The production process of the prosthetic hand is well-suited for both small-scale and mass production.

Development and Future Directions
The successful operation of the prototype demonstrates the future potential of prosthetic limb technologies. The technologies and materials used in the design of the artificial hand can serve as a foundation for more advanced applications in the medical field. In the future, the prototype can be enhanced using more durable materials to make it more flexible and functional. Additionally, integrating the prosthetic hand with neural control systems and incorporating advanced software algorithms could enable more natural and intuitive movements.

Achieved Results
A functional prosthetic hand prototype capable of • mimicking the movements of a human hand has been successfully designed and produced.

PLA filament was chosen as a cost-effective and efficient

- material. However, considering issues such as wear and brittleness over time, more durable materials may be used in future iterations.
- achieved through servo motors, and various tests confirmed that the prototype is user-friendly.

Thanks to its low energy consumption, the portability • of the prosthetic hand has been increased, ensuring efficiency during long-term use.

Future Applications to be Considered
Rehabilitation Devices: The prosthetic hand can be used in physical therapy and in the rehabilitation of individuals who have lost motor skills.

Prosthetic Technology: A more advanced version of the device could be used as a prosthesis for individuals who have undergone amputations.

Education and Research: It can serve as educational material for teaching biomechanical principles and for developing robotic designs.

General Evaluation
This project demonstrates how biomechanical principles can be effectively applied in engineering and robotic design processes, and how these principles can contribute to technological advancements in the healthcare field. The prosthetic hand prototype is a significant example of how biomechanical understanding is not merely a theoretical concept, but something that can be practically integrated into real-world design and applications.

The project highlights not only the challenges encountered in engineering and biomechanics but also showcases the creative solutions used to overcome these obstacles [1-60].

Integration of Biomechanical Principles into Design
The project concretely demonstrated how biomechanical principles can be adapted into prosthetic limb design. Considering the anatomy and functions of the human hand, the prosthetic's mobility and natural functionality were optimized through biomechanical analyses and engineering design. Biomechanical factors such as finger movements, torque, and force calculations were taken into account to enable the functional motion of each finger. This has provided a significant reference point for integrating biomechanical principles into engineering design. Additionally, the accurate application of biomechanical concepts like natural movement and force transmission during the design process directly impacted the project's success.

Functionality and Performance of the Prosthetic Hand

The project demonstrates that the designed prosthetic hand is quite successful in terms of functionality. Thanks to the servomotors and the Arduino-based control system, the prosthetic hand can mimic the gripping, holding, and movement abilities of the human hand. Supported by biomechanical analyses, the design enables the fingers of the prosthetic hand to move naturally and grasp various objects. However, the current functions of the prosthetic hand can still be further improved. For example, motor systems that provide more precise movements and wider ranges of motion could be integrated. This would enhance the prosthetic hand's performance and expand its potential applications.

Prosthetic limbs are among the most significant applications in healthcare. This project has taken an important step in prosthetic design through the integration of biomechanical and engineering principles. The artificial hand has the potential to restore lost functions by providing users with a functional limb. This is a crucial advancement for improving the quality of life for individuals with disabilities. Additionally, the project offers insights into how more advanced biomechanical analyses and design improvements can be conducted, laying a foundation for future studies in this field.

Overall, this project demonstrates how biomechanical principles can be effectively integrated into engineering design processes, creating significant applications in healthcare. The artificial hand prototype has been successfully designed using current technologies and provides valuable insights for future biomechanical and robotic systems. In upcoming projects, more advanced and functional systems can be developed building upon this foundation. This project once again proves how the fusion of engineering and biomechanical disciplines offers opportunities for innovative solutions in health technologies.

This article explains a project which aims to develop a treatment method integrated with electrical-electronic and computer systems based on neuro-engineering, which is much more economical and accessible to all patients regarding the treatment of the disease. That is, by the realization and implementation of the methodology to be developed, it may be possible to treat individuals who are suffering from with other neurological diseases without applying expensive treatment methods. BCI – Brain Computer Interface applications will also be used for the project.

This Braingate-based technology which is planned to develop by this article can also be used especially for paralyzed patients, ALS patients, MPS, SSPE and DMD patients as well as SMA patients.

There is no previous study related this methodology to be developed for the treatment of SMA and similar neurological disease within the scope of the current project introduced here.
Thus, the project entitled as "A Novel Unique Neuro-Physical Medical Treatment Method for SMA – Spinal Muscular Atrophy Disease, Paralyzed Patients, ALS patients, MPS, SSPE, DMD Patients and for Similar Neurological Muscle Diseases" is completely original and unique to the authors of this article. It will be called as "Applied Medi-Brain Energy-Tronic Treatment Method" [1-60].

Results

Within the scope of this project, a prosthetic hand was designed using PLA filament and operated with an Arduino-based control system, taking biomechanical principles into consideration. The design prioritized anatomical compatibility and functionality, with finger movements (opening and closing) controlled by servo motors. Throughout the process, engineering and biomechanical analyses were conducted to ensure the efficiency, durability, and functionality of the chosen materials and design.

Conclusion

Therefore, as a basic principle, these muscles and their connected systems, which cannot perform their movement functions because they cannot receive the necessary electrical stimulation from the brain, will gain movement ability thanks to the neurophysiological treatment to be designed.

Ultimately, SMA patients who lack these features will regain their health thanks to the medical treatment method developed within the scope of project which is introduced by this article. Thus, the project entitled as "A Novel Unique Neuro-Physical Medical Treatment Method for SMA – Spinal Muscular Atrophy Disease, Paralyzed Patients, ALS patients, MPS, SSPE, DMD Patients and for Similar Neurological Muscle Diseases" is completely original and unique to the authors of this article. It will be called as "Applied Medi-Brain Energy-Tronic Treatment Method". The physical parameters to be studied and determined during the development process of the current treatment method can be stated as follows; It is predicted that there will be current intensity, potential difference, voltage, frequency, period, wavelength, band width, amplitude, duration, time, action potential and related pysical parameters.

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