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The Fifth Industrial Revolution: Enlightenment of 5ire towards Industry 5.0

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Abstract: Industry 5.0 is a concept that has been designed to harmonize the working space and efficiency of humans and machines in a consistent manner. Enabled by a variety of emerging applications and supporting technologies, Industry 5.0 is expected to increase manufacturing production and customer satisfaction. In this work, we presented our thoughts on supporting technologies and potential applications of Industry 5.0. We started this work by providing the description of some concepts of Industry 5.0 from the perspective of both industrial and academic communities and try to present the thoughts of the 5ire founders' towards 5IR and SDG2030.

1. Introduction:

The term Industrial Revolution was used by the 19th century economic historian Arnold Toynbee to describe Britain's economic development from 1760 to 1840. An industrial revolution has two components (*Creation of new technology* and *Change in production brought about by the technology*). Each time a new technology is created, the manufacturing process ratchets up a notch. As the revolutions become more complicated, multiple new technologies are discovered, and the process accelerates. The first revolution mechanized the textile industry. The second industrial revolution gave us the assembly line, high volume industrial production and high mass consumption. The third allowed information to be captured in digital format and to be cost-effectively transformed, manipulated and transmitted. The fourth industrial revolution has provided us with robotics, artificial intelligence, augmented reality, and virtual reality. The fifth is to strike a balance between machine and human engagement. The fifth industrial revolution has the potential to initiate a new socio-economic era that closes the gaps between the "top" and the "bottom," creating infinite opportunities for humanity, and for a better planet. In contrast to trends in the fourth industrial revolution toward dehumanization, technology, and innovation, best practices need to be bent back toward the service of humanity. We are trying to make 5ire as a gateway to the smooth transitioning of the world from 4IR to 5IR.

2. Key drivers of Industry 5.0

5ire believes that, IR 5.0 focuses on stakeholder value rather than shareholder value, reinforcing the industry's role and contribution to society. Below are the key drivers of IR 5.0 (as shown in *figure* 1)

- *Human-centric:* Human ingenuity and craftsmanship are combined with the speed, efficiency, and consistency of robots in IR 5.0. Thus it promotes human empowerment, talent, and diversity.

- *Sustainability:* Additive manufacturing, often known as 3D printing, is one of the most notable elements of IR 5.0, and it is used to make manufacturing items more sustainable. In IR 5.0, additive manufacturing aimed to improve customer happiness by incorporating benefits into goods and services.
- *Resilient:* The term "resilience" refers to the necessity to improve industrial production's robustness. High resilience can be attained when humans and robots operate together.
- *Reduced cost and environmental control:* Climate, humidity, temperature, and energy usage are all monitored in real-time and predicted using smart, networked sensors and specialized algorithms. This is especially beneficial in farms that are highly dependent on the weather. Knowing what to expect and where to act might help to avoid costly mistakes and boost the output.

Figure 1: *Key drivers of IR 5.0*

We, the 5ire team, always focus on sustainability and environmental friendly business operation where our business revolution consist with high resilience and cooperation of humans and AI to achieve SDG2030. Notably, 5ire rewards its validators & customers for taking sustainable actions.

5ireChain is a fifth-generation blockchain that aims to bring a paradigm shift from a for-profit to a for-benefit economy. 5ireChain is on a mission to cater to the never-before solved the problem of sustainability, and create a platform to transform the businesses from the current Industry 4.0 to Industry 5.0 where businesses act as a force for good; and profits & benefits co-exist. 5ireChain intends to be the leading blockchain ecosystem to solve sustainability issues with its core technology, "Proof of 5ire", which integrates sustainability & social impact at the consensus mechanism level by economically rewarding companies for their sustainable practices.

3. Comparison of IR 4.0 and 5.0

To better understand and visualize the benefits of IR 5.0, it's important to comprehend and see the differences between IR 4.0 and 5.0. Table below summarizes the comparison between IR 4.0 and 5.0 so that organizations could leverage the benefits of IR 5.0.

Industry 4.0	Industry 5.0
The goal is to automate processes.	The goal is to strike a balance between machine and human engagement.
The most crucial factor was technology.	The most crucial collaboration is between people and robots.
The entire environment is virtual.	The shift back to the real world.
As new smart technologies were adopted, the number of personnel was reduced.	An increase in the number of people who come into contact with machines.
Machines that are smarter and more linked to the workplace.	Cognitive computers and human intelligence are being combined.
There is no way to personalize or customize the product.	Personalization and customization are available, allowing each product to be improved and tailored to the needs of the person.
It's still tossing back and forth between renewable and non-renewable energy sources.	It is more environmentally friendly since renewable energy sources will be used more often.

4. Prospective shift towards Industry 5.0 ecosystem

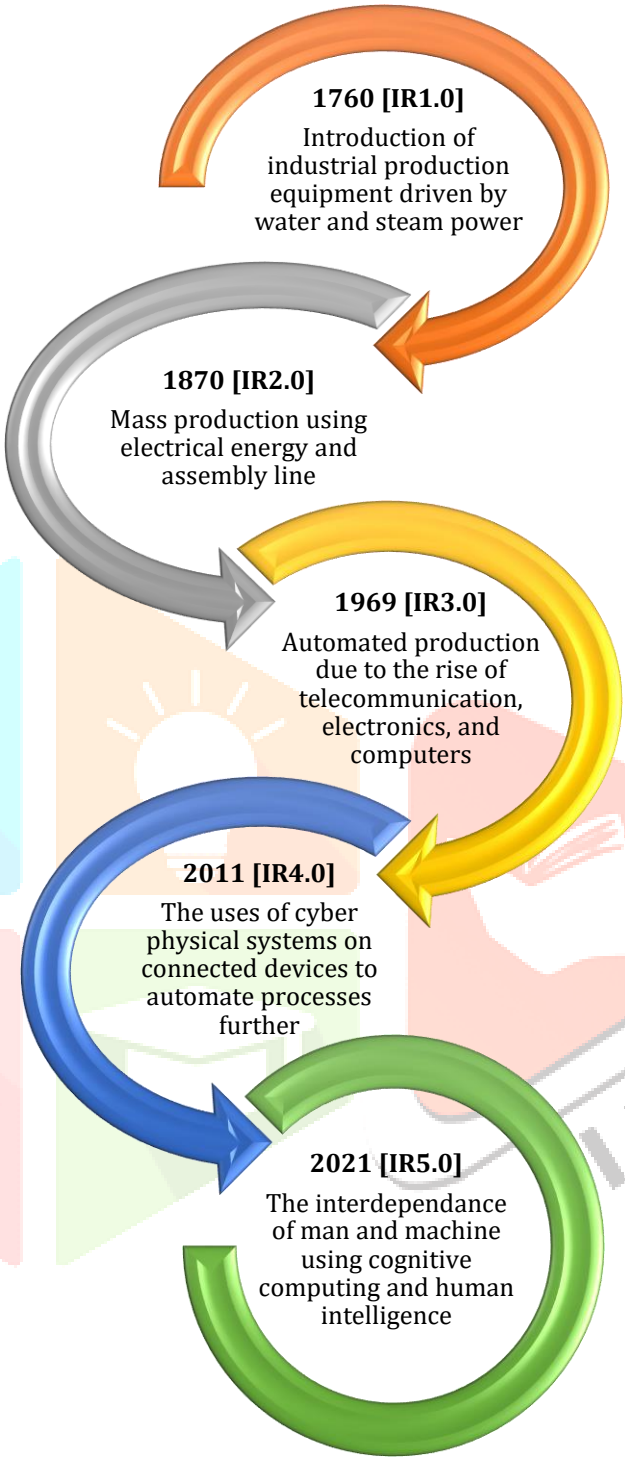

Figure 2: *Prospective shift towards Industry 5.0 ecosystem*

5. Industry 5.0 Potentials, Challenges and Future Directions

Potentials Industry 5.0 Applications	Challenges							Future Directions					
	Data Security	Skilled Workforce	Regulatory compliance	Privacy Preserving Transactions	AM Scaling	Scalability	Human Robot Coworking	Blockchain	Continuous Training	Human-Machine CO-working Policies	Cognitive Edge	Global Industry Standard	Quantum Computing
Digital Drug	□	□	□	□	□	×	□	□	□	□	□	□	□
Fusion Energy	□	□	□	□	□	×	□	□	□	□	□	□	□
Personalized Covid Therapy	□	□	□	□	□	×	□	□	□	□	□	□	□
Innovation Ecosystem	□	□	□	□	×	□	□	□	□	□	□	□	□
Intelligent Traffic	□	□	□	□	□	□	□	□	□	□	□	□	□
Smart Fashion	□	□	□	□	□	□	□	□	□	□	□	□	□
Green Ecology	□	□	□	□	□	□	□	□	□	□	□	□	□
Smart Factory	□	□	□	□	□	□	□	□	□	□	□	□	□

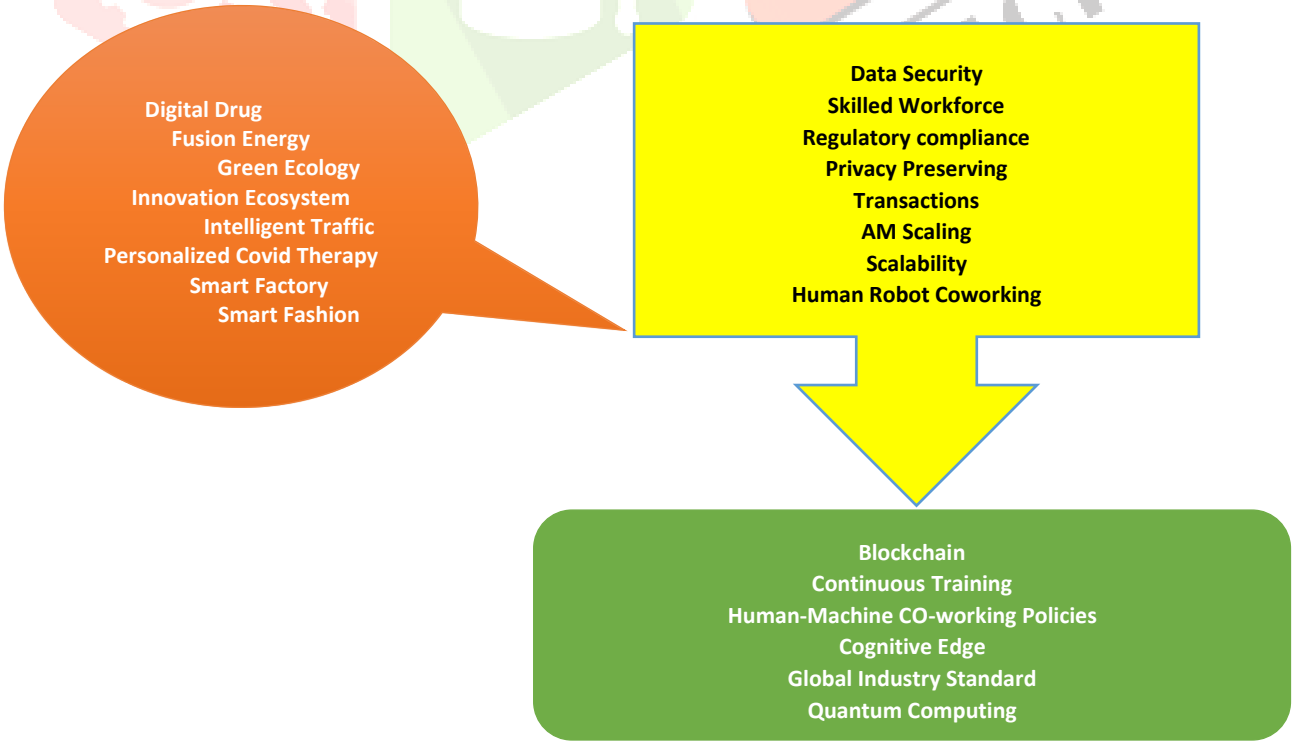

Figure 3: *5ire Enlightenment towards Industry 5.0*

6. 5irechain technology and Industry 5.0

Blockchain technology can offer significant value additions in future Industry 5.0. Centralized management of a large number of heterogeneous connected devices in Industry 5.0 is a critical challenge. Blockchain can be used to design decentralized and distributed management platforms by enabling distributed trust. The immutable ledger supports operational transparency and accountability for the significant events in Industry 5.0 applications. Especially, transparency is important for the dispute resolution in Industry 5.0 ecosystem. The smart contracts can be used for security enforcement, such as authentication as well as automated service-oriented actions of the future Industry 5.0 applications. Also, a higher level of protection for data and transactions can be offered by using a compartmentalized and distributed approach using blockchains.

5irechain technology has the potential to provide significant value to IR 5.0 in the future. In IR 5.0, centralized administration of a high number of heterogeneous linked devices is a major difficulty. By enabling distributed trust, 5irechain technology may be utilized to construct decentralized and distributed management solutions. For effective subscriber management in IR 5.0, 5irechain technology may be utilized to generate digital identities for various persons and businesses. It's required for access management and authentication of stakeholders in any industrial activity that takes place via the internet. Additionally, these digital identities may be used to manage properties, belongings, items, and services. 5irechain technology may also be used to catalog and save original work and register IP rights. By automating the agreement procedures between diverse parties, 5irechain technology can also assist to automate the contractual process.

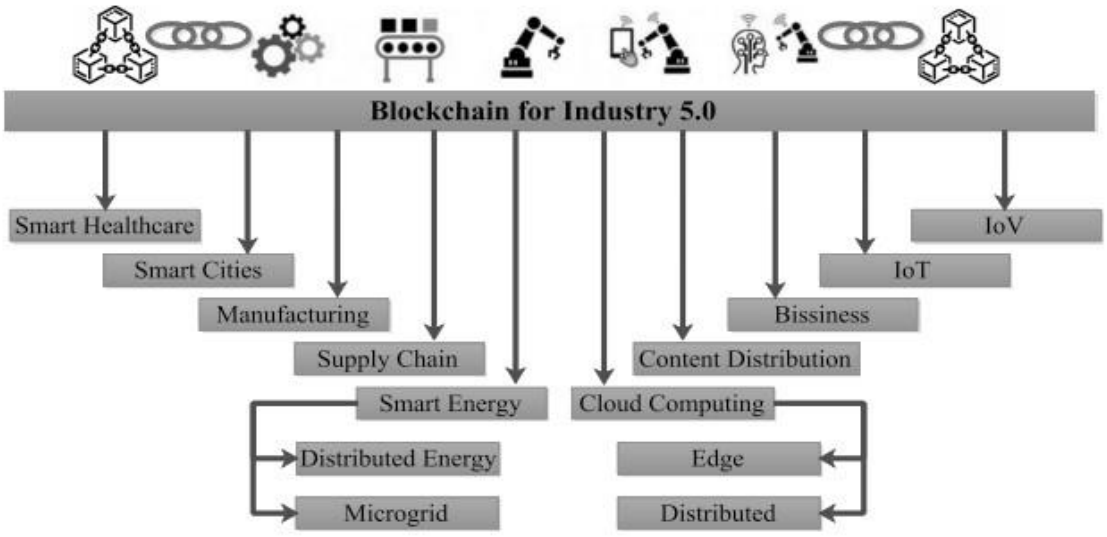

Figure 4: *Categorization of 5irechain Blockchain Applications in Industry 5.0*

7. Industry 5.0 primers and its convergence with 5irechain technology

Limitations in Industry 4.0	Solutions with 5irechain technology in Industry 5.0
Leaves all the work to the user to generate the best experience for themselves	Immutable ledger of networked data and control process to streamline the industrial processes
Administrative access is limited to a single party which increases data tempering and misplaced control	Only insertion is allowed which prevents tempering and ensure transparency
Replaces barriers in network locations with an increase in cobot communication to yield more productivity	Increased access control is guaranteed
Not customized as per personal needs	Allow hyper-customization at large scale by ensuring data privacy using 5irechain technology
Customer experience (as an End goal) often ignored	Trusted and auditable customer oriented solution

8. Conclusion

5ire is a blockchain ecosystem that brings forth sustainability, technology & innovation to build the fifth industrial revolution. The mission of the 5ire ecosystem is to embed the for-benefit paradigm at the heart of blockchain, by highly incentivizing practices that align with the United Nations Sustainable Development Goals (SDGs), therefore facilitating the transition from the 4IR to 5IR. 5ire assures openness, unity of purpose, and inclusivity. Thus, shaping the ethics of business and collaborations toward sustainability while providing a cross-chain environment as well as advanced governance and rewarding mechanisms for participants.

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