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TECHNOLOGICAL REQUIREMENTS IN DEFINING PARAMETERS BASED ON COMPUTER INTERFACES

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Abstract

Technological problems, and the fulfillment of the requirements, require the preliminary processing of the system parameters, which are necessary, in the proper functioning of the process itself. In this case, the paper deals with the possibility of access to system parameters, located in computer resources and applications of different types and who receive and send information in strictly defined ways. The communication channels in the system are the ports of the computer, and the interfaces as well as other auxiliary devices, which convey the reports of an integrated system. To create an integrated platform, of different devices, the relevant project must be created and then the placement and incorporation of elements in the system. In the paper, the possibility of a manual work is also emphasized and addressed. Then, the eventual simulation process continued for normal operation of the parameters. The analysis continues with the deployment of an application, which provides access to external terminals, through system parameters, using the communication channels of the computer with the outside world. Interfaces play a key role in the process of accessing external terminals. Also of particular importance, here is the software that enables such communications.

Keywords: Technology, terminal, interfaces, computer, software-applications**.**

1 Introduction

The role of technological systems, in everyday life, is of particular importance, because currently, technological systems use computer resources to access external terminals. External terminals, including interfaces, are precursors to terminal equipment, and are commanded and processed. It is not an easy task the issue and the aspect of designing such a system. This should take into account the various conditions that are an integral part of the process, and system parameters, as well as disruptive factors that disrupt work and normal operation.All of these can be deployed in control algorithms. To verify that such a system is feasible, and the other side is the analysis of parameters that are competitive for system stability. In this paper there are several treatments to reflect the relevant values, in terms of including the state of the process. In fact, such systems have been created, which assesses the state of the parameters through the installed programs. This is about sophisticated applications, when the program contains, the menu of changing the values of the parameters and their adaptation to the process. So as can be seen in this paper, it deals with the path from the computer, the interface to the electronic interconnecting devices, and then to the end devices. At the very bottom are the mechanical devices that need to be controlled. Because, from this

command depends the production process, the process of generating the respective values in accordance with the created design of this system and the adaptation to the demand [1][2].

2 System design with computer platform and remote-process access

The following figure shows a system that communicates with the outside world. A typical case is the remote access of a system as well as the control room. To design this system, it is necessary to arrange the elements in order and function. Also here presented the functional hierarchy in the process of completing the process flow cycle [4].

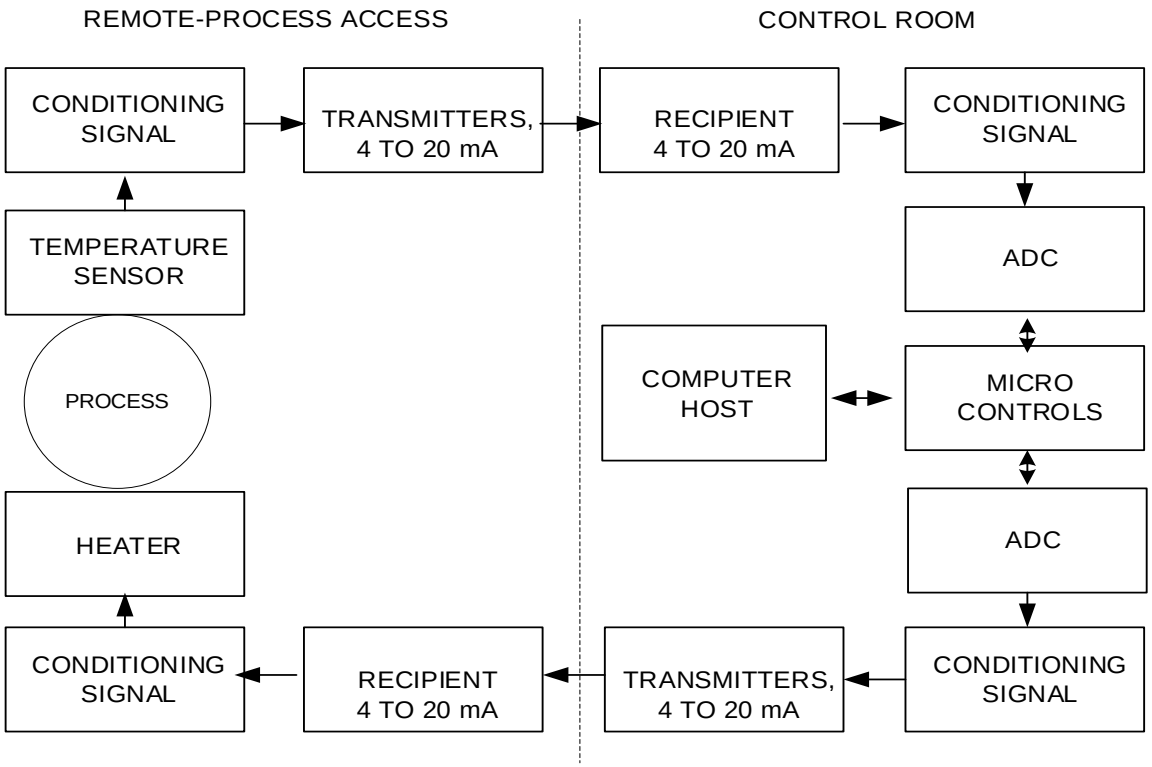

Figure 1- Flow - process design, air conditioning signal, auxiliary equipment, microcomputer, and control system (sorce: Zeqiri,2020)

Based on the above scheme, it can be concluded that there are different elements, which are interrelated, for the realization of general communication. This connection is between the Host-computer and all other electronic devices. Remote access is provided through various communication channels, such as leased telecommunication lines, internet, or interconnection with lines with direct connections. The sensor is also an integral part. Knowledge about sensor and signal conditioning circuits is important in different systems. During this communication, care must be taken in the suitability of the platforms. This also means the platform of computer and communication networks, as well as the aspect of the suitability of the operating systems that support such communication. All microprocessors need input voltage (power supply) toreceive instructions and information. In addition, an electrical signal is generated at the output of the sensor, so the sensor can also be considered as an electronic device.

There are different formats for sensors. The design system has different interpretations of the sensor performance parameters, and in fact, this can cause confusion. It is important to note that this confusion is not due to the inability to explain the meaning of the terms, but is due to the fact that different parts of the sensor community are used in different terms. It is important to understand the specification function when using sensor. A sensor is a device that receives a signal or stimulus and responds with an electrical signal,

while a transducer is a converter of one type of energy into another. However, in practice these terms are often used as similar. Sensors and associated circuits are used to measure various physical characteristics, such as: temperature, force, pressure, flow, position, light intensity, etc. These magnitudes or characteristics act and stimulate the sensor, and the sensor output is conditioned to provide the corresponding magnitude of the physical characteristic-physical magnitude.Sensors do not work as singles, but they are part of large systems, and which respond through conditioning signals and various processing signals of digital signals or analog signals.

In the diagram of Figure 1, has been presented the object of treatment process of A/D (analog to digital) and D/A (digital to analog) and their conversion, which are auxiliary modules for access to external devices, various terminals, as well as the reception of data for computer processing. Also, in the diagram of figure 1, there are different types of sensors, temperature, etc. We also see the appearance of the host computer and the interfaces. The purpose of this paper is to design the way of communication through interfaces, as shown in Figure 1. Therefore, different functionalities can be derived from this, because here is presented a combination of hardware and software aspect in an integrated system for generalized purpose. [3][4].

Usually, through feedback connection, and in the presence of sensors, actuators, or encoders, and then signals returned to the central system for processing. These values are for currents from 4 mA to 20 mA.

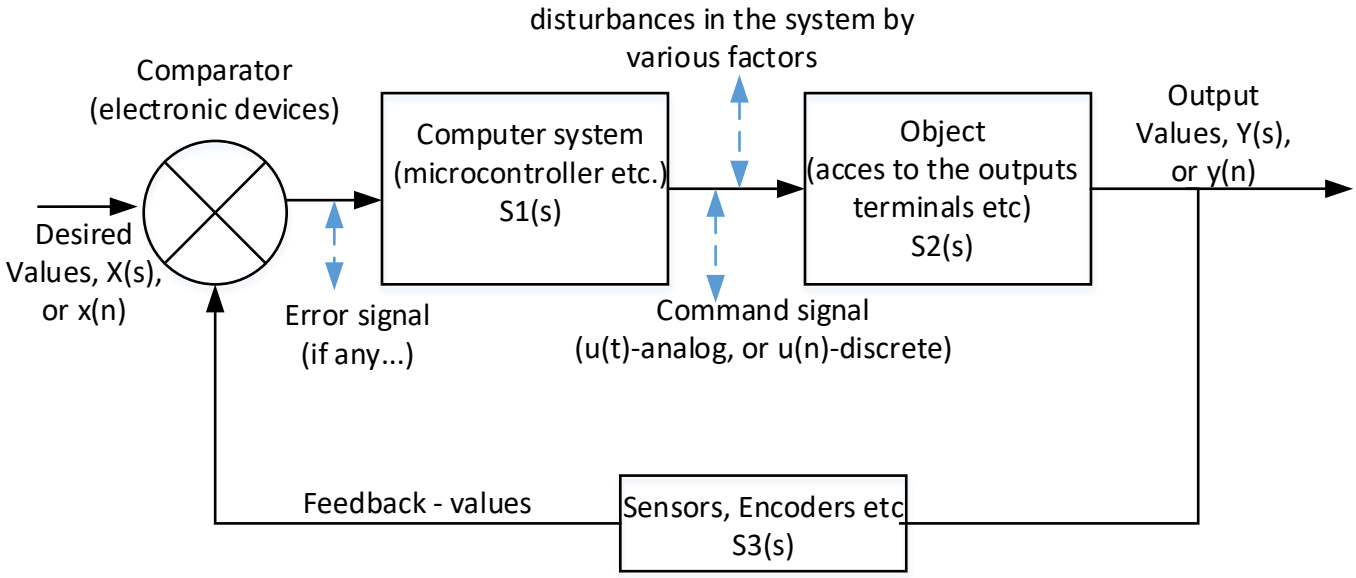

Figure2- Flow process design, air conditioning signal, auxiliary equipment, microcomputer, and control system

In the diagram of figure 2, it is seen that the control algorithm can be incorporated here. Through this algorithm,can be accessed the output terminals, from differently distances, depending on their connection. This block diagram is of general use, because it can be accessed in any of the objects. For genuine research, access to external equipment must be realized. The diagram presented in figure 1 and figure 2, are related to each other. Because, in the scheme of figure 2 is realized concretely the possibility of practical approach. After this realization, then is writed a program or application which enable a more sophisticated practical realization [7][8].

The characteristic formula of the control system for above scheme of the Figure 2, isexpressed inthe following step:

$$H(s) = \frac{Y(s)}{X(s)} = \frac{S_1(s)x\ S_2(s)}{1 \pm S_1(s)x\ S_2(s)\ x\ S_3(s)} \qquad (1)$$

The above formula is generalized, and expresses all the values that can be part of, Figure 2:

Of which, $s = j\omega$, reflection/mapping of operator "s" in "jω", in the frequency domain.

$X(s) - input\ signal$

$Y(s) - output\ signal$

$H\ (s), is\ the\ generalized\ transmission\ function$

$S_1(s) \rightarrow All\ the\ values$ →Computer system, (microcontroller etc.)

$S_2(s) \rightarrow\ All\ the\ values$ → Object (acces to the outputs terminals etc)

$S_3(s) \rightarrow All\ the\ values$ →Sensors, Encoders etc.

A system is called numeric when the numeric input signal x (n) transmits it to the output with a certain rule T [x (n)]. The numerical signal at the output is y (n).

$$y(n) = T[x(n)] \tag{2}$$

To find the y (n) signal, the x (n) signal must be known at all discrete time values n.
So the signal of the command u (n), can have a discrete nature, therefore the same rule can apply to this signal, according to the rule of the above formula. When numeric input signal x (n)→u(n) (after passing the computer system), then transmits it to the output with a certain rule T[u(n)]. The numerical signal at the output is y (n).

$$y(n) = T[u(n)] \tag{3}$$

However, it is about discrete values. If the system has analog values then we have signals, x (t), u(t), y (t) etc. Then modules A/D and D/A should be used to transform from analog to digital or digital to analog values (as seen in Figure 1).

3 Application software design and management of the computer interfacing

In the following Figure 3,are presented some sequences of possible programs for the presentation of a system which manages external resources, terminals, etc. Firstlyis designed the main mask of the program. Then are designed the buttons, buttons functionality, parameter setting, working mode, simulation mode, etc. The following figure shows an application view sequence (worked with MS Access) but can be worked similarly through other applications, such as SQL, Oracle or other software, which also link programming languages, C ++, C #, etc. The latter is sometimes mandatory because it is required to create buttons with functionality that is more complex and linked to the database[5][6].

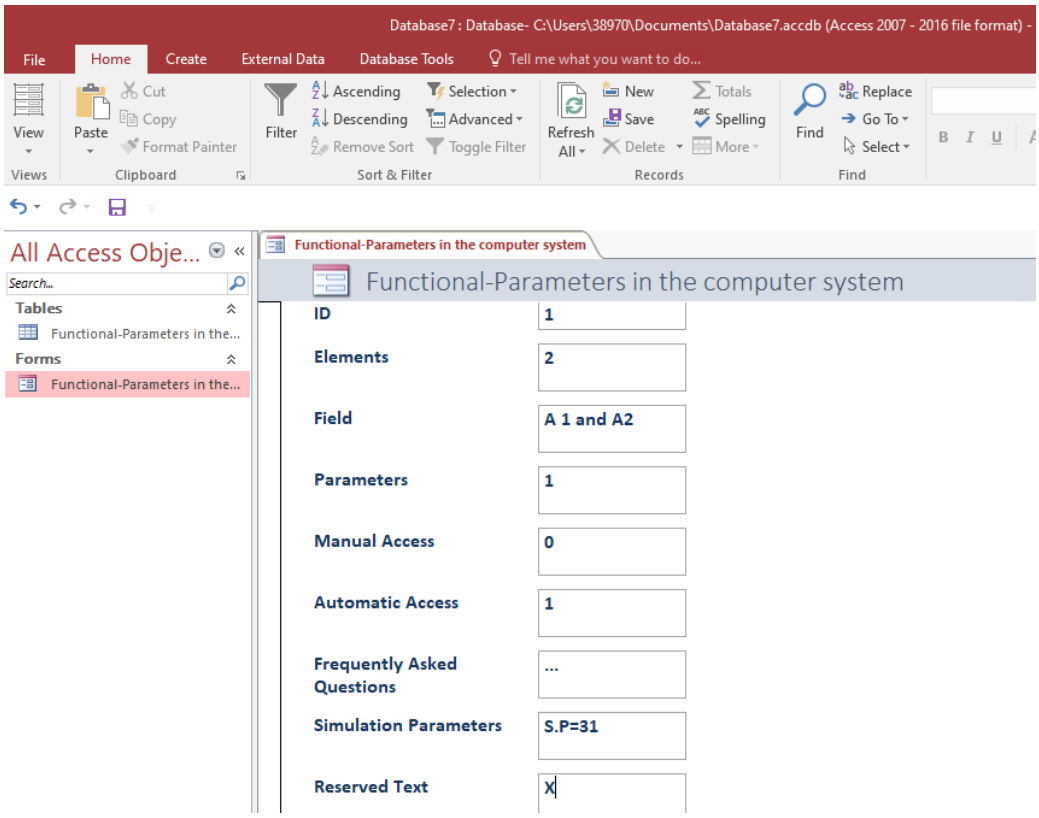

Figure 3. View a part of the database and define some of the system functionalities

In the next Figure 4, is given the respective mask, to command all the output parameters, configuration, simulation etc.

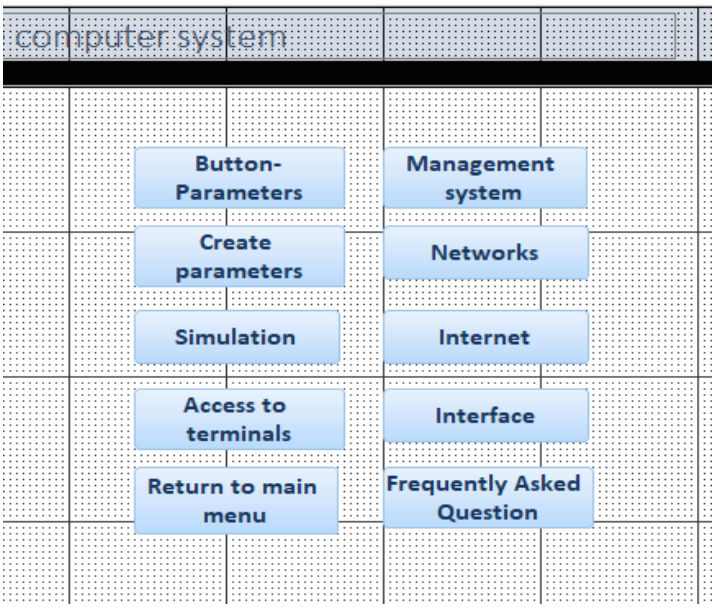

Figure 4. Part of the program-Buttons and settings for system configuration, and interface with external terminals

3.1 *Logical implementation and parameters configuration- based on relevant data*

In current technologies, the biggest problem is the aspect of configuring system parameters. In addition, another problem is the aspect of generating certain conditions for full functionality of data based on computer command.The following data processed through MS Excel, are only fictitious analyzes, based on various technological practices. These parameter values can be adjusted for the respective system. The

purpose of this planning through MS Excel is to demonstrate the marking of certain conditions that must meet the configured parameters of the computer, microcontrollers, etc [1][7].

Also, the purpose of demonstrating the fulfillment of the conditions is a good basis, how the organization of the creation for the respective application (software) can be planned, build and can be an integral part of various practical systems. In addition, the presentation of these values is arbitrary, for the purpose of illustration, for the treatment of comparative systems, and for finding the level or threshold, or how can be the deviation and magnitude of the values of these parameters.

Table 1 - Logical implementation and parameters configuration -examples

	Logical implementation-and parameters configuration											
												Logical condition implementation
		P1	P2	P3	P4	P5	P6	P7	P8	Max Value	Min Value	IF(Max Value>=2*Min Value, "STOP","START")
1	simulation1	23	22	21	25	26	34	45	56	56	21	STOP
2	simulation2	34	38	43	42	34	35	46	57	57	34	START
3	simulation3	12	22	21	25	34	34	45	34	45	12	STOP
4	simulation4	35	34	35	40	35	35	36	35	40	34	START
5	simulation5	33	45	31	46	26	34	45	56	56	26	STOP
6	simulation6	34	46	32	47	27	35	46	57	57	27	STOP
	...											

IF(Max Value>=2*Min Value,"STOP","START")-This condition can be changed and can be adapted conform to the different requirements that a system may have. However, through this condition the process can usually be implemented, when the system can be for example in the state "START", or "STOP". So to start the process or the process to be interrupted, due to the eventual deviation of the values of the parameters of the system itself.The graphical representation of the table values is given in the following figure 5.

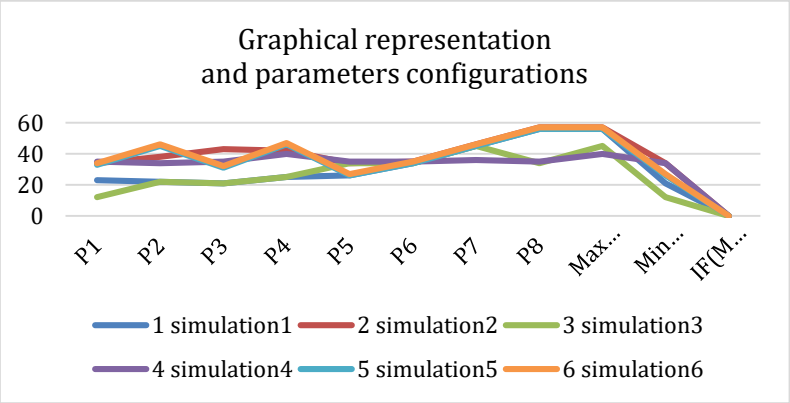

Figure 5. Graphical representation and parameters configurations

4 Conclusion

In conclusion, it can be said that the creation of a relevant model designed for the aspect of computer communication with the outside world is a very important analysis and work. The paper deals with the aspect of interconnection of the computer communication system and auxiliary elements, which create a completely integrated system. For the realization of these analyzes a generalized model of a central

computer system has been built, which communicate with external objects through the A/D and D/A converter modules. In addition, the incorporation of sensors is very characteristic because the diagram of Figure 1, presents a clear reflection of this conversion. Using sensors, physical phenomena are converted into suitable electrical signals, using interconnection to access the objects in the different distances. Through sensors, all the signals becomes integral part of the control system, Figure 2. The characteristic part is communication through interfaces, which makes the computer not only a system for software calculations, but also an integrative system for access to objects, external terminals (through electronic interfaces we have access to various electrical and mechanical equipment).

Another feature of the paper is the presentation of the algorithm model, and the presentation through algebraic formulas suitable for performing other analyzes, regarding the stability of the system. Also, the impact of disturbances in the system is another concept, which of course requires additional analysis, or may be part of the discussion with some other scientific work.

In the paper is created a relevant software - application through the database that allows us to configure various system parameters, perform simulations and do complete system management. Through the table (Table 1), given some arbitrary simulations, these values in practice should be adapted to the nature of the technology used. So here the simulations have more demonstrative character and precede the preliminary phase for configuration of computer system parameters. In current systems, the simulation part is an integral part, because it guarantees the work of any technological part commanded by computer systems.

References

[1.] Randal Bryant, David O'Hallaron.Computer Systems:A Programmer's Perspective. Publisher: Pearson; 3rd edition. 2015.

[2.] The Pragmatic Programmer: Your Journey To Mastery, 20th Anniversary Edition (2nd Edition). Addison-Wesley Professional. 2019.

[3.] Thomas H. Cormen. Introduction to Algorithms, 3rd Edition.Publisher: MIT Press; 3rd edition. 2009

[4.] N.Zeqiri. “Bazat e inxhinierisë kompjuterike”. 2020. UT.

[5.] N.Zeqiri, E.Rufati, B.Zeqiri.Functional parameters and performance requirement in the industrial system. JAS-SUT Journal of Applied Sciences-SUT 5 (9-10), 14-21. 2019.

[6.] N.Zeqiri, F.Idrizi. Software management and algorithms for real-time control systems. Journal of Applied Sciences-JAS-SUT (ISSN: 1857-9930/print & ISSN: 2671-304.2018.

[7.] Robert Sedgewick, Kevin Wayne. Algorithms (4th Edition). Addison-Wesley Professional. 2011.

[8.] Steven S S. Skiena. The Algorithm Design Manual. Publisher Springer. 2and edition, 2008.