Control System of Multitasking Interactions between Society 5.0 and Industry 5.0: A Conceptual Introduction & Its Applications

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Abstract. The basic concept of control system of multitasking interactions between Society 5.0 and Industry 5.0 (MISI-5.5) is presented in order to have a critical thinking or expert thinking for facing a current complex life of man on earth. The integration of internet of things (IoT), big data (BD), and artificial intelligence (AI) associated with living (L), mobility (M), and working (W) of a person on earth was derived based on their unseparated links in the language of a couple three differential equation particularly from the wisdom extracted according to the knowledge and understanding of current sophisticated nanotechnology system.

Finally, the relationship between control system and its feedback can be easily formulated in a matrix system so that the whole big picture of such multitasking interactions is obviously understandable. The impacts of this work are applicable to various actions and reactions in many different fields such as herbal medicines, airplanes, robots, birds, animals, or human being because of its fundamental contribution.

1. Introduction

Expanding the knowledge and understanding is a crucial part of improving life of human being from simple activity to a more complex and effective as well as productive life. In improving scientific and technological advances, breakthrough scientific research and engineering are the key point. These attractive fields of study are truly supported by excellence collaboration between either scientists and senior engineers/technicians particularly on nanoscience and nanotechnology or interdisciplinary researchers [1-3] sustained by experts from mathematics or applied mathematics [4,5]. Deeply
searching from such universe behaviours, this conceptual letter provides a simple, accurate, obvious, and very important or precise thought namely as SAOVI thinking to face current world wide interactions of society 5.0 and industry 5.0, of course by proposing a creative and fruitful concept to improve our coming sophisticated generation with a better multitasking work due to effective and productive life as well as light burden of man.

Based on the history of earthly society and their industry output [1-27] extracted and identified using traditional life from year 1780 in the late of 18th century to ~ 1870 in 19th century to automate life in about 100 years after that up to both modern industry and digitalization society in this 21st century, the improvement of society knowledge and understanding can marvellously top up the mobility (M) of people on earth with more effective transportation technology as well as important big data (BD) transfer and share of a nation to another nation widely spread. Such smart system was labelled as society 1.0, society 2.0, society 3.0 and so forth following by its industry system of industry 1.0, industry 2.0, et cetera. Recently, the most advanced country who firstly was aware to prepare and implement society 5.0 is Japan. While Germany with breakthrough country system of industry 4.0 had made their ~70 excellent companies rank among the whole world 300 best remarkable companies. In addition, the United State of America (USA) with their pioneering system of internet of things (IoT) and artificial intelligent (AI) has generated many modern countries to prepare their security improvement from unpredictable disasters in recent unstable nature of earth due to many broken forests and environments due to wild fires of climate changes of earthly temperature increase and industrial CO/CO$_2$ gasses products.

In this main work, an idea with detail illustration and explanation is shown through a broad concept to explain multitasking interactions between Society 5.0 and Industry 5.0 (MISI-5.5) by inserting a critical thinking or expert thinking which is slightly higher level than critical thought from math [4,5,26,28] and physics background of nanoscience and nanotechnology [1-3, 6-25] for facing a current complicated life and characters of human being in the world.

2. Results and Discussion

The integration of internet of things (IoT), big data (BD), and artificial intelligence (AI) associated with living (L), mobility (M), and working (W) of a person on earth was derived based on their closed links in the language of a couple three differential equation particularly from the heavenly wisdom extracted from the knowledge and understanding of current sophisticated hybrid control system in math and nanotechnology system as depicted in Fig. 1. Fig. 1 shows a basic concept of control system of multitasking interactions between Society 5.0 and Industry 5.0 (MISI-5.5). It is like an electron that climbs higher states in 2D quantum well device. When the energy of the electron is not high enough to move up, it will then go down step by step in its lower states by emitting radiation such as photoluminescence. The top side of Fig. 1 depicts the control system of MISI-5.5. The control system itself was divided into few parts starting from reference input, following by controller, actuator, and process, and then sensor, and feedback control system before the final stage of actual output [4,5] and it closely links with the idea of multi-agent systems [28] in conjunction with multitasking physics [7,8,10] of MISI-5.5 with various applications in herbal medicines, airplanes, robots, birds, animals, or human being.
Figure 1. A basic concept of control system of multitasking interactions between Society 5.0 and Industry 5.0 (MISI-5.5). IoT is the acronym of internet of things. While BD and AI are big data, and artificial intelligence, respectively. The top side of the scientific illustration is the flow of low order thinking to high order thinking that shows the state of human life. While the bottom part describes the control system of MISI-5.5.

In order to figure out such MISI-5.5 physically and mathematically, Fig. 2 shows how a daily life of modern human being characters in this 21st century especially closely related to their living (L), mobility (M), and working (W) in conjunction with the main three output parameters of IoT, BD, and AI. The right side of Fig. 2 are three examples of the multitasking physical system in a RLC circuit,
nanofibers [7,8] with three different structures and nanomedicine [10-12]. On the other hand, the left side of the figure identifies the general picture of MISI-5.5. Learning from basic electronic circuits of RLC circuit, one extracts eq. (1) with the control input of \( V_i(t) \) connected to the output adjustment of \( C \) voltage as follows:

\[
L \frac{di(t)}{dt} + R i(t) + \frac{1}{C} \int_0^t i(\tau) d\tau = V_i(t).
\]  

(1)

Similarly, the three different structures in a nanofiber as well as a nanomedicine with three different substances as depicted in Fig. 2 exhibit a harmonic oscillation with differential equation and its three possible solutions with and without time parameter [7,8] are written in Eq. (2), equations (3), Eq. (4), and equations (5).

For 1D case:

\[
\frac{d^2 x(t)}{dt^2} + (\omega)^2 x(t) = 0, \quad \omega = \sqrt{\frac{k}{m}}, \text{ and } \phi \text{ is the phase of wave},
\]

(2)

and its three possibility of solutions as follows

\[
x(t) = A \cos(\omega t + \phi),
\]

(3a)

\[
x(t) = B \sin(\omega t + \phi), \text{ and}
\]

(3b)

\[
x(t) = A e^{-i\omega t} + B e^{i\omega t}.
\]

(3c)

For 2D case (or 1D with in 1D space and time):

\[
\frac{\partial^2 \psi(x,t)}{\partial t^2} + (\omega)^2 \psi(x,t) = 0,
\]

(4)

with its possible solutions in Eq. (5a), Eq. (5b), and Eq. (5c).

\[
\psi(x,t) = A \cos(\omega t + kx),
\]

(5a)

\[
\psi(x,t) = B \sin(\omega t + kx), \text{ and}
\]

(5b)

\[
\psi(x,t) = A e^{-i(\omega t+kx)} + B e^{i(\omega t+kx)}.
\]

(5c)

Learning from the above mentioned explanations, one can then extract the connections and its solution for L, M, and W associated with the main three output parameters of IoT, BD, and AI based on the contents of low order thinking (\( y_1 \)), critical thought (\( y_5 \)), high order thinking (\( y_9 \)), knowledge & comprehension (\( y_2 \)), remember & understand (\( y_3 \)), application & analysis (\( y_4 \)), apply & analyze (\( y_6 \)), synthesis & evaluation (\( y_7 \)), and create & evaluate (\( y_8 \)) as partly depicted in Fig. 2 and briefly described in Eq. (6).

\[
\begin{bmatrix}
  y_1 & y_2 & y_3 & L \\
  y_4 & y_5 & y_6 & M \\
  y_7 & y_8 & y_9 & W
\end{bmatrix}
= \begin{bmatrix}
  \text{IoT} \\
  \text{BD} \\
  \text{AI}
\end{bmatrix}, \text{ or}
\]

(6)

\[
\begin{bmatrix}
  \text{low order thinking} & \text{knowledge & comprehension} & \text{remember & understand} \\
  \text{application & analysis} & \text{critical thought} & \text{apply & analyze} \\
  \text{synthesis & evaluation} & \text{create & evaluate} & \text{high order thinking}
\end{bmatrix}
= \begin{bmatrix}
  L \\
  M \\
  W
\end{bmatrix}
= \begin{bmatrix}
  \text{IoT} \\
  \text{BD} \\
  \text{AI}
\end{bmatrix}, \text{ or}
\]

(6)

Low order thinking * (L) + knowledge & comprehension * (M) + remember & understand * (W) = IoT

application & analysis * (L) + critical thought * (M) + apply & analyze * (W) = BD

synthesis & evaluation * (L) + create & evaluate * (M) + high order thinking * (W) = AI
Figure 2. MISI-5.5 explained through a daily current human being of their living (L), mobility (M), and working (W) in conjunction with the main three output parameters of IoT, BD, and AI. The right side are three examples of the multitasking physical system in a RLC circuit, nanofibers [7,8] with three different structures and nanomedicine [10-12] with three different substances, respectively. \( \omega_3 \) is the internal frequency mainly contributed in the system of (b) and (c). In addition, the diagonal axis of the 3x3 matrix in the inset with components of \( y_1 \), \( y_5 \), and \( y_9 \) stand for low order thinking, critical thought, and high order thinking, respectively, \( y_2 \), and \( y_3 \) are knowledge & comprehension, and remember & understand, respectively. \( y_4 \), and \( y_6 \) are application & analysis, and apply & analyze, respectively. Lastly, \( y_7 \), and \( y_8 \) are synthesis & evaluation, and create & evaluate, respectively.
Figure 3 (a). Critical thinking of MISI-5.5 was started by wave interactions in one integrated system like a bread divided into 3 pieces. All the 3 pieces bread has the same taste even they have different solution of wave function. Such illustration is exactly like human being soul in conjunction with ratio, feeling and brawn (body). (b) In reality, for instance: a mark “y” happened on the front part of laboratory building during a devastated earthquake in Ambon island, Maluku province, Indonesia on 26th September 2019 at ~8:46 am with the magnitude of 6.8 RC.

Fig. 3 shows how the MISI-5.5 is illustrated in wave possible solutions as the impact of motion or interactions. This scientific image is exactly like the character of human being with soul is in the center in conjunction with ratio, feeling and brawn. This was firstly written in Holy Bible on the 26th book of Ezekiel in chapter 37 verses 1 to 14 about 600 years before Jesus Christ was born on earth on 6th January 5 BC [27]. Such information was confirmed in Ref. [27] on another book of Hebrews
especially in chapter 8 verses 10 to 11, and chapter 10 verses 16 to 18. Figure 3(b) proves an evident of an earthquake was controlled on target by a supranatural work of Almighty GOD (YaHWeH in Hebrews). Such mystery of control and feedbacks need further study by involving many aspects of learning based on ratio that obeys the truth called as faith. This is because supraratio could not be detected by the ratio of man.

3. Conclusions
In conclusion, a SAOVI conceptual explanation of control and feedback of MISI-5.5 has been presented in such a way so that all readers including ordinary people are able to catch it according to their number of talents. We obtained that MISI-5.5 depends on the quality of IoT, BD, and AI associated with $L$, $M$, and $W$. While the control and its feeds back are dependable on low order thinking ($y_1$), critical thought ($y_3$), high order thinking ($y_9$), knowledge & comprehension ($y_2$), remember & understand ($y_3$), application & analysis ($y_4$), apply & analyze ($y_6$), synthesis & evaluation ($y_7$), and create & evaluate ($y_8$). This conceptual contribution is useful to make social 5.0 and industry 5.0 more effective and simple as well as full of productive activities.

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