

The cover features a red background. In the top left, a blue, multi-lobed shape contains the text 'European Pupils Magazine' in white. In the center, a hand holding a magnifying glass is shown. The magnifying glass's lens is focused on the letters 'EPM' in a large, black, stylized font. Below 'EPM', the date '1/2025' is written in a smaller, black font. Three orange triangles are positioned above the magnifying glass. In the bottom right, another blue, multi-lobed shape contains the text 'History of Science and Technology' in white.

**European
Pupils
Magazine**

EPM
1/2025

**History of
Science and
Technology**

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Braşov, Romania

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Teacher: Viviana Moldovan

Mircea Cristea Technical College, Braşov, Romania

Teacher: Marius Dan Benţa

Issue Coordinator

Bălan Denis Andrei

Cover Design

Mathe Diana

Template Author

Baku Adrian

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Translated by Monica Cotfas
monicacotfas@gmail.com

Editorial

EPMagazine Welcomes New Partners from Turkey!

The international collaborative project **EPMagazine - History of Science and Technology** continued with the same dynamics in 2025, through a series of activities aimed at ensuring the editing and publishing of the **History of Science and Technology** magazine, addressed to pupils, students and teachers. The activities carried out included regular workshops, conferences and meetings, organized by members of the editorial teams and the international partners of the project.

One of the most important achievements of **EPMagazine** is due to the activity of the main coordinator Prof. Angelo Rapisarda who continued to promote the objectives of **EPMagazine** in various parts of the world, in order to strengthen the international character of the project. Through sustained efforts and working visits to schools in Turkey, the **EPMagazine** team was joined by several schools in Turkey under the coordination of Prof. Dr. Şenol Karabaltaoğlu.

EPMagazine welcomes new Turkish Editorial Group in this great educational and scientific European project for students!

By expanding the consortium, the **EPMagazine** Editorial Groups will continue to have as their main objectives the popularization of the **History of Science and Technology**, by writing articles and editing the **EPMagazine - History of Science and Technology** magazine, as well as the acquisition of skills for technical editing and editing the magazine in English and the native language. An essential aspect remains the strengthening of the collaboration between the partners.

In the future, this collaboration will be materialized through work meetings of the Editorial Boards facilitated by the partners both online and face-to-face.

The experience so far was extremely useful for all the students involved, as Miruna Manole, one of the members of the Editorial Team in Braşov, confess: *Through this project, we had the chance to meet new people and participate in an exchange of experience during the celebration of the 20th anniversary of, an event that took place in Catania, Italy. This opportunity was special, being a perfect combination of learning, collaboration and cultural exploration.*

Underlining the multi-faceted aspect of the **EPM experience** Prof. Angelo Rapisarda, main coordinator of the project, declared, in a letter to the Turkish team: *In the 24 years of dynamic life of **EPMagazine**, numerous constructive results have been achieved, developing valuable skills for countless students from various countries, while also providing opportunities to open their minds and broaden their perspective on the real world. Boys and girls work at **EPMagazine** for the long term and we see them transforming from children into adults, ready to face any kind of scientific and social challenge.*



EPMagazine urează bun-venit noilor parteneri din Turcia!

Proiectul internațional colaborativ **EPMagazine - Istoria Științei și Tehnologiei** a continuat cu aceleași dinamici în 2025, printr-o serie de activități având ca scop asigurarea editării și publicării revistei **Istoria Științei și Tehnologiei**, adresată elevilor, studenților și profesorilor. Activitățile desfășurate includ ateliere, conferințe și întâlniri regulate, organizate de membrii echipelor editoriale și de partenerii internaționali ai acestui proiect.

Una dintre cele mai semnificative realizări ale **EPMagazine** se datorează activității profesorului coordonator principal Angelo Rapisarda, care a continuat să promoveze obiectivele **EPMagazine** în diverse regiuni ale lumii, pentru a consolida caracterul internațional al acestui proiect. Prin eforturi susținute și vizite de lucru în școlile din Turcia, echipei **EPMagazine** i s-au alăturat mai multe școli din Turcia sub coordonarea Prof. Dr. Şenol Karabaltaoglu.

EPMagazine urează bun-venit noii echipe editoriale din Turcia în acest proiect european educațional și științific dedicat elevilor și studenților!

Prin extinderea consorțiului, grupurile editoriale **EPMagazine** vor continua să aibă ca obiective principale promovarea **istoriei științelor și tehnologiei**, prin redactarea articolelor și editarea revistei **EPMagazine - Istoria Științei și Tehnologiei**, precum și dobândirea de competențe pentru editarea tehnică și publicarea revistei în limba engleză, dar și în limba maternă. Un aspect esențial rămâne consolidarea colaborării dintre parteneri.

În viitor, această colaborare va fi materializată prin întâlniri de lucru ale comitetelor editoriale, facilitate de parteneri atât online, cât și față în față.

Această experiență s-a dovedit extrem de valoroasă până în prezent pentru toți elevii implicați, precum Miruna Manole, membră a echipei editoriale din Brașov, care mărturisește: „*Prin acest proiect, am avut oportunitatea de a cunoaște persoane noi și de a participa la un schimb de experiențe în timpul celebrării a 20 de ani de **EPMagazine**, un eveniment desfășurat în Catania, Italia. Această oportunitate a fost deosebită, reprezentând combinația ideală între învățare, colaborare și explorare culturală*”.

Subliniind dimensiunile multifacetate ale experienței **EPM**, Prof. Angelo Rapisarda, coordonatorul principal al proiectului, a declarat într-o scrisoare adresată echipei din Turcia: „*În cei 24 de ani ai evoluției dinamice a **EPMagazine**, numeroase rezultate constructive au fost obținute, dezvoltând abilități valoroase pentru nenumărați elevi din diverse țări, oferindu-le totodată oportunități de a-și deschide orizonturile și de a-și extinde perspectivele asupra vieții reale. Băieți și fete lucrează la **EPMagazine** pe termen lung, iar noi îi vedem transformându-se din copii în adulți pregătiți să facă față oricărui tip de provocare științifică sau socială*”.



Списание ЕРМ: Приветстваме нови партньори от Турция!

Международният съвместен проект **ЕРМ** *Magazine - История на науката и технологиите* продължи със същата динамика през 2025 г. чрез серия от дейности, насочени към осигуряване на редактирането и публикуването на списанието за история на науката и технологиите, адресирано до ученици, студенти и учители. Проведените дейности включваха редовни семинари, конференции и срещи, организирани от членове на редакционните екипи и международните партньори на проекта.

Едно от най-важните постижения на **списание ЕРМ** се дължи на дейността на главния координатор проф. Анджело Раписарда, който продължи да насърчава целите на **списание ЕРМ** в различни части на света, с цел да се засили международният характер на проекта. Чрез постоянни усилия и работни посещения в училища в Турция, към екипа на **списание ЕРМ** се присъединиха няколко училища в Турция под координацията на д-р Шенол Карабалтаоглу.

Списание ЕРМ приветства нова турска редакционна група в този страхотен образователен и научен европейски проект за студенти и ученици!

Чрез разширяване на консорциума, редакционните групи на **списание ЕРМ** ще продължат да имат за основни цели популяризирането на историята на науката и технологиите, като пишат статии и редактират **списание ЕРМ - История на науката и технологиите**, както и придобиване на умения за предпечатна подготовка и редактиране на списанието на английски и родния език. Съществен аспект остава укрепването на сътрудничеството между партньорите.

В бъдеще това сътрудничество ще се материализира чрез работни срещи на редакционните съвети, водени от партньорите, както онлайн, така и лице в лице.

Досегашният опит беше изключително полезен за всички участващи студенти, както призна Мируна Маноле, един от членовете на редакционния екип в Брашов: „Чрез този проект имахме възможността да се запознаем с нови хора и да участваме в обмен на опит по време на честването на 20-годишнината на **списание ЕРМ**, събитие, което се проведе в Катания, Италия. Тази възможност беше специална, тъй като представляваше перфектна комбинация от учене, сътрудничество и културно опознаване.“

Подчертавайки многостранния аспект на опита на **ЕРМ**, проф. Анджело Раписарда, главен координатор на проекта, заяви в писмо до турския екип: „През 24-те години динамичен живот на **списание ЕРМ** са постигнати множество конструктивни резултати, развиващи ценни умения за безброй студенти и ученици от различни страни, като същевременно предоставят възможности за отваряне на съзнанието им и разширяване на перспективата им за реалния свят. Момчета и момичета работят в **списание ЕРМ** в дългосрочен план и ние ги виждаме как се превръщат от деца във възрастни, готови да се изправят пред всякакви научни и социални предизвикателства.“



Το **EPMagazine** καλωσορίζει νέους συνεργάτες από την Τουρκία!

Το διεθνές συνεργατικό έργο **EPMagazine** - Ιστορία της Επιστήμης και της Τεχνολογίας συνεχίστηκε με την ίδια δυναμική το 2025, μέσω μιας σειράς δραστηριοτήτων που στόχευαν στη διασφάλιση της επιμέλειας και έκδοσης του περιοδικού Ιστορίας της Επιστήμης και της Τεχνολογίας, που απευθύνεται σε μαθητές, φοιτητές και εκπαιδευτικούς. Οι δραστηριότητες που πραγματοποιήθηκαν περιλάμβαναν τακτικά εργαστήρια, συνέδρια και συναντήσεις, που διοργανώθηκαν από μέλη των συντακτικών ομάδων και τους διεθνείς εταίρους του έργου.

Ένα από τα σημαντικότερα επιτεύγματα του **EPMagazine** οφείλεται στη δραστηριότητα του κύριου συντονιστή Καθηγητή Angelo Rapisarda, ο οποίος συνέχισε να προωθεί τους στόχους του **EPMagazine** σε διάφορα μέρη του κόσμου, προκειμένου να ενισχύσει τον διεθνή χαρακτήρα του έργου. Μέσω συνεχών προσπάθειών και επισκέψεων εργασίας σε σχολεία στην Τουρκία, η ομάδα του **EPMagazine** ήρθε σε επαφή με πολλά σχολεία στην Τουρκία με τον συντονισμό του Καθηγητή Δρ. Şenol Karabaltaoğlu.

Το **EPMagazine** καλωσορίζει τη νέα Τουρκική Συντακτική Ομάδα σε αυτό το σπουδαίο εκπαιδευτικό και επιστημονικό ευρωπαϊκό έργο για μαθητές!

Με την επέκταση της κοινοπραξίας, οι Συντακτικές Ομάδες του **EPMagazine** θα συνεχίσουν να έχουν ως κύριους στόχους τους τη διάδοση της Ιστορίας της Επιστήμης και της Τεχνολογίας, μέσω της συγγραφής άρθρων και της επιμέλειας του περιοδικού **EPMagazine -Ιστορία της Επιστήμης και της Τεχνολογίας**, καθώς και την απόκτηση δεξιοτήτων για την τεχνική επιμέλεια του περιοδικού στα αγγλικά και τη μητρική γλώσσα. Ένας ουσιαστικός στόχος παραμένει πάντοτε η ενίσχυση της συνεργασίας μεταξύ των εταίρων.

Στο μέλλον, αυτή η συνεργασία θα υλοποιηθεί μέσω συναντήσεων εργασίας των Συντακτικών Επιτροπών, οι οποίες θα οργανωθούν από τους εταίρους, τόσο διαδικτυακά όσο και με φυσική παρουσία.

Η μέχρι στιγμής εμπειρία ήταν εξαιρετικά χρήσιμη για όλους τους εμπλεκόμενους φοιτητές, όπως ομολόγησε η Miruna Manole, ένα από τα μέλη της Συντακτικής Ομάδας στο Μπρασόβ: «Μέσω αυτού του έργου, είχαμε την ευκαιρία να γνωρίσουμε νέους ανθρώπους και να συμμετάσχουμε σε ανταλλαγή εμπειριών κατά τον εορτασμό της 20ής επετείου του **EPMagazine**, μιας εκδήλωσης που πραγματοποιήθηκε στην Κατάνια της Ιταλίας. Αυτή η ευκαιρία ήταν ξεχωριστή, καθώς αποτελεί έναν τέλειο συνδυασμό μάθησης, συνεργασίας και πολιτιστικής εξερεύνησης».

Υπογραμμίζοντας την πολύπλευρη πτυχή της εμπειρίας του EPM, ο καθηγητής Angelo Rapisarda, κύριος συντονιστής του έργου, δήλωσε σε επιστολή του προς την τουρκική ομάδα: «Στα 24 χρόνια δυναμικής ζωής του **EPMagazine**, έχουν επιτευχθεί πολλά επικοινωνιακά αποτελέσματα, αναπτύσσοντας πολύτιμες δεξιότητες για αμέτρητους μαθητές από διάφορες χώρες, παρέχοντας παράλληλα ευκαιρίες να ανοίξουν το μυαλό τους και να διευρύνουν την οπτική τους στον πραγματικό κόσμο. Αγόρια και κορίτσια εργάζονται στο **EPMagazine** με προοπτική και τα βλέπουμε να μεταμορφώνονται από παιδιά σε ενήλικες, έτοιμοι να αντιμετωπίσουν κάθε είδους επιστημονική και κοινωνική πρόκληση».



Translated by Angelo Rapisarda
epmagazine@libero.it

EPMagazine accoglie i Nuovi Partner Turchi!

Il progetto in partenariato internazionale **EPMagazine - History of Science and Technology** continua la sua attività, con lo stesso passo del 2025, grazie alla sua di vitalità, per la continuazione della pubblicazione della rivista di **Storia delle Scienze e della Tecnologia** rivolta a giovani, studenti ed insegnanti. Le attività seguite sono workshop, conferenze e convegni organizzati dai membri del Gruppo Editoriale Europeo e dai partner del progetto.

Una recente affermazione di **EPMagazine** si deve a uno dei coordinatori, Prof. Angelo Rapisarda, che promuove continuamente gli obiettivi scientifici, didattici e formativi di **EPMagazine** in varie parti del Mondo per rinforzare il carattere internazionale del progetto. Attraverso attività sostenute, e recenti diverse visite in Turchia, **EPMagazine** ha incontrato parecchie scuole che hanno dato disponibilità a supportare i nostri obiettivi sotto la coordinazione del Prof. Dr. Şenol Karabaltaoğlu.

EPMagazine dà il benvenuto al nuovo Gruppo Editoriale Turco in questo grande progetto scientifico e educativo per gli studenti.

Allargando l'organizzazione, il Gruppo Editoriale Europeo di **EPMagazine** continua a perseguire la popolarizzazione della **Storia delle Scienze e della Tecnologia**, come uno dei suoi principali obiettivi, stimolando la produzione di contributi scientifici e pubblicandoli su **EPMagazine - Storia delle Scienze e della Tecnologia**. Così facendo, viene anche rinforzata l'acquisizione di competenze tecniche per la pubblicazione di una rivista multilingue, in Inglese e nella lingua madre dell'autore. Un aspetto essenziale di tutto ciò è il rafforzamento della collaborazione tra partner.

Nel futuro, questa stretta collaborazione sarà mantenuta e incrementata attraverso convegni dei vari Gruppi Editoriali, organizzati sia on-line, sia in presenza.

L'esperienza è estremamente utile per tutti gli studenti coinvolti, come Miruna Manole, una dei membri del Gruppo Editoriale di Brasov (Romania), che dichiara: *Grazie al progetto, abbiamo avuto la possibilità di fare nuove conoscenze e partecipare a uno scambio di esperienze durante la celebrazione del 20° Anniversario di EPMagazine che si è tenuto a Catania. Questa opportunità è stata speciale, in quanto perfetta combinazione di apprendimento, collaborazione e esplorazione culturale.*

Evidenziamo un aspetto delle molteplici esperienze del prof. Angelo Rapisarda - un Coordinatore del nostro Progetto - condivise con il Gruppo Editoriale Turco: *Nei 24 anni di vita dinamica di EPMagazine, sono stati registrati numerosi risultati concreti, sviluppando utilissime capacità e competenze per numerosissimi studenti di svariate Nazioni, contribuendo a potenziare l'apertura delle loro menti ed espandere le loro prospettive di affermazione nel mondo reale. Negli studenti attivi per un tempo adeguato in EPMagazine, si può percepire la loro trasformazione da ragazzi ad adulti, pronti ad affrontare ogni sorta di sfida formativa e scientifica.*



EPMagazine Türkiye'den Yeni Ortakları Selamlıyor!

Uluslararası iş birliğine dayalı **EPMagazine** – Bilim ve Teknoloji Tarihi projesi, 2025 yılında da aynı dinamizmle devam etti. Proje kapsamında, öğrenci ve öğretmenlere yönelik hazırlanan bilim ve teknoloji tarihi dergisinin hazırlanması ve yayımlanmasını sağlamak amacıyla çeşitli faaliyetler gerçekleştirildi. Bu faaliyetler arasında editör ekipleri ve uluslararası proje ortakları tarafından düzenlenen düzenli atölye çalışmaları, konferanslar ve toplantılar yer aldı.

EPMagazine'in en önemli başarılarından biri, projenin ana koordinatörü Prof. Angelo Rapisarda'nın yürüttüğü çalışmalar sayesinde elde edilmiştir. Rapisarda, projenin uluslararası niteliğini güçlendirmek amacıyla dünyanın farklı bölgelerinde **EPMagazine**'in hedeflerini tanıtmaya ve yaygınlaştırmaya devam etmiştir. Türkiye'deki okullara gerçekleştirilen çalışma ziyaretleri ve sürdürülen yoğun çabalar sonucunda, Prof. Dr. Şenol Karabaltaoğlu'nun koordinasyonunda Türkiye'den birçok okul **EPMagazine** ekibine katılmıştır.

EPMagazine, öğrenciler için yürütülen bu büyük eğitim ve bilim projesinde Türkiye'den yeni Editör Grubunu memnuniyetle karşılamaktadır.

Ortaklığın genişlemesiyle birlikte **EPMagazine** Editör Grupları, bilim ve teknoloji tarihinin yaygınlaştırılmasını temel hedef olarak sürdürmeye devam edecektir. Bu kapsamda öğrenciler, bilim ve teknoloji tarihi üzerine makaleler yazacak, **EPMagazine – History of Science and Technology** dergisinin hazırlanması ve editörlüğü süreçlerinde aktif rol alacak ve aynı zamanda derginin İngilizce ve ana dilde hazırlanması konusunda teknik editörlük becerileri kazanacaklardır. Bununla birlikte proje ortakları arasındaki iş birliğinin güçlendirilmesi de önemli bir hedef olmaya devam edecektir.

Gelecekte bu iş birliği, ortaklar tarafından hem çevrim içi hem de yüz yüze gerçekleştirilecek Editör Kurulu çalışma toplantıları aracılığıyla sürdürülecektir. Bugüne kadar elde edilen deneyim, projeye katılan tüm öğrenciler için son derece değerli olmuştur. Braşov'daki Editör Ekibi üyelerinden Miruna Manole bu deneyimi şu sözlerle ifade etmiştir:

"Bu proje sayesinde yeni insanlarla tanışma ve İtalya'nın Catania şehrinde düzenlenen **EPMagazine**'in 20. yıl kutlamaları sırasında deneyim paylaşımına katılma fırsatı bulduk. Bu etkinlik, öğrenme, iş birliği ve kültürel keşfin mükemmel bir birleşimi olduğu için bizim için çok özel bir deneyimdi."

EPMagazine deneyiminin çok yönlü yapısına dikkat çeken proje ana koordinatörü Prof. Angelo Rapisarda ise Türk ekibine gönderdiği bir mektupta şu ifadeleri kullanmıştır:

"**EPMagazine**'in 24 yıllık dinamik yaşamı boyunca çok sayıda yapıcı sonuç elde edilmiştir. Bu süreçte farklı ülkelerden sayısız öğrenci değerli beceriler kazanmış, aynı zamanda gerçek dünyaya dair bakış açılarını genişletme fırsatı bulmuştur. **EPMagazine**'de uzun süre çalışan öğrencilerin çocukluktan yetişkinliğe doğru gelişimlerine tanıklık ediyor ve onların bilimsel ve toplumsal her türlü zorlukla başa çıkabilecek bireyler hâline geldiklerini görüyoruz."



Titration: Principles, Types and Applications

Introduction

Titration is an analytical method used to determine the concentration of an unknown solution by reacting it with a solution of known concentration, called a titrant. This technique is essential in analytical chemistry and has wide applicability in fields such as chemistry, biology, medicine and the food industry.

Principles of Titration

Titration is based on well-defined chemical reactions, usually between an acid and a base, an oxidizing agent and a reducing agent, or a precipitation reaction. There are several main steps in the titration process (Fig. 1):

- Preparation of solutions: the unknown solution and titrant of known concentration are prepared.
- Addition of titrant: the titrant is slowly added to the unknown solution until the equivalence point is reached.
- Identification of the equivalence point: this point is determined either visually by a colored indicator or by an instrumental method such as potentiometry.

Types of Titrations

Acid-base titration: involves the reaction between an acid and a base. pH indicators are often used to determine the equivalence point

Titarea: Principii, Tipuri și Aplicații

Introducere

Titarea este o metodă analitică utilizată pentru a determina concentrația unei soluții necunoscute, prin reacția acesteia cu o soluție de concentrație cunoscută, numită titrant. Această tehnică este esențială în chimia analitică și are aplicabilitate largă în domenii precum chimia, biologia, medicina și industria alimentară.

Principii ale titrării

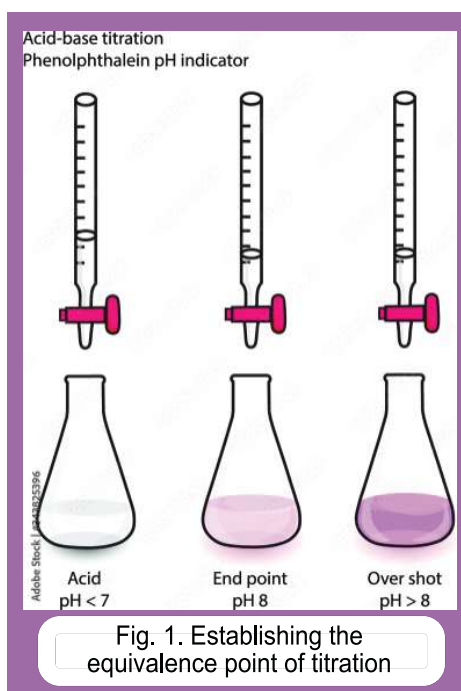
Titarea se bazează pe reacții chimice bine definite, de obicei între un acid și o bază, un agent oxidant și unul reducător sau o reacție de precipitare. Există câțiva pași principali în procesul de titrare (Fig. 1):

- Pregătirea soluțiilor: Se pregătesc soluția necunoscută și titran-tul de concentrație cunoscută.
 - Adăugarea titrantului: Titrantul este adăugat lent în soluția necunoscută până la atingerea punctului de echivalență.
 - Identificarea punctului de echivalență: Acest punct se determină fie vizual printr-un indicator colorat, fie printr-o metodă instrumentală, cum ar fi metoda potențimetrică.

Tipuri de titrare

Titarea acid-bază: implică reacția dintre un acid și o bază. Indicatorii

de pH sunt adesea utilizați pentru a



(Fig. 2).

Redox titration: involves an oxidation-reduction reaction between titrant and analyte. Common examples include permanganometry and iodometry.

Precipitation titration: it is based on the formation of a precipitate during the reaction. An example is silver nitrate titration for the determination of halides.

Complexometric titration: uses complex-forming reactions, for example, the use of EDTA (Ethylenediaminetetraacetic acid) for the determination of metal ions.

Applicability of Titration

Titration technique is applied in various fields due to its accuracy and simplicity.

Some notable applications include:

- Pharmaceutical industry:** Determination of purity of active substances.
- Quality control:** Checking the content of chemicals in food and beverages.
- Biological research:** Analysis of the composition of biological samples.
- Environmental monitoring:** Determination of pollutants in surface and ground water.

Fig. 3 describes a sequence of the water quality monitoring procedure.

Equipment Used in Titration

The main equipment used in titrations includes burettes, Erlenmeyer flasks, pipettes, and various apparatus for precise measurements, such as pH meters and electrodes for potentiometric titrations.

Advantages and Limitations of Titration

Benefits of titration:

- High precision and accuracy.
- Relatively low costs.
- Wide applicability in various fields.

determina punctul de echivalență (Fig. 2).

Titrare redox: implică o reacție de oxidare-reducere între titrant și analit. Exemple comune includ permanganometria și iodometria.

Titrare de precipitare: se bazează pe formarea unui precipitat în timpul reacției. Un exemplu este titrarea cu azotat de argint pentru determinarea halogenurilor.

Titrare complexometrică: utilizează reacții de formare a complexelor, de exemplu, utilizarea EDTA (Acid etilendiaminotetraacetic) pentru determinarea ionilor metalici.

Aplicabilitatea titrării

Tehnica titrării este aplicată în diverse domenii datorită preciziei și simplității ei.

Câteva aplicații notabile includ:

- Industria farmaceutică:** determinarea purității substanțelor active.
- Controlul calității:** verificarea conținutului de substanțe chimice în produse alimentare și băuturi.

- Cercetarea biologică:** analiza compoziției probelor biologice.
- Monitorizarea mediului:**

determinarea poluanților în apa de suprafață și cea subterană.

În Fig. 3 este descrisă o secvență din procedura de monitorizare a calității apei.

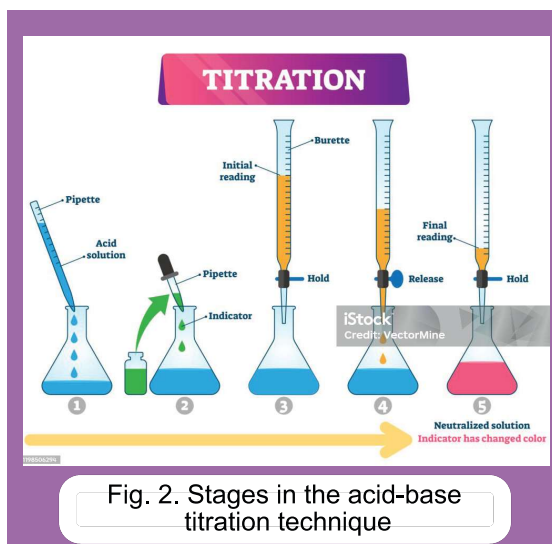
Echipamente Utilizate în Titrare

Echipamentele principale utilizate în titrare include: biurete, pahare Erlenmayer, pipete, și diverse aparate pentru măsurători precise, cum ar fi pH-metrele și electrozii pentru titrări potențiometrice.

Avantajele și Limitările Titrării

Avantajele titrării:

- Precizie și acuratețe ridicată.
- Costuri relativ scăzute.
- Aplicabilitate largă în diverse domenii.



There are also limitations related to:

- The need to know the exact reaction between titrant and analyte,
- The possibility of interference from other substances present in the sample,
- The need for specialized equipment for certain types of titrations.



Fig. 3. Water quality monitoring

Există și limitări legate de:

- Necesitatea cunoașterii reacției exacte între titrant și analit;
- Posibilitatea interferențelor din partea altor substanțe prezente în probă;
- Necesitatea unui echipament specializat pentru anumite tipuri de titrări.

Conclusion

Titration remains a fundamental analytical technique in various scientific and industrial fields. Understanding its principles, types, and applications is essential to performing accurate and correct chemical analyses.

Concluzie

Titrarea rămâne o tehnică analitică fundamentală în diverse domenii științifice și industriale. Înțelegerea principiilor, tipurilor și aplicabilităților ei este esențială pentru efectuarea unor analize chimice precise și corecte.

Webography

<https://chemguide.co.uk/physical/acideqiamenu.html>

<https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:chemical-reactions/x2eef969c74e0d802:introduction-to-titration/v/titration-calculation-example>

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Iconography

Fig.1: <https://stock.adobe.com/ro/images/acid-base-titration-and-phenolphthalein-indicator/343825396>

Fig.2: <https://ziarullumina.ro/societate/actualitate-sociala/laboratoare-pentru-monitorizarea-calitatii-apei-167105.html>

Fig.3: <https://www.istockphoto.com/ro/vector/ilustrație-vectorială-de-titrare-schema-de-proces-de-chimie-educățională-etichetată-gm1198506294-342560320>

Supervising Teacher: Marius Dan Bența
bentamariusdan@gmail.com



The Evolution of BMW Automotive Group

Few automotive brands have such instant recognition and respect as Bayerische Motoren Werke AG, better known worldwide as BMW.

The early foundation of the BMW Group goes back to 1916. Few people know that the company was first created by the collaboration of two pioneer aviation companies Rapp Motorenwerke, founded by Karl Rapp and Flugmaschinenfabrik an aviation factory owned by Gustav Otto. At the early beginnings, the company only focused on producing aircraft engines for the German Military with their first significant product being the BMW IIIa engine, in 1917 (Fig. 1).

The engineer behind this success was Max Friz, who built an engine that was more superior at high altitudes giving the German aircrafts more advantage when flying during the World War I (Fig. 2)

Since Germany's defeat in World War I, BMW had to stop producing aircraft engines and had to change significantly to

Η Εξέλιξη του BMW Automotive Group

Λίγες αυτοκινητοβιομηχανίες έχουν άμεση αναγνωρισιμότητα και σεβασμό όσο η Bayerische Motoren Werke AG, γνωστή σε όλο τον κόσμο ως BMW.

Η πρώτη βάση του ομίλου BMW τοποθετείται χρονικά στο 1916. Λίγοι γνωρίζουν ότι η εταιρεία δημιουργήθηκε αρχικά από τη συνεργασία δύο πρωτοπόρων αεροπορικών εταιρειών:

της Rapp Motorenwerke, που ιδρύθηκε από τον Karl Rapp, και της Flugmaschinenfabrik, ενός εργοστασίου αεροσκαφών που ανήκε στον Gustav Otto. Στα πρώτα της βήματα, η εταιρεία εστίαζε αποκλειστικά στην παραγωγή κ ι ν η τ ή ρ ω ν αεροσκαφών για τον γερμανικό στρατό, με το πρώτο σημαντικό προϊόν της BMW IIIa να είναι ο κινητήρας το 1917 (Εικ 1).

Ο μηχανικός πίσω από αυτή την επιτυχία ήταν ο Max Friz, ο οποίος κατασκεύασε έναν κινητήρα που ήταν ανώτερος σε μεγάλα υψόμετρα, δίνοντας στα γερμανικά αεροσκάφη σημαντικό πλεονέκτημα κατά τη διάρκεια πτήσεων στον Α' Παγκόσμιο Πόλεμο (Εικ 2).

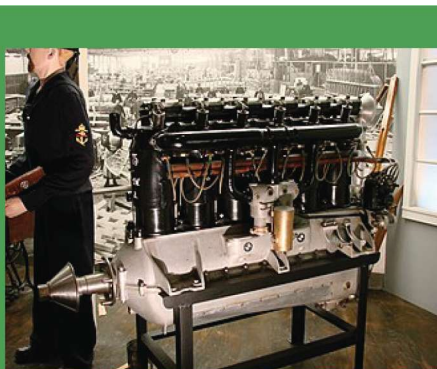


Fig. 1. The Smithsonian National Air and Space Museum



Fig. 2. First aircrafts using BMW engines

survive the postwar era. BMW's breakthrough came in 1932 with the R32 Motorcycle (Fig. 3).

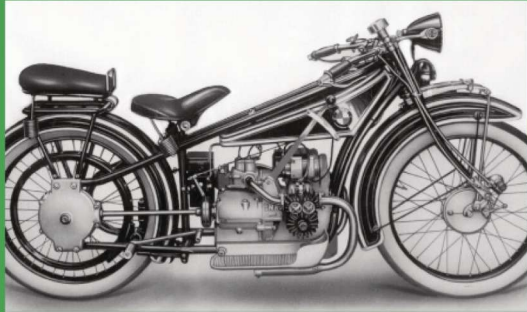


Fig. 3. R32 Motorcycle

The R32 bike was immediately recognized for its quality, reliability and great engineering, making BMW a serious motorcycle manufacturer. The car production first started in 1928 when BMW purchased a car making company called Fahrzeugfabrik Eisenach, already producing Austin Sevens under license as Dixi cars. The first car sold as a BMW was the 3/15 (Fig. 4).

During the 1930s, BMW expanded its automotive range with increasingly sophisticated models, including BMW 303, the BMW 328 sports car, and larger luxury models like the 326 and 327. The 328 was highly successful in motorsports, establishing BMW's reputation for building sporty, performance-oriented vehicles (Fig. 5).

After World War II and during the 1950s BMW was about to close. This was mainly because on the one hand Germany was recovering from

Μετά την ήττα της Γερμανίας στον Α' Παγκόσμιο Πόλεμο, η BMW αναγκάστηκε να σταματήσει την παραγωγή αεροπορικών κινητήρων και να αλλάξει σημαντικά για να επιβιώσει στη μεταπολεμική εποχή. Η μεγάλη επανάσταση για την εταιρεία ήρθε το 1932 με τη μοτοσικλέτα R32 (Εικ 3).

Η μοτοσικλέτα R32 αναγνωρίστηκε αμέσως για την ποιότητα, την αξιοπιστία και την εξαιρετική μηχανολογία της, καθιστώντας την BMW μια σοβαρή κατασκευάστρια μοτοσικλετών.

Η παραγωγή αυτοκινήτων ξεκίνησε για πρώτη φορά το 1928, όταν η BMW αγόρασε μια εταιρεία κατασκευής αυτοκινήτων που ονομαζόταν Fahrzeugfabrik Eisenach, η οποία παρήγαγε ήδη υπό την άδεια της Austin Sevens με την επωνυμία Dixi. Το πρώτο αυτοκίνητο που πωλήθηκε ως BMW ήταν το 3/15 (Εικ 4).

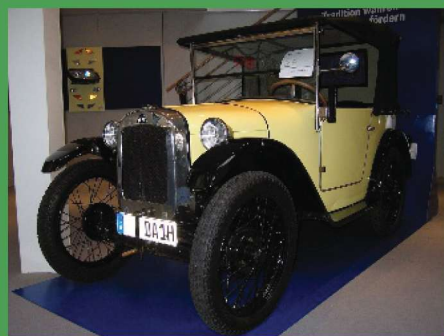


Fig. 4. BMW 3/15 (1929)

Στη διάρκεια της δεκαετίας του 1930, η BMW διεύρυνε τη γκάμα αυτοκινήτων της με ολοένα και πιο εξελιγμένα μοντέλα, όπως το BMW 303, το σπορ αυτοκίνητο BMW 328, και μεγαλύτερα πολυτελή μοντέλα όπως η σειρά 326 και 327.

Το μοντέλο 328 σημείωσε μεγάλη επιτυχία στον αθλητικό κόσμο των αγωνιστικών, καθιερώνοντας τη φήμη της BMW για την



Fig. 5. BMW 328 (1936)

another defeat and buyers wanted smaller cars.

Trying to reach broader markets, BMW began producing the Isetta microcar under the license from Iso in 1955 (Fig. 6). This small car with front door entry was successful to some extent but not entirely. In 1959 it was nearly bought by Daimler-Benz (Mercedes). Gradually the company grew and developed with its markets expanding globally, establishing the first production site in South Africa in 1972. The same year, BMW established BMW Motorsport GmbH, later known as BMW M GmbH to add to its racing activities. More specifically the M Series would later produce high-performance road cars like the M1 supercar (1978), M5 (1984), and M3 (1986) (Fig. 7).

The 1990s were both successful and full of challenges for the company. BMW purchased the British Rover Group in 1994, but it was not a great financial decision, so it was sold off in a few years. From the Rover Group BMW kept only the MINI brand, which

κατασκευή δυναμικών οχημάτων υψηλών επιδόσεων (Εικ 5).

Μετά τον Β' Παγκόσμιο Πόλεμο και κατά τη δεκαετία του 1950, η BMW βρέθηκε στο χείλος της πτώχευσης. Ο κύριος λόγος για αυτό ήταν ότι η Γερμανία ανέκαμπτε από μια ακόμη ήττα, ενώ οι αγοραστές έψαχναν για μικρότερα και οικονομικότερα αυτοκίνητα.

Προσπαθώντας να προσεγγίσει ευρύτερες αγορές, η BMW ξεκίνησε την παραγωγή του μικροαυτοκινήτου Isetta με άδεια από την ιταλική Iso το 1955 (Εικ 6). Αυτό το μικρό αυτοκίνητο, με είσοδο από την μπροστινή πόρτα, γνώρισε κάποια επιτυχία, αλλά όχι πλήρη. Το 1959, η BMW κόντεψε να αγοραστεί από την Daimler-Benz (Mercedes).

Σταδιακά, η εταιρεία αναπτύχθηκε και οι αγορές της επεκτάθηκαν παγκοσμίως, ιδρύοντας το πρώτο της εργοστάσιο παραγωγής στη Νότια Αφρική το 1972.



Fig. 6. BMW Isetta

Την ίδια χρονιά, η BMW ίδρυσε την BMW Motorsport GmbH, η οποία αργότερα έγινε γνωστή ως BMW M GmbH, για να ενισχύσει τις δραστηριότητές της στον αθλητισμό. Πιο συγκεκριμένα, η σειρά M

was not until the year 2000 it launched a new MINI line. Later in 1998 Rolls-Royce brand name was

αργότερα παρήγαγε υψηλών επιδόσεων αυτοκίνητα δρόμου, όπως το σούπερ καρ M1 (1978), το M5 (1984) και το M3 (1986) (Εικ 7).



Fig. 7. BMW M Series Evolution

obtained, creating like that a separate ultra luxury line. In the mid-1990s the iconic Z3 roadster was launched, appearing in the James Bond film Golden Eye! (Fig. 8). In early 2000



Fig. 8. Z3 Roadster

BMW created its first SUV, a car that combined both elegant and sporting experience at the same time.

The BMW headquarters are located in a tower block in the north of Munich (Fig. 9). Its unusual shape soon led to it to be known as the "four-cylinder building", and it soon became a notable landmark in the city's architecture. The BMW Museum was installed next to it in a bowl-shaped

Η δεκαετία του 1990 ήταν όχι μόνο επιτυχημένη αλλά και γεμάτη προκλήσεις για την εταιρεία. Η BMW αγόρασε τον Βρετανικό όμιλο Rover το 1994, ωστόσο αυτή η απόφαση δεν αποδείχθηκε οικονομικά κερδοφόρα, με αποτέλεσμα να την πουλήσει μετά από λίγα χρόνια. Από τον όμιλο Rover, η BMW κράτησε μόνο την μάρκα MINI, η οποία ξεκίνησε μια νέα σειρά οχημάτων το έτος 2000.

Αργότερα, το 1998, απέκτησε τα δικαιώματα στο όνομα Rolls-Royce, δημιουργώντας έτσι μια ξεχωριστή σειρά υπερπολυτελών οχημάτων. Στα μέσα της δεκαετίας του 1990, κυκλοφόρησε το εμβληματικό roadster Z3, που εμφανίστηκε και στην ταινία του Τζέιμς Μποντ, «GoldenEye»! (Εικ 8).

Στις αρχές της δεκαετίας του 2000, η BMW δημιούργησε το πρώτο της SUV, ένα όχημα που συνδυάζε κομψότητα και αθλητικό δυναμισμό.

Η έδρα της BMW βρίσκεται σε έναν κτίριο στο βόρειο τμήμα του Μονάχου (Εικ 9). Το ασυνήθιστο σχήμα του, το έκανε γνωστός ως «κτήριο των τεσσάρων κυλίνδρων», και σύντομα έγινε ένα αξιοσημείωτο ορόσημο της αρχιτεκτονικής. Το Μουσείο BMW εγκαταστάθηκε δίπλα σε ένα ιδιαίτερο

building that is still one of a kind to this day. The new building complex was officially opened on 18 May 1973.

Till today BMW has its headquarters in Munich and produces motor vehicles not only in Germany, but also the United Kingdom, the United States, Brazil, Mexico, South Africa, India, China, and previously also in the Netherlands (ceased in 2023). It has maintained the same more or less logo (Fig. 10) brand throughout the years showing to the public its strength and sustainability over the years. BMW kept the original Rapp's black ring inscribed with the company name, but the interior of the ring is quartered blue and white. The colors of the inside of the ring represent the colors of the white and blue flag of the district of Bavaria (Fig. 11).

The history of BMW shows how a company can change with the times and use new technology without losing what makes it special. Whether it was a famous motorcycle in the 1920s, a popular sedan in the 1960s, or its new electric cars today (Fig. 12), BMW has always used innovation to solve its problems.

Now, as BMW looks to the future, it faces new challenges like electric cars, self-driving technology, and changes in how people get around. But based on its past, this strong

κυκλικό κτίσμα που παραμένει μοναδικό μέχρι σήμερα. Το νέο αρχιτεκτονικό συγκρότημα εγκαινιάστηκε επίσημα στις 18 Μαΐου 1973.



Fig. 9. Headquarters of BMW Group

Μέχρι σήμερα, η BMW διατηρεί την έδρα της στο Μόναχο και παράγει οχήματα όχι μόνο στη Γερμανία, αλλά και στο Ηνωμένο Βασίλειο, τις Ηνωμένες Πολιτείες, τη Βραζιλία, το Μεξικό, τη Νότια

Αφρική, την Ινδία, την Κίνα, και προηγουμένως επίσης στην Ολλανδία (διακόπηκε το 2023). Διατήρησε το ίδιο, λίγο-πολύ, λογότυπο (Ει. 10) και την ταυτότητα της μάρκας όλα αυτά τα χρόνια, δείχνοντας στο κοινό τη δύναμη και τη βιωσιμότητά της. Η BMW κράτησε τον αρχικό μαύρο δακτύλιο της Rapp εγγεγραμμένο με το όνομα της εταιρείας, αλλά το εσωτερικό του δακτυλίου χωρίζεται σε τέσσερα τεταρτημόρια μπλε και λευκό. Τα χρώματα στο εσωτερικό του

δακτυλίου αντιπροσωπεύουν τα χρώματα της λευκής και μπλε σημαίας της πολιτείας της Βαυαρίας (Εικ 11).

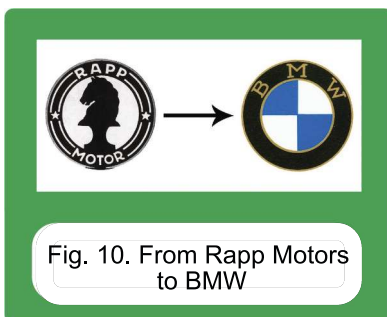


Fig. 10. From Rapp Motors to BMW

Η ιστορία της BMW δείχνει πώς μια εταιρεία μπορεί να αλλάξει με τους χρόνους και να αξιοποιήσει νέες

τεχνολογίες, χωρίς να χάσει αυτό που την κάνει ξεχωριστή. Είτε ήταν μια διάσημη μοτοσυκλέτα στη δεκαετία του 1920, ένα δημοφιλές σεντάν στη δεκαετία του 1960, είτε τα νέα της ηλεκτρικά αυτοκίνητα σήμερα (Εικ 12), η BMW πάντα χρησιμοποίησε την καινοτομία για να λύσει τα προβλήματά της.

company will likely find a way to keep making cars that are both innovative and fun to drive.



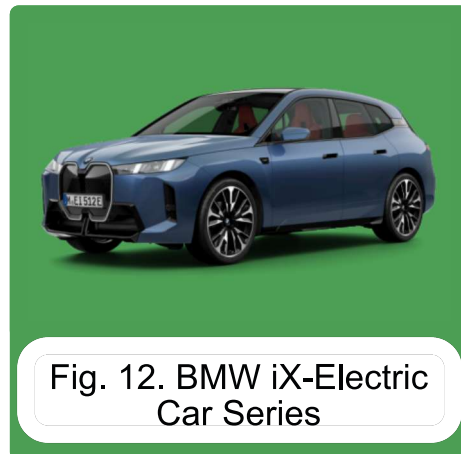
Their logo, inspired by Bavaria's colors and an airplane propeller, symbolizes a company that is always moving forward, always building better machines, and always aiming for perfection.

Personally, I find BMW's journey incredibly inspiring. It's amazing to think that a company born from building warplane engines is now a leader in the car manufacturing. To me, the most fascinating part is how they've constantly turned near-failure into success by being strong on innovation, like with the R32 motorcycle or the i-Series electric cars. Their story makes me believe that a strong identity is your greatest asset. As a car enthusiast (Fig. 13), it makes me hopeful that the future of driving, even an electric, tech-heavy ones, is in the hands of companies that are still motivated by the great pleasure of being behind the wheel



Είναι πραγματικά εντυπωσιακό να σκεφτεί κανείς αυτή την πορεία. Από κινητήρες αεροπλάνων σε πρωτοπόρους της αυτοκίνησης – η ιστορία της BMW είναι ένα απόλυτο μάθημα πώς η καινοτομία και η διατήρηση της ταυτότητας μπορούν να μετατρέψουν ακόμα και τις πιο κρίσιμες οικονομικά στιγμές σε ευκαιρίες.

Το γεγονός ότι διατήρησαν τη φιλοσοφία της « απόλαυσης της οδήγησης » ακόμα και στην ηλεκτρική εποχή, με μοντέλα όπως το i4 ή το iX, δείχνει ότι στη BMW κατανοούν το βασικό πνεύμα του σήματος τους. Δεν πουλάνε απλά μεταφορικά μέσα, πουλάνε μια εμπειρία.



Κατά τη γνώμη μου, αυτό δίνει ελπίδα σ τ ο υ ς καταναλωτές (Εικ.13). Σε έναν κόσμο που γεμίζει με αυτόνομα οχήματα και ψηφιακές τεχνολογίες, είναι καθησυχαστικό που μια εταιρεία μπορεί ακόμα να βάζει στο προσκήνιο την ανθρώπινη επαφή και τη χαρά του οδηγού.

Webology

<https://bimmerlife.com/2025/03/19/the-bmw-kidney-grille-through-time-1933-2025/>
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<https://en.wikipedia.org/wiki/BMW>
<https://www.goclassic.eu/en/blog/cars/the-bmw-logo-meaning-and-history-55>

Iconography

Fig. 1: https://en.wikipedia.org/wiki/BMW_IIIa
Fig. 2: <https://www.pbs.org/newshour/world/heres-what-bmw-did-before-it-made-luxury-cars>
Fig. 3: <https://www.bmwgroup-classic.com/en/classic-on-air/journey-trough-time/popup/BMW-R32.html>
Fig. 4: [https://en.wikipedia.org/wiki/BMW_3/15#/media/File:Dixi_3-15_DA_\(1929\).jpg](https://en.wikipedia.org/wiki/BMW_3/15#/media/File:Dixi_3-15_DA_(1929).jpg)
Fig. 5: https://en.wikipedia.org/wiki/BMW_328
Fig. 6: [https://el.wikipedia.org/wiki/%CE%91%CF%81%CF%87%CE%B5%CE%AF%CE%BF:BMW_Isetta_300_\(1961\)_at_Astley_Park_Classic_Car_Show_2017.jpg](https://el.wikipedia.org/wiki/%CE%91%CF%81%CF%87%CE%B5%CE%AF%CE%BF:BMW_Isetta_300_(1961)_at_Astley_Park_Classic_Car_Show_2017.jpg)
Fig. 7: <https://www.bmw-m.com/en/topics/magazine-article-pool/bmw-m3-e30-portraet.html>
<https://bimmerlife.com/2025/03/19/the-bmw-kidney-grille-through-time-1933-2025/>
Fig. 8: https://www.google.com/search?q=z3+roadster+bmw+1995&sca_esv=b874bfd7680df073&rlz=1C1GCEA
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Supervising Teacher: Nikolaos Georgolios
ngeorgol@otenet.gr



Christos-Lucas Tsiakmakis
Experimental Junior High School of the University of Macedonia,
Thessaloniki, Greece
loukastiakmakis@gmail.com

The Evolution of the Subway: From London to the World

Metro systems have played a pivotal role in the development of modern urban transport. What began as a simple underground railway in London has transformed into complex networks that connect millions of people worldwide. This article explores the history and expansion of metro systems, highlighting key developments and trends.

Early Beginnings: The Birth of the Underground (Late 19th Century)

The story of metro systems begins in the mid-19th century with a groundbreaking event in London. On January 10, 1863, the world's first underground metro system—the London Underground (also known as the Tube)—opened its doors to the public. Initially powered by steam, the system ran from Paddington to Farringdon. The success of this early metro system inspired other cities to pursue similar underground solutions to manage their growing populations and traffic congestion (Fig. 1).

As the century progressed, cities around the world began to develop their own underground systems. In 1890, Berlin introduced its electric-powered U-Bahn, marking a significant technological leap forward. The use of electricity made trains faster, cleaner, and more efficient. By 1893, Boston, USA, joined the ranks with its own underground line, the Tremont Street Subway, alleviating street-level traffic in the city.

Expansion in the Early 20th Century: A Global Movement

Η Εξέλιξη του Μετρό: Από το Λονδίνο στον Κόσμο

Το μετρό είναι ένα σύστημα υπόγειου σιδηροδρόμου που έχει παίξει καθοριστικό ρόλο στην ανάπτυξη των σύγχρονων αστικών συγκοινωνιών. Αυτό που ξεκίνησε ως ένα απλό υπόγειο σιδηροδρομικό δίκτυο στο Λονδίνο έχει εξελιχθεί σε περίπλοκα δίκτυα που συνδέουν εκατομμύρια ανθρώπους παγκοσμίως.

Το άρθρο αυτό εξετάζει την ιστορία και την εξάπλωση των συστημάτων μετρό, επισημαίνοντας τα βασικά σημεία εξέλιξης και τις σύγχρονες τάσεις.

Αρχικές Αρχές: Η Γέννηση του Υπογείου (Τέλη 19ου Αιώνα)

Η ιστορία του μετρό ξεκινά στα μέσα του 19ου αιώνα ως ένα επαναστατικό γεγονός στο Λονδίνο. Στις 10 Ιανουαρίου 1863, το πρώτο υπόγειο σιδηροδρομικό σύστημα στον κόσμο – το Λονδρέζικο Μετρό (γνωστό και ως "Tube") – άνοιξε τις πύλες του στο κοινό. Αρχικά μετρήνα που κινούνταν με ατμό εκτελούσαν τη διαδρομή από το Paddington έως το Farringdon. Η επιτυχία του πρώτου αυτού

συστήματος ώθησε άλλες πόλεις να δημιουργήσουν τα δικά τους υπόγεια δίκτυα (Fig. 1).

Καθώς ο 19ος αιώνας προχωρούσε, πόλεις σε όλο τον κόσμο άρχισαν να αναπτύσσουν τα δικά τους υπόγεια συστήματα. Το 1890, το Βερολίνο εγκαινίασε το πρώτο του ηλεκτρικινούμενο μετρό, το U-Bahn, σημειώνοντας ένα σημαντικό τεχνολογικό βήμα μπροστά. Η χρήση της ηλεκτρικής ενέργειας έκανε τα τρένα ταχύτερα, καθαρότερα και πιο αποδοτικά. Το 1893,



Fig. 1. Portland Road Underground Station 1862

The early 20th century saw an explosion of metro systems across the globe. In 1900, Paris inaugurated the Métro, which would



Fig. 2. Tremont Street Subway

go on to become one of the most efficient and well-known metro systems in the world. Its first line ran from Porte de Vincennes to Porte Maillot, and Paris quickly established itself as a leader in metro transportation.

New York City followed in 1904, with a subway system that initially ran from City Hall to 137th Street. Overtime, New York's subway system expanded to become one of the largest in the world, serving millions of people daily.

By 1913, Vienna joined the ranks with its own U-Bahn system, and in the 1920s and 1930s, other cities such as Madrid (1922) and Moscow (1935) started their underground metro systems, helping manage the growing urban populations and traffic.

Mid-20th Century Growth: Globalization of Metro Networks

The 1930s through the 1960s marked a period of growth for metro systems worldwide. Cities like Tokyo, Los Angeles, and Chicago developed underground transport solutions to address street congestion. The 1950s saw Hong Kong and Buenos Aires begin construction of their own metro systems,

η Βοστώνη στις ΗΠΑ άνοιξε τη δική της υπόγεια γραμμή, την Tremont Street Subway, ελαφρύνοντας την κυκλοφορία στους δρόμους της πόλης.

Επέκταση στα πρώτα χρόνια του 20ο Αιώνα:

Στις αρχές του 20ου αιώνα, παρατηρήθηκε μία έκρηξη στην ανάπτυξη των συστημάτων μετρό σε παγκόσμιο επίπεδο. Το 1900, το Παρίσι εγκαινίασε το Μετρό (Métro), το οποίο θα γινόταν ένα από τα πιο αποδοτικά και διάσημα συστήματα του κόσμου. Η πρώτη γραμμή συνέδεε τις περιοχές Porte de Vincennes και Porte Maillot. Σε λίγα χρόνια το Παρίσι απέκτησε κι άλλες γραμμές ενώ σήμερα διαθέτει συνολικά 16 γραμμές Μετρό.

Η Νέα Υόρκη ακολούθησε το παράδειγμα το 1904, με το μετρό της πόλης να ξεκινά από το City Hall έως τη 137η Οδό. Με το πέρασμα του χρόνου, το Μετρό της Νέας Υόρκης επεκτάθηκε και έγινε ένα από τα μεγαλύτερα του κόσμου, εξυπηρετώντας καθημερινά εκατομμύρια ανθρώπους.



Fig. 3. Paris inauguration of the Métro

Το 1913, η Βιέννη εγκαινίασε το δικό της Μετρό, το U-Bahn, και στις δεκαετίες του 1920 και του 1930, άλλες πόλεις, όπως η Μαδρίτη (1922) και η Μόσχα (1935), ξεκίνησαν τα δικά τους υπόγεια συστήματα, βοηθώντας στη διαχείριση των αυξανόμενων αστικών πληθυσμών και της κυκλοφορίας.



Fig. 4. New York City Subway

while other cities began planning their systems to accommodate the increasing population.

The 1960s and 1970s were especially notable for the expansion of metro networks in Europe and North America. In the 1960s, the London Underground continued to expand, and new systems were developed in cities across the globe. During the 1970s, cities such as Toronto and Seoul introduced metro systems, and by the 1980s, cities in Latin America, including Mexico City, São Paulo, and Rio de Janeiro, followed, seeking solutions to their growing transportation challenges.



Fig. 6. This is a map of the Beijing Urban Rail Transit system

Post-War Growth: Technological Advancements (1960s–1980s)
During the second half of the 20th century, technological innovations transformed

Ανάπτυξη στα μέσα του 20ου Αιώνα: Παγκοσμιοποίηση των Δικτύων Μετρό
Η περίοδος από τη δεκαετία του 1930 έως τη δεκαετία του 1960 αποτέλεσε μια περίοδο ανάπτυξης για τα συστήματα μετρό σε όλο τον κόσμο. Πόλεις όπως το Τόκιο, το Λος Άντζελες και το Σικάγο ανέπτυξαν υπόγεια συστήματα συγκοινωνιών για να αντιμετωπίσουν τη συμφόρηση στους δρόμους. Στη δεκαετία του 1950, το Χονγκ Κονγκ και το Μπουένος Άιρες ξεκίνησαν τη δημιουργία των δικών τους Μετρό, ενώ άλλες πόλεις άρχισαν να σχεδιάζουν τα δικά τους δίκτυα για να καλύψουν τις αυξανόμενες ανάγκες της αστικής ανάπτυξης.

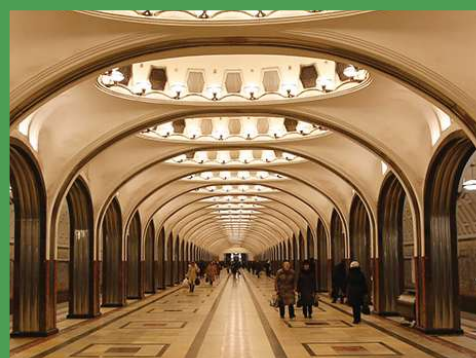


Fig. 5. Mayakovskaya station of the Moscow Metro

Η δεκαετία του 1960 και του 1970 ήταν ιδιαίτερα σημαντική για την επέκταση των συστημάτων μετρό στην Ευρώπη και στη Βόρεια Αμερική. Στη δεκαετία του 1960, το Λονδρέζικο Μετρό συνέχισε την επέκτασή του, ενώ και άλλες πόλεις σε όλο τον κόσμο άρχισαν να δημιουργούν ή να επεκτείνουν τα δικά τους συστήματα. Στη δεκαετία του 1970, πόλεις όπως το Τorόντο και η Σεούλ δημιούργησαν το δικό τους Μετρό, και τη δεκαετία του 1980, πόλεις στη Λατινική Αμερική, όπως το Μεξικό, το Σάο Πάολο και το Ρίο ντε Τζανέιρο, απέκτησαν το δικό τους δίκτυο για να αντιμετωπίσουν τις αυξανόμενες πληθυσμιακές πιέσεις και τη κυκλοφορική συμφόρηση.

metro systems, making them faster, safer, and more reliable. The introduction of electric trains, improved infrastructure, and automated ticketing systems all contributed to the efficiency of metro lines.

In the 1980s, Latin American cities like Mexico City, São Paulo, and Rio de Janeiro completed their metro networks, catering to rapidly expanding urban populations. Meanwhile, the 1990s saw further developments in Asia, as cities like Shanghai and Beijing expanded their metro systems to meet the demands of their booming populations.

Late 20th Century to Early 21st Century: Modernization and New Frontiers (1990s–2020s)
The turn of the century witnessed a wave of modernization and new metro projects across the globe. In the 1990s, cities in Asia such as Shanghai and Beijing expanded their metro networks, helping to keep pace with urbanization and increasing transportation demands. In the 2000s, cities like Dubai opened state-of-the-art metro systems, with the Dubai Metro launching in 2009. These new systems were designed with modern technologies to be efficient, comfortable, and eco-friendly.

During the 2010s, cities like Mumbai (India) and Riyadh (Saudi Arabia) began their metro projects to address growing populations and alleviate traffic congestion. The expansion of metro networks in South America and Africa also took off, with cities like Cairo and Lagos starting their own systems to reduce pollution and improve mobility.

Key Developments: The Future of Metro Systems

Today, metro systems are evolving with new technologies and environmental considerations. One of the most significant

Μεταπολεμική Ανάπτυξη: Τεχνολογικές Εξελίξεις (1960s–1980s)

Κατά το δεύτερο μισό του 20ού αιώνα, οι τεχνολογικές καινοτομίες μεταμόρφωσαν τα συστήματα μετρό, καθιστώντας τα πιο γρήγορα, ασφαλή και αξιόπιστα. Η εισαγωγή ηλεκτρικών τρένων, η βελτίωση της υποδομής και η αυτοματοποίηση του συστήματος εισιτηρίων συνέβαλαν στην αποδοτικότητα των γραμμών μετρό.

Τέλη 20ου Αιώνα και Αρχές 21ου Αιώνα: Εκσυγχρονισμός και Νέα Σύνορα (1990s–2020s)

Με την αλλαγή του αιώνα, παρατηρήθηκε μία νέα εποχή εκσυγχρονισμού και νέων έργων μετρό σε όλο τον κόσμο. Τη δεκαετία του 1990, πόλεις στην Ασία, όπως η Σαγκάη και το Πεκίνο, επέκτειναν τα δίκτυα μετρό τους για να συμβαδίσουν με την ταχεία αστικοποίηση και τις αυξανόμενες ανάγκες μετακίνησης. Στη δεκαετία του 2000 κι

άλλες πόλεις άνοιξαν σύγχρονα συστήματα μετρό, όπως το Μουμπάι του οποίου το μετρό ξεκινά το 2009. Αυτά τα νέα συστήματα σχεδιάστηκαν με τις πιο σύγχρονες τεχνολογίες για να είναι αποδοτικά, άνετα και φιλικά προς το περιβάλλον.

Τη δεκαετία του 2010, πόλεις όπως η Μουμπάι (Ινδία) και το Ριάντ (Σαουδική Αραβία) ξεκίνησαν έργα μετρό για να αντιμετωπίσουν

τις αυξανόμενες πληθυσμιακές πιέσεις και να μειώσουν τη συμφόρηση. Η επέκταση των συστημάτων μετρό στην Λατινική Αμερική και την Αφρική συνεχίστηκε, με πόλεις όπως το Κάιρο και το Λάγκος να ξεκινούν τα δικά τους δίκτυα για να μειώσουν την ρύπανση και να βελτιώσουν την κινητικότητα.

Κύριες Εξελίξεις: Το Μέλλον του Μετρό
Σήμερα, τα συστήματα μετρό εξελίσσονται με νέες τεχνολογίες και περιβαλλοντικές ανησυχίες. Μία από τις πιο σημαντικές



Fig. 7. interior of a modern Dubai Metro train carriage

developments is the advent of driverless metrosystems. Cities such as Dubai, Vancouver, Copenhagen and Thessaloniki have successfully implemented automated systems where trains operate without human operators, relying on sophisticated technology to ensure safety and efficiency.

Another trend is the shift toward green systems. Many modern metro lines focus on sustainability, incorporating energy-efficient trains, solar-powered stations, and eco-friendly designs. These advancements help reduce the environmental impact of urban transportation and contribute to cleaner, more livable cities.

Current Trends: Expanding Networks and Innovations

Today, some of the largest and busiest metro systems in the world can be found in cities like New York, Tokyo, Shanghai, and Beijing. These cities carry millions of passengers every day, making metro systems an essential part of urban life. As more cities face the challenges of urban congestion and environmental sustainability, metro systems remain a key solution to these problems.

Many growing cities, including Lagos (Nigeria), Lahore (Pakistan), and Cairo (Egypt), are now developing metro networks to address their transportation challenges. These new projects not only promise to ease traffic but also help combat pollution and improve the quality of life for millions of urban residents.

Conclusion: A Legacy of Innovation and Growth

From its humble beginnings in London, the metro system has evolved into a global network of underground and automated

exeliseis einai h eisaγωγή συστημάτων χωρίς οδηγό. Πόλεις όπως η Κοπεγχάγη και το Βανκούβερ έχουν εφαρμόσει επιτυχώς αυτοματοποιημένα συστήματα, όπου τα τρένα λειτουργούν χωρίς οδηγούς, χρησιμοποιώντας προηγμένη τεχνολογία για να εξασφαλίσουν την ασφάλεια και την αποδοτικότητα.

Μια άλλη τάση είναι η στροφή προς πράσινα συστήματα. Πολλά σύγχρονα συστήματα μετρό επικεντρώνονται στη βιωσιμότητα, ενσωματώνοντας ενεργειακά αποδοτικά τρένα, ηλιακά τροφοδοτούμενους σταθμούς και οικολογικά σχέδια. Αυτές οι εξελίξεις βοηθούν στη μείωση του περιβαλλοντικού αποτυπώματος των αστικών συγκοινωνιών και συμβάλλουν στη δημιουργία πιο καθαρών και βιώσιμων πόλεων.

Τρέχουσες Τάσεις: Επέκταση Δικτύων και Καινοτομίες

Σήμερα, τα μεγαλύτερα και πολυπληθέστερα συστήματα μετρό στον κόσμο βρίσκονται σε πόλεις όπως η Νέα Υόρκη, το Τόκιο, η Σαγκάη και το Πεκίνο. Αυτές οι πόλεις μεταφέρουν εκατομμύρια επιβάτες κάθε μέρα, καθιστώντας τα συστήματα μετρό ένα αναπόσπαστο μέρος της αστικής ζωής. Καθώς όλο και περισσότερες πόλεις αντιμετωπίζουν τις προκλήσεις της αστικής συμφόρησης και της περιβαλλοντικής βιωσιμότητας, τα συστήματα μετρό παραμένουν η βασική λύση σε αυτά τα προβλήματα.

Συμπέρασμα: Μια Κληρονομιά Καινοτομίας και Ανάπτυξης

Τα τελευταία χρόνια σε πολλές πόλεις το μετρό έχει εξελιχθεί σε ένα παγκόσμιο δίκτυο υπόγειων και αυτοματοποιημένων συγκοινωνιών. Καθώς οι πόλεις αναπτύσσονται και αντιμετωπίζουν νέες προκλήσεις, το μετρό συνεχίζει να παρέχει απαραίτητες λύσεις για τη διαχείριση της κυκλοφορίας,

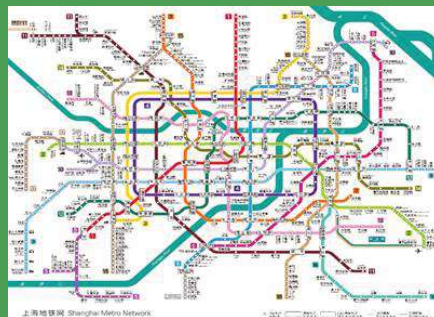


Fig. 8. This is a map for the Shanghai Metro network

transport systems. As cities grow and face new challenges, metro systems continue to provide essential solutions for traffic management, environmental sustainability, and urban mobility. Today, these systems represent not just a means of transport, but a testament to human ingenuity and the ability to adapt to the ever-changing demands of urban life. As technology continues to advance, the future of metro systems looks bright, with more cities embracing innovation that promises to make public transportation even more efficient, sustainable, and accessible.

τη βιωσιμότητα του περιβάλλοντος και τη μετακίνηση των πολιτών. Σήμερα, αυτά τα συστήματα δεν αντιπροσωπεύουν απλώς έναν τρόπο μετακίνησης, αλλά αποτελούν απόδειξη της ανθρώπινης ευφυΐας και ικανότητας προσαρμογής στις συνεχώς μεταβαλλόμενες ανάγκες της αστικής ζωής. Καθώς η τεχνολογία συνεχώς εξελίσσεται, το μέλλον του μετρό διαφαίνεται λαμπρό, με περισσότερες πόλεις να υιοθετούν καινοτομίες που υπόσχονται να κάνουν τις δημόσιες συγκοινωνίες ακόμα πιο αποδοτικές, βιώσιμες και προσβάσιμες για όλους.

Iconography

Fig.1:

https://en.wikipedia.org/wiki/File:Portland_Road_Underground_Station_1862.jpg

Fig.2:

<https://urbanismosnewsletter.substack.com/p/the-first-subway-in-the-us-tremont>

Fig.3:

<https://ar.pinterest.com/pin/663155113922486660/>

Fig.4:

<https://viewing.nyc/vintage-photographs-of-the-new-york-city-subway/>

Fig.5:

Moscow metro station

Fig.6:

https://hu.wikipedia.org/wiki/Peking_k%C3%B6zleked%C3%A9se

Fig.7:

<https://wdubaju.blogspot.com/2015/03/dubaj-metro.html>

Fig.8:

<https://global.yometro.com/network-shanghai-metro>

Supervising Teacher: Nikolaos Georgolios
ngeorgol@otenet.gr



1. Squaring the circle: What are A,B,C and D for the following statements to be true?

Squaring the Circle

EASY

IEEE PuZzLeRs

$$\begin{array}{rcccl} \text{A} & \times & \text{B} & = & 54 \\ - & & + & & \\ \text{C} & - & \text{D} & = & 10 \\ \parallel & & \parallel & & \\ -7 & & 18 & & \end{array}$$

John Day
Senior Puzzler - 7.17.23

2. Mok clock: What is the missing number?

Mok Clock

EASY

IEEE PuZzLeRs

What is ?

Cybele Ghanem
Master Puzzler - 7.16.23

3. Rebus ruse: What famous person do the images describe?

Rebus Ruse

INTERMEDIATE

IEEE PuZzLeRs

The correct answer is the depicted phrase of this rebus with space.

Rahul Pasunuri - Novice Puzzler - 7.15.23

IEEE

4. Missing number: What is the missing number?

Missing Number Easy

Arko Mustafi
Novice Puzzler - 7.22.23

IEEE
PuZzLeRs

5. Code it: What will be the output of the following script?

Code it EASY

C++ challenge

```
#include <iostream>

int main() {
    int num = 1;
    int sum = 0;

    while (num <= 12) {
        sum += num;
        num++;
    }

    std::cout << sum << std::endl;
    return 0;
}
```

Justin Jacob - Novice Puzzler - 7.24.23

What is the output?

IEEE

Answers:

1. Squaring the circle:

A is 3

B is 18

C is 10

D is 0

2. Mok clock:

The missing number is 16

3. Rebus ruse:

The answer is Neil Armstrong, first human to land on the moon as commander of the Apollo 11 mission.

4. Missing number:

The missing number is 31

5. Code it:

The missing number is 78

= 0+1

= 1+2

= 3+3

= 6+4

= 10+5

= 15+6

= 21+7

= 28+8

= 36+9

= 45+10

= 55+11

= 66+12

Since num=12 final answer is 78



Hybrid Synergy Drive in Automotives

1. Introduction

The system first used by Toyota; stands out with its efficiency, environmentalism and durability. (HSD) has emission values and fuel consumption similar to turbocharged engines but (HSD) has more durability than turbocharged cars.

The system, which debuted on the market as Toyota Hybrid Drive III (THD III), later took its current name so that other brands could use it. The system was previously developed as Toyota Hybrid Drive (THD), after 2003 and is currently being developed as Hybrid Synergy Drive (HSD).

It is used in Lexus brand vehicles as Lexus Hybrid Drive. It was first used in the second-generation Prius in 2003. Later, various brands used this system in their own manufactured vehicles.

The reason why I focus on hybrid vehicles in this text is their low emission values, fuel consumption and the fact that they do not shorten the life of the internal combustion engine (ICE). The reason why I chose the hybrid system (HSD) is that it has been on the market for a long time and is a proven system. The article

Otomotivde Hibrit Sinerji Sürüşü

1. Giriş

İlk kez Toyota'nın kullandığı sistem; verimliliği, çevreciliği ve dayanıklılığı ile öne çıkmaktadır. (HSD) yeni nesil turboşarjlı motoru bulunan araçlarla benzer emisyon değerlerine ve yakıt tüketimine sahiptir fakat (HSD) sistemini

kullanan araçların motoru turboşarjlı araçlardan çok daha uzun ömürlüdür. Toyota Hibrit Sürüşü III (THD III) olarak piyasaya çıkış yapan sistem daha sonradan başka markaların kullanabilmesi için bugünkü ismini

almıştır. Sistem daha önceden Toyota Hibrit Sürüşü (THD) olarak geliştirilmekteydi, 2003 sonrası ve şu an Hibrit Sinerji Sürüşü (HSD) olarak geliştirilmeye devam ediliyor. Lexus marka araçlarda da Lexus Hibrit Sürüşü olarak kullanılıyor. İlk olarak 2003 yılında üçüncü jenerasyon Prius'da kullanılmıştır.

Daha sonradan çeşitli markalar bu sistemi kendi araçlarında

kullanmıştır. Bu metinde hibrit araçları konu almamın nedeni düşük emisyon değerleri, yakıt tüketimi ve içten yanmalı motorun (ICE) ömrünü kısaltmaması. Hibrit sistemlerden (HSD)'ünü seçmemin nedeni ise uzun süredir piyasada bulunması, kendini kanıtlamış bir sistem



Fig. 1. Logo for Hybrid Synergy Drive



Fig. 1.1. Logo for Lexus Hybrid Drive

consists of information about the parts of (HSD), the reactions of the parts, inventions that indirectly enable the production of (HSD), what would happen if I built my own vehicle, and a closing section.

2. Short Description of Hybrid Synergy Drive

For understanding this system, it is first necessary to recognize the components. Some abbreviations are used:

Hybrid Synergy Drive (HSD),

Electronic continuously variable transmission (E-CVT),

Motor/Generator 1 and Motor/Generator (MG1 and MG2),

Internal Combustion Engine (ICE) which uses petrol, or diesel,

Power inverter (PI),

High Voltage Battery (HVB).

In Fig. 3, the Bloc diagram for Hybrid Synergy Drive is shown.

Internal combustion engine (ICE): Toyota, Hybrid mostly uses petrol engines in passenger cars; while it prefers diesel engines in trucks. Works

effectively at high speeds. It can work together with MG2 at low speeds, only MG2 works in EV (Electric vehicle) mode. For working MG2, (ICE) working in most efficiently rpm and rotate MG1, MG1 generate electric (Work like generator.) MG1 (Motor/Generator 1): One of its tasks is to ensure that the (ICE) is started (starter). Another task is to generate electrized energy for MG2 via the (ICE), acting as an alternator

olması. Makale (HSD)'nün parçaları hakkında bilgiler, parçaların vereceği tepkiler, dolaylı yoldan (HSD)'nün üretilmesini sağlayan icatlar, kendi aracımı yapsam şöyle olurdu ve kapanış bölümünden oluşmaktadır.

2. Hibrit Sinerji Tahrik Sisteminin Kısa Tanımı

Bu sistemi anlamak için öncelikle bileşenlerini tanımak gerekir. Bazı kısaltmalar kullanılmaktadır:

HSD (Hibrit Sinerji Tahrik Sistemi); E-CVT (elektronik kontrollü sürekli değişken şanzıman), MG1 ve MG2 (Motor/Jeneratör 1 ve Motor/Jeneratör 2) (elektrikli), içten yanmalı motor (ICE) (benzinli, diesel), güç dönüştürücü (Power inverter), (HVB) Yüksek Voltajlı Batarya diğer adı Hibrit Araç Bataryası ve bunların

en verimli şekilde y ö n e t e n bilgisayardan oluşur. Bu sistemi anlayabilmek için ilk olarak parçaları tanımak gerekir.

İçten yanmalı motor (ICE): Toyota, hibrit binek araçlarında ç o ğ u n l u k l a benzinli motor kullanmaktadır; kamyonlarında ise diesel motor

tercih eder. Yüksek hızlarda etkili şekilde çalışır. Düşük hızlarda MG2'yle beraber çalışabilir, EV (Elektrikli Araç) modunda sadece MG2 çalışır. MG2'nin çalışabilmesi için (ICE) en verimli olduğu devirde MG1'i döndürerek enerji üretir (Jeneratör işlevi görür.).

MG1 (Motor/Jeneratör 1): Görevlerinden biri (ICE)'un çalıştırılmasını sağlamaktır (Marş verir.). Bir başka görevi ise (ICE)

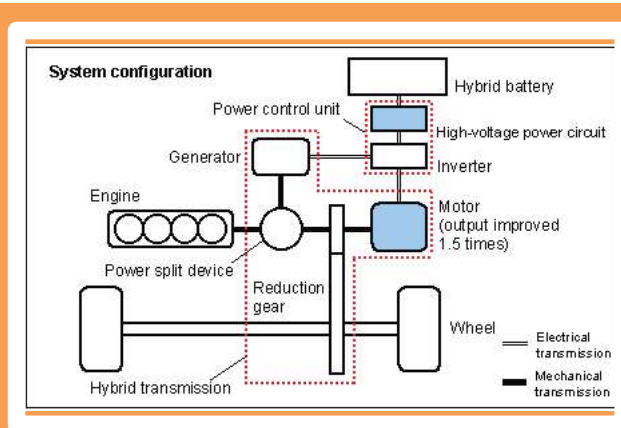


Fig. 2. Bloc diagram for Hybrid Synergy Drive

MG2 (Motor/Generator 2): Effective at take-off and low speeds, gradually deactivated at higher speeds. Charges (HVB) during regenerative braking

Power inverter: Its purpose is to convert Alternative Current (AC) to Direct Current (DC) and from (DC) to (AC). In this way, the electricity generated by MG1 or MG2 is converted by the inverter and routed to the (HVB), so charging the vehicle. The energy of the MG2, which can operate effectively at low speeds, comes from the battery, is converted through the inverter and supplied to the MG2. The power inverter is therefore of vital importance

High Voltage Battery, Hybrid Vehicle Battery (HVB): The unit that stores the energy required for MG1, MG2 and the electronic components of the vehicle. The state of this battery, which cannot reach as long-range values as the battery of fully electric vehicles, is charged by MG1 and MG2

E-CVT (electronic continuously variable transmission): With the help of the computer system (ICE), it is responsible for managing MG1 and MG2 in the most efficient way. E-CVT can utilize all 3 engines at the same time thanks to its planetary gearset, also known as epicyclic gearing. Planetary gearset consists of 1 sun gear, 1 ring gear, more

aracılığıyla MG2'ye elektrik enerjisi üretmektir, alternatör görevi görür.

MG2 (Motor/Jeneratör 2): Kalkışlarda ve düşük hızlarda etkili çalışmaktadır, yüksek hızlara çıkıldıkça kademeli olarak devre dışı bırakılır. Rejeneratif frenleme sırasında (HVB)'yı şarj eder.

Güç dönüştürücü: Amacı Alternatif Akımı (AC) Doğrudan Akıma (DC) ve (DC)'dan (AC)'a doğru çevirmektir. Bu sayede MG1'in veya MG2'nin ürettiği elektrik Güç dönüştürücü sayesinde dönüştürülür ve (HVB)'ya yönlendirilir,

bu şekilde araç şarj edilir. Düşük hızlarda etkili şekilde çalışabilen MG2'nin enerjisi; bataryadan gelir, inverter aracılığıyla çevrilir ve MG2'ye verilir. Güç dönüştürücü bu sebeple hayati öneme sahiptir.

Yüksek Voltajlı Batarya, Hibrit Araç Bataryası (HVB): MG1, MG2 ve aracın elektronik aksamlarına lazım olan enerjiyi depolayan birim. Tamamen elektrikli araçların bataryası kadar uzun menzil değerlerine ulaşamayan bu batarya MG1 ve MG2 tarafından şarj edilir.

E-CVT (elektronik kontrollü sürekli değişken şanzıman): Bilgisayar sistemi yardımıyla (ICE), MG1 ve MG2'yi en verimli şekilde yönetmekle sorumludur. E-CVT, planet dişli seti sayesinde 3 motordan da aynı anda

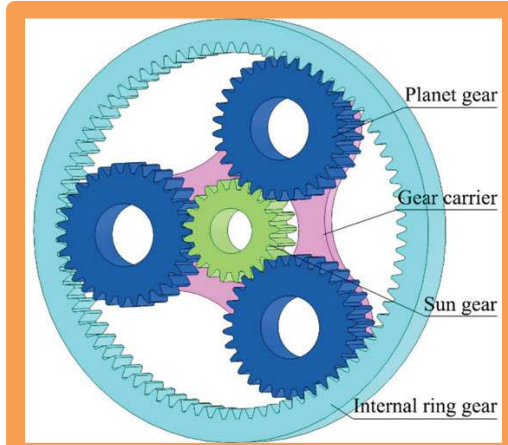


Fig. 3. The planetary gearset image

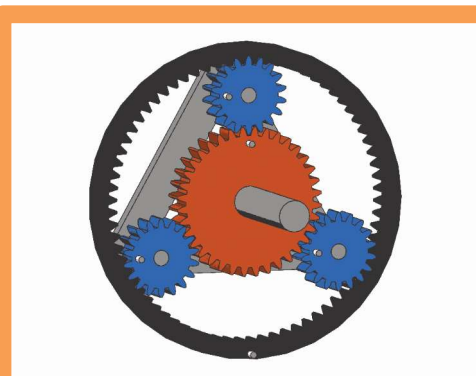


Fig. 4. The animated planetary gearset movement

than 1 planetary gear and a carrier to hold them. This transmission was produced by Toyota in partnership with Aisin, Aisin produced this transmission in partnership with also Ford with minor modifications. The planetary gearset image and its animated movement are shown in Fig. 3 and Fig. 4.

Computer system: It manages all the systems described above in the most efficient way and operates the system in the safest way.

The assembly of the system is shown in Fig. 5.

3. System Maneuvers

I will now describe how parts of the system react in certain situations/maneuvers

Engine start: (ICE) start by MG1. If car's needs to (ICE), this is made: (HVB) running low on charge, MG2 requiring electricity, fast acceleration and the vehicle travelling at high speeds

Battery Charge: The kinetic energy produced by the (ICE) at the most efficient speed is converted into electric energy by MG1 without any power to the wheels. It happens (HVB)'s has not enough charge or (ICE)'s heating in situation

Regenerative Braking: If this feature is switched on, the MG2 converts the kinetic energy in the tires into electrical energy when the accelerator is not pressed, so that braking is performed without wearing out the pads and the (HVB) is charged

faaydalanabilir. Planet dişli seti; 1 güneş dişlisi, 1 yüzük dişlisi, 1'den fazla gezegen dişlisi ve bunları tutacak bir taşıyıcıdan oluşur. Toyota bu şanzımanı Aisin ile ortak olarak üretilmiştir, Aisin bu şanzımanı ufak değişikliklerle Ford ile ortak olarak da üretmiştir.

Bilgisayar sistemi: Üstte anlatılan tüm sistemleri en verimli şekilde yönetir, sistemi en güvenli şekilde çalıştırır.



Fig. 5. Assembly of system: ICE (left); MG1 and MG2 connected in E-CVT (right)

3. Sistem Manevraları

Şimdi belirli durumlarda/manevralarda sistemin parçalarının nasıl tepki verdiğini anlatacağım.

Motor çalıştırma: MG1, (ICE)'u başlatır. Araç

(ICE)'u çalıştırmaya ihtiyaç duyulursa yapılır: (HVB)'nin şarjının azalması, MG2'nin elektriğe ihtiyaç duyması, hızlı ivmelenme ve aracın yüksek hızlara çıkması bu durumlardandır.

Şarj: (ICE) tarafından en verimli hızda üretilen kinetik enerji, tekerleklerle herhangi bir güç verilmeden MG1 tarafından elektrik enerjisine dönüştürülür. (HVB)'nin şarjının azalması ya da (ICE)'un ısıtılması gibi durumlarda gerçekleşir.

Rejeneratif frenleme: Eğer bu özellik açıksa araçta gaza basılmadığı zaman MG2 tekerlerdeki kinetik enerjiyi elektrik enerjisine çevirir, bu sayede balatalar eskitilmeden frenleme yapılmış olur ve (HVB) şarj edilir.

Neutral Gear (N): The purpose of (N) in automatic transmission vehicles is to disconnect the engine from transmission. (HSD) is close to the electric motors for enter (N). In this state, there is no regenerative braking; MG1 cannot generate electricity. For this reason, the result of keeping the vehicle at (N) for too long periods will be the discharge of (HVB)

Reverse Gear (R): Unlike conventional gearboxes, there is no reverse gear in this vehicle; it is reversed via MG2. If (HVB) has enough charge, only MG2 works, otherwise MG1 generates electricity via (ICE) and supplies this electricity to MG2

Drive Gear (D): The vehicle generates electricity MG1 via (ICE) when using MG2 at slow speeds (depending on the vehicle), slow accelerations; at higher speeds or accelerations (ICE), it starts to apply power to the wheels

Brake Gear (B): When travelling downhill, in addition to regenerative braking, it prevents the vehicle from accelerating uncontrollably on slopes by using the engine brake (ICE) prevents acceleration by increasing high speeds and charges the MG1 engine (Fig. 6).

Electric Vehicle (EV) Mode: Only MG2 is powered, (ICE) and MG1 is not used. Vehicles go like fully electrized car; other name is silent mode. Depending on the vehicle, it usually has a range of 1-2 km, the maximum speed varies according to the vehicle. Activated at low speeds, in (R) gear and if the driver has activated the (EV) feature

Boş (Nötr) vites (N): Otomatik vites araçlarda (N)'in amacı şanzıman ile motor arasındaki bağlantıyı kesmektir. (HSD)'ünde elektrik motorlarının kapatılmasıyla bu duruma girilir. Bu durumdayken rejeneratif frenleme yapılmaz, MG1 elektrik üretemez. Bu sebeple aracı çok uzun sürelerde (N)'de bekletmenin sonucu (HVB)'nin boşalması olacaktır.

Geri vites (R): Geleneksel vites kutularından farklı olarak bu araçta geri vites yoktur, MG2 aracılığıyla geri gidilir. (HVB) yeterli şarja sahipse sadece MG2 çalışır aksi durumda MG1, (ICE) aracılığıyla elektrik üretir ve bu elektriği MG2'ye verir.



Fig. 6. Corolla Hatchback Excel (2019-2022) gear stick

Sürüş vitesi (D): Araç yavaş hızlarda (Araca göre değişmektedir.), yavaş ivmelenmelerde MG2'yi kullanırken MG1 (ICE) aracılığıyla elektrik üretir; daha yüksek hızlarda veya ivmelenmelerde (ICE) tekerlere güç uygulamaya başlar.

Fren vitesi (B): Yokuş aşağı giderken rejeneratif frenleme

yanında, motor freni kullanarak (ICE) yüksek devirlere çıkarak hızlanmayı engeller ve MG1 motorunu şarj eder. Aracın yokuşlarda kontrolsüzce hızlanmasını engeller.

Elektrikli Araç (EV) Modu: Sadece MG2'ye güç verilir, (ICE) ve MG1 kullanılmaz. Araç tamamen elektrikli gibi ilerler, sessiz mod olarak da tanınır. Araca göre değişmekle beraber genellikle 1-2 km menzile sahiptir, hızı araca göre değişmektedir. Düşük hızlarda, (R) viteste ve sürücünün (EV)

Slow Acceleration: When travelling at low speeds (depending on the vehicle) with little pressure on the accelerator or when taking off, MG1 generates electricity through the (ICE) while MG2 works effectively. If the vehicle tries to accelerate to high speeds, MG2 and (ICE) together give power to the wheels, MG2 loses its activity as the vehicle accelerates

Fast Acceleration: At low speeds when high pressure is applied to the accelerator (It varies according to the vehicle.) MG2; When working together with (ICE), as the vehicle accelerates, the effect of MG2 decreases and the effect of (ICE) increases.

4. Automobile Industry Developments and HSD

You have understood how (HSD) works and how it reacts in certain situations. Now you will see which developments in the automobile industry affect (HSD).

Two-stroke engine and first (ICE) car (First (ICE) for car.): Karl Benz chose a two-stroke engine design for the engine he began developing in 1878, as four-stroke engines were both too heavy and protected by the DRP 532 patent owned by Gasmotoren-Fabrik Deutz. On New Year's Eve 1879, the two-stroke engine worked quite successfully. Karl looked for investors for a long time to use this engine in a vehicle. The vehicle was ready for tests in 1885. On 29 January 1886, the 'vehicle with gas engine drive' was patented under patent number DRP 37 435. The two prototypes, the Model 1 and 2, failed to attract sufficient interest, but the later prototype Model 3 was tested and proven by Karl's sons on a 100 kilometer journey from Mannheim to Pforzheim. (The Model 3, produced between 1886 and 1894, was the first horseless carriage produced in Germany, with an engine power of only 3 HP and a cylinder displacement of 1990cc. Karl

özelliğini aktif etmesi durumunda devreye girer.

Yavaş ivmelenme: Gaza az baskı uygulandığında düşük hızlarda (Araca göre değişmektedir.) ilerlerken veya kalkış yapılırken MG2 etkili şekilde çalışırken MG1, (ICE) aracılığıyla elektrik üretir. Araç yüksek hızlara çıkmaya çalışırsa MG2 ve (ICE) birlikte tekerlere güç verir, araç hızlandıkça MG2 aktifliğini yitirir.

Hızlı ivmelenme: Gaza yüksek baskı uygulandığında MG2; (ICE)'la birlikte çalışırken araç hızlandıkça MG2'nin etkisi azalır, (ICE) etkisini artırır.

4. Otomotiv Endüstrisi Gelişmeleri ve Yüksek Verimlilik Geliştirme

(HSD)'ünün nasıl çalıştığını, belirli durumlardan nasıl tepki verdiğini anladınız. Şimdi otomobil sektöründe hangi gelişimlerin (HSD)'nü etkilediğini göreceksiniz.

Çift zamanlı motor ve ilk (ICE)'lu araba (Araçlar için ilk (ICE)): Karl Benz 1878 yılında geliştirmeye başladığı motor için iki zamanlı motor tasarımını seçti, o zamanlar dört zamanlı motorlar hem çok ağırdı hem de Gasmotoren-Fabrik Deutz şirketinin sahip olduğu DRP 532 patentiyle korunuyordu. 1879 yılının yılbaşı arifesinde iki zamanlı motor oldukça başarılı şekilde çalıştı. Karl bu motoru bir araçta kullanabilmek için uzun süre yatırımcı aradı. Araç 1885'te testlere girebilecek duruma geldi. 29 Ocak 1886'da "gaz motoru tahrikli araç", DRP 37 435 patent numarasıyla patentlendi. Model 1 ve 2 olarak çıkan iki prototip yeterli ilgi göremedi fakat daha sonradan çıkan prototip Model 3 Karl'ın oğulları tarafından Mannheim'dan Pforzheim'a olan 100 kilometrelik bir yolculukta test edildi ve kendin kanıtlandı. (1886-1894) yılları arası üretilen Model 3 Almanya'da üretilen ilk atsız arabaydı; motor gücü sadece 3

went on to build other vehicles. It was realized that it could be used in vehicles (ICE).

First electrified car: The Flocken Electrowagen, the first electric car prototype in real terms, was developed by Andreas Flocken in 1888 (Fig. 7).

This vehicle had a 1 HP engine and a rechargeable lead-acid battery; the maximum speed of the vehicle was 9 mph, well 14 km/h.

Unfortunately, this car remained as a prototype. The first mass-produced electric car was the Detroit Electric in 1907. At that time, the cheapness of petrol, the lack of environmental concerns in people, and the ability of (ICE) vehicles to offer longer range and more speed at a much cheaper price kept electric vehicles out of sight for a long time. It was seen that electric motors could be used in vehicles.

First hybrid car: A Viennese engineer named Jacob Lohner wanted to silence and reduce the emissions of (ICE) vehicles. For this reason, he met with the Austrian engineer Ferdinand Porsche. Ferdinand had invented the wheel-hub engine at the age of 21. That's why Jacob put Ferdinand in charge of the vehicles. Ferdinand had used engines of his own invention on the 2 front wheels of the

beygir idi, silindir hacmi ise 1990cc idi. Karl sonradan başka araçlar üretmeye devam etti. Araçlarda (ICE) kullanılabileceği görüldü.

İlk elektrikli otomobil: Gerçek anlamda ilk elektrikli araba prototipi olan Flocken Electrowagen 1888 yılına Andreas Flocken tarafından geliştirilmiştir. Bu araç 1 beygir motor ve şarj olabilen kurşun-asit aküye sahipti; aracın maksimum hızı 9

mp/h yani 14 km/h idi. Maalesef bu araba prototip olarak kalmıştır. İlk seri üretime giren elektrikli araba 1907 yılında Detroit Elektrik olmuştur. O zamanlarda petrolün ucuzluğu, insanlarda çevre kavgısının olmaması, (ICE)'lu araçların çok daha ucuza daha uzun menzile ve fazla hız sunabilmesi elektrikli araçları uzun bir süre gözlerden

uzaklaştırdı. Araçlarda elektrik motoru kullanılabileceği görüldü.

İlk hibrit araç: Jacob Lohner isimli Viyanalı mühendis (ICE)'lu araçları sessizleştirmek ve emisyonunu azaltmak istedi. Bu sebeple Avusturyalı mühendis Ferdinand Porsche ile bir araya geldi. Ferdinand 21 yaşında tekerlek göbeği motorunu icat etmişti. Bu sebeple Jacob araçları için Ferdinand'ı görevlendirdi. Ferdinand aracın 2 ön tekerleğine kendi icadı olan motorlardan kullanmıştı. Araç 7 beygir güç üretebiliyordu. İlk başta elektrikli ve 2WD olarak 1900 yılında çıkan



Fig. 7. Flocken Electrowagen

vehicle. The vehicle was capable of producing 7 HP.

Initially electric and 2WD in 1900, it later became 4WD and Ferdinand added an (ICE). (ICE) acts only as a generator and is not connected to the wheels. Lohner-Porsche vehicles have participated in many races and have been used by many people of high status. Jacob and Porsche's system is more similar to Nissan's E-Power technology (Fig. 8).

In 1905, German/Belgian engineer Henri Pieper, who developed a system similar to the (HSD) system, died before he could produce this system. His project was continued by Woods Motor Vehicle. The 1915 Dual Power had a 4-cylinder (ICE), electric motor/generator and battery pack. Above 24 km/h (15mp/h) the (ICE) was engaged. The maximum speed of the vehicle was 56 km/h (35 mp/h). Hybrid cars have also remained in the shadow of petrol vehicles, but hybrid technology has found the opportunity to be used in many areas from locomotives to tanks. Toyota has been the brand that actually popularized the use of this technology in automobiles. You have already learnt it at

araç sonradan 4WD olmuştur ayrıca Ferdinand tarafından araca (ICE) eklenmiştir. (ICE) sadece jeneratör görevi görmektedir, tekerlerle bağlantısı yoktur. Lohner-Porsche araçları birçok yarışa katılmış ve yüksek mevkide olan çok sayıda insan tarafından kullanılmıştır. Jacob ve Porsche'nin sistemi daha çok Nissan'ın E-Power teknolojisine benzerdir. 1905 yılında (HSD) sistemine benzer bir sistem geliştiren Alman/Belçikalı mühendis Henri Pieper bu sistemi üretmede n



Fig. 8. Race car manufactured by Lohner-Porsche the car driving by Ferdinand Porsche

Onun projesini Woods Motor Araçları sürdürmüştür. 1915 yılında çıkan Çift Güç; 4 silindirli bir (ICE)'a, elektrikli motor/jeneratöre ve batarya paketine sahipti. 24 km/h'in (15mp/h) üstünde (ICE) devreye giriyordu. Aracın maksimum hızı 56 km/h'ti (35 mp/h). Hibrit otomobiller de benzinli araçların gölgesinde kalmıştır fakat hibrit teknolojisi lokomotiflerden tutun tanklara kadar oldukça fazla alanda kullanılma imkânı bulabilmiştir. Bu teknolojinin

otomobillerde kullanımı asıl yaygınlaştıran marka Toyota olmuştur. Sizler zaten onu üstte öğrendiniz.

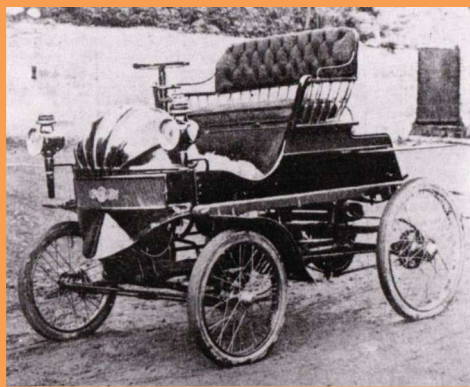


Fig. 9. Henri Pieper's hybrid car

5. Some Conclusions

How would it be different from (HSD) if I built my own hybrid vehicle (Strange episode.)?

I would use the systems used by (HSD) as drivetrains, I would enlarge the battery of the vehicle (The battery should have a range of at least 20 km, I do not care about the shrinkage of the trunk and interior volume.), I would use a 1.0, 1.2 turbo (1.8 alternative but smaller) engine (I wouldn't care about engine life since people sell their vehicles early now a days), I would have solar panels added to the vehicle in countries where the climate does not cause rapid pollution of vehicles (Not in Turkey.). In this way, when I enter a crowded place, the vehicle can drive in EV mode for a long time at low speeds, the emission values and fuel consumption values are grounded thanks to the low-volume but high-power turbo engine (HSD), and thanks to the solar panel, the vehicle can charge while travelling and stopping. If I install LPG, emissions will be even lower, but not every user may want to see LPG in their vehicle.

(HSD) is used by most Toyota vehicles today. From the past until today (HSD) has been divided into generations with various updates; with the updates, its efficiency has increased even more and existing problems have been solved. Toyota is very hopeful about this system and wants to develop it further. In my opinion, this system (and other hybrids) will be very popular due to its low fuel consumption and high durability in places where the infrastructure for electric vehicles is not sufficiently developed. In places where the infrastructure is suitable enough for electric vehicles, I don't think people will be very keen on this system.

5. Bazı Sonuçlar

Kendi hibrit aracımı yapsam (HSD)'den nefarkı olurdu (Garip bir bölüm.)? Aktarma organları olarak (HSD)'nin kullandığı sistemleri kullanırdım, aracın bataryasını büyüttümdüm (Batarya en az 20 km menzile sahip olmalı, Bagaj ve iç hacmin daralmasını önemsemiyorum.), Toyota'nın Corolla'da kullandığı 1.8 atmosferik (ICE)'un aksine (ICE) olarak 1.0, 1.2 turbo (1.8 alternatifi olan fakat daha küçük) bir motor kullanırdım (Artık insanlar araçlarını erkenden sattıkları için motor ömrünü önemsemeydim.), iklimi araçların hızlı kirlenmesine neden olmayan ülkelerde araca güneş paneli ekletebilirdim (Türkiye'de olamaz.). Bu şekilde kalabalık bir yere girdiğimde araç düşük hızlarda uzun süre EV modunda gidebilir, düşük hacimli fakat yüksek güçlü turbo motorun (HSD) ile buluşması sayesinde emisyon değerleri ve yakıt tüketimi değerleri zemine çakılır, güneş paneli sayesinde araç giderken de durarken de şarj olabilir. LPG takarsam emisyonlar daha da düşer ama her kullanıcı aracında LPG görmek istemeyebilir.

(HSD) bugün Toyota'nın çoğu aracı tarafından kullanılmaktadır. Geçmişten bugüne kadar (HSD) çeşitli güncellemelerle jenerasyonlara ayrılmıştır; güncellemelerle birlikte verimliliği daha da artmış, varolan sorunlar çözülmüştür. Toyota bu sistemden oldukça umutludur, sistemi daha da geliştirmek istemektedir. Bana göre bu sistem (ve diğer hibritler) elektrikli araçlar için altyapısı yeterince gelişmemiş olan yerlerde düşük yakıt tüketimi ve yüksek dayanıklılığı sebebiyle oldukça sevilecektir. Altyapısı elektrikli araçlar için yeterince uygun olan yerlerde ise insanların bu sisteme çok rağbet göstereceğini sanmıyorum.

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Supervising Teacher: Emin Tutuk
emintutuk36@gmail.com



John Forbes Nash

1. Introduction

The question “Who is John Nash?” has many answers. A loving man to his wife, an example to people and a remarkable mathematician. His ideas impressed and made great change, being an important addition in Game Theory even nowadays.

This article presents a summarized description of his personal life, as well as his mathematical theories applied in the economic field and in social sciences.

2. Personal life

He is born on June 13 1928, in Bluefield, West Virginia. In High school he is interested in reading and chess, the book „Men of Mathematics” written by E.T Bell being the one that starts his passion. Nash was a creative child, as he used to pull pranks and build bombs along with his friends, which unfortunately led to the death of one of them. Initially desiring to follow his father's career, he joins the University Carnegie Mellon in Pittsburgh. (Fig. 2)

After getting his masters degree, he arrives to Princeton in 1948, where he writes his doctorate thesis. He is then employed to work as an instructor at M.I.T., the reason being that he had the ability to approach math problems which no one thought could be solvable.

His love life becomes tumultuous when he encounters his first love, Eleanor Stier, a nurse with whom he has a son in 1953. However, they eventually break up, and

John Forbes Nash

1. Introducere

Intrebarea „Cine este John Nash?” are mult raspunsuri. Un bărbat iubitor pentru sotia sa, un exemplu pentru oameni si un matematician remarcabil. Ideile lui au impresionat si au produs o puternica schimbare, fiind o aditie importanta in Teoria Jocului chiar si in zilele noastre.

Articolul prezintă o descriere a vietii și operei sale referitoare la teoriile matematice aplicate in domeniul economic si in științele sociale.

2. Viata personala

John Nash se naște pe 13 Iunie 1928, in Bluefield, Virginia de Vest. In liceu este interesat de literatură și șah, cartea „Oameni ai matematicii” scrisa de E.T Bell fiind cea care da startul pasiunii sale pentru citit. Nash era un copil creativ, obișnuia sa faca farse si sa construiasca bombe impreuna cu prietenii lui, Initial a dorit sa urmeze cariera tatalui său, astfel că se inscrie la Universitatea

Carnegie Mellon din Pittsburgh (Fig. 2).

Dupa ce finalizează studiile de masterat, urmează în 1948 studiile doctorale la Universitatea Princeton unde și finalizează teza sa de doctorat. Este apoi angajat ca instructor la M.I.T., având abilitatea deosebită de a rezolva probleme matematice de mare dificultate.

In 1958 viata lui Nash ia o turnura neașteptată, deoarece începe sa dea



Fig.1. John Forbes Nash (1928-2015)

he marries Alicia Larde, an M.I.T. student specialized in physics, admirer of his work.

In 1958 his life takes an unexpected turn, since he starts to show the signs of a disease that will change everything for him, schizophrenia. It's known that he

semnele unei boli care va schimba totul pentru el, schizofrenia. Se cunoaste ca acesta se comporta paranoic, dispărea cu zilele fara a da nicio explicatie, totul pana cand a fost internat la spitalul McLean (Fig. 3), locul unde ii este stabilit diagnosticul.



Fig. 2. View of University
Carnegie Mellon, US

acted paranoid and would disappear for days without giving any explanation, all until checking in at hospital McLean (Fig.3), the place where he is given his diagnosis.

At start, he was under treatments such as insulin and electric shocks, but also psychoanalysis, which did not work. He then got prescribed chlorpromazine, that helped him at first. Even though his condition improved temporarily and he was discharged, his battle would last longer than he had expected. Nash was often delusional and interrogated his hallucinations, heard voices and thought of the bible as being correlated to his own life. Also, he was convinced that in Mozart's operas there were messages he was meant to decode.

But John Nash never gave up. He accepted and controlled the disease, and his study in mathematics is the passion that saved him. Once he gets older, John Nash's schizophrenia „treats itself”, which happens in some cases with elderly patients.

La început, a fost supus la diferite tratamente precum socuri de insulină și șocuri electrice, de psihoanaliză, dar fără rezultate. I-a fost apoi prescrisă clorpromazina, care l-a ajutat la început. Deși starea lui s-a îmbunătățit temporar și el a fost externat, lupta cu boala avea să dureze mai mult decât se aștepta.

Nash era adesea deziluzionat și avea halucinații, auzea voci și se gândea la biblie ca fiind corelată cu propria viață. De asemenea, era convins că în operele lui Mozart erau mesaje pe care el era menit să le decodeze.

Dar John Nash nu a renunțat niciodată de a lupta pentru viață. A acceptat și a controlat boala, iar pasiunea sa pentru matematică l-a salvat. Odată ce îmbătrânește, schizofrenia lui John Nash se „trata singură”, ceea ce se întâmplă în anumite cazuri cu pacienții vârstnici.

În 1994 este primește premiul Nobel pentru Științe Economice. La 23 mai 2015 are loc un accident de masină care cauzează decesul său și al soției sale.

3. Echilibrul lui Nash în Teoria Jocurilor

In 1994 he is rewarded with the Nobel for Economic Sciences, and on the 23 of may 2015 takes place a car accident causing his and his wife's decease.

3. Nash equilibrium in Game Theory

Nash equilibrium is a concept which refers to the attainment of an optimal result in a non-cooperative game by maintaining the initial strategy of each player without deviating as a consequence of others' decisions. Assuming all players maintain their strategy, if one of them changes his decision based on external factors, the person won't obtain any benefit. Therefore, what he desires can be obtained only by the constant of his own strategy.

For example, let's say there are two companies: X and Y. Each one wants to see if it should launch an advertisement for its own products. If both companies launch the advertisement, they get 100 new buyers each. If only one of them makes this decision, then it gets 200 new buyers, while the other one none. If neither launches the advertisement, then none will have new clients. The best decision is that both opt for the same strategy, of launching the advertisement, no matter what the other one does, and so it's created a Nash equilibrium.

4. Conclusions

John Nash was a man who still lives in spirit through his genius mathematical theories, although what makes him truly unique is the inspiration he gives to all

Echilibrul lui Nash este un concept care face referire la obținerea unui rezultat optim într-un joc non-cooperant prin pastrarea strategiei initiale a fiecarui jucator fara a devia din cauza deciziilor celorlalti. Presupunandu-se ca toti jucatorii isi mentin strategia, daca unul dintre ei isi schimba decizia in functie de factorii externi, nu va obtine niciun beneficiu. Deci, ceea ce el doreste poate fi dobandit doar prin constanța propriei strategii.



Fig. 3. Hospital McLean where Nash was diagnosed with schizofrenia

Spre exemplu, sa zicem ca exista doua companii: X si Y. Fiecare vrea sa vadă daca ar trebui sa lanseze o reclama pentru produsele ei. Daca ambele companii lanseaza reclama, fiecare atrage 100 de noi cumparatori. Daca doar una ia aceasta decizie, aceasta atrage 200 de noi cumparatori, in timp ce cealalta

niciunul. Daca niciuna nu lanseaza reclama, atunci niciuna nu va avea clienti noi. Cea mai buna decizie e ca ambele sa opteze pentru aceeași strategie, de a lansa reclama, indiferent ce face cealalta, si asa se creeaza un echilibru Nash.

4. Concluzii

John Nash a fost un matematician care inca traieste in spirit prin teoriile sale matematice geniale. Ceea ce il face sa fie cu adevarat unic este inspiratia pe care o transmite tuturor indivizilor care isi urmeaza pasiunea, sau care sufera de probleme medicale. John Nash a facut mai mult decat sa revolutioneze domeniul matematicii, apatrunsi in inimile oamenilor

individuals who follow their passion, or suffer from mental illness. He in fact did much more than revolutionize domains, he entered people's hearts and changed their mentality, and he still does.

si le-a schimbat mentalitatea, si inca o face.

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Supervising Teacher: Monica Cotfas
monicacotfas@gmail.com



Telephone's Evolution and Phone Addiction

1. Introduction

Except for the dictionary definition, definition of telephone depends person by person. Some might define it as the best invention ever; some might think it is one of the reasons of our biggest issues about society and family structure, one of the most effective communication devices or kind of an addiction.

This article's goal is letting people know more about the devices they carry everywhere and preventing their getting addicted by teaching about telephones' addictive side. For the rest, there will be mentioned historical and addictive views of telephone and how it works.

2. Results

Most people think that the first telephone invented was by Alexander Graham Bell. It is not all wrong but the truth is Alexander Graham Bell only has the first patent not the first telephone, there had been other works and results intended for telephone since the seventh century.

In fact, all attempts, whether successful or unsuccessful, to create a telephone date back to the 7th century. Moreover, while people doubted whether the first telephone belonged to him, there was a more important question that puzzled them: "Was the telephone he invented truly his invention?" This dilemma arose because Elisha Gray and Alexander Graham Bell began their work on the telephone in the same year, and there were only 2 hours between their patent applications.

Gray filed a lawsuit against Graham Bell, claiming that Bell had reviewed his application and made changes to it by copying it.

The fact that the first application was Graham Bell's worked in his favor, and

Yıllar İçerisinde Telefonun Gelişimi ve Telefon Bağımlılığı

1. Giriş

Sözlük tanımı haricinde telefonun tanımı kişiden kişiye değişir. Bazıları gelmiş geçmiş en iyi ihtiyaç olduğunu savunurken kimisi de günümüz toplumunun ve aile yapısının bozulmasının en büyük nedeni, en etkili iletişim aracı veya bir çeşit bağımlılık olduğunu iddia edebilir. Bu makalenin yazımında okuyucunun her yereyanında yaşadığı alet daha yakından tanınması ve telefonların bağımlılık yapıcı yönleri hakkında bilinçlendirilip olası bağımlılıklarına bir önlem olması amaçlanmıştır. İlerleyen bölümlerde telefonun tarihi ve bağımlılık yapıcı yönlerine ve çalışma sistemine değinilecektir.

2. Sonuçlar

İnsanların çoğu en başından beri Alexander Graham Bell'in ilk telefonun mucidi olduğunu düşünür. Bu tanımla inkar edilememekle birlikte gerçek şudur: Alexander Graham Bell her ne kadar telefonun ilk patentine sahip olsa da kendisi icat edilen ilk telefonun mucidi değildir. Öyle ki telefonun gerçekten bir telefon üretme amaçlı sonuçlanabilmiş veya sonuçlanamamış her türlü çalışması 7. Yüzyıla dayanır. Üstelik ilk telefonun ona ait olup olmadığı bile insanların içinde şüphe uyandırırken bir yandan insanların kafasını kurcalayan daha önemli bir soru vardı, "onun icat ettiği telefon gerçekten onun icat ettiği bir telefon mu?" bu kilemin ortaya atılmasına sebep olan durum ise Elisha Gray ve Alexander Graham Bell'in telefon adına yürütmeye başladığı çalışmaların ortaya koyulmaları aynı yıl gerçekleşmesi ve patent başvuruları arasında 2 saat olmasıdır.

Gray, Graham Bell'e karşı dava açarak, Bell'in başvurusunu inceleyip kopyalayarak değişiklikler yaptığını iddia etti.

İlk başvurunun Graham Bell'e ait olması onun lehine işledi ve Gray patenti almak

although Gray fought tooth and nail to obtain the patent, it was all in vain; ultimately, the patent went to Alexander Graham Bell.

2.1. In history

Elisha Gray was not the only one sued Alexander Graham Bell. Antonio Meucci invented a device similar to the telephone, available for spoken communications. After almost 10 years, he got sick and could not pay for the patent because of the expenses of treatment, unfortunately this date was pretty close with the date Alexander Graham Bell found the sketches of Meucci's telephone and get it's patent, at least this is what Meucci claimed and sued for. However the judge accepted that Meucci is right, it was ten years after the sue and he was about to die and could not get his patent.

Johann Philipp Reis who credited as the first inventor of the telephone by Thomas Edison is the one coined the term "telephone".

The telephone he constructed before Graham Bell in 1861 has named "Reis telephone".

The first samples we can talk about its contributes for the invention of the telephone are the string telephones. String telephones are the devices that people might see in the magazines or in the kids channels as an experiement, these also can be seen in cartoons. Sounds make vibrations, this is what this tools system based on. The thing is, there are two cups tied with a string, while one person put this closer to their mouth, the

için canla başla mücadele etse de, tüm çabaları boşunaydı; sonuçta patent Alexander Graham Bell'e gitti.

2.1. Tarihte telefon

Graham Bell'eaçılan tek dava Elisha Gray tarafından olmamıştı. Antoni Meucci de telefona çok benzer, sesli iletişime amaçlanmış bir cihaz icat etmişti. Hemen hemen on sene sonra hastalanması ve tedavi ücretleri sebebiyle patentin ücretini karşılayamamasının Alexander Graham Bell'in eline Meucci'nin telefonun çizimlerinin geçmesi aynı yıla denk gelmesi ise Meucci'nin telefonun patentini Alexander Graham Bell'in almasına sebep oldu, en azından Meucci'nin davasındaki iddiası bu yöneydi. Nihayetinde davanın onuncu yılında mahkeme Meucci'yi haklı buldu fakat ne var ki bu tarihte Meucci ölmek üzereydi ve patentini geri alamadı.



Fig. 1. Alexander Graham Bell's patent

"Telefon" teriminin ilk kullanımı ise Thomas Edison tarafından telefonun ilk mucidi olaraklandırılan Johann Philipp Reis tarafından olmuştur. Graham Bell'den önce 1861'de yapmış olduğu telefon "Reis telefonu" olarak adlandırılmaktadır.

Günümüzdeki telefonun oluşumuna katkıda bulunmuş olabilecek en eski tarihli örnek oluşturabilen telefon ipli (bardaktan) telefonlardır. Bardak telefonlar dergilerde veya çocuk kanallarında bir deney olarak veya çizgi filmlerde görebileceğiniz basitliktedir. Sesler dalgalar halinde yayılır, bu icadın temel noktası da buna dayanır. Bir ipe bağlı iki bardak vardır bir kişi telefonu bardaklardan birini ağzına tutarken diğeri

other one put their cup closer to their ear and can hear what the other one saying easier.

kulağına tutar ve diğerinin ne söylediğini rahatlıkla duyabilir.

2.2. How do telephones work

The most essential term for the systems of any technological devices are sound-waves. Sound-waves are often used in ultrasounds, radios, televisions and especially in telephones' system. When a sound-wave comes, first phonesense it and digitalize them to store. If there is a phone call, the process goes like this. The sound-waves which had been already digitalized be sent to the farrest base station. After the waves arrive



Fig. 2. Johann Philipp Reis

2.2. Telefonlar nasıl çalışır

Herhangi bir teknolojik aletin çalışma sistemiyle ilgili konuşuyorsak değinmemiz gereken en önemli husus ses dalgalarıdır. Ses dalgaları genellikle ultrason cihazlarında, radyolarda, televizyonlarda ve özellikle telefonların sistemlerinde kullanılır. Bir ses dalgası yayıldığında ilk olarak telefonlar bunu algılar ve depolamak için dijitalleştirir. Bir telefon aramasında ise süreç şöyledir: Hâlihazırda dijitalleştirilmiş olan ses dalgaları en uzak



Fig. 3. Corded telephone

to the base station, all the waves start to leave the station and go their destination by the phones' choosing and finding the signals that are sent to them.

baz istasyonuna gönderilir. Dalgalar istasyona ulaştığında tüm dalgalar istasyonuterkediptelefonlarınkendilerine gönderilen sinyalleri ayırt edip

At last the signals arrived to second phones get placed to the speaker of the phone and finally the others speaker can be able to hear the first one's speech.

Since the phones are including cameras they also need to sense the light-waves. Besides that the thing lets us to see something by the screen of our telephones is every single pixel's gathering and creating something visual by using the light-waves.

Also, there is one another wave type which has a place for telephone's working system. Radio waves, they often used by wi-fi to reach to the local area networks.

2.3. Phone addiction

Cell phones have a enormous place in our lives. They are essential for most of the situations. It is impossible to say they are unnecessary in our developing world when there are a lot of technological works running. But the more phones getting essential, the more we get addicted. It starts with just needing cell phones for exact reasons and then this feeling that they need to check or use your phone getting bigger and bigger. Their frequency to watch, play something or scrolling in their social media accounts via their phone gets increase and as a

seçmesiyle hedefe ilerler. Son olarak ise sinyaller ikinci telefona ulaşır telefonun hoparlörüne yerleşir ve diğer konuşmacının ilk konuşmacının konuşmasını duymasını sağlar.

Telefonlara kamera da eklenmesiyle birlikte ışık dalgaları da telefonların çalışması sistemine dahil oldu. Bunun

dışında telefon ekranında gördüklerimiz ise her bir pikselin bir araya gelip ışık dalgalarını kullanarak anlamlı bir görsel oluşturmasıyla gerçekleşiyor.

Ayrıca telefonların çalışma sistemlerine kendine yer edinen bir dalga tipi daha vardır. Radyo dalgaları sıklıkla wi-fi tarafından bölgesel ağlara ulaşmasını sağlar.

2.3. Telefon bağımlılığı

Cep telefonları hayatımızda büyük bir önem taşır. Öyle ki sayısız durumda bulundurulması artık bir gerekliliktir.

Gelişen dünyamızda onlarca teknolojik çalışmaları yürütülürken telefonlara önemsiz demek imkansızdır. Fakat ne yazık ki telefonların önemi arttıkça onlara olan bağımlılıkta da artış yaşanır. İlk başta belirli

nedenlerden ötürü telefonlara ihtiyaç duyulurken zamanla bu telefonları kontrol etme veya kullanma isteği daha da artar. Bir şeyler izleme, oynama veya sosyal

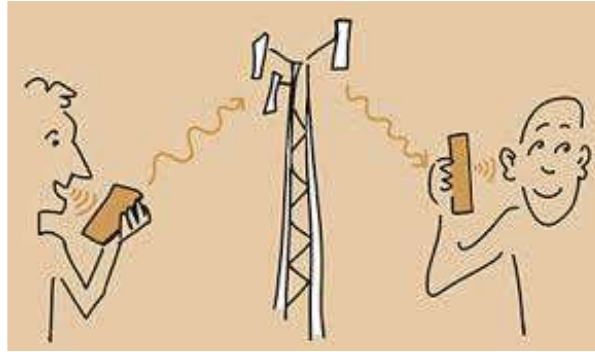


Fig. 4. Wireless telephone



Fig. 5. Phone Addiction

consequence of this, they escape from their responsibilities, they may experience attention deficit disorders, their succes may fall down and they may fail more.

2.4. Are you addicted to your phone?

Before breaking a phone addiction, first thing to do is checking if there is an addiction. Effects of phone addiction can be seen in 6 different situations.

Lack of consantration

This issue can be seen in any academical enviroment or a work place, especcially in the situations that requires full focus. As a result there may be some lack of succes or a tend to fail. Fear of missing out

If a person afrails of missing something at social media, their messages etc. and because of this fear people check their phones, notifications often and when this behavior turns into a very often habit, this is what called addiction.

Mental deficiency

Sense of reality disorder

Especcially affected by the social media. Because most of the users of these kind of platforms are tend to demonstrate the things are look amazing in an unrealistic way and exposuring these all the time might harmful for our senses.

Anxiety

Sleeping issues

This issue occure by the whole much light our eyes had to see during the day.

2.5. How to break a phone addiction

Since we detect whether we have an addiction to phone or not, now it's time to break it. Accourding to the searches, there are 6 most effective ways to break this addiction.

Flight mode

During the day, when you need to focus on something, turn on the flight mode on your phone so you are not going to be warned by any notification or when you try to use your phone you are not going to able to reach anything that will waste your time

medyada kaydırma sıklığı artar ve bunun sonucu olarak da sorumluluklardan kaçma, dikkateksikliği bozukluğu, başarı düşüşü ve daha fazla başarısızlığa uğrama durumları gözlenebilir.

2.4. Telefon bağımlısı mısın?

Telefon bağımlılığından kurtulmadan önce yapılması gereken ilk şey ortada bir bağımlılık söz konusu mu diye sorgulamaktır. Telefon bağımlılığının etkileri 6 farklı durumda incelenebilir:

Dikkat eksikliği

Bu sorun herhangi bir akademik ortam, çalışma alanı gibi odaklanma gerektiren yerlerde görülebilir. Sonucunda ise genellikle başarıda düşüş veya başarısızlığa eğilim görülebilir.

Bir şeyleri kaçırma, bir şeylerden geri kalma korkusu

Kişi sosyal medyada olup bitenden geri kalmaktan, gelen mesajları kaçırmaktan korkup bu korku sebebiyle sık sık telefonlarını bildirimlerini kontrol ediyor save butir alışkanlığı dönüşüyse buna bağımlılık denebilir.

Zeka geriliği

Gerçeklik algısında bozukluk

Özellikle sosyal medyanın bir etkisidir çünkü bu tür platformların kullanıcıları genellikle gerçek dışı şekildedemükemmel görünen şeyleri sergilemeye eğilimlidir ve sürekli bu içeriklere maruz kalmak algılara zararlı olabilir

Kaygı

Uyku sorunları

Bu sorunun temel sebebi gözlerimizin gün boyunca ekrandaki tüm ışığa maruz kalmasıdır.

2.5. Telefon bağımlılığı nasıl çözülür

Telefon bağımlığımız olup olmadığını tespit ettikten sonra sıradaki adım bağımlılığı çözmektir. Araştırmalar göre bu bağımlılığı çözmek için 6 etkili yöntem şöyledir:

Uçak modu

Gün içerisinde odaklanmanız gerektiğinde telefonunuzun uçak modunu açın ki herhangi bir bildirim tarafından uyarılmanız ve telefonunuz kullanmanız gerektiğinde zamanınızı

Black&White filter on the screen
When you turn this mode on, the colorful world of whole entertaining things in your phone is going to lose their joy and they will not be attractive for your imprinting emotions anymore

Using a hair tie

If you tie your phone a hair tie, everytime you take your phone in your hands, you are going to notice the hair tie and remember you need get back to the work, study, etc.

Time limitation

Turning on a time limitation for the applications you frequently use, you are going to be warned for using your phone/ application too much and you will remember to turn off your phone.

Don't place your phone in your bedroom
Be careful about where you are placing your phone during the sleeptime, if it is always in your room you are going to keep using it until you fall asleep at night and when you wake up it will be the first thing you check because you are so close to reach your phone. That's why replacement your phone away is important.

Let yourself a day without phone usage.

3. Conclusion

About all of the things mentioned above, I hope if someone reading this found out they have an addiction is going to break their addiction and live a healthier life both physically and mentally.

Even if cell phones have a complicated system, the basic things to let them work are some kind of waves that have interesting system. And to mention about the first phone, I do not think that there is anyone who never thought Graham Bell was the first one invented the phone at least once. But besides he was not the first inventor, actually he was not even the first one had a patent.

There are still a lot of questions about the historical side of telephones.

harcayabilecek şeylere erişiminizi engellesin.

Ekranda siyah beyaz filtre

Bu özelliği aktifleştirdiğinizde telefonunuzdaki o eğlenceli rengarenk dünya neşesini kaybedecek ve böyle kullandığınızda duygularınız daha fazla tatmin olamayacak.

Saç tokası kullanmak

Eğer telefonunuz abir saç tokası dolarsanız telefonunuzu her elinize alışınızda tokayı fark edip ne amaçla taktığınızı hatırlayacaksınız ve yapmanız gereken işe geri döneceksiniz.

Zaman kısıtlaması

Sık kullandığınız uygulamalar bir kısıtlam getirirseniz belirlediğiniz sürenin sonunda uyarılacaksınız ve telefonu kapatmanız gerektiğini hatırlayacaksınız.

Telefonu yatak odasına sokmamak

Uyku vaktinizde telefonu nereye bıraktığınıza dikkat etmelisiniz zira hep odanızdaysa uykuya dalan kadar kullanmayadevamedeceksiniz vesabah uyandığınızda ilk iş telefonunuza bakacaksınız çünkü en yakınınızda o olacak. Bu yüzden telefonunuzu bıraktığınız yerin önemi büyüktür.

Kendinize telefonsuz bir gün ayırın.

3. Sonuç

Tüm yukarıda yazılanların ardından umarım bunları okuyup bağımlılığı olduğunutespiteden herkes bağımlılığını çözebilir ve hem fiziksel hem de mental açıdan daha sağlıklı bir yaşam sürer.

Her ne kadar telefonların karmaşık bir sistemi olsa da çalışmalarını sağlayan şey ilgi çekici sistemleri olan bazı basit dalgalardır. Ve eğer ilk telefondan bahsedecek olursak, muhtemelen aranızda bir kere olsun telefonun ilk mucidinin Alexander Graham Bell olduğunu düşünmeyen yoktur.

Üstelik ilk mucidi olmamasının yanında ilk patenti alan bile o değildir ama hala telefonun tarihçesi hakkında cevaplanamayan sorular vardır.

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Iconography

Fig.1: https://en.wikipedia.org/wiki/File:USPTO_Telephone_Patent_No._174465.jpg, 4.11.2023

Fig.2: <https://en.wikipedia.org/wiki/File:JPReis.jpg>, 4.11.2023

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Supervising Teacher: Ahmet Hakan Yaz
ahmethakanyaz@hotmail.com



Urdea Cezar, Suciu Mihnea-Bogdan
Universitatea Transilvania din Braşov
cezar.urdea@student.unitbv.ro
mihnea.suciu@student.unitbv.ro

History of Nuclear Power Plants

1. Introduction

The history of nuclear power plants is a complex journey from the first discoveries related to nuclear energy to the development of safe and efficient power generation facilities. Starting with the discovery of nuclear fission in the 1930s and continuing with the world's first operational nuclear power plant, developed in the 1950s, nuclear technology has made remarkable progress. Nuclear power plants have become an important source of energy for many countries, contributing to the reduction of greenhouse gas emissions and providing a stable alternative to traditional energy sources. However, their history is also marked by significant challenges, from the risks of accidents to the issue of radioactive waste management, which have influenced public perception and global energy policies [1].

2. About nuclear power plants

A nuclear power plant is a complex facility designed to generate electricity from thermal energy. This thermal energy is produced through a controlled process of nuclear fission, carried out inside a nuclear reactor.

Once you understand what a nuclear power plant is, it is worth learning how it produces electricity. The principle is simple: the plant heats water to generate steam. The steam drives the blades of a turbine, which in turn produces electricity. More precisely, the thermal energy generated during the fission process is used to heat the water.

In nuclear fission, atoms are split into smaller fragments, and this process

Istoria centralelor nucleare

1. Introducere

Istoria centralelor nucleare reprezintă o călătorie complexă de la primele descoperiri legate de energia nucleară până la dezvoltarea unor instalații de producție a energiei electrice sigure și eficiente. Începând cu descoperirea fisiunii nucleare în anii '30 și continuând cu prima centrală nucleară operațională din lume, dezvoltată în anii '50, tehnologia nucleară a cunoscut progrese remarcabile.

Centralele nucleare au devenit o sursă importantă de energie pentru numeroase țări, contribuind la reducerea emisiilor de gaze cu efect de seră și oferind o alternativă stabilă la sursele de energie tradiționale.

Totuși, istoria lor este marcată și de provocări semnificative, de la riscurile legate de accidente până la problematica gestionării deșeurilor radioactive, ceea ce a influențat percepția publicului și politicile energetice globale [1].

2. Despre centralele nucleare

Centrala nucleară este un sistem complex, destinat generării de energie electrică din energiei termică, produsă printr-un proces controlat de fisiune nucleară, desfășurat în interiorul unui reactor nuclear.

După ce înțelegi ce este o centrală nucleară, merită să afli cum se produce această energie electrică.

Principiul este simplu: centrala încălzește apa pentru a genera aburi. Aburii antrenează elicele unei turbine, care la rândul său produce electricitate. Mai exact, energia termică generată în timpul procesului de fisiune este folosită pentru a încălzi apa.

Căldura generată în timpul fisiunii încălzește apa, producând abur care pun în mișcare turbinele conectate la

releases a large amount of energy. Fission takes place in the core of a nuclear reactor, where fuel, usually based on uranium, is used to generate heat.

The uranium is processed into small ceramic pellets, each of which has the capacity to produce the same amount of energy as 567 liters of oil. These pellets are placed in thin metal rods, approximately 3.5 meters long, which together form a fuel assembly. The reactor core is composed of several such assemblies.

The heat

generators of electricity. After use, the steam is cooled and condensed in a special cooling tower or, alternatively, by using water from natural sources such as rivers, lakes or oceans. The water thus obtained is recycled to produce new steam [2].

In the framework of nuclear fission, atoms are divided into smaller fragments, and this process releases a large amount of energy. Fission takes place in the core of the nuclear reactor, where the combustible, usually based on uranium, is used to generate heat.

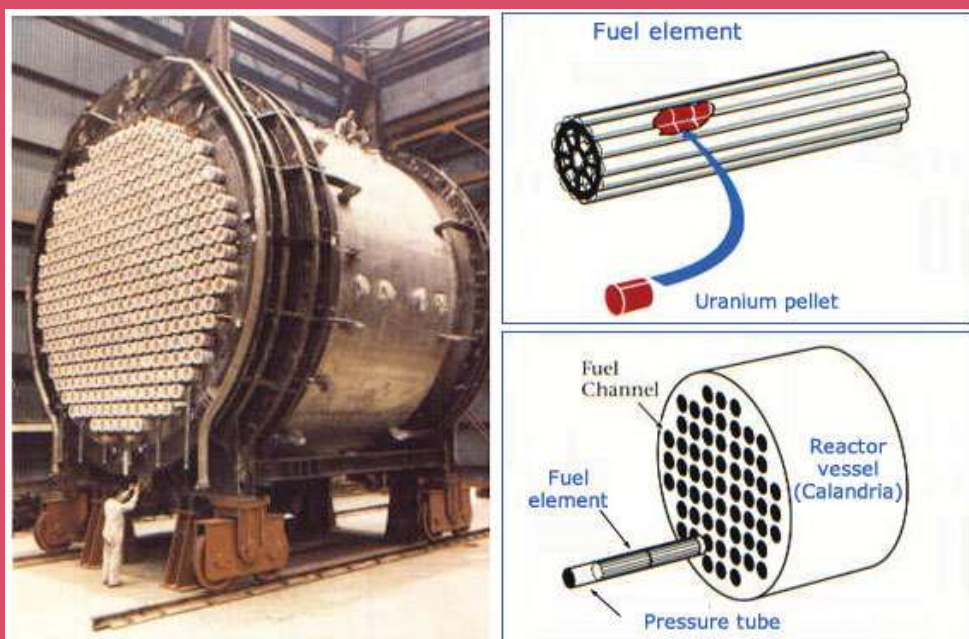


Fig. 1. CANDU Type reactor

generated during fission heats water, producing steam that drives turbines connected to electricity generators. After use, the steam is cooled and condensed in a special cooling tower or, alternatively, by using water from natural sources such as rivers, lakes or oceans. The water thus obtained is recycled to produce new steam [2].

A CANDU-type reactor, also used in Romania, has an active core located in a horizontal cylindrical tank called a

uranium is processed under the form of small ceramic pellets, each having the capacity to produce the same amount of energy equivalent to about 567 liters of petrol. These pellets are placed in thin metal rods, approximately 3.5 meters long, which, together, form a combustible assembly. The core of the reactor is composed of many such assemblies.

A CANDU-type reactor, also used in Romania, has an active core located in a horizontal cylindrical tank called a

Calandria, protected at the ends by steel plates. CANDU reactors have the following main characteristics (Fig.1.):

1. The project is Canadian.
2. They use heavy water as a moderator.
3. They use natural uranium as fuel.

The spent uranium pellets are continuously replaced with fresh pellets, even while the reactor is operating, by specialized machines. The entire process is automated and managed by a main computer, with a second computer ready to take over in case of failure.

3. Types of nuclear power plants

Nuclear power plants are an essential source of energy for many countries around the world, due to their high efficiency and low carbon emissions. Depending on the technology used, these plants are divided into several categories, each with specific advantages and disadvantages. In this essay, we will explore the most important types of nuclear power plants, analyzing their operation and role in the global energy mix.

3.1. Pressurized Water Reactor (PWR)

The pressurized water reactor is the most widely used type of nuclear reactor globally. It works by heating pressurized water in a primary circuit, without turning it into steam. The heat is transferred to a secondary circuit, where the water is turned into steam to drive turbines. This separation of the circuits ensures increased safety, preventing radioactive contamination in the event of a failure.

rezervor cilindric orizontal numit Calandria, protejat la capete de plăci din oțel.

Reactoarele CANDU au următoarele caracteristici principale (Fig. 1):

1. Proiectul este canadian.
2. Folosesc apă grea ca moderator.
3. Utilizează uraniu natural drept combustibil.

Peletele de uraniu consumate sunt înlocuite continuu cu pelete proaspete, chiar și în timpul funcționării reactorului, prin intermediul unor mașini specializate. Întregul proces este automatizat și gestionat de un calculator principal, având un al doilea calculator pregătit să preia controlul în caz de defecțiune.

3. Tipuri de centrale nucleare

Centralele nucleare reprezintă o sursă esențială de energie pentru multe țări din

lume, datorită eficienței lor ridicate și emisiilor reduse de carbon. În funcție de tehnologia utilizată, aceste centrale se împart în mai multe categorii, fiecare având avantaje și dezavantaje specifice. În acest eseu, vom explora cele mai importante tipuri de centrale nucleare, analizând funcționarea și rolul lor în mixul energetic global.

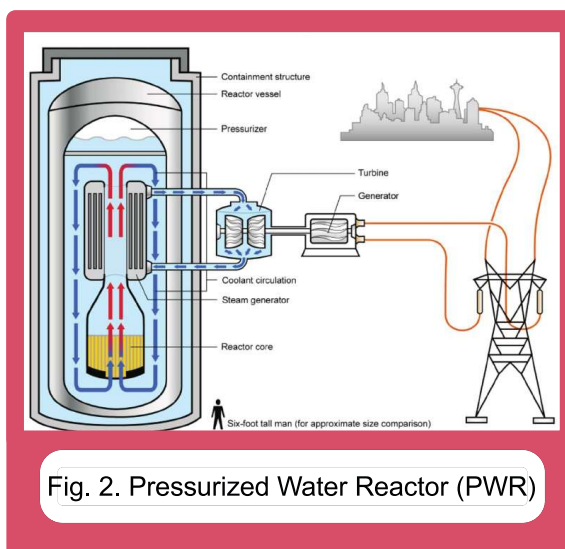


Fig. 2. Pressurized Water Reactor (PWR)

3.1. Reactor cu Apă Sub Presiune (PWR)

Reactorul cu apă sub presiune este cel mai utilizat tip de reactor nuclear la nivel global. Funcționează prin încălzirea apei sub presiune într-un circuit primar, fără a o transforma în abur (Fig. 2). Căldura este transferată într-un circuit secundar, unde apa este transformată în abur pentru a acționa turbinele. Această separare a circuitelor asigură o siguranță sporită, prevenind contaminarea radioactivă în cazul unei defecțiuni. Reactoarele PWR sunt cunoscute pentru proiectarea lor

PWR reactors are known for their robust design and ability to operate under extremely safe operating conditions (Fig.2.).

3.2. Hot Water Reactor (BWR)

The hot water reactor differs from the PWR in that the water in the primary circuit is converted directly into steam to drive the turbines. This design simplifies the plant structure, but complicates the management of radioactive water, since it comes into direct contact with the turbines (Fig.3.). However, BWR reactors are efficient and are widely used, especially in the United States and Japan.

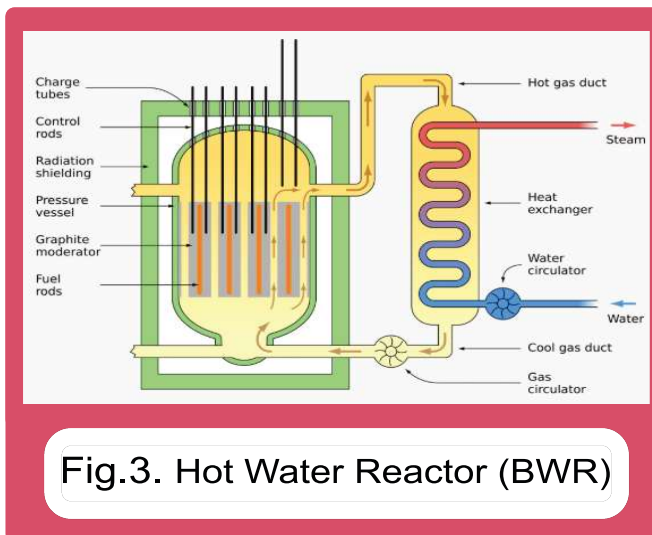


Fig.3. Hot Water Reactor (BWR)

robustă și pentru capacitatea de a funcționa în condiții de operare extrem de sigure.

3.2. Reactor cu Apă Fierbinte (BWR)

Reactorul cu apă fierbinte diferă de PWR prin faptul că apa din circuitul primar este transformată

direct în abur pentru a acționa turbinele (Fig. 3). Acest design simplifică structura centralei, însă complică gestionarea apei radioactive, deoarece aceasta intră în contact direct cu turbinele. Cu toate acestea, reactoarele BWR sunt eficiente și sunt utilizate pe scară largă, în special în Statele Unite și Japonia.

3.3. Graphite Reactor (Magnox and AGR)

Graphite reactors, such as Magnox and AGR (Advanced Gas-cooled Reactor), use graphite as a moderator and carbon dioxide or helium as a coolant (Fig.4.). These reactors are specific to UK power plants and are notable for their high thermal efficiency. Although they are less widespread than other types, they have demonstrated good reliability and high operational safety.



Fig.4. Graphite Reactor

3.3. Reactor cu Grafit (Magnox și AGR)

Reactorii cu grafit, cum ar fi Magnox și AGR (Advanced Gas-cooled Reactor), folosesc grafitul ca moderator și dioxidul de carbon sau heliul ca agent de răcire (Fig. 4). Acești reactori sunt specifici centralelor din Marea Britanie și se remarcă prin eficiența lor termică ridicată. Deși sunt mai puțin răspândiți decât alte tipuri, ei au demonstrat o fiabilitate bună și o siguranță operațională înaltă.

3.4. Reactor cu Neutroni Rapizi (FBR)

Reactorii cu neutroni rapizi sunt proiectați pentru a utiliza neutroni de mare energie în susținerea reacției nucleare. O

3.4. Fast Breeder Reactor (FBR)

Fast reactors are designed to use high-energy neutrons to support a nuclear reaction. A distinctive feature of these reactors is their ability to generate more fuel than they consume, using plutonium or uranium (Fig. 5.). Although efficient in resource use and reducing radioactive waste, these reactors are more complex and pose greater operational risks.

trăsătură distinctivă a acestora este capacitatea de a genera mai mult combustibil decât consumă, prin utilizarea plutoniului sau uraniului (Fig. 5). Deși eficienți în utilizarea resurselor și în reducerea deșeurilor radioactive, acești reactori sunt mai complecși și prezintă riscuri operaționale mai mari.



Fig. 5. Fast Breeder Reactor (FBR)

3.5. Molten Salt Reactor (MSR)

Molten salt reactors are an emerging technology with the potential to transform the nuclear industry. In these reactors, the fuel is dissolved in a liquid salt, which also acts as a coolant (Fig. 6.). Due to the lack of pressure in the reactor, the risks of an accident are significantly reduced. In addition, these reactors can reduce the amount of radioactive waste generated.

3.5. Reactor pe Bază de Sare Topită (MSR)

Reactoarele pe bază de sare topită sunt o tehnologie emergentă, cu potențialul de a transforma industria nucleară. În aceste reactoare, combustibilul este dizolvat într-o sare lichidă, care funcționează și ca agent de răcire (Fig. 6). Datorită lipsei presiunii în reactor, riscurile de accident sunt reduse semnificativ. În plus, aceste reactoare pot reduce cantitatea de deșeuri radioactive generate.



Fig. 6. Molten Salt Reactor (MSR)

3.6. Nuclear Fusion Reactor

Although still in the research stage, nuclear fusion reactors promise to be a revolutionary source of energy. By replicating the processes that occur in the sun, these reactors use the fusion of hydrogen

3.6. Reactor de Fuziune Nucleară

Deși încă în stadiu de cercetare, reactoarele de fuziune nucleară promit să fie o sursă revoluționară de energie. Prin replicarea proceselor care au loc în soare, aceste reactoare utilizează fuziunea nucleelor de hidrogen pentru a genera



Fig. 7. Nuclear Fusion Reactor

nuclei to generate energy. If they become viable, they could provide an inexhaustible source of energy, with zero emissions and minimal radioactive waste (Fig.7.).

4. Advantages of nuclear power plants

Advantages of Nuclear Power Plants
Nuclear power plays a significant role in the global energy system, providing a reliable and efficient source of electricity. Nuclear power plants are recognized for their essential contributions to reducing greenhouse gas emissions and for their ability to provide continuous power. In this essay, we will explore the main advantages of nuclear power plants and their impact on the environment and the economy.

- **High energy production** One of the greatest advantages of nuclear power plants is their ability to produce large amounts of electricity. Compared to other sources, such as coal-fired or natural gas-fired power plants, nuclear power plants generate 2-3 times more energy per unit of fuel used. This makes them ideal for meeting energy demand in densely populated areas and energy-intensive industries.
- **Reducing carbon emissions** Nuclear power is an important solution in the fight against climate change. Unlike fossil fuel power plants, nuclear power plants do not emit carbon dioxide (CO₂) during operation. Thus, they contribute significantly to reducing air pollution and meeting global climate goals. According to the International Energy Agency, nuclear power plants have prevented the release of billions of tons of CO₂ into the atmosphere in recent decades.
- **Reliability and continuous production** Nuclear power plants operate almost non-stop, ensuring constant energy production. Unlike renewable sources such as solar and wind power, which depend on weather conditions, nuclear power plants provide a stable and

energie. Dacă vor deveni viabile, ele ar putea oferi o sursă inepuizabilă de energie, cu emisii zero și deșeuri radioactive minime (Fig. 7)

4. Avantajele centralelor nucleare

- **Energia nucleară joacă un rol semnificativ în sistemul energetic global,** oferind o sursă fiabilă și eficientă de electricitate. Centralele nucleare sunt recunoscute pentru contribuțiile lor esențiale la reducerea emisiilor de gaze cu efect de seră și pentru capacitatea lor de a furniza energie continuu. În această lucrare, vom explora principalele avantaje ale centralelor nucleare și impactul lor asupra mediului și economiei.
- **Producție ridicată de energie:** Unul dintre cele mai mari avantaje ale centralelor nucleare este capacitatea lor de a produce cantități mari de energie electrică. Comparativ cu alte surse, cum ar fi centralele pe bază de cărbune sau gaze naturale, centralele nucleare generează de 2-3 ori mai multă energie pe unitatea de combustibil utilizată. Această caracteristică este ideală pentru satisfacerea cererii energetice în zonele dens populate și în industriile mari consumatoare de energie.
- **Reducerea emisiilor de carbon:** Energia nucleară este o soluție importantă în lupta împotriva schimbărilor climatice. Spre deosebire de centralele pe combustibili fosili, centralele nucleare nu emit dioxid de carbon (CO₂) în timpul funcționării. Astfel, ele contribuie semnificativ la reducerea poluării atmosferice și la îndeplinirea obiectivelor climatice globale. Potrivit Agenției Internaționale pentru Energie, centralele nucleare au prevenit eliberarea a miliarde de tone de CO₂ în atmosferă în ultimele decenii. Fiabilitate și producție continuă.
- **Centrale nucleare funcționează aproape non-stop,** asigurând o producție constantă de energie. Spre deosebire de sursele regenerabile, cum ar fi energia solară și eoliană, care depind de condițiile meteorologice, centralele nucleare oferă o sursă de electricitate stabilă și previzibilă. Aceasta le face esențiale

predictable source of electricity. This makes them essential for maintaining balance in electrical grids and preventing voltage fluctuations.

- **Long-term economic efficiency** Although building a nuclear power plant involves high initial costs, operating and maintenance costs are relatively low in the long term. Nuclear fuel, such as uranium, has an extremely high energy density, which means that a small amount of fuel can produce energy for a long time. This reduces dependence on external energy sources and price fluctuations in the fuel market.

- **Reduced consumption of natural resources** Due to their high efficiency, nuclear power plants require smaller amounts of natural resources to produce energy compared to other energy technologies. For example, the uranium used as fuel in reactors can be recycled in some cases, which reduces waste and maximizes resource use.

- **Reduced space for operation** Nuclear power plants require a smaller physical space to operate compared to other energy sources. For example, to produce the same amount of energy, nuclear power plants require much less land than solar farms or wind farms. This advantage is important in regions with limited land or high property costs.

- **Contributions to innovation and research** Nuclear energy stimulates innovation in areas such as safety technologies, the use of alternative fuels and the reduction of radioactive waste. Recent projects such as small modular reactors (SMRs) and molten salt reactors promise to make nuclear energy even safer, more efficient and more affordable.

- **Reducing energy dependence** In a world where access to energy is becoming increasingly important, nuclear power plants can help reduce dependence on fossil fuel imports. They provide a stable

pentru menținerea echilibrului în rețelele electrice și pentru prevenirea fluctuațiilor de tensiune.

- **Eficiență economică pe termen lung.** Deși construirea unei centrale nucleare implică costuri inițiale ridicate, costurile de operare și întreținere sunt relativ scăzute pe termen lung. Combustibilul nuclear, precum uraniul, are o densitate energetică extrem de mare, ceea ce înseamnă că o cantitate mică de combustibil poate produce energie pentru o perioadă îndelungată. Acest lucru reduce dependența de sursele externe de energie și fluctuațiile prețurilor pe piața combustibililor.

- **Reducerea consumului de resurse naturale.** Datorită eficienței lor ridicate, centralele nucleare necesită cantități mai mici de resurse naturale pentru a produce energie, comparativ cu alte tehnologii energetice. Spre exemplu, uraniul folosit ca combustibil în reactoare poate fi reciclat în unele cazuri, ceea ce reduce deșeurile și maximizează utilizarea resurselor.

- **Spațiu redus pentru operare.** Centrale nucleare necesită un spațiu fizic mai mic pentru operare comparativ cu alte surse de energie. De exemplu, pentru a produce aceeași cantitate de energie, centralele nucleare necesită mult mai puțin teren decât fermele solare sau parcurile eoliene. Acest avantaj este important în regiunile cu terenuri limitate sau costuri mari pentru proprietăți.

- **Contribuții la inovație și cercetare.** Energia nucleară stimulează inovația în domenii precum tehnologiile de siguranță, utilizarea combustibililor alternativi și reducerea deșeurilor radioactive. Proiectele recente, cum ar fi reactoarele modulare mici (SMR) și reactoarele pe bază de sare topită, promit să facă energia nucleară și mai sigură, mai eficientă și mai accesibilă.

- **Reducerea dependenței energetice.** Într-o lume în care accesul la energie devine din ce în ce mai important, centralele nucleare pot contribui la reducerea dependenței de importurile de combustibili fosili. Ele oferă o sursă stabilă și internă de energie, ceea ce sporește

and domestic source of energy, which increases the energy security of countries that adopt them.

5. Disadvantages of Nuclear Power Plants

Although nuclear power plants are an important source of clean and efficient energy, they are not without challenges and controversies. Nuclear technology involves significant risks, high costs, and concerns about safety, the environment, and radioactive waste management. In this essay, we will analyze the main disadvantages of nuclear power plants.

- High construction costs

Building a nuclear power plant requires major financial investments. These costs include complex design, obtaining licenses, the actual construction, and implementing safety measures. Also, the deadlines for completion are often extended, which leads to an increase in the final costs. For this reason, many countries are hesitant to adopt nuclear energy, preferring more affordable sources, such as natural gas or renewable energy.

- Risk of nuclear accidents

One of the most discussed disadvantages of nuclear power plants is the risk of accidents. Events such as Chernobyl (1986) and Fukushima (2011) have demonstrated the potentially devastating consequences of nuclear accidents, including loss of life, environmental destruction, and population displacement. Even with modern safety measures, the risk of an accident cannot be completely eliminated.

- Radioactive waste issue

Radioactive waste management is a major challenge for the nuclear industry. Spent fuel and other contaminated materials remain hazardous to the environment and human health for thousands of years. Although modern technologies allow for the storage of this waste in deep geological

securitatea energetică a țărilor care le adoptă.

5. Dezavantajele centralelor nucleare

Deși centralele nucleare sunt o sursă importantă de energie curată și eficientă, ele nu sunt lipsite de provocări și controverse. Tehnologia nucleară implică riscuri semnificative, costuri ridicate și preocupări legate de siguranță, mediu și gestionarea deșeurilor radioactive. În acest eseu, vom analiza principalele dezavantaje ale centralelor nucleare.

- Costuri ridicate de construcție

Construirea unei centrale nucleare necesită investiții financiare majore. Aceste costuri includ proiectarea complexă, obținerea licențelor, construcția propriu-zisă și implementarea măsurilor de siguranță. De asemenea, termenele de realizare sunt adesea extinse, ceea ce duce la creșterea costurilor finale. Din acest motiv, multe țări ezită să adopte energia nucleară, preferând surse mai accesibile financiar, precum gazul natural sau energia regenerabilă.

- Risc de accidente nucleare

Unul dintre cele mai discutate dezavantaje ale centralelor nucleare este riscul de accidente. Evenimente precum cele de la Cernobîl (1986) și Fukushima (2011) au demonstrat potențialele consecințe devastatoare ale unor avarii nucleare, inclusiv pierderi de vieți omenești, distrugerea mediului și strămutarea populațiilor. Chiar și cu măsuri de siguranță moderne, riscul unui accident nu poate fi complet eliminat.

- Problema deșeurilor radioactive

Gestionarea deșeurilor radioactive reprezintă o provocare majoră pentru industria nucleară. Combustibilul uzat și alte materiale contaminate rămân periculoase pentru mediu și sănătatea umană timp de mii de ani. Deși tehnologiile moderne permit stocarea acestor deșeuri în depozite geologice adânci, costurile și complexitatea acestui proces sunt ridicate. În plus, există riscul ca depozitele să devină instabile în timp.

repositories, the costs and complexity of this process are high. In addition, there is a risk that the repositories will become unstable over time.

- Vulnerability to attack and sabotage

Nuclear power plants can become targets for terrorist attacks or sabotage, due to their potential to cause catastrophic damage. The radioactive materials used can be used to make nuclear weapons or “dirty bombs.” This vulnerability requires additional security measures, which increase the cost and complexity of operating the plants.

- Environmental impact

Although the carbon emissions of nuclear power plants are low, their environmental impact is not non-existent. The extraction and processing of uranium can cause water and soil pollution, and nuclear accidents can contaminate ecosystems in the long term. In addition, nuclear power plants require large amounts of water for cooling, which can affect the region's water resources.

- Dependence on limited resources

Nuclear energy depends on fuels such as uranium, which is a limited resource. Although current reserves are sufficient for several decades, increasing demand may lead to their depletion more quickly. This raises questions about the long-term sustainability of nuclear energy.

- High decommissioning costs

At the end of a nuclear power plant's life, decommissioning it is an expensive and complex process. This process includes dismantling the equipment, managing the remaining radioactive waste, and restoring the land. Decommissioning costs are often underestimated when planning a plant, which can put additional financial strain on governments or companies involved.

- Public acceptance and political controversy

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- Public acceptance and political controversy

Nuclear energy is often met with skepticism and controversy, particularly in the public sphere. This is primarily due to concerns about safety and the environment. Protests and political opposition can delay or even prevent the construction of new nuclear power plants. In addition,

Nuclear power is often met with skepticism by the public, mainly due to safety and environmental concerns. Protests and political opposition can delay or even prevent the development of nuclear power plants. In addition, the lack of international consensus on the use and regulation of nuclear power can complicate the implementation of global solutions to the associated problems.

6. Nuclear energy in the context of the future

Artificial intelligence (AI) is defined as a system capable of perceiving the environment and acting to achieve its goals. AI methods, especially those based on deep learning, have evolved significantly in recent decades and have been successfully applied in various fields, such as image processing, robot control, climate forecasting and others. A notable example is the convolutional neural network (CNN), which has surpassed human performance in certain image classification tasks. The application of AI in the field of nuclear power plants (NPP) is increasingly being explored, for purposes such as nuclear fuel management, monitoring power distribution in the reactor and detecting equipment failures. In the field of management, intelligent cyber-physical systems are implemented that optimize the operation of nuclear power plants. Also, for the diagnosis and forecasting of reactor behavior, artificial neural networks and fuzzy models are used. AI is essential for the development of next-generation nuclear power plants, especially due to its potential to improve safety and operational efficiency. However, most existing applications focus on specific scenarios, and a systemic approach and high-level design for integrating AI into nuclear power plant design is still needed. The high-level design of future nuclear power plants proposes the integration of a "Nuclear Power Plant Human-Cyber-Physical

lipsa unui consens internațional cu privire la utilizarea și reglementarea energiei nucleare poate complica implementarea unor soluții globale pentru problemele asociate.

6. Energia nucleară și inteligența artificială

Inteligența artificială (IA) este definită ca un sistem capabil să perceapă mediul și să acționeze pentru a-și atinge obiectivele. Metodele de IA, în special cele bazate pe învățarea profundă (deep learning), au evoluat semnificativ în ultimele decenii și au fost aplicate cu succes în diverse domenii, cum ar fi procesarea imaginii, controlul roboților, prognoza climatică și altele. Un exemplu notabil este rețeaua neuronală convoluțională (CNN), care a depășit performanțele umane în anumite sarcini de clasificare a imaginilor.

Aplicarea IA în domeniul centralelor nucleare (NPP) este tot mai mult explorată, în scopuri multiple, precum: managementul combustibilului nuclear, monitorizarea distribuției de putere în reactor, detectarea defecțiunilor echipamentelor.

În domeniul managementului, sunt implementate sisteme cyber-fizice inteligente care optimizează operarea centralelor nucleare. Pentru diagnosticarea și prognoza comportamentului reactorilor, se folosesc rețele neurale artificiale și modele fuzzy. IA este esențială pentru dezvoltarea centralelor nucleare de generație viitoare, în special datorită potențialului său de a îmbunătăți siguranța și eficiența operațională.

Totuși, majoritatea aplicațiilor existente se concentrează pe scenarii specifice, iar o abordare sistemică și un design la nivel înalt pentru integrarea IA în proiectarea centralelor nucleare este în continuare necesar.

Proiectarea la nivel înalt a centralelor nucleare de viitor propune integrarea unui sistem „Centrala Nucleară Sistem Uman-Cyber-Fizic” (NPPHCPS), bazat pe concepte de sisteme cyber-fizice și tehnologii precum „Healthy Operator 4.0”

System” (NPPHCPS), based on cyber-physical systems concepts and technologies such as “Healthy Operator 4.0” (HO4.0). It combines people, technology and physics to create an intelligent and safe operating environment, using AI to process big data and continuously monitor operators. By integrating real-time data and using advanced technologies, NPPHCPS promises to improve operator safety, efficiency and health [3].

7. Conclusions

Nuclear energy is a key element in the global transition to cleaner and more efficient energy sources. Nuclear power plants offer high output, stability and low carbon emissions, making them essential in combating climate change. However, they come with significant challenges, such as radioactive waste management, accident risks and high construction and maintenance costs. For nuclear energy to play a central role in the future, continued investment in innovation, safety technologies and waste solutions is needed. Public engagement and international cooperation can also help increase trust and acceptance of this technology. Nuclear energy is not a perfect solution, but it can be a vital complement to renewable sources in ensuring a sustainable energy future.

(HO4.0). Acesta combină gândirea umană, tehnologia și știința pentru a crea un mediu de operare inteligent și sigur, folosind AI pentru procesarea datelor masive și monitorizarea continuă a operatorilor. Prin integrarea în timp real a datelor și utilizarea unor tehnologii avansate, NPPHCPS promite să îmbunătățească siguranța, eficiența și sănătatea operatorilor [3].

7. Concluzii

Energia nucleară este un element-cheie în tranziția globală către surse de energie mai curate și mai eficiente. Centralele nucleare oferă o producție ridicată, stabilitate și emisii scăzute de carbon, fiind esențiale în combaterea schimbărilor climatice. Totuși, ele vin cu provocări semnificative, precum gestionarea deșeurilor radioactive, riscurile de accidente și costurile ridicate de construcție și întreținere.

Pentru ca energia nucleară să joace un rol central în viitor, sunt necesare investiții constante în inovație, tehnologii de siguranță și soluții pentru deșeuri.

De asemenea, implicarea publicului și cooperarea internațională pot contribui la creșterea încrederii și acceptării acestei tehnologii. Energia nucleară nu este o soluție perfectă, dar poate fi un complement vital pentru sursele regenerabile în asigurarea unui viitor energetic durabil.

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Fig.2:<https://www.telework.ro/ro/in-romania-vor-functiona-primele-reactoare-de-mici-dimensiuni-smr-din-lume-construite-de-nuscale-power/>

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Translated by: Vasilescu Irina,
irina.vasilescu@mesota.ro

Supervising Teacher: Helerea Elena
helerea@unitbv.ro

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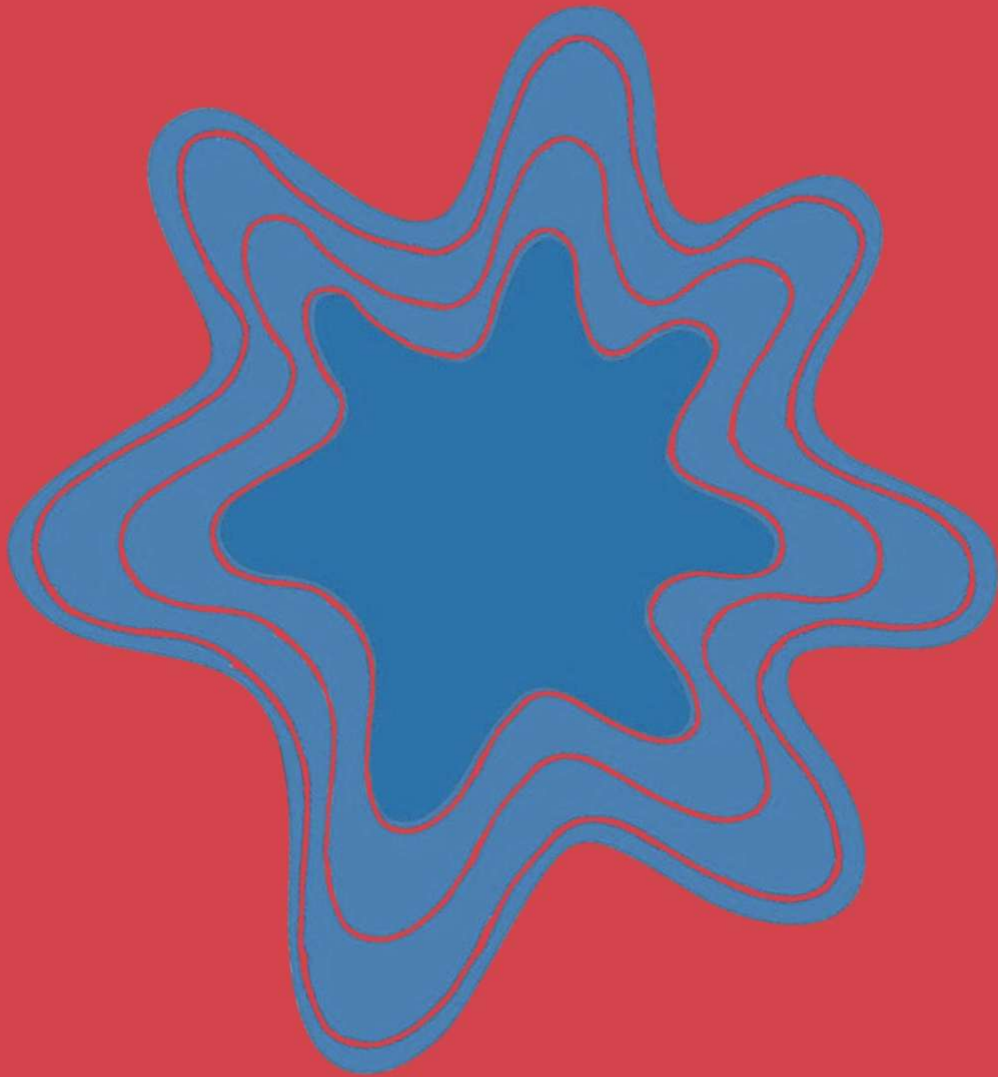
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