Cognitive and sociocultural aspects of robotized technology: innovative processes of adaptation

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Absract. The paper dwells upon interaction between socio-cultural phenomena and cognitive characteristics of robotized technology. The interdisciplinary approach was employed in order to cast light on the manifold and multilevel identity of scientific advance in terms of robotized technology within the mental realm. Analyzing robotized technology from the viewpoint of its significance for the modern society is one of the upcoming trends in the contemporary scientific realm. The robots under production are capable of interacting with people; this results in a growing necessity for the studies on social status of robotized technological items. Socio-cultural aspect of cognitive robotized technology is reflected in the fact that the nature becomes 'aware' of itself via human brain, a human being tends to strives for perfection in their intellectual and moral dimensions.

1. Introduction

Within this framework, the viewpoint analysis is argued to be significant, as well as the multidisciplinary approach to the issue of robotized technology and the general outline for the development prospects of the latter.

Relying on the determinist perspective, the present paper strives:

1) to define the theoretical and methodological background of robotized technology phenomenon;
2) to state the chief developmental paths for robotized technology within the social environment taking into account robot vs. human interactive processes and the application sphere.

The 21st century scientific and technologic standards stipulate the existence of a certain communicational space that allows to adjust robotized technology to a human's abilities [1]. In spite of the fact that robotized technology system involves mainly automated digital items, it is still able to compensate the deficiency of natural human capabilities, which bears axiological significance of manmade civilization.

Cognitive robotized technology allows mitigating man-power deficiency. Artificial intelligence plays a significant role in the formation and development of robotized technology realm, the former generating a new status of the latter via synthesizing robotized technology with cognitive robotized technology.

The aim of the present research is to analyze the socio-cultural aspect of the cognitive robotized technology. The aforementioned aim implies the formulation of numerous objectives, namely:

1) analyzing the essence of cognitive robotized technology as a system of robot vs. human interaction within a social environment for purposes;
2) exploring the socio-cultural aspect of robot vs. human interaction.

Aims and objectives were reached by means of socio-cultural method and cognitive approach. Socio-cultural method implies analyzing society as a single entity of culture and humankind social relations, while a single individual is understood to be a micro-system of culture and relationship, as well as an amalgamation of social values and norms. In turn, cognitive approach implies taking into consideration the importance of knowledge for better understanding of human behavioral patterns.
Besides, synergetic and analytical methods have been employed, as well as the competence-based approach to the analysis of robotized technology as one of the most important issues in the sphere of social engineering.

2. Cognitive and sociocultural factors of robotized technology as the innovation

From the standpoint of the cognitive approach, robot presents an epistemological model. Being a product of the social construction process, epistemological robotic models are to a certain extent the replicas of human consciousness and activity. Robotized technology in cognitive realm integrates the epistemological characteristics into socio-cultural values.

The coordination of epistemological and socio-cultural factors provides the society with multidimensionality of cognitive robotized technology, that is, while analyzing the essence of cognitive robotized technology, we observe a convincing contrast between descriptive and analytical methods and research tools [2].

Modern cognitive robotic models allow us to figure out the mechanisms of their production following worldview systems and scientific traditions, which stimulates the revelation of the new values [3].

The worldview level of technical knowledge predetermines the cognitive context of robotized technology production processes. It is the worldview ideas that guide the processes of research, outlining, and construction within the sphere of artificial intelligence and cognitive robotized technology.

The emerging robotic science possesses the whole framework of diverse conceptual, cognitive, and sociocultural systems, which contributed to the identification of prerequisites for the establishment of cognitive robotized technology. The mentioned prerequisites have been integrated into a cohesive systemic unity of the numerous axiological and cognitive factors.

Cognitive and socio-cultural factors of robotized technology advance predetermine the background and dimensionality for the ways artificial intelligence works. It is impossible to ignore the importance of sociocultural factors (including worldview systems) since they have managed to remove the impediments on the way of non-standard scientific novelties [4].

The sociocultural factors had their influence on cognitive factors (including IT, math, engineering, etc.) and served as the basis for the genesis of new knowledge. Human beings consider themselves to be the highest value of culture; such position bears the name of anthropocentric. This fact heightens man’s interest in the production of thinking self-organizing machines – as humankind assumes that they create gnostic technologic methods capable of transforming the world in full compliance with man’s desire for environmental changes [5].

Robotized technology is characterized by being oriented towards conservation and sustainable development of intra- and extra-scientific factors that increase the ideological importance of the role the robotized technology plays in scientific advance, educational and manufacturing processes, as well as in the growing social awareness.

Throughout the increasing development of cognitive and humanities, the revision of interdisciplinary approaches to progressive scientific changes takes place. It allows researchers to reconstruct the changes taking into account interdependent cognitive and socio-cultural aspects. In the course of ongoing research, it has been attempted to analyze the multidimensional identity of the interaction between socio-cultural and cognitive factors within the realm of robotized technology advance [6].

Technologic advance provides an opportunity to produce robots capable of solving problems beyond human capacity, which results in the appearance of new and profound prospects for human activity development and improvement.

However, in order to realize these prospects it is required to re-consider the personal factor within society and social foundations.

Performance management for the development of robotized technology (especially in its cognitive branch) should be aimed at innovations in general and getting the staff prepared for the introduction of innovative technologies in particular.

Considering the prospects for the robotized technology development, it should be noted that there exist high risks in the sphere of its implementation from socio-cultural viewpoint. To benefit from the introduction of expensive high-tech robotized technology items and to commensurate with the costs of their production, it is necessary to analyze the indicators, which will stipulate the maximum profit.

While considering the prospects of high-tech robotic technology, it is necessary to carry out analysis of current social and scientific trends. The ensuing outcome will foster further anticipation and predict of social relations transformation.

Sociocultural aspect in cognitive robotized technology reflects the framework of a particular culture. Socio-cultural content owes its significance to scientific, educational, and production tasks, as well as to developmental problems. Such an event results in certain psychic transformation; the development of awareness- and knowledge-based personal qualities begins to take place.

Sociocultural content robotics contributes to the formation of human culture through the formation of social and cultural awareness, as well as by means of conscious approach to robotics. This is a major scientific and educational target in conjunction with developing a person's readiness to soak up the technologic innovations. Therefore, the socio-cultural component becomes a prioritized field of tech advance [7]. The socio cultural factors identity depends on clear understanding of modern society problems.

Social and cultural factor – in order to activate the ideological triggers of the man vs. robot interaction – strives for the familiarization of robotics, the formation of the up-to-date' mentality within the field of science and technology, the promotion of cultural, technical, and socio-cultural enlightenment.

Socio-cultural approach provides information about society, cultural phenomena in various stages of social development. Still, there exists a downside to the impact of socio-cultural factors, which is expressed in a distorted ideological standpoint of society: the social image remains unrealistic; it is to a certain extent idealized – being a result of abstraction and idealization.

During the image formation process, the phenomenon of emerges–resulting in a recurring stereotype, which is becoming increasingly typical for a robotic model. This model only partially reflects the social culture being in a way static, for it includes a set of current and prior knowledge, art, morality, law, etc. [8].

Humankind employs a cognitive model in order to acquire and develop the basic and supplementary expertise. The adjustment to the social culture, to the social reality, and to the social environment serves as the basis for different approaches to socio-cultural component of technical education(including robotized technology).

The ethnographic orientation of socio-cultural approach is to be expressed by means of describing social culture and various ethnic groups demand for modern robotics, as well as the nature of these requirements implementation [9]. The social agent serves as a simulation model, a sort of ideal for creating robotic models capable of meeting the needs of this or that nationality. The purpose of education in robotics is to adapt human beings to the real-life socio-cultural norms of human society.

The pragmatic aspect of sociocultural method concerning the production of robotic devices must be oriented towards understanding of contemporary developmental processes in the field of manufacturing, science, education, which requires the development of completely automated robotics– due to the ongoing formation of IT-domineering society and digital reality [10]. The modern conception of social / cultural impact on the nature of robotics under production implies dialogue-

oriented approach based on national, climatic, and other needs of the people [11]. This trend of socio-cultural methodology bears the name of analytical method based on comparative techniques with a special focus on the cultures and culture vs. robotics juxtaposing.

However, civilization is multicultural [12]. Thus, technology – including robotics – can be regarded as a system of multicultural and universal values. For a deeper understanding of cognitive robotized technology, it is necessary to study culture and diverse tech systems. It is strongly recommended that cultural studies, communication theory, and mental pictures become the subject-matter of the research.

Comparative analysis of socio-cultural approach states multiculturalism as its chief postulate. In this respect, great significance role might be attributed to robotic models produced by means of socio-cultural method, since it is cognitive robotics that is capable of transferring information to a single individual and of disseminating it to the public through the prism of cultural image of an event and shaped other-culture' images.

Sociocultural aspect of cognitive robotics lies in the fact that with the help of a robotic model the new cultural reality emerges. As a result, the processes of socialization and cultural self-determination are triggered by means of cognitive robotized technology. Understanding cultural identity and understanding of cultural unity are outstandingly important. People begin to identify themselves as members of society, as they become integrated into technical systems being the results of human intellectual activities(i.e., cognitive robotics, thinking machines, artificial intelligence in general). While choosing an aspect for socio-cultural robotic model it is important to consider interrelated and interacting factors of different cultures, as well as the integration of cultures into the global sociocultural space. Sociocultural content is the basis of communication practice where one cognitive robotics acts as one of the agents [13].

Cognitive robotics – serving as the subject of the communication space and practice – allows us to compare and interpret our attitude to cultural values. It is necessary to classify the sociocultural principles of cognitive robotics. The authors distinguish the following principles [14]: accessibility; universality; efficiency.

Cognitive robotics systems must be available to users, the latter being the stakeholders of communicative space. Socio-cultural aspect of the robot vs. human vs. society communication content may become available in case of robotized systems control language becoming a universal language of communication – clear, discernible and understandable for any subject within social and cultural space [8].

The principle of cognitive robotics efficiency implies the presence of robotic-triggered essential achievements within the spheres of science, education, and manufacturing. Besides, the mentioned achievements must significantly exceed the previous results and allow the world to increase the rating of this particular subject / enterprise.

Sociocultural aspect of cognitive robotic systems presupposes the presence of two forms of human interaction within the space communication socio-cultural space [9], namely [15]:

1) explicit socio-cultural content. It manifests itself through legible / audible texts that dwell upon the socio-cultural events, phenomena, or actions.
2) implicit socio-cultural content that is supplied in the form of thesaurus, video- and audio products of mass culture, dialogues, monologues, advertisements, etc.

These forms of cooperation are complementary (interrelated), yet, quite autonomous (independent). Socio-cultural aspect of cognitive robotics, expressed in the aforementioned forms, is closely connected with the processes taking place in people's lives. Global evolutionism is one of those processes; the global evolutionism in cognitive robotics is understood not only as awareness of various branches of science, but also as the integration of explicit and implicit socio-cultural content forms.

Additionally, improvement of methods and search for evolutionary robotics pathways can also be regarded as a certain reflection of the global evolutionism within the frame of cognitive robotics [16].

Global evolutionism tends to solve the problem of integrating sociocultural technologies into information technologies via searching the scientific / technical / engineering solution to the problem of producing and promoting cognitive robotics.

One can argue that current estimates of global evolutionism in robotics are incomplete and serve as a lame alternative [17]. Yet, the concept of global evolutionism can be considered to be methodological base, man vs. society integration process, and the robotic models per se.

The paradigm of global evolutionism predetermined the necessity to understand the processes of formation of IT society. The paradigm is regarded as man-centered one. In the context of cognitive robotized technology, the problem of understanding the world per se remains unsolved, as well as the problem of understanding society and its tech-tools – including robots.

The modern relations concerning information exchange have no final completeness, and the interactions between the social systems included in network more often have unsystematic character. The situation becomes complicated by the fact that the complexity of processing of continuously increasing volume of information resources causes the emergence of a number of the specific problems determined by the information redundancy.

It should be noted that during the present period the problem of redundancy of information acquired the special scale that dictates the necessity for further strengthening of intensity of their interactions. In general, the process of the creation of system links in the information space is caused by a large number of the phenomena of self-organization that is typical for difficult systems of a high level of uncertainty.

At the registration of structural links there is the widest range of possible trajectories of system's development that confirms the importance of the choice with the system of communications' method in the information space.

One more problem caused by the formation of a global information space is the emergence of the whole range of non-canonical, informal communications of the systems complicating the management and coordination of the processes of interaction in the network. These communications are formed owing to a combination of the mass phenomena of self-organization and imperfections of the arising network structures [18]. Thus, it is obvious that the modern situation is characterized by the registration of network structures based on active information exchanges that attracts the emergence of a number of the specific questions demanding for the solution of new innovative approaches.

Concerning social systems this principle causes the amplifying tendency to association of the systems of different complexity and the nature which are characterized by own specifics [19]. As a result, the complex structures are formed representing the global networks which are characterized by the presence of the maximum adaptation opportunities both at each participant, and at all structure.

One of the most significant manifestations of the impact of communication and information technologies on social processes the information revolution has become, promoting the formation of macro trends, based on the expansion of the range of the mutual influence and the interaction of social systems. These trends, the formation of which was largely predetermined by the enhancing processes of integration, in prospect become a kind of catalyst for globalization processes; wherein each of them to a certain extent is the manifestation of global synergy. Globalization has formed a new favorable condition for the development of social systems, at the same time creating additional factors affecting the dynamics and uncertainty of the environment. Incomplete significantly complicates the procedure for the development of optimal behavior strategies; in these circumstances, one of the most important characteristics of the social system becomes the main - the ability to quickly and efficiently adaption to the dynamics of the external environment, which is determined by the susceptibility of the system to the innovations [20, 21].

3. Summary

The significance of global evolutionism is expressed in the current formation of IT-domineering civilization, i.e., we are able to witness the growing concern about the search for optimal ways to merge humankind, society, and robotic systems into one single entity.

Sociocultural content of the global evolutionary process, which flows smoothly and continuously, predetermines the mentioned ways. It is the paradigm of global evolutionism, expressed via socio-cultural form with the help of socio-cultural approach, that presents the essence of the modern welt.

While analyzing cognitive robotized technology in accordance with individual and society, we can ponder on the internal problem examination, as well as on the issue of the robot vs. human vs. society interaction processes.

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