



GEORGE EMIL PALADE  
UNIVERSITY OF MEDICINE, PHARMACY,  
SCIENCE AND TECHNOLOGY  
OF TARGU MURES

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## BOOK OF ABSTRACTS

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## HOW CAN 5G INFLUENCE OUR LIVES: THE NEW OPPORTUNITIES ARE ACCOMPANIED BY RISKS

Andone Miruna-Cristina<sup>1</sup>, Popârda Elena-Daniela<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureş

**Background:** The use of internet networks has remarkably changed people's lives. However, the quality of services depends on the speed of data transfer. Introduced in 2019, fifth-generation wireless mobile communication or 5G technology promises to revolutionize many fields, creating 22 million jobs worldwide and improving data transfer speeds of up to 20 GBps. **Objective:** We aim to expose some of the areas in which 5G is needed in both medicine and industry, such as IoT (Internet of Things), remote surgery, quick internet, etc. Because the data transmission involves electromagnetic waves, the paper will also address issues related to the physical structure of these waves and their influence on users. **Materials and methods:** Starting from articles in the literature, we have documented how it is produced, as well as the advantages and disadvantages of using 5G on a large scale. **Results:** 5G technology applied in medicine, can lead to high quality imaging determinations, easily and quickly interpretable by experts from anywhere in the world, operations performed by remote surgeons, and interconnected medical devices, which take care of the patient, having the right commands and ensuring the need for drugs. 5G also finds applications in industry and in the Internet of Things (IoT). **Conclusions:** Taking into account the multiple impact of electromagnetic waves used in data transmission through 5G technologies, it is necessary to study and analyze the impact of these technologies on medical and industrial fields and on users' health.

**Keywords:** 5G, electromagnetic waves, remote surgery, Internet of Things (IoT).

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## SCIENTIFIC INVESTIGATION OF ARCHAEOLOGICAL ARTIFACTS WITH THE HELP OF COMPLEMENTARY TECHNIQUES

Gheborean Bogdan-Dacian<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** History is a big business. Trade in stolen art objects and antiquities reaches at least three billion dollars yearly to the great sorrow of the countries which are fighting to regain stolen artifacts. Throughout history, various searchers for artifacts, both amateurs and professionals, have discovered objects that seem to be modern or made from advanced materials, only that they are inside old layers of soil or in different places where they couldn't have existed normally. **Objective:** The implication of modern techniques of investigation on objects found in archeological sites helps us determine the chemical nature of the: components, microstructure, displacement of mineral elements, temperature and the type of combustion, way of use, path that stretches from building to discovery, conservation form and other characteristics. **Materials and methods:** For example, for studying old ceramics we use non-destructive, pardestructive, non-invasive methods of investigation which allow direct operation on the object, for example: visual examination with tools, reflectography, profilometry, colorimetry, radiography. **Results:** The analysis made with microscopes and x rays performed on the crust of the artifacts from different historical periods, showed major differences in terms of structure. **Conclusions:** The most modern methods from the prelevation and processing group are those which involve interdisciplinary techniques.

**Keywords:** history, conventional techniques, visual examination, artifacts.

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## ARTIFICIAL HEART: A HEARTBEAT THAT BRINGS US CLOSER TO THE FUTURE

Buruş Florina<sup>1</sup>, Tornea Teodora

<sup>1</sup>UMFST Târgu Mureş

**Background:** Regardless of the work field, healthcare is a matter of great importance for people. Regarding medical engineering and bioengineering, the continuous development of new technologies and apparatus represents an indispensable factor when it comes to the progress of science. This progress may contribute to the salvation of a bigger number of patients and may facilitate the process of rehabilitation. **Objective:** The main purpose of this paper is to demonstrate the utility of both medical engineering and bioengineering in people's lives and their role in order to maintain high sanitary standards. We chose to analyze the evolution of the artificial hearts and their

impact on some patients, as well as the mechanisms that are used in their construction and the long-term development of the artificial hearts. **Materials and methods:** In terms of research, we analyzed some official, European-wide statistics which present numerous conditions that affect the cardiovascular system. Moreover, we strictly observed possible adverse reactions to certain drugs in multiple categories of patients. Technically, we chose the artificial hearts manufactured by Carmat and AbioCor. Analyzing them, we were able to draw the conclusion that a heartbeat produced with the aid of an artificial heart could definitely increase the survival rate of a patient. **Results:** The research has proven the compatibility between the human body and a complex mechanism, such as an artificial heart, and the period of time that the tissues require in order to adapt to the manner the device pumps the blood through the blood vessels. **Conclusions:** The study of patients suffering from heart diseases, of tissues and vessels after the implementation of an artificial heart, the external factors which might affect a patient's life, and the comparison between the two products manufactured by Carmat and AbioCor proves the importance of this kind of device in the medical field.

**Keywords:** artificial heart, long-term development, blood vessels, healthcare.

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## CINEMAS ATTENDANCE IN MUREȘ AND CLUJ COUNTY(2018-2019)

Késmárki Anikó-Emese<sup>1</sup>, Matei Ioana<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** Going to the cinema is a very good form of spending our free time. Watching movies in cinemas has a better influence on our happiness, because we can socialize too. People who prefer the movies in the original version choose to go to the cinema. This form of entertainment is popular especially in teenagers' groups. **Objective:** The aim of study was to observe the cinema attendance in Mureș and Cluj county in 2018-2019. **Materials and methods:** The statistics data were collected from Romania National Institute of Statistics TEMPO database. **Results:** The statistical analysis showed that the attendance wasn't so high. The population of Mureș County in 2018 was 594431, and the number of visitors in cinemas was 293 which is 4,92% of the population. The population in 2019 in Mureș County was 592784 and 276 persons attended the cinemas (4,67%). The population of Cluj county in 2018 was 729441 and the number of audience in cinema was 916(12,56%). In 2019 the population in Cluj county increased to 732913 person and the attendance in cinemas decreased to 860 (11,7%). **Conclusions:** The study shows that the population in Cluj county increased from 2018 to 2019, and the population in Mureș county decreased in this period. This fact includes lower attendance in cinemas in 2019 than in 2018. The people didn't choose this form of entertainment as much in 2019 as they did in 2018.

**Keywords:** statistical analysis, consumer behavior, .

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## STUDIES ON PRODUCT QUALITY OPTIMIZATION AT SC HUMI SRL

Curca Clara<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** Quality management has developed more and more in recent years. And during all these years this subject has been researched more and more and it has been concluded that quality management starts with customers and their satisfaction. That is why when a company wants to improve its quality management system, it must take into account the feedback received from customers. In this paper, research was conducted in order to improve the quality of products from SC Humi SRL. **Objective:** This paper aims to set out the main complaints from customers and how they were resolved. **Materials and methods:** Several methods of quality analysis and evaluation were used for the study in this paper, such as the Pareto diagram, the Fishbone diagram, etc. We also used different graphs to observe the evolution of complaints over a certain period of time. **Results:** Following this study, the main three reasons for the complaint were identified. Steps have also been taken to prevent these complaints in the future. Following the implementation of the measures, there was a decrease in complaints, therefore, the quality of the products increased in the eyes of customers. **Conclusions:** It is very important for a company to carefully study every complaint received because they provide important feedback for the company's growth.

**Keywords:** quality, quality management, engineering.

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## OBESITY IN ROMANIA - A MAJOR PROBLEM

Florea Alexandra Maria<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** Romania is at the forefront of adult and children obesity in Europe. Obesity is a very common affection in our country. Some of the reasons could be food, sedentarianism, to which is added the increase in alcohol consumption, which has the effect of increasing the appetite, thus increasing the calorie contribution. One of the most worrying issues, however, is children obesity. **Objective:** The aim of this study is to show how much obesity affects the population in our country and how widespread this disease is among children in particular **Materials and methods:** The statistics data were collected from World Health Organization (who). **Results:** Studies have shown that the obesity and overpopulation affect around 73% of the country's adult population, with obesity in around 36% and overlap in 37% of cases, in 2016. According to the World Health Organization (WHO), in 2020, one of four Romanian children is obese, and each second child has difficulty. The lack of food education in schools and unhealthy eating habits taken from parents are the main drivers for a high rate of obesity among children. Jamie Oliver is a nutritionist who implemented in 2017 the first program dedicated to children between 7 and 12 years of age to learn basic principles for healthy eating. Obesity brings with it various illnesses and one by one affects both physical and mental health. If in 2011, 7,3% of Romania's children were obese, in 2014, obesity affected more than 16% of children **Conclusions:** Studies show that obesity is becoming an increasingly common health problem among people from Romania, and prevention measures for this disease are almost non-existent. The statistics on obesity to people from Romania are increasingly worrying.

**Keywords:** population, Romania, children, obesity.

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## TRANSLATING SIGN LANGUAGE INTO SPEECH WITH AN ARTIFICIAL INTELLIGENCE APP

Andron Flavia Călina<sup>1</sup>, Ferenczi Paula-Stefana<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** In Romania, according to A.N.S.R., there are over 23,564 deaf people (21,733 adults and 1,831 children). Most of them face difficulties in their daily life because the number of people who know sign language is small. Most are born into families with hearing parents who don't have knowledge about this deficiency and treat them as people with disabilities.

**Objective:** A smartphone application development based on AI technologies for deaf people to provide real-time translation and speech in sign language.

**Materials and methods:** The operation of the application is easy and cheap for users. By placing the deaf person in front of the frontal camera, the application records every movement and transmits the information to the database that contains phrases and keywords from sign language. The algorithm compares the transmitted information with the information in the database and translates in written and spoken words everything that is said in the sign language, in a very fast way. For the process of transforming the input information into the output information, the application uses advanced algorithms, neural networks and computer vision. The main programming languages used in the implementation of these applications are Python and Java, two object-oriented programming languages, which help implement and process input information. **Results:** The efficiency and accuracy of translating sign language into spoken language are quite high. Based on the principles of artificial intelligence, this application will learn more and more new characters of sign language over time. **Conclusions:** With the help of technology, it is possible to achieve in real-time the conversion from sign language to spoken language, thus making the life of deaf people easier.

**Keywords:** artificial intelligence, neural networks, sign language, computer vision.

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## DEEP BRAIN STIMULATION FOR PARKINSON DISEASE

Merisan Aura<sup>1</sup>, Marginean Andrada-Alexandra<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureş

**Background:** Nowadays, medicine and technology are inseparable. Generally, in the area of medicine technology is indispensable due to the fact that it makes doctors' work a lot easier. Despite of all advantages there are still a few diseases that are incurable. For instance, the Parkinson disease, which is a progressive disorder of the nervous system, whereas it affects the movement. The new technology called DBS(Deep Brain Stimulation) uses an electrode infixd deeply in the brain for its stimulation. **Objective:** Our principle purpose is to point out that this technology can help many people to obtain the control of their movements. **Materials and methods:** The surgery usually takes few hours. During this time, the patient is mostly awake. Usually, an electrode is placed on each side of the skull through a little hole. The electrode's fibers are connected to a machine similar to a pace-maker. It is called neurostimulator and it is situated underneath the skin in the chest region. After the implant, the doctor has to establish the best functional parameters with the help of a device connected to the neurostimulator. The process' duration is between three to six months. **Results:** In Romania there are over 70 000 patients with Parkinson disease, who could benefit from such treatment, which is worth three thousand ron. In some cases where the disease is more advanced, the costs can reach up to 80 thousand ron. The age of onset was 65 years, but there have been some exceptions that begin at age 50, meanwhile the disease is becoming more common. **Conclusions:** It is clear that the age of onset has decreased, so the best adjuvant to maintain the balance between self-control and trembling is DBS.

**Keywords:** Parkinson, DBS (Deep Brain Stimulation), electrode infixd deep in the brain, disease.

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## ULTRASOUND AND INFRASOUND

Moldovan Maria-Alexandra<sup>1</sup>, Napău Cristina<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** In 1879 John Lubbock stated, thinking of the limits of the audible spectrum: "The universe is full of music. which we cannot perceive...". Ultrasound is obtained by the use of quartz piezoelectric crystals. If the frequency of the applied AC voltage exceeds 20 kHz, the blade will emit ultrasound into the environment. Infrasound (0-16 Hz) is perceived by infants, animals, birds and fish, which take refuge when a storm arises. In the case of earthquakes, some animals perceive the accompanying infrasound and panic before the man senses the seismic wave. **Objective:** Some of the most useful applications of ultrasound and infrasound. **Materials and methods:** Ultrasound, due to its ability to destroy microorganisms, is used in vaccine preparation, sterilization and food preservation. **Results:** Disturbances caused inside the cells by the ultrasound method allow medical diagnosis: a transmitter sends an ultrasound beam to the scanned area and a detector receives the echoes. The destruction of ultrasonic micro-organisms is important in the preparation of vaccines, sterilization and preservation of food. The removal of fog or smoke at airports is important in the protection of air navigation. **Conclusions:** Infrasound of certain frequencies produces physiological effects on humans: drowsiness, dizziness, vomiting, false euphoria or unpleasant resonance effects. High-intensity infrasound can traumatize the nervous system and the circulatory system. Ultrasound causes migraines, nausea or loss of balance when near a source. Ultrasound of certain frequencies produces irritating effects on animals and humans. When ultrasound is used to make a diagnosis, its intensity is low so as not to destroy the red blood cells.

**Keywords:** ultrasound, infrasound, applications in medicine.

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## EFFECTS OF THE IAQ IN PRODUCTION HALLS

Dălălău-Rus Adrian<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureş

**Background:** The idea of monitoring IAQ (indoor air quality) is not new but many companies are not concerned regarding this aspect because their main focus is on how to reduce the production costs and how to become more profitable. Nowadays more and more people suffer from breathing problems, stress, discomfort and other health problems. If we take into consideration a basic aspect which refers to the whole production of the companies we should ask ourselves what happens if the employees are getting sick for a specific period of time or they come to work without pleasure and feeling exhausted? What happens with the production? These questions should be a big start for the companies in order to analyze and take action. The quality of the production and the production itself depend on humans' wellbeing. Because people spend most of their daily time at the workplace, the subject regarding indoor air quality should be a big concern for the companies and researchers. **Objective:** The paper aims to present the main aspects of the indoor air quality, which are the most important air parameters and investigate how companies can monitor and analyze the air parameters. **Materials and methods:** Continuous research, analyses and evaluations of the air indicators using a proper device and last the use of surveys to receive employers and employees feedback regarding the effect of the indoor air quality on their daily worklife. **Results:** Countable effects of the indoor air quality on the companies' production and feedback from the employees. **Conclusions:** Through this work I want to highlight the effects of the IAQ on the productivity and performance of the employees. It is mandatory for companies to provide a suitable work environment for the people because the human resource of a company is the most important.

**Keywords:** effects, IAQ, comfort.

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## EMOTIONAL CONTACT LENSES (ECL)

Daviduță Maria-Magdalena<sup>1</sup>, Crăciun Alexandra-Elena<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** Contact lenses are devices made of soft and/or rigid materials used for corrective, cosmetic or therapeutic purposes that adapt to the outer surface of the eyeball. Their structure includes the thermotropic liquid crystals contained in the lens structure. The liquid is highly sensitive, in such a way that it changes its structure depending on the mood of the wearer. Changes in mood can be associated with changes in body temperature, and therefore these lenses convey what a person feels through different colors.

**Objective:** The main purpose of using these lenses is to give people around them the opportunity to be able to recognize the mood/emotions of the wearer. Another important objective is the aesthetics, by the simple fact that they can be worn without standing out, compared to another accessory.

**Materials and methods:** Contact lenses are of three types and can be used depending on medical conditions. Also, their structure includes the thermotropic liquid crystals contained in the lens structure. Thus, the first type is soft (disposable) lenses, the second type is rigid lenses made of a biocompatible polymer, which are recommended in patients with large cylindrical diopters (4-5 diopters), irregular astigmatism, Keratoconus, and the third type is mixed lenses (hybrids).

**Results:** By using these, medical defects can be corrected. Moreover, lenses can also be used as accessories. Two of the most important results are: in the case of large diopters, the aberrations that would be produced by glasses are no longer present and in the case of certain eye diseases, the lenses provide a better image than the glasses. **Conclusions:** In conclusion, these lenses are intended for any age group in order to help the medical world, but also to be an accessory easily worn by people who want to express their mood.

**Keywords:** crystal, lenses, emotion.

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## FULLY ECONOMICAL GAS-FIRED POWER PLANT INTPUMP21

Durcău Valentin<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** INTpump2 gas boiler is an innovative idea of energy efficiency and network optimization. **Objective:** The INTpump21 boiler is more precisely a conventional boiler with condensation on the outlet of which a radiator from a mini heat pump is designed. **Materials and methods:** Exhaust gases from the boiler that are lost at 60 degrees anyway will heat the radiator of the heat pump (climate). The heat pump works on the principle of climate, in an opposed way. If outside the temperature is 10 degrees Celsius, it raises the temperature of the freon to 10 degrees Celsius after which, when it is put under pressure, it overheats resulting in the temperature difference which then yields to the consumer. **Results:** The pump must be connected together with the boiler and if the boiler comes out about 60 degrees automatically we have a very good efficiency at the pump. **Conclusions** It is a very efficient idea doing some calculations we will get a considerable gain of energy.

**Keywords:** thermal power plant, economic, heat pump.

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## ANTI BEDSORES BED

Ferenczi Paula-Stefana<sup>1</sup>, Simota Elena<sup>1</sup>, Andron Flavia Călina<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** Pressure ulcers or bedsores are injuries developed by patients from intensive care or who are bedridden. Skin ulcers occur most frequently in the sacrum and coccyx, but also in other areas where strong pressure is exerted on the skin. Blood vessels produce vasoconstriction, become obstructed and do not nourish the tissues. **Objective:** Prevention and treatment treatment of bedsores **Materials and methods:** The bed is made up of three components. Two are passive parts and a mobile third one. The passive parts are the loops made up of the seaweed combined with the cotton fibers. Through a simple mechanism of raising and lowering of silicone bars, a space is created between the patient and the bed, allowing the two rollers located on the side of the bed to rotate a lever to change the bed sheet. **Results:** The first and most important step is to change the position, as well as maintaining a dry and clean environment, which are considered which are considered to be the most important methods of preventing bedsores. **Conclusions:** Pressure ulcer affects many people immobilized in bed, and sometimes they can even be the cause of death, which is why it is important to find optimal solutions for patients. It is easier to prevent than to treat pressure ulcers.

**Keywords:** bedsores, pressure, prevention.

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## FLAT SHOES

Sorlescu Iustina-Maria<sup>1</sup>, Zugravu Rares-Mihai<sup>1</sup>, Alexandru Maznic<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureş

**Background:** The flat foot is a medical condition in which the arch of the plant collapses, and the entire surface of the sole comes into contact with the ground. In 20% of people, the arch never develops on one or both legs. Progressive flat foot is a common deformity in adults. Despite the significant incidence of this condition, its pathophysiology is still debated. The term implies some structural and physiological changes that determine the deformation of the foot which is structurally normal at a given time. Insufficiency or dysfunction of the posterior tibial tendon was considered the main cause of the flat foot gained. **Objective:** These shoes help people with this orthopedic problem to remedy their gait and even over time to form a curvature close to normal parameters. **Materials and methods:** The sole of these shoes would be made of a material made from used tire residues, they are recyclable and have a resistance, hardness and durability over time. And the curvature is made of a metallic and flexible alloy. The structure of the shoes incorporates chips for measuring the steps and the distance traveled by the patient during the day, these data being transmitted through an application on the phone. The exterior construction of these types of shoes is black and made of a cotton material woven with recycled plastic threads. The exterior of the slipper changes according to the client's / patient's preferences, as well as the design described by them. **Results:** The cost of these shoes is minimal because they contain a recyclable material, which is an advantage for patients from an economic and medical point of view. **Conclusions:** Thus, these shoes represent the most accessible and practical method of ameliorating the orthopedic problem that many people face today.

**Keywords:** Flat foot, recyclable material, accessible, practical.

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## APPLICATION FOR AUTOMATICALLY ISSUING TICKETS FOR TRAVELS BY TRAIN

Nagy Stefan<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** Traveling by train is one of the fundamental ways of getting from point A to point B in Romania. In 2019 approximately 5 million people travelled by train, from which 3.6 million did interregional travels, and 1.4 regional travels. To ride a train you need a ticket, and the process itself is rather clunky when it comes to people who benefit of discounts and gratuity (you need to provide certain documents containing data that needs to be entered manually in a computer, not to mention the paper tickets you receive in trains that take an eternity to be emitted). **Objective:** The development of an application that can emit tickets with minimal manual input (such as pictures of documents). **Materials and methods:** In the cases of emitting a ticket for instance for a student, the human operator will scan the required documents (usually with the aid of a camera, a phone camera to be more precise). The picture will then be processed, as in the application will know the general layout of the document, be it an identity card or a travel pass, and will extract the serial number, or the name/surname from the document. The "understanding" of the text itself will be done through alphanumerical recognition, since texts on official documents have a standard font size and type, making it easier to recognize. Based on the information, appropriate discounts and gratuity will be applied and through the aid of a portable ticket emitter, a ticket will be emitted. **Results:** People can be served better and faster, thus cutting down a great deal of the time that is usually lost staying in a line to buy a ticket or waiting for your ticket to be emitted. **Conclusions:** Through the aid of alpha-numeric recognition, the time spent extracting information useful information from documents needed to emit a ticket.

**Keywords:** alpha-numerical recognition, image processing, ticket.

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## THE USING OF REUSABLE MATERIALS AND THEIR TRANSFORMATION PROCESSES

Paiu Oana<sup>1</sup>, Lazar Andreea-Elena<sup>1</sup>, Maxim Diana-Raluca<sup>1</sup>

<sup>1</sup>UMFST Târgu Mureș

**Background:** recycling is a procedure in which waste becomes secondary base material for new products. Recycling is a method of reducing the pollution therefore protecting the planet. **Objective:** the aims of this study are to show the importance of recycling and the bad consequences of pollution. **Materials and methods:** concrete that is no longer needed is used for creating recycled aggregate which will be used as a second base material or it can be paired with virgin materials and reused as an aggregate in new concrete. Newly mined aggregate from the ground is called virgin aggregate and these are typically granular or crystalline rocks, sand, gravel. These come from a local mine or quarry. Aluminum products are all over the world. they can be found in window frames, cooking utensils and incorporated in electronics. It's a reliable material in solar panels, wind turbines and cables. It is a recyclable material because it doesn't change regardless of how many times it is used. Plastic is the most common thing when it comes to recycling materials. Different types of plastics are melted together to create new material. **Results:** Recycled aggregate material is made from crushed concrete, returned to the plant for creating a new recycled product. Aluminum from use phase pass into post consumer scrap, collection is the next step then it is sorted and treated. All these processes (scrap sorting by alloy, remelting and refining) lead to primary aluminum which is used for product manufacturing. By combining and melting different types of plastic, plastic consumption is world widely reduced. **Conclusions:** The most three recycled materials are being spread everywhere so everyone can contribute to a better life.

**Keywords:** recycling, plastic, aluminum, aggregate.

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GEORGE EMIL PALADE  
UNIVERSITY OF MEDICINE,  
PHARMACY, SCIENCE, AND  
TECHNOLOGY OF TARGU MURES

38 Gheorghe Marinescu st., Târgu Mureș, 540139, ROMANIA

Telephone: +40-265-21 55 51; Fax: +40-265-21 04 07

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Web: <http://amset.umfst.ro>

E-mail: [amset@umfst.ro](mailto:amset@umfst.ro).



George Emil Palade University of  
Medicine, Pharmacy, Science, and Technology of Târgu Mureș  
38 Gheorghe Marinescu Street, Târgu Mureș, 540139, ROMANIA  
Telephone: +40-265-21 55 51; fax:+40-265-21 04 07

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Web: <http://amset.umfst.ro/>  
E-mail: [amset@umfst.ro](mailto:amset@umfst.ro)