CURRENT TENDENCIES IN SCIENTIFIC EXPLORATION WITHIN INFORMATION TECHNOLOGY AND ELECTRICAL AND ELECTRONICS ENGINEERING

Dorin Mihail DINULESCU

Polyethnic University of Bucharest

Within the extensive research and development realms of Information Technology (IT) and Electrical and Electronics Engineering, this paper focuses on selected pivotal topics. It elucidates the reasoning behind the choice of these subjects, emphasizing their significance in contemporary industries. The principal criteria for their selection hinge on their pertinence to current industry trends and the availability of funding, ensuring the transition from theoretical and experimental research to practical applications. Additionally, this exploration can assist college students in shaping their preferences for a prosperous engineering career. Before delving into the specifics of the chosen subjects, this paper delves into the interplay between learning strategies and scientific epistemological views, thereby aiding in the development of an appropriate scientific mindset.

Keywords: research, scientific exploration, methodology, emerging patterns, ethical considerations, financial support, technology, practical implementation.

I. INTRODUCTION

Scientific Investigation in IT and Electrical and Electronics Engineering embodies both Science and Technology, specifically science, technology, engineering, and the symbiotic connection among them. Scientific inquiry utilizes technologies and instruments engineered by professionals to generate knowledge applicable in the engineering sphere, with a focus on analyzing, designing, and constructing novel technologies or maintaining existing ones to cater to human necessities and desires.

Although engineering sciences follow a relatively well-defined framework, less susceptible to varied personal interpretations, a concise presentation of predominant worldviews is offered to augment cognitive orientation and cultivate a correct mindset in the quest for scientific verity. A brief exploration of the scientific method, encompassing the boundaries of scientific capabilities and limitations, precedes a straightforward method for knowledge construction during scientific inquiry. Lastly, several of the most critical subjects have been handpicked for analysis, including Artificial Intelligence (AI) and Machine Learning, Robotics and Autonomous Systems, Wireless Sensor Networks, Big Data Analytics, Bioinformatics, Cyber Security, Computer-Assisted Education, Batteries and Energy Storage, and Materials Science and Engineering.

II. MAJOR WORLDVIEWS

One's worldview can be expressed as the fundamental lens through which body, soul, mind, and spirit perceive the world. As elucidated in [6], the mental model of the world significantly influences actions, reactions, behavior, and beliefs. Irrespective of the chosen perspective, it must grapple with five fundamental queries:

1. Reality: Deciphering the true essence of reality presents a formidable quandary. Answers have proliferated over millennia and continue to do so. Is reality comprised solely of matter and energy? Alternatively, does it encompass a spiritual dimension wherein soul and spirit serve as predominant constituents? Does the framework of reality admit the presence of a divine entity?

2. Origin: The origins of humanity constitute an equally intricate enigma. Where did we originate? Did our existence evolve through a succession of random natural occurrences, or are we the handiwork of a purposeful intelligence? Can we reconcile faith in evolution with belief in creation, or perhaps embrace both by discerning competence within each sphere of inquiry [9]?

3. Meaning: Does existence inherently possess meaning, a life's purpose, a genuine sense of achievement and contentment? Alternatively, are we nothing more than biological automatons devoid of consciousness and meaning?

4. Morality: What defines goodness or badness, rightness or wrongness, and how do we discern the truth? Is truth an absolute, or conversely, is everything relative to our experiences and desires?

5. Destiny: What awaits us at life's culmination? Does life persist beyond death, or does death terminate all existence? What lies on the other side of death's threshold? Are concepts like eternity, resurrection, and hope substantiated?

Worldview extends beyond cultural bounds and compels responses to these probing inquiries. These questions are inescapable, but many individuals may deliberately evade addressing them. However, securing answers to life's questions beyond reasonable doubt necessitates a leap of faith.

Prominent worldviews encompass:

- Naturalism (e.g., Atheistic Materialism, Agnosticism, Existentialism, Scientism, Marxism)

- Pantheism (e.g., Hinduism, Taoism, Buddhism, New Age)

- Theism (e.g., Christianity, Islam, Judaism)

- Polytheism (myriad religions)

- Postmodernism, Post-Christianity, Post-Truth, Relativism, Nihilism

The Christian worldview, construed as a comprehensive perspective of the world from a Christian vantage point, can be delineated as follows: an infinite, personable God instigated the creation of a finite, material world, thereby resulting in a reality that interweaves the material and spiritual dimensions.We, fashioned in the "image of God," manifest as beings that are both personal, spiritual, and biological.Fulfilling our obligation for God-centered thinking fosters a purposeful and meaningful existence.The truth is attained through revelation, with morality representing an objective manifestation of an absolutely moral God, the bestower of morality.We are eternal, hopeful, conscious entities endowed with rationality, morality, spirituality, and the liberty of choice.

III. SCIENCE AND TECHNOLOGY

According to Oxford Dictionaries, science denotes "the methodical examination of the structure and behavior of the physical and natural world through observation and experimentation," encompassing both intellectual and practical pursuits.

Within the vast realm of sciences, particular attention in this document is paid to the Engineering Sciences. Often, Science, Technology, and Engineering become intertwined or conflated despite their clear distinctions. In brief, science entails acquiring knowledge, engineering involves the application of scientific knowledge for design and construction, and technology encompasses the totality of engineered processes, tools, and devices [4], [5].

A. Science and the Scientific Method

- Science embodies a process and a methodology oriented towards the exploration, comprehension, and elucidation of the natural world, as well as a reservoir of knowledge accrued during scientific investigations.

- In the pursuit of genuine understanding of the world's workings, science leans on evidence and testable concepts to furnish precise and dependable explanations.

- To address the intricate interplay between complexity and precision, the scientific process continually engages the scientific community in ongoing research and discovery.

- Dissemination of scientific research findings predominantly transpires through the composition of articles, subject to scrutiny by field experts to gauge the validity and quality of the work, ultimately arriving at reasonable conclusions. Although peer review proves indispensable and advantageous, instances arise where monopolistic tendencies among peer reviewers prove counterproductive and deleterious to scientific endeavors. Competitive research funding, for instance, may pave the way for monopolistic dominance. Hubris and constraints may instigate various forms of supremacy, such as the decades-long denial of neuroplasticity or the belated acceptance of epigenetics and Rupert Sheldrake's morphic resonance theory [10]. The realm of climate change has also been politically manipulated. Conversely, there exists the flip side of the coin: the inherent pitfalls associated with the academic pressure to publish, which may engender corruption within the review process, equally detrimental to scientific progress.

- Acknowledged scientific concepts remain open to revision if substantiated by fresh evidence. For example, Einstein initially postulated that the Universe was static and unchanging, which was later refuted by Hubble's discovery of its dynamic, expanding nature. Einstein also asserted the emptiness of space, yet physicists subsequently demonstrated its occupancy by aether, a diffuse, uniform energy. The conceptions of reality and separability (quantum entanglement) continue to evolve. The definition of "Gene" has undergone multiple revisions, from Johansson (1909) to Bruce Lipton.

- The pursuit of scientific truth need not entail the rejection of alternative sources of truth. Truth is absolute, transcending cultural boundaries, and can manifest as either objective or subjective truth. Science, as conventionally understood, confines itself to the domain of objective truth without impinging upon other realms.

B. Knowledge Building

To simplify, the scientific process serves as a systematic and rational approach to constructing a repository of knowledge concerning the functioning of phenomena and problem-solving. Numerous avenues exist for knowledge acquisition, one of which is proposed here, encompassing four phases:

- Observation: What is articulated in text and/or speech? What is its subject matter, description, and method of illustration? Attempting memorization can aid in grasping the content of text or speech. Accurate observation constitutes a fundamental prerequisite for precise interpretation.

- Interpretation: What is intended by the message, and what significance does it hold for the observer? Placing it within context and extracting knowledge from the observed information is vital. Comprehending the broader meaning of the text or speech is pivotal.

- Correlation: Where else is this information articulated, conveyed, or explained? Evaluating how the context aligns with existing literature on the subject under scrutiny is essential. Consultation of diverse resources ensures the accuracy of interpretation and allows for the amalgamation of newfound knowledge with pre-existing understanding.

- Application: How can this information be practically employed? This entails the transfer of acquired knowledge and skills to alternative contexts. This transfer typically necessitates thoughtful consideration and judgment.

C. Some Limitations of Science

In essence, science is a passive entity; scientists drive the scientific process. What transpires if scientists cease scientific pursuit? The realm of philosophy of science seeks to address questions concerning science itself rather than answering scientific queries. Science wields considerable power and, in synergy with technology and engineering, resolves some of humanity's most pressing issues. Despite its limitations, these accomplishments remain undiminished.

- Science is not omniscient [1]. Science, although potent, encompasses a lengthy register of scientific theories now regarded as obsolete. While once validated by mainstream science, they are now perceived as incomplete, inadequate, or even inaccurate portrayals of reality. Science has been mistaken in the past, which is entirely permissible.

- Some existential truths remain unanswered. For instance, the location of memory, whether within the brain or a broader field, continues to elude us. The purpose of dreaming remains an enigma. Will we eventually conquer cancer? Historical truths, pertaining to events in history, lack the replicability necessary for scientific validation, rendering historians reliant on historical validity rather than truth.

- Experiential truths elude scientific validation; for instance, science cannot prove one's spouse's love. It is a matter of personal experience.

- Views rejecting the existence of objective moral truth and moral evil, transcending the domain of science, exist. Science cannot prove the moral reprehensibility of actions such as rape or the Holocaust.

- Scientific methodologies offer avenues for knowledge acquisition through observation and experimentation but do not provide the wisdom to dictate the use of scientific knowledge. It does not determine whether atomic bombs, GMOs, or genetic modification are advisable.

- Science does not arbitrate aesthetic judgments; it remains indifferent to notions of beauty.

- Science does not pronounce moral judgments; it refrains from dictating right from wrong, good from evil. It refrains from addressing inquiries regarding abortion, euthanasia, terminal illness, consciousness, or animal rights.

- Upholding scientific integrity, encompassing sincerity among scientists and truthfulness, constitutes an integral facet of the scientific process and the dissemination of scientific knowledge. Safeguarding science from political interests, bias, plagiarism, falsification, censorship, and flawed procedures is imperative to uphold scientific integrity.

- Science avoids delving into the supernatural and, consequently, neither supports nor refutes the existence of the supernatural or the existence of a deity. Science and spiritual dimensions can coexist harmoniously and productively.

IV. TRENDS IN SCIENCE AND TECHNOLOGY

1. Artificial Intelligence (AI) and Machine Learning

Understanding intelligence, whether natural or artificial, presents a formidable challenge. Dulcan's endeavor to elucidate the Principle of Universal Coherence posits that intelligence resides inherently within atomic and molecular matter [3].

Deliberations concerning AI commenced in 1956 when John McCarthy, a Dartmouth professor, coined the phrase "Artificial Intelligence" [2].

Max Tegmark, President of the Future of Life Institute, provides an intriguing perspective on AI: "The essence of civilization, a product of intelligence, implies that enhancing our human intelligence with artificial intelligence holds the potential to elevate civilization to unprecedented heights, provided we ensure the technology remains advantageous" [8].

- After approximately three decades of sluggish research growth, recent years have witnessed a reinvigoration of AI. The most prolific facets of AI that have burgeoned in recent times are delineated. Expert systems entail extensive data/knowledge repositories with efficient indexing mechanisms, employing inferences to resolve practical exigencies. AI and Robotics execute efficient physical actions within their surroundings, contributing to practical applications. Personal AI assistants, such as Google Assistant, Siri (Apple), Cortana (MS), and Echo (Amazon), are now ubiquitous in smartphones. OpenAI's mission is to construct safe AGI (Artificial General Intelligence), a cross-domain optimization of intelligence. OpenAI's concept hinges on leveraging existing field knowledge to bootstrap development, progressively incorporating additional resources for exponential growth.

- Google, IBM, Apple, Facebook, and Microsoft are making substantial investments in AI research.

- Abundant opportunities exist to cultivate real-world applications of this technology.

- Concerns voiced by luminaries like Bill Gates, Stephen Hawking, and Elon Musk revolve around AI's potential to become dangerously potent.

- EU research commissioner, Carlos Moedas, contends that the world's "astonishingly pessimistic" stance on Artificial Intelligence stems primarily from the proliferation of fake news.

- Ray Kurzweil forecasts the occurrence of singularity by 2045 due to the exponential growth of technology.

- In 2015, the worldwide output of AI patents reached 18,000, with the EU contributing a 12% share.

- Investment in AI is on the rise, albeit still in its nascent stages, projected to reach $70 billion by 2020.

- In conclusion, information thermodynamics convincingly advocates for OpenAI development as opposed to safeguarding information for exclusive private gain, thereby mitigating the entropic and energetic costs of information processing.

2. Robotics and Autonomous Systems

- Technological progress has exhibited exponential growth in recent years:The intersection of machine learning and robotics, where AI interfaces with the real world.Signal and image processing encompassing distributed sensing and processing along with pattern analysis.Computer vision's application in autonomous navigation, visual surveillance, image & video indexing applications.Robotics is progressively transitioning from the realms of industry and science into everyday life. It's crucial to recognize that robots lack self-awareness and consciousness.

- The global robotics industry is projected to attain a worth of $38 billion by 2018 and $83 billion by 2020.

- In 2018, the robotic service market is anticipated to grow by 15% in the industrial sector, 11% in the professional sector, and 35% in the personal sector.

- In 2018, an estimated 400,000 industrial units will be sold, with 70% distributed among China, Japan, the United States, South Korea, and Germany.

- In defense, agriculture, and logistics, around 150,000 units are anticipated to be sold in 2018, amassing roughly $20 billion.

- Autonomous vehicles developed by Google, Apple, Tesla, and Waymo promise more efficient traffic flow, reduced congestion, fewer vehicular accidents, enhanced mobility for the young and elderly, cost-effective travel, reduced parking space requirements, and optimized travel time utilization. This, however, brings about heightened manufacturer liability and reduced personal liability, accompanied by inconsistent state regulations.

3. Wireless Sensor Networks

- A novel approach to information acquisition and processing permeates various domains: WSNs (Wireless Sensor Networks), an array of spatially distributed autonomous devices equipped with sensors to monitor:

  - Environmental factors such as air, water, soil, solar radiation, and noise.

  - Physical conditions, offering minimally invasive healthcare system procedures.

  - Utility monitoring, encompassing the electricity grid, street lighting for system load pattern analysis, and availability.

  - Surveillance of structural integrity in buildings, bridges, dams, and water reservoirs.

  - Process management, asset tracking, data centers, home automation, military applications, and homeland defense.

  - The development of cost-effective, diminutive, robust, and energy-efficient WSN nodes poses a significant challenge.

  - Software development for WSNs involves crafting software for resource-constrained embedded devices operating over low-bandwidth wireless links. This necessitates the attainment of a high level of efficiency, reliability, and autonomy within dynamic environments.

  - Middleware packages for WSNs offer advanced abstractions that simplify programming. These middleware systems route data based on users' descriptions of interest, employing information fusion, whether distributed or centralized, to surmount fluctuations in temperature, pressure, radiation, and electromagnetic interference. Varied techniques, methods, and algorithms must be tailored to distinct objectives.

4. Big Data Analytics

Big Data Analytics entails scrutinizing extensive and diverse datasets to uncover correlations, unveil latent patterns, discern customer preferences, or predict market trends.

  - Harvard Business Review has hailed data science as the "sexiest job of the 21st century."

  - Big data analytics is pervasive, from the banking sector to healthcare.

  - Companies increasingly strive to personalize and enhance their services.

  - Big data plays an integral role in shaping marketing decisions.

  - Its proliferation has intensified the intrusion of social media firms into individuals' privacy.

  - Companies actively collect, analyze, and monetize social media profiles.

- Prominent social media platforms boast staggering active monthly user counts: Facebook (1.9 billion), YouTube (1 billion), Instagram (600 million), Twitter (327 million), and LinkedIn (106 million).

5. Bioinformatics

  - Bioinformatics stands as an enthralling application of big data.

  - The human cell houses a staggering number of molecules, ranging from 5 million to 2 trillion.

  - DNA molecules alone account for a substantial data volume, requiring software to compile vast biological datasets.

  - This domain bridges prominent pharmaceutical firms with burgeoning software companies, fostering high demand.

  - Since 1991, Intel Capital has invested $12.2 billion in 1,500 companies.

  - The bioinformatics market is poised to reach $30.87 billion by the end of 2020.

  - Research spans several areas:

  - Bioinformatics and computational biology, embracing mathematics, statistics, informatics, and computer science.

  - Genetics and genomics, exploring DNA inheritance and genome structure and function.

  - Systems biology, elucidating the integrated functioning of cells, tissues, and organisms.

6. Cyber Security

  - In the preceding year, 77% of data breaches implicated insiders.

  - Notably, Edward Snowden convinced 20-25 colleagues to share their passwords by posing as a system admin.

  - In 2016, cybercrime incurred a staggering $450 billion in global economic losses.

  - The United States witnessed a 74% growth in cybersecurity jobs between 2007 and 2013, with a 21.4% uptick in the past five years.

  - It is projected that there will be 3.5 million unfilled cybersecurity positions worldwide by 2021.

  - Data protection is no longer an optional concern, applicable to individuals, corporations, and nations alike.

  - The burgeoning job landscape in this domain encompasses cyber incident response, cyber risk and strategic analysis, software assurance, vulnerability detection and assessment, and digital forensics.

- The emergence of cyber warfare as a new terrorist threat has witnessed notable incidents such as Aurora (2010), Stuxnet (2010), Flame (2012), Red October (2012), and Turla (2014). Specialized operations within the United States Air Force focus on cyber warfare and mandate top-secret security clearance.

7. Computer Assisted Education

  - Computer-assisted education leverages computers and software to facilitate learning and training.

  - The incorporation of Twitter into classrooms fosters heightened student engagement without bureaucratic hurdles.

  - Personalized instruction allows students to progress at their own pace and assists those with learning disabilities.

  - Students gain access to active, independent, and play-based learning.

  - Anticipated trends include a 27% increase in demand for ICT professionals, a 22% rise in telecommunications specialists, and a 21% surge in special education teachers by 2020.

  - The United States alone anticipates over 500,000 job openings in IT fields, including cybersecurity.

  - Stockholm, rather than Berlin, is emerging as Europe's tech capital.

  - Sweden offers a diverse array of master's programs encompassing ecotechnology, conflict studies, game design, communications for development, automotive engineering, spacecraft design, energy for smart cities, and water resources engineering.

  - Prestigious institutions like MIT, Stanford, CMU, UCB, Cambridge (UK), Harvard, Oxford (UK), Princeton, ETH (Zurich), and NUS (Singapore) top the QS World University Rankings for Computer Science and Information Systems.

8. Batteries and Energy Storage

  - Portable electronic devices, ranging from smartphones to wearable gadgets, have become omnipresent. Most of these devices rely on lithium-ion batteries. However, these current battery technologies impose limitations on the mobility and independence of such devices. Surpassing these limitations heralds an energy storage revolution, and numerous indicators suggest that it is impending.

  - Technologically advanced batteries are transitioning from research labs to massive giga-factories, expanding beyond smart devices to encompass smart grids.

  - There's a significant surge in the demand for portable and industrial rechargeable batteries. The global consumer battery market is projected to surpass $46 billion by 2022, driving the demand for battery materials and novel processing technologies.

  - Several research initiatives hold promise for fueling this battery revolution:

- Scientists at Berkeley Lab, the Department of Energy, and MIT are collaborating on a "Holy Grail" for batteries, involving solid-state magnesium batteries that replace liquid electrolytes with solid-state magnesium-ion conductors. These solid-state electrolytes offer superior energy density and enhanced fire resistance compared to potentially flammable lithium-ion batteries.

- The Battery500 consortium, backed by Tesla and IBM, as well as academic institutions like Stanford University, Brookhaven National Laboratory, and the Department of Energy, is led by the Pacific Northwest National Laboratory (PNNL). This consortium is committed to developing advanced lithium-metal batteries by replacing graphite with lithium for the anode. The objective is to triple the energy stored in electric vehicle (EV) batteries to achieve a range of 500-800 Wh/kg, compared to the existing 170-200 Wh/kg. This would result in smaller, lighter, and more affordable batteries capable of enduring 1,000 vehicle cycles. The consortium's target is to charge 360 kWh in 10 minutes while reducing the cost from $200/kWh to less than $100/kWh. The goal is to deliver a 500-mile (805 km) range per charge, expected by 2020.

- IBM's lithium-air batteries utilize oxygen (air) flowing through a carbon cathode to react with lithium, enabling electric vehicles to cover 500 miles per charge. These batteries can store 1,000 times more energy than lithium-ion batteries and charge electric cars five times faster.

- The UK has invested £80 million in a research project for new batteries.

- Samsung is pioneering the use of "graphene balls" to enhance battery capacity by 45% and charging speed by 500%.

- Shell petrol stations are planning to offer 5-10 minute charging for electric cars.

- BMW, Daimler, Ford, VW, Audi, and Porsche are collaborating to create a network of 350 kW chargers in the European Union.

9. Materials Science and Engineering

- Materials science is a multidisciplinary field that focuses on comprehending and applying material properties. Materials scientists, through observation and experimentation, gain insights into the relationships between material structure, properties, performance, processing techniques, and applications. Engineers leverage this knowledge to design and construct devices using appropriate materials and processing methods. By understanding how materials function, materials scientists and engineers can create new materials for emerging applications or enhance the performance of existing ones.

- Many portable electronic devices, including smartphones, tablets, laptops, cameras, and various wearables, are an integral part of our daily lives. Most of these devices rely on lithium-ion batteries for power. Battery-powered mobility devices such as wheelchairs, golf carts, scooters, and electric vehicles provide users with increased freedom and independence. However, the main limitation to the extent of this freedom and independence is the battery technology currently available. Overcoming

these battery limitations is key to a revolution in energy storage. Various signs indicate that this revolution is on the horizon.

- Advanced battery technologies are transitioning from laboratory research to large-scale production in giga-factories, expanding from smart devices to smart grids.

- There is a significant increase in the market demand for portable and industrial rechargeable batteries. The global consumer battery market is estimated to exceed $46 billion by 2022, driving the demand for battery materials and new processing technologies.

- Numerous promising research initiatives are paving the way for this battery revolution:

- Scientists at Berkeley Lab, the Department of Energy, and MIT are collaborating on solid-state magnesium batteries that replace liquid electrolytes with solid-state magnesium-ion conductors. Solid-state electrolytes offer high energy density and superior fire resistance compared to potentially flammable lithium-ion batteries.

- The Battery500 consortium, with advisory input from Tesla and IBM, along with contributions from Stanford University, Brookhaven National Laboratory, and the Department of Energy, is led by the Pacific Northwest National Laboratory (PNNL). The consortium aims to developadvanced batteries that will power future vehicles. Their focus is on lithium-metal batteries, replacing graphite with lithium for the anode. The goal is to triple the energy stored in electric vehicle (EV) batteries to achieve 500-800 Wh/kg, compared to the current 170-200 Wh/kg, resulting in smaller, lighter, and more affordable batteries with a capacity for 1,000 vehicle cycles. The consortium also aims to enable rapid charging, targeting 360 kWh in 10 minutes, while reducing battery costs from $200/kWh to less than $100/kWh. All of these innovations are intended to achieve a 500-mile (805 km) range per charge, with plans to deliver this by 2020.

- IBM has developed lithium-air batteries that utilize oxygen (air) flowing through a carbon cathode to react with lithium, enabling electric vehicles to cover 500 miles per charge. These batteries can store 1,000 times more energy than lithium-ion batteries and charge electric cars five times faster.

- The UK has invested £80 million in a research project for new batteries.

- Samsung is pioneering the use of "graphene balls" to enhance battery capacity by 45% and charging speed by 500%.

- Shell petrol stations are planning to offer 5-10 minute charging for electric cars.

- BMW, Daimler, Ford, VW, Audi, and Porsche are collaborating to create a network of 350 kW chargers in the European Union.

V. CONCLUSIONS

The process of Scientific Research is a methodical endeavor centered around a specific subject matter. To function effectively as scientists, it becomes crucial to comprehend the capabilities and limitations

of science. Additionally, a thorough understanding of the societal consequences, both immediate and eventual, is paramount when selecting research domains and methodologies. Given the absence of both qualitative and quantitative measures to gauge the societal ramifications across diverse research domains, the guiding principles of research ethics and moral integrity serve as the compass, guiding researchers toward responsible actions. The initial section of this article seeks to shed light on these fundamental aspects.

From the broad spectrum of research domains within the realms of Information Technology and Electrical and Electronics Engineering, nine vibrant areas have been singled out for examination. Further emphasis has been placed on a select few, with rationale provided to underscore their prominence in the contemporary landscape. The imperative of pioneering new batteries boasting superior storage capacity, rapid charging, enhanced safety, and cost-efficiency cannot be overstated. Such innovations are indispensable to meet the escalating energy storage requisites spanning a wide array of devices, ranging from smartphones to smart grids. The arena of Materials Science and Engineering serves as the ideal convergence point for advanced scientific inquiry and the development of novel technologies essential for engineers engaged in devising and crafting new devices.

For decades, Artificial Intelligence remained an enthralling realm of research, but only recently has it attained maturity. Owing to the inherent complexities surrounding the core concept of intelligence, a plethora of predictions have emerged. These predictions span the spectrum from highly optimistic outlooks to apprehensions that AI might pose a threat to human existence.

REFERENCES

1. University of California Museum of Paleontology, "Understanding Science," University of California - Berkeley, Jan 8, 2009.

2. "Leading academic who coined the term "Artificial Intelligence," The Irish Times, 01/28/2016.

3. D.C. Dulcan, "Intelligence of Matter (Inteligenta materiei)," Eikon, Cluj-Napoca, ASIN:B0076IASSS, 2009.

4. A. Bradford contributor, "What is Science?," Life Science, August 4, 2017.

5. V. Stone, J.P. Lane, "Modelling Technology Innovation: How Science, Engineering, and Industry Methods Can Combine to Generate Beneficial Socioeconomic Impacts," Implementation Science, May 16, 2012.

6. K. M. Edmondson, J. D. Novak, "The Interplay of Scientific Epistemological Views, Learning Strategies, and Attitudes of College Students," Journal of Research in Science Teaching, 1993.

7. V. Callaghan, J. Miller, R. Yampolsky, S. Armstrong, "The Technological Singularity," Springer-Verlag GmbH, Germany, 2017.

8. M. Tegmark, "Life 3.0: Being Human in the Age of Artificial Intelligence," Knopf, ISBN 978-1-101-94659-6, August 23, 2017.

9. W.E. Carroll, "Creation, Evolution, and Thomas Aquinas," Revue des Questions Scientifiques, 171 (4), 319-347, 2000.

10. R. Sheldrake, "Morphic Resonance: The Nature of Formative Causation," Park Street Press, 4th edition, ISBN-13 978-1594773174, September 9, 2009.

11. B.H. Lipton, "The Biology of Belief," Hay House UK, ISBN: 9781781805473, October 13, 2015.

12. P. Canepa et al, "High Magnesium Mobility in Ternary Spinel Chalcogenides," Nature Communications, 2017.

13. R.D. Cepoi, F.F. Jaşcău, L. Szabo, "Current Trends in Energy Efficient Electrical Machines," Journal of Electrical and Electronics Engineering, Vol. 10, No. 2, pp.13-18, Oct. 2017.

Data About Author:

Dorin Mihail DINULESCU, senior student at the Department of Mechatronics and Precision Mechanics*,* Polyethnic University of Bucharest

E-mail: dorinmihail.d@gmail.com

ORCID: 0009-0003-7971-8575

Engpaper Journal

https://www.engpaper.com