REASONS FOR THE INFORMATION PROCESSES UTILIZATION IN THE ERA OF THE PLATFORM INDUSTRY 4.0

Olga Aleksandrovna Gubanova, Alexander Yurievich Ivanov, Alexander Sergeevich Krutolapov and Mikhail Theodosievich Pelekh

Saint Petersburg University of State Fire Service of Emercom of Russia, Moskovskiy Avenue, 149, Saint Petersburg, 196105, Russian Federation

Julia Aleksandrovna Gubanova

The Bonch-Bruevich Saint-Petersburg State University of Telecommunications, Russia, 193232, Prospekt Bolshevikov 22-1

ABSTRACT

Platform Industry 4.0 combines industrial technologies and the global network into a single Internet of Things. Cyber-physical systems will increase manufacturing efficiency and resource performance, and will also induce more flexible work management models. Every year, mankind has to work with increasing volumes of information. Therefore, the developers of interfaces and specialized software invent new ways of data display. But the work of a human-operator is still needed, as the specialists in this field know the mathematical environment, and therefore, they study the customer's business and help to compose the necessary algorithm of data analysis for the customer, which is still impossible for the computer. Thus, the aim of the research is to analyze the prospects for the development of post-NGN network technologies (environmental management, the creation of an integrated information communication space, the interpenetration of ideas and technologies of automation and telecommunications) in the era of the technology platform Industry 4.0.

Keywords: platform Industry 4.0, Internet of Things, cyber-physical systems, pervasive sensor networks, big data, advanced analytics, human-machine interface, smart factory, smart sensors.


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1. INTRODUCTION
Significant changes have occurred in the field of industrial production and development technologies over the past twenty years. New (particularly information) technologies, organizations, and logistics are implementing a modern business system that leads to new production ways, doing business and the enhancement in the sphere of industrial production servicing.

Industry 4.0 combines virtual and real worlds. The result is a system with fully integrated processes, this is a kind of information system in real time. The rate of change in consumer trends will be a significant factor for Industry 4.0 [1]. Since the products are equipped to meet the preferences of individual users, the production should be more flexible and more specific. To become valuable for the client, it is necessary to involve them in this process from the very beginning. Of course, companies that use high-performance mass production are of benefit, and at the same time, they can show a high level of adaptation.

2. METHODS
Together with the development of information and communication technologies, the Internet, wireless networks, production networks, industrial production was also developing, experiencing serious and thorough transformations. Systems are the basis for a smart factory. Cyber-physical production systems will be structured in such a way that they can react to almost any temporary changes in the market not only within its boundaries but also beyond. This not only increases the rate of production and meets the specific needs of individual customers, but also allows the creation of production processes within the company, optimizing them through a global cooperation network [2].

The potential for savings and innovation in these production systems and operations is enormous. The introduction of cyber-physical production systems in smart factories providing real-time management is one of the fundamental principles of a new era in industrial production [3].

The industry of developed countries in Europe and North America is based on the use of cyber-physical systems through the technologies based on the integration of wireless systems, wireless control systems, machine learning and manufacturing sensors [4]. Such industries are developing a national platform for new production systems and a new generation - Industry 4.0. [5].

The new generation production must be adjusted for the changing conditions and problems posed to it. Optimization of the plant will be carried out by improving and speeding up communications. The starting points are the solutions offered by the "smart environment" for the production [6].

Smart Factory is a production solution that provides such flexible and adaptive production processes that will solve the problems arising at the production site with dynamic and rapidly changing boundary conditions in a world of increasing complexity. The configuration of the system in the field of the product information and their production parameters requires an intelligent product that is available at the right time in the right place and that can be processed digitally. Therefore, the history of the intelligent products' production is directly recorded on the product itself, which makes the process faster and more efficient. Thus, the intellectual product becomes the medium for transferring information about production processes, their phases, and characteristics of the product itself [7].
3. RESULTS
The development of computer technologies directly influenced the development and improvement of sensor technologies, especially the intelligent sensors. [8]. The International Society of Automation (ISA) defined the sensor as a device that provides an appropriate output in response to a specific measured value.

The sensors do not work independently but are usually a part of a larger system that contains air conditioning signals, various analog and digital circuits for signal processing. It can be a measuring system, a data acquisition system or a process control system.

The key feature of intelligent sensors is that they process the input signal at a logical level to improve the level of information processing. The sensor is able to make a logical decision at the information level (for some initial information). It is able to perform the action depending on this information or can transmit the message to a higher level. Another function of intelligent sensors is their ability to self-check, variable calibration, improved rejection of false inputs (noises) and an easier setup and use.

Drivers - are mechanical devices that allow one to apply a specific offer indirectly, rather than manually, to a product or process. Individuals can drive or manipulate the drivers manually using software or computer interfaces. Disks controlled by programmable logic or a computer are “smart” disks [9].

For example, fire monitoring sensors are being developed by the Russian government in the Irkutsk region due to the increased number of deaths in fires. The state and the regional Ministry of Emergency Situations help the population to equip the apartments with autonomous fire detectors. For the socially vulnerable citizens, the simple fire monitoring systems are installed. An autonomous fire detector is an effective device for preventing the deaths of people from fires, regardless of the fire causes. The sensor reacts to smoke at the stage of ignition when it is still possible to put out the fire by means at hand.

4. DISCUSSION
Industry 4.0 can be defined as the next stage in the digitization of the manufacturing sector, caused by four factors: increased data volumes, processing power and connectivity (new low-power broadband networks); new analytical and business intelligence capabilities; new forms of human-machine interaction (sensor interfaces and augmented reality systems); improvements in the transmission of digital instructions to the physical world (advanced robotics and three-dimensional printing [10]). Let us consider the examples of each of these trends [11].

Big data. The improvement of sensor technology with the help of discoveries that improve efficiency for the application in the mining industry is very significant and is in demand. It also refers to the use of multichannel gas analyzers with patented sensors, optimized for operating conditions in mines. New technologies, processing large amounts of data, make it possible to use systems with such sensors [12].

Human-machine interfaces. KnappAG – a logistics company - has developed a technology for consolidation with the augmented reality. Developers wear a headset that provides vital information on the display, thereby helping to quickly and accurately find objects. The built-in camera captures serial and identification numbers for real-time tracking. [13].

Transmission from digital to physical. Local Motors builds cars almost entirely by using 3D-printing, while the project was collectively coordinated by the Internet community. [14].
5. CONCLUSION

These and many others challenges are undoubtedly ambitious, affecting all the parts of the factory and supply chain. The change rate is likely to be slower than the one in the consumer sector, where equipment changes often. The use of mechanical equipment operating with steam power and the growth of robotics led to the replacement of 80-90% of industrial equipment. However, the surveyed managers estimate that 40-50% of modern machinery require modernization or replacement.

To get the most advantage out of Industry 4.0, companies will have to take another step: prepare for digital transformation [15]. Manufacturers should start the search for the best talents in the digital field today, and think about the structure of their digital organization. The main challenges will be data management and cybersecurity. Many companies will find out that a "dual-speed" data structure can help them deploy new technologies at a required speed, and also to save critical applications.

REFERENCES


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