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Review Article

Human Enhancement: Moving Towards Homo Intelligentes in Industrial Revolution 5.0

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Abstract

There are conflicting opinions that we have faced the dawn of Industrial Revolution 5.0 (IR 5.0), and it became more popular in the current academic literature. While some believe that the post-Covid-19 pandemic has already sparked and initiated the next industrial revolution, others are waiting for a technological breakthrough that brings about changes in society 5.0. Dehumanization during the preceding Industrial Revolution 4.0, which was built on Cyber Physical System (CPS) and the Internet of Things (IoT), is the reason for the development of a new concept of "Men & Machines Dancing Together". Human Augmentation (HA) & Human Enhancement (HE) are topics of interest among high-tech researchers and medical & science futurists. Men & Machine dancing is layman terminology. We tried to explore this concept, based on the review of literature, scientific blogs, industrial websites & professional opinions. We noticed three types of humans who would dance with machines during the forthcoming Industrial Revolution 5.0. These are H. Augments, H. Bionics & H. Cyborgs & jointly named as (H. Intelligentes). Technological evolution laid down the foundations of new societies due to the high impact on social, ethical & legal values. Therefore, emphasis has been given to this matter as H. Zombies are predicted to emerge during the Industrial Revolution 6.0 if uncontrolled research continues.

Keywords: Industrial Revolution 5.0, society 5.0, Artificial Intelligence, Cyborgs, Human Enhancement, Internet of Things, Large Language Models, Smart Implants, Brain-Computer Interface, Bionic

Introduction

There are four established Industrial Revolutions (IR) i.e., IR 1.0 to IR 4.0 after the inventions of the Steam engine (Mechanization), Electricity (Mass production), Computers (Digitalization) & Internet of Things (IoT)/Cyber-Physical System (CPS) respectively [1]. Regarding the Dawn of IR 5.0 controversy there but dancing of men & machines together is consensus among researchers which was introduced during the World Economic Forum (2019). Dancing is layman's terminology & needs to re-address scientifically. Therefore, we tried to explore dancing men-machines relationship based on a literature review to conceptualize our paperwork. We sectioned the paper into literature review section 2, conceptual framework section 3, applications of human enhancement during industrial revolution 5.0 section 4, followed by conclusion in section 5.

Literature Review

The term Industry 4.0 was first introduced at Hannover Messe (Tradefair) held in 2011, by a group of researchers from different fields to accomplish the German Federal Government high tech plans but was popularized after five years by Klaus Schwab, the Founding Chairman of World Economic Forum [2,3]. Since the introduction of Society 5.0 in 2014, people have started talking about men & machines dancing together despite a robotic woman, invented in 2009, dancing with her human counterpart in 2010 (HRP-4C) in Tokyo (*Kaneko, et al.,* 2009; *Saenz,* 2010) [4,5]. The Rada (2015) was considered a self-claimed Founder of Industry 5.0. The popularity of IR 4 by Schwab (2016) & Introduction of IR 5.0 by Rada (2015) coincidently occurred about the same year [6]. "What the Fifth Industrial Revolution is and why it matters", was the slogan

of the World Economic Forum (2019), with a focus on men & machines "dancing together" [2,7]. Since the COVID-19 pandemic started, researchers have started focusing on Industrial Revolution 5.0 [8,9]. The European Commission in 2021 released a document titled "Industry 5.0: Towards a Sustainable, Human-centric, and Resilient European Industry" after two virtual workshops held in July 2020 [10]. Similarly, the Society 5.0 plan was proposed, in 2014 & published, in 2015 as the 5th Science and Technology Basic Plan (2016-2020) on Keidanren, the official website of the Japan Business Federation, and got attention during the CeBIT 2017 trade fair in Hannover, Germany (I-scoop, 2017) and cited [10,11]. The Dawn of Industrial Revolution 5.0 was triggered by COVID-19 with the metamorphic dancing of Men and Machines together. Some researchers believe that such technology is not established yet, others are waiting. However, the post COVID-19 pandemic publications declared its emergence. To differentiate IR 4.0 from IR.50, the earlier is Cyber-Physical System (CPS) whereas the latter is described as a Human Cyber-Physical System (H-CPS) due to humanization [12]. Humanity & humanization are the key elements that will differentiate both IR 4.0 & IR 5.0 from each other. The people in IR 4.0 & IR 5.0 are labelled as Human & Human Plus respectively. The post-humanity era will differentiate Industry 5.0 from the upcoming IR 6.0. Is the emergence of IR 5.0 on the horizon or not? The researchers are talking about Synthetic Society [13] which we termed Society 5.0 in our framework. Dancing man with machine is layperson terminology, therefore in our paper, the man is being divided into 5 sub-types (sapiens, smarten, intelligences, cyborgs & zombies) to evaluate men's relationship with machines in IR 5.0 to IR 6.0. Till IR 3.0 & early IR 4.0, human was using technology as a tool and were termed Homo Sapiens (wise man) but later part of IR 4 & ongoing/forthcoming IR 5.0 after the introduction of smartphones humans are much occupied & tools were replaced through enhancement to convert a human into Homo Augmentus/Smartien (smart man). We prefer the terminology of Homo Augmentus because of the "smart word" everywhere. Traditional Implants with pathological indications, body extension & skin implants will be included in IR 5.0 (A) [14]. Industrial Revolution 5.0 (B) will be another turning point in human history, where human will move forward to become Homo Bionics (Bionic man) when the body will be loaded by body implants+/- exoskeletons with or without surgical indications & brain implants will be included in another category of Homo Cyborgs i.e., IR 5.0 (C). Homo Augmentus, Bionics & Cyborgs are jointly considered as Homo Intelligentes (Human Plus). Mind/brain uploading in iClouds & their connectivity with the partial/total body exoskeleton will be labeled as Homo Zombies which will be no longer like human & termed as Post-human in IR 6.0. To summarize, IR 4.0, IR 5.0 (A, B & C), and IR 6.0 are termed a Cyber-Physical System (CPS), Augmentus CPS (A-CPS), Bionics Cyber-Physical System (B-CPS), Cyborgs CPS (C-CPS) & Zombies CPS (ZCPS) respectively. Cyber Physical Systems (CPS from A to C) are summed up as Homo Intelligentes CPS (I-CPS) or simply as H-CPS. IR 5.0 subcategories A, B & C will represent Society 5, 6 & 7. To make this point clear this is not compulsory that the number in society & industrial revolutions should correspond with each other, e.g., IR 1.0 represents Society 3.0.

We can exemplify H-CPS by understanding i.e., the fall detection mechanism on an Apple smartwatch to send out an emergency alert, was triggered when 92 years old fell to the ground [15]. Similarly, a smart Implanted Medical Device (IMD) for the elderly after hip replacement, could provide such alerts on the occurrence of adverse events [14,16,17]. The first case is the story of Society 5.0 where Cyber-Physical System is helping people due to AI & the latter case can be exemplified by Society 6.0 (IR 5.0 B) because these are intelligent hip implants. But in Society 4.0, which is not human centric, someone or a patient must call for emergency assistance. The introduction of gadgets subcutaneously for job related work, despite its controversial use, is included in IR 5.0 A. The IR 5.0 C can be exemplified by Neuralink [18]. Prediction about IR 6.0 is too early to comment but our team believes that with the uploading of mind & brain in the iCloud & advancement of total body exoskeletons, the entire technological world will be changed. Men & Machines dancing is moving differently after IR 4.0 which is considered a non-human cyber-physical system. These are men & machines dancing with external sensors followed by internal body & brain sensors in IR 5.0 C (mental & physical dance) and ultimate dancing with the Zombies in IR 6.0.

Conceptual Framework

Pew Research Centre (2016) claimed that majorities of U.S. adults worried about gene editing (68%), brain chips (69%), and synthetic blood (63%). Despite all such studies & researchers are moving forward & new technologies growing faster. The tool never becomes a part of your identity, but an augmentation must be integrated into the user's life as an extension. Therefore, tools can be exemplified by hammers & computer desktops whereas smartphones especially smartwatches are a human augmentation that improves our ability to access information at any time [19]. Augments, extensions & traditional & smart skin or body implants (except intelligent implants) are being used to differentiate them from tools in Homo Augmentus. Intelligent devices/implants are considered an integral part of Homo Bionics & Homo Cyborgs.

Human Enhancement (HE)

Human Enhancement (HE) is defined as "any kind of genetic, biomedical, or pharmaceutical intervention to improve human dispositions, capacities, or well-being, even without any pathology [20]. This is a broader field than human augmentation, covering several disciplines from mechanical to genetic engineering. Simply, this is the use of science and technology to improve bodily functions like pharmaceuticals to boost cognition, the exoskeleton to help body strength, and the BCI to aid in communication speed [21].

Human Augmentation (HA)

Human Augmentation (HA) is f5ocused on creating cognitive and physical improvements as an integral part of the human body [22]. Both terms are being used interchangeably but according to Joosten [21], HA is the use of technology to enhance a person's cognitive and physical performance of their employees in industry, whereas as HE is mostly used in scientific research and government studies Human augmentation is an interdisciplinary field that addresses methods, technologies, and their applications

for enhancing sensing (sensory), action (motor actuation) and/or cognitive (mental) abilities through AI [23]. Another difference between both is, that "augmentation tends to be device-based and temporary, while enhancement may be permanent" which could be exemplified by spectacles & lenses as an augmentation, while laser eye surgery is enhancement. [24]. Brain-computer interfaces (BCI), leading us towards augmented human intelligence [16,25].

Purpose & Techniques of Human Enhancement

Reproductive, biological, and genetic enhancements include embryo selection by preimplantation genetic diagnosis, cytoplasmic transfer, and in vitro-generated gametes. Joosten [21] claimed that we might be able to analyze and edit genes at the embryonic stage (designer babies) as well as in full grown humans (somatic gene therapy) soon.

Physical enhancements include cosmetics (plastic surgery & orthodontics), drug-induced (doping & performance-enhancing drugs), functional (prosthetics & powered exoskeletons), medical implants (pacemaker & neuro-implants) & organ replacements (bionic lenses & eyes), and strength training (weightlifting) & dietary supplement. Exoskeletons to assist in walking or lifting heavy things even in normal healthy people are possible.

Mental (chemical & electronics) enhancements are uses of nootropics, neurostimulation, & supplements that improve mental functions. These pharmaceuticals increase concentration, focus and memory for a couple of hours. Nootropics are often described as "smart" drugs whose aim is to enhance the process of thinking. Computers, mobile phones, & the Internet can also be used to enhance cognitive efficiency. Notable efforts in human augmentation are driven by the interconnected Internet of Things (IoT) devices, including wearable electronics (e.g., augmented reality glasses, smart watches, smart textiles), personal drones, on-body, and in-body nano-networks. Brain-computer interfaces to communicate seamlessly with computers, machines, and maybe even other people [26].

Categories and Dimensions in Human Augmentation

Four categories & three dimensions have been described by researchers [24] but we have added a fourth dimension i.e., creating dimension 4 which is unique & never has been seen in the human body (physiological & anatomical). This division is called the Modified classification of HA/HE Table 1 & 2.

Categories: 1. Sensory/Sens 2. Physical/Action, 3. Cognitive & 4. Social/Communication

Dimensions: 1. Replication 2. Supplementing 3. Exceeding & 4. Creating

Table 1: Categories & Dimensions in HE Based on Modified De Boeck & Vaes (2021) Model.

CATEGORIES	Social	Technologies to enhance Social Interaction (*Olsson, et al.,* 2019)	VR headset to improve work (Wang, 2022)	Smart Necklace to cautions alarm (Hong, 2021)	Zombies as PA/Secretary
	Cognitive	BCI to improve patient memory (*Belkacem, et al.,* 2020)	Machines read the brain at workplace (Velasquez-Manoff, 2020)	Brain implant for Superintelligence (Vandette, 2019)	Zombies navigator
	Physical	Traditional Limbs prosthesis	Exo.sk for lifting load Sarcos Guardian (Oitzman, 2022)	Zapata Flyboard Air (Vandoorne & Bell, 2019)	Zombies soldiers
	Sensory	Traditional Hearing Aids	Aids to detect fall in heart rate (Rich, 2020)	North Pole sensors (Thaddeus-Johns, 2017)	Zombies noxious smelling
		Replication	**Supplement**	**Exceeding**	**Creating**
		DIMENSIONS			

Table 2: SAMR & De Boeck & Vaes Models, IR & Society Relationship.

Human	SAMR Ruben Puentedura (2006)	De Boeck & Vaes (2021)	IR	Society
H. Sapiens* HS Substitution	Tools & Traditional implants	Replication (Tools & Traditional Implants)	4.0	4.0
H. Augmentus^ HA Augmentation	Augments, outer smart, or AI Skin/other Implants	Supplementing (Smart & Skin Implants)	5.0 A	5.0
H. Bionics^ HB Body Modification	Body AI implants	Exceeding (AI Body Implants)	5.0 B	6.0
H. Cyborgs^ HC Mind Modification	Brain AI implants	Exceeding (AI Mind Implants)	5.0 C	7.0
H. Zombies** HZ Redefinition	Brain emulation +exoskeleton	Creating (Brain Emulation+ exoskeleton)	6.0	8.0

Types of Humans

Based on industrial revolutions, three stages (human, human plus & post-human) and five subtypes (H. Sapiens to H. Zombies) are given below.

Human or H Sapiens (real humans): are traditional human beings who were ignorant of smartphone technology till the earlier half of Industrial Revolution 4.0. He was using everything available to him as a tool.

Human Plus, Superhumans, Human, Connected Human 2.0 & Homo Intelelligentes (recognizably human): These are peoples secondary to human augmentation or enhancement & being used interchangeably. People who are recognizably human, but much smarter, stronger, and healthier. We divided into three different sub-types based on literature review i.e., H. Augmentus, H. Bionics & H. Cyborgs & jointly termed as Homo Intelligentes with comprehensive examples in Table 3 with illustrations in Figures 1 & 2.

Table 3: Applications of HE.

Homo Augmentus (Replicating) IR 5.0 A	
Product & Reference	**Purpose**
Naked Prosthetics (Naked Prosthetics, 2019)	Hand prosthetics for finger amputees.
eSight (eSight, 2023)	A wearable device that provides the blind, the ability to see.
Motion Savvy (Tsotsis, 2014)	A platform acting as a personal translator for deafness.
e-Tattoos (Reedy, 2017)	To control smartphones
Smart Wound Bandages (*Jiang, et al.,* 2022)	To detect biomarkers of relevance for the wound-healing process.
Sarcos Guardian (Oitzman, 2022)	Exoskeletons allow a human worker to lift to 200 lbs.
Waverly Labs (Nast, 2021)	Earbuds to translate conversations in real-time, two foreign languages.
HoloLens 2 (Vovk, 2021)	Mixed reality headset from Microsoft to visualize objects in holographic.
Dexcom G6 CGM (Livingston, 2023)	Continuous Glucose Monitoring
Google Glass (Gvora, 2020)	For vision augmentation
Invisibility Cloak (Singh, 2022)	Will Hide You from AI Cameras
Zapata Flyboard Air (Vandoorne & Bell, 2019)	A turbine-powered hoverboard to fly in the air.
Sub-dermal microchips (Manganello, 2019)	Privacy and cybersecurity issues for children's safety for special needs
Homo Bionics (Supplementing) IR 5.0 B	
Nanobot (English, 2020)	The bots deployed to enhance immunity against diseases.
Bioprinting (*Jo, et al.,* 2022)	The 3D printing of organic tissues)
Dissolving cardiac pacemaker (Larkin, 2022)	Dissolving "Smart" Pacemaker Design for Temporary Heart Pacing
Persona IQ (Ballard, n.d.)	Smart Knee Implant
Homo Cyborgs (Exceeding) IR 5.0 C	
Synthetic Memory Chip (Hamilton, 2021)	Installed in the human brain for better memory.
Ted Berger's memory implant Strickland (2016)	Allow interacting with a computer on a neural level.
Hugh Herr (Herr, 2011)	Neuro-implant for Amputee
Synchron's Stentrode (Synchron, n.d.)	Neuro-implant for people with severe paralysis
Cochlear Implants (*Wathour, et al.,* 2019)	Hearing aids are not required
Micro Implant Eye (*Xu, et al.,* 2021)	First Human Results of 256 Channel Intelligent Micro Implant Eye
Bionic Eye Smith (2022)	Restoring hope to many who are unable to see
Machines can read the brain. (Velasquez-Manoff, 2020)	Brains are talking to computers, and computers to brains
Neuralink (Neuralink, n.d.)	High-bandwidth brain-computer interfaces
Superintelligence (Vandette, 2019)	Brain chips give superintelligence
eDura Sreekumar (2015)	For the injured surface of spine/brain

A. Homo Augmentus or Smartian (smart man), people much dependent on smartphones, smart bodies or skin implants secondary to the disease process. This can be further elaborated, in the earlier part of Society 4.0 we will use computers, phones, & other gadgets as a tool whereas in the later part of Society 4 & Society 5.0 these became our temporary body augments/ extensions. These enhanced/augmented humans are termed differently by researchers as Human 2.0, Cyborg, Bionics, & Superhumans. We tried to differentiate them based on technology & possible surgical difficulties. This era is considered as Smart Society 5.0 & earlier part of Industrial Revolution 5.0 & labeled as IR 5.0 A [27,28].

B. Homo Bionics is designed by AI based synthetic implants within the human body except the brain. This will lead us to Bionic Society 6.0 & middle part of Industrial Revolution 5.0 & labelled as IR 5.0

C. Homo Cyborgs (Cyborgs) is an amalgamation of designed (synthetic) and biological body parts (28). Synthetic Society is brain chips and exoskeletons manipulated society [13]. This will be the era of Neuro-Synthetic Society 7.0 & later part of Industrial Revolution 5.0 & labeled as IR 5.0 C

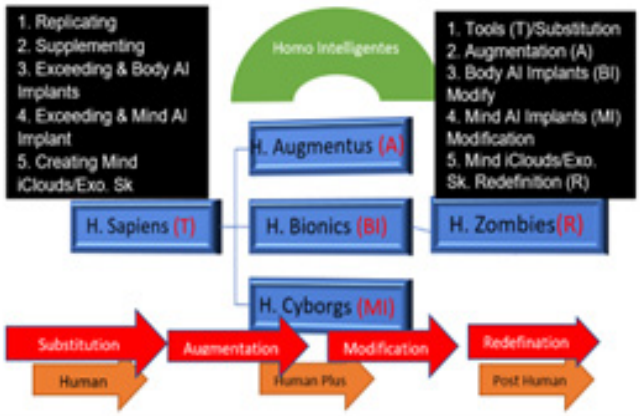

Figure 1: Human, Human Plus & Post Human.

Figure 2: Industrial Revolutions & Societies.

Post-humanity or Homo Zombies (not-recognizably human): They will be No More Human & advancing gene editing through genetic engineering (CRISPR), brain emulsion & total body exoskeletons and AI machine technology may ultimately allow people to become conscious machines i.e., Homo Zombies as per our conceptual framework. Many thinkers worry about ethical & moral values because radical changes will lead to people who will no longer be either physically or psychologically human [29].

Homo Zombies: There is a prediction that the human brain can be uploaded to the I-cloud (brain emulation) & the total body exoskeleton will be available too, if both were connected then the start of Virtuo-Synthetic/Zombies Society 8.0 & Industrial Revolution 6.0, will start. This will be the era of Homo Zombies Society 8.0 with an amalgamation of Robot, Cobot, Cyborg & Bionicbot (Synbot) where the mastermind will be enjoying somewhere to control all including Zombies.

Applications of HE During Industrial Revolution 5.0

Human evolution had undergone radical changes to the shift from Homo erectus to Homo sapiens & technological revolution will change Homo Sapiens to Homo Augmentus [30]. Men & Machines dancing together in Industrial Revolution 5 is the dream of researchers, but this is a layman's terminology & needs further elaboration based on ongoing research & predictions of science & technology futurists. From the moment a human being placed a prosthesis in his body, the contrast between machine and human started to enter a grey area. Nowadays everything is even more confusing when we have virtual and real environments coexisting & the metaverse will contribute to speeding up these revolutions [22]. With advances in brain-computer interfaces, we are approaching augmented human intelligence. But not all forms of human aug-

mentation technology will grant us "superpowers" or "human 2.0." The brain is both the hard drive and the processor to store everything & execute the actions. The heart, however, is the power supply [31]. The technological issue in inserting implants in the body is its compatibility with human tissue as well as battery recharging.

HA & HE Based on De Boeck & Vaes, and SAMR Ruben Puentedura Models

De Boeck & Vaes divided the HA into three subtypes based on performance, i.e., replication, supplantation and exceeding but we added "creating" as the fourth dimension in our framework. Based on technological developments these are named as tools for substitution, augments & extensions for augmentation, body & brain implants for modification & zombies (combination of brain emulation & exoskeletons) are taken as added dimensions i.e., creating/redefinitions [24,32]. Puentedura designed the SAMR (Substitution, Augmentation, Modification, and Redefinition) Model, which categorizes four different degrees of classroom technology integration. The SAMR model, the substitution (by desktops & laptops, etc.), augmentation (by extended versions like smartphones, smartwatches & surgically indicated implants), modification by non-surgically body extensions & mind implants & redefinition through hi-tech technology through whole brain emulation & total body exoskeleton provided the base to design this framework [32].

De Boeck & Vaes Model:

a) Replicating: The first level of human augmentation is replication, i.e., replication of work that an ordinary person can do, i.e., limb prosthesis for amputations due to trauma, congenital or other diseases. H. Augmentus is the representative of this group [24].

b) Supplementing: Supplementing our strength, speed, endurance, and five senses by heavyweight boxing, running faster, higher jump, more endurance, better night vision, tougher, beautification & more attractive. H. Bionics with intelligent knee or hip replacement where mounted sensors will give caution alarm for failure of implants after surgery [14,33].

c) Exceeding: The final level of human augmentation allows humans to exceed normal abilities. Flying & recording dreams through BCI. Neuralink in H. Cyborgs [18,34].

d) Creating: Homo Zombies existed in fictional movies but not in history & this will be another era of industrial revolution with newer functions & abilities. We tried to summarize these 4 categories & dimensions in Table 1 & technology is advancing & overlapping is possible. Table 2 is the summary of both models under discussion. Figures 1 & 2 is the summary of the overall conceptual framework.

SAMR Model (Ruben Puentedura, 2006):

a) Homo Sapiens (wise man) by Substitution: A tool never becomes a part of our identity, but an augmentation must be integrated into the user's life as an extension. Therefore, tools can be exemplified by hammers & computer desktops whereas smartphones especially smartwatches taken as human augmentation which augments our ability to access information at any time (19). Before the start of the first smartphones by IBM in 1992, desktops & laptops were being used as tools but smartphones especially smartwatches led to a new era of human augmentation. Therefore, from the pre-industrial revolution to the first half of Industrial Revolution 4.0, humans were not very dependent on technology and labelled as Homo Sapiens. Traditional prostheses can be placed under the category of substitution just like replication [35,36].

b) Homo Augments/Smartien (Smart Man) by Augmentation: Eggleston of Nokia Bell Labs claimed that human augmentation will not be limited to limb prostheses or surgical intervention to enhance human abilities, but Homo Augments will reach far beyond the confines of the human body [30]. Homo Smartien/Homo Augments can be used interchangeably & included removable extensions like smartwatch, smartphones, smart prosthesis etc., skin implants (external physical) & traditional implants (internal physical) without a smart system i.e., traditional total knee or hip arthroplasty. Homo Augments/Smartien is considered as representative of Industrial Revolution 5.0 A, i.e., Augments Cyber-Physical System (A-CPS). Simply these are removable gadgets preferably with smart functions. In the Homo Smartien, the extensions/augments enhancing individual can easily keep away or remove them after its use, e.g., external physical (smart external fixators) & internal physical like interlocking nails & DCP (smart internal devices) after the union of fractured bones [14]. The latter half of Industrial Revolution 4.0 & upcoming Industrial Revolution 5.0 (Smart Society 5.0) will be the era where humans & machines will dance together with such humans i.e., H. Augments Homo Bionics (Bionic Man) by Body Modification. A smart device is an electronic device connected to other devices or networks via Bluetooth, Zigbee, Wi-Fi, Li Fi, or 5G [37]. Smartness is the ability to act independently by use of computers/phones, but the AI or simple intelligence enables us to imitate or mimic human capabilities [38]. Not necessarily all smart devices are intelligent devices because they can do complex mathematics faster than us due to their memory, storage & programming but they are not smart. Therefore, AI based smart devices which are implanted in the human body other than the brain with or without any pathological indications are considered integral to H. Bionics (Biology & Electronics). predicted such an era as Synthetic Society, we may be termed as a Society 6.0 & IR 5.0 B in our conceptual framework [13].

c) Homo Cyborgs (Altered Man) by Brain Modification: With advances in brain-computer interfaces, we are approaching augmented human intelligence [22]. Neuralink opened another chapter in the technological revolution. A cyborg (Cybernetics & Organism), the term was coined by Manfred Clynes and Nathan S. Kline in 1960 having both organic and biomechatronic body parts together. Bionics and cybernetics have been called the two sides of the same coin, but a cyborg is a human whose brain is connected to a robotic device which is attached to their bodies. They can control this device with their mind. In summary, we termed Bionics if human body implants are connected to robotics devices & Cyborgs if human brain implant relates to such devices. Homo Cyborgs will

lead to Industrial Revolution 5.0 C (Neuro-prosthetic Cyborgs Society 7.0) by implanting brain chips with or without surgical indications [39,40]. Although Dentsu described Synthetic Society 6.0 where brain chips and exoskeletons will manipulate society, in our paperwork, Synthetic Bionics Society 6.0 & Cyborgs Society 7.0 will be described by body & brain implants respectively. O'Reilly described this as "a complex dance" between the mental and physical types [13,41]. Similarly, AI based implants can be used outside or inside the body for cognitive function. They are termed as internal (Neuralink) & external cognitive (Gesture sensors) devices & representative of H. Cyborgs & H. Augmentus respectively. Table 3 Homo Intelligentes & Applications [42,43].

d) Homo Zombies (Post Humanity) by Redefinition: Michio Kaku claimed that there is the possibility of uploading the human brain in iCloud till 2040 & the total body exoskeleton is the dream of transhumanist researchers too [44,45]. If scientists can connect both then the era of post-humanity will start where the human uploaded brain will control the exoskeleton in the absence of a real brain & termed as Homo Zombies. Genetic engineering and machine technology may ultimately allow people to become conscious machines (not recognizably human) at least on the outer look. Genetic editing (CRISPR) is another option that raises the most ethical and moral questions [46-48]. Total body exoskeletons for different causes will be designed for health issues to warheads & termed as Era of Zombies/Virtuo-Synthetic Society 8.0. This society will start destruction in human & humanity despite good indications of exoskeletons. Such technology will start a race where Zombies will be created from Total Body Exoskeleton for targeted missions that may harm one & protect another. Ultimately with an increase in societal entropy with greed for dominance, Industrial Revolution 6.0 leads to massive destruction & perhaps men & machine dance would not be possible. Technological revolutions are difficult to delineate from each other. Every preceding revolution provided the basis for the succeeding industrial revolution. Overlapping is common even though earlier revolutions span centuries compared to ongoing & forthcoming which had a shorter life. Therefore, there are strong possibilities of amalgamation of all such Humans, Human Plus & Post-Human at a given period, but the identification of era will be determined by which type is more dominating compared to the human population at that time.

Artificial Intelligence and Large Language Models: Catalysts for Human Enhancement

Artificial Intelligence (AI) and Large Language Models (LLMs) are revolutionizing human enhancement through the creation of models that push the limits of human interaction and cognition, resulting in promoting the development of "superhuman" abilities. In order to enable efficient human-machine interaction, these powerful systems like OpenAI's GPT series, simulate highly developed human-like thinking, problem solving, and natural language production. LLMs and AI are instruments for enhancing mental capacities within the context of Industry 5.0, offering previously unachievable insights and innovative solutions. In addition to redefining human potential, these AI systems are key to creating a future in which humans and robots work together harmoniously by revolutionizing healthcare, tailored education, and daily jobs. Therefore, a future where people use superhuman intellect and flexibility to succeed in challenging situations can be anticipated by AI-driven augmentation [25,49-52].

Conclusion

Dancing of "Men & Machine" together in Society 5.0 & Industrial Revolution 5.0 is layman's terminology. Literature is full of ongoing current & prospective future technologies. This technological advancement in relation to human enhancement requires scientific evaluation. Ethical issues will arise in the future which may lead to destruction if uncontrolled. To avoid encounters with post-humans like H. Zombies advancement with legislations regarding ethical issues that may arise in the future.

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Conflict of Interest

None.

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