DESIGN OF AN ALGORITHM OF A COMPUTER APPLICATION FOR REMOTE MONITORING

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ABSTRACT: Industrialization represents the period were people try to change economy of society using more machines instead of workers. First country has adopted this process of industrialization was the Regat of Great Britain in XVII century during the industrial revolution. Nowadays the biggest country with an industrial power is China, manufacturing a lot of products and parts for every domain. The most known invention is steam machine developed by James Watt and that transform thermic energy in mechanical work. Subsequent that was used in componence of a train engine.

KEYWORDS: IoT, LabVIEW, Fluid mechanics

1. Introduction

Dosing assemblies are one of the most important parts of an automated liquid dosing process. Assemblies of this type are a combination of various specific devices, and the dosing system may comprise several components. The automation of such a process represents an increase in the manufacturer's production and a reduction in the risks to which operators are exposed in the case of chemical liquid dosing assemblies.

"THE DESIGN OF AN ALGORITHM AND THE REALIZATION OF SOME COMPONENTS OF A COMPUTER APPLICATION FOR REMOTE MONITORING OF A MECHANICAL FLUID DOSING INSTALLATION" is the title of the topic I chose to develop for the diploma project, but also to try to operate such a system from the distance.

As the technology evolves faster and faster, more and more, this kind of assembly, due to IoT, can be followed and operated from the distance. IoT is at the core of the development of the Industrialization 4.0. For the development of this system we needed knowledge of fluid mechanics to calculate and create the dosing route and the experimental stand, programming in LabVIEW to develop the graphical interface with which the operator has first contact, but also to automate the process using electronic components such as frequency converter , process computer, but also a relay, WEB development knowledge in order to be able to make the platform on which the operator will have access to view the status of the process, but also to control it.

2. The current stage

The current state of this application is at the level of testing, verification and optimization for its use and fictionalization. As we are talking about an industrial process, it has a hardware component, a software component, but also an experimental stand. All this being interconnected with each other and depending on each other for a good functionality of the whole dosing process. In the following we find an extensive completion of the components, the explanation of the dosing procedure, the logic of automation but also the use of the web platform.

a) Software component:

- Web platform
- Automation

b) Hardware component:

- Process calculator
- Frequency converter
- USB card

c) Experimental stand component:

- Dosing pump
- Solenoid valve
- Measuring units

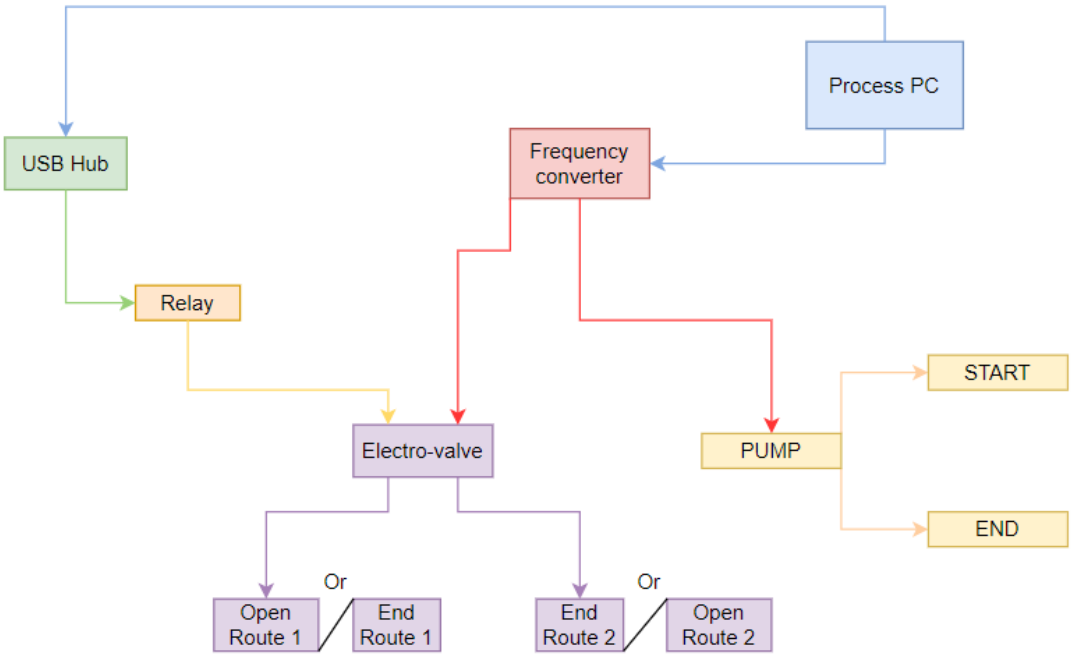

Fig. 1. The logical scheme of the ensemble

In the figure represented above we find the operating logic of the Hardware components and those of the experimental stand, working in tandem. All automation is controlled by a process computer on which the software created in LabVIEW is uploaded. As shown in the diagram above, the computer is connected to both the frequency converter and the USB card that will switch, in turn, on which route to open and close the solenoid valve. Since we used a liquid material dosing pump, they will be stored in two mixers, one for each type of liquid transported in the system.

The mixers have sensors attached so that they can monitor their filling level. If errors occur during the process, they will be displayed in the interface to be able to locate exactly which route the problem is on and to find a timely solution, in extreme cases the process is stopped for maintenance.

From the process computer the parameters are sent to the converter that will activate the solenoid valves that will open the path indicated in the program after the frequency converter activates the pumps that will start extracting the liquid from the magazine.

For the correct operation of all the components listed above, the scheme represented in Fig. 1 has been carefully elaborated. 2 representing the routes, but also the electrical connections between them.

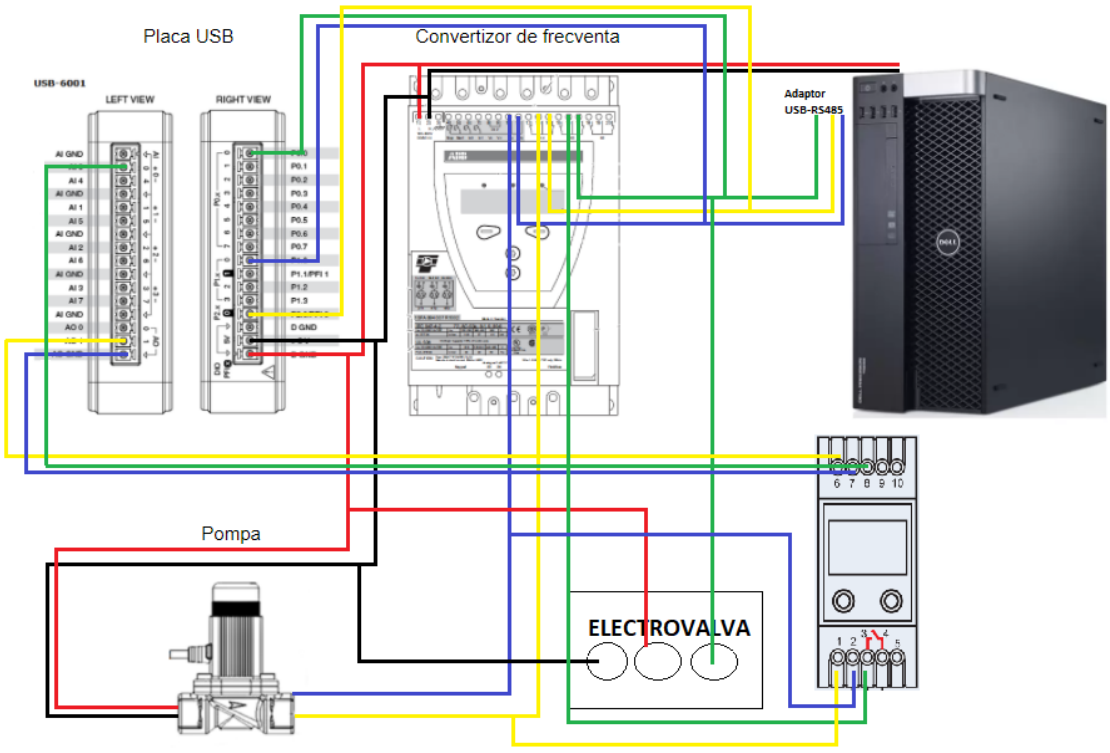

Fig. 2. Electric schema

- Connection legend Eclectic diagram

--------- Power supply +
--------- Power supply –
--------- Signal transfer / frequency Route 1 / Route 2
--------- Power supply to the computer
--------- START / STOP signal transfer

Once these components are connected, the system verification step begins, running the automation program. In the image below we find the graphical interface of the process that the operator can view and access the web platform created especially for it. To connect it to the platform, you need to enter a user account (Fig. 4.), a threshold made to increase the security of the platform.

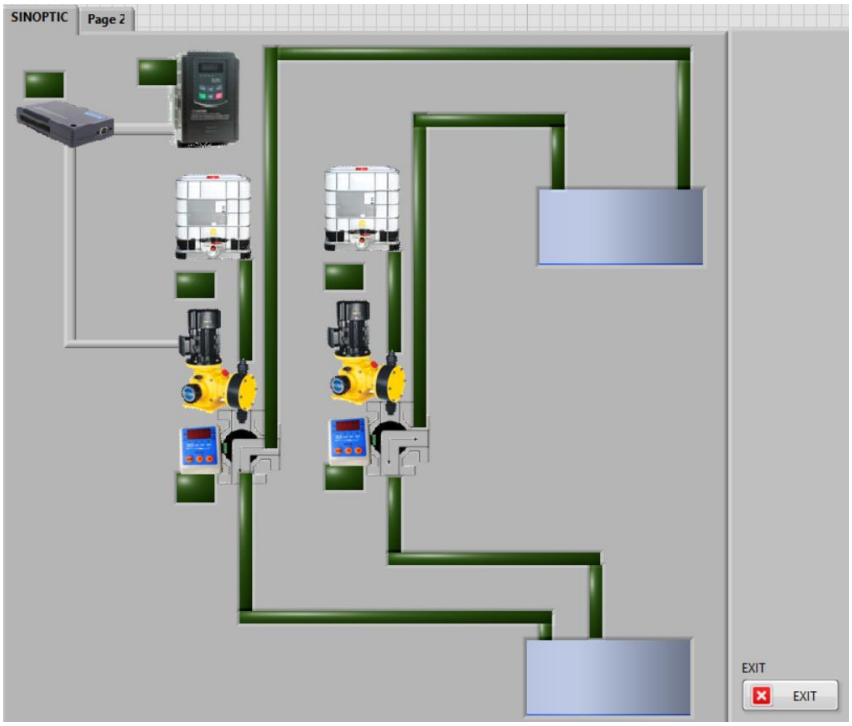

Fig. 3. Process graphical interface

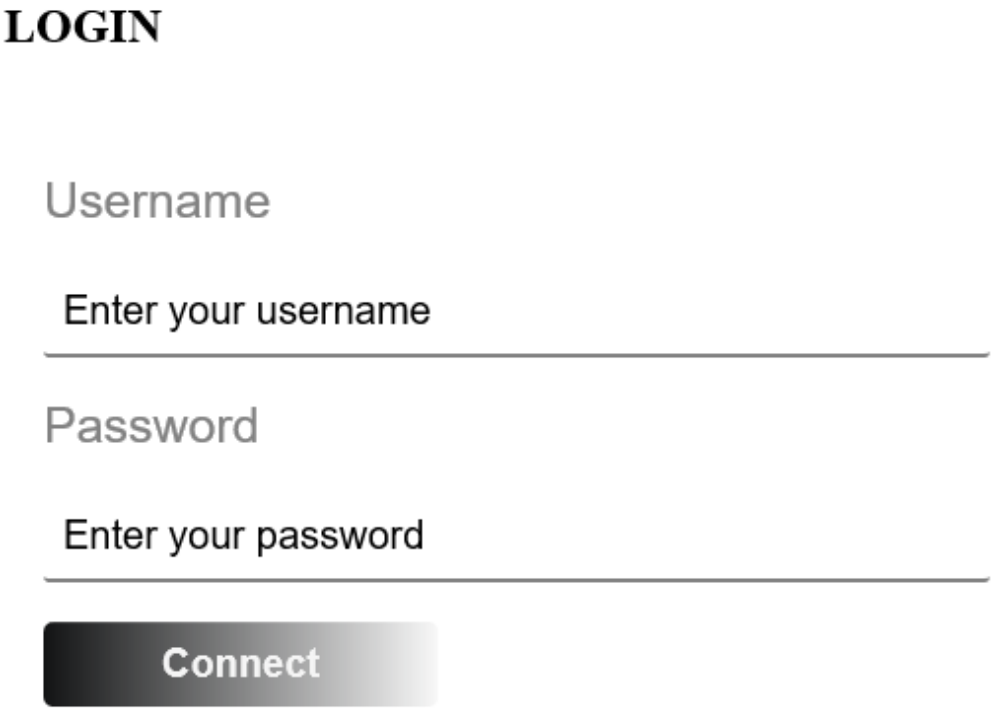

Fig. 4. Platform Login Portal

3. Experimental stand

Since I had the equipment listed above, I was able to perform in physical format part of the experimental stand developed. In the image below we find the hardware components electrically connected to the components of the experimental stand.

Fig. 5. Experimental stand in physical format

4. Conclusions

Although dosing processes have been automated since the beginning of industrialization as the level of manufacturing of liquid component products has increased, the set developed above is trying to mold itself to Industrialization 4.0, which is current and in continuous development. Its level of operation is low as it uses modern technologies and methods with which both operators and people are already accustomed to using them at work or for their own purpose.

5. Bibliography

[1]. Balaban, A, “Sisteme de automatizare”, suport curs
[2]. https://math.fandom.com/ro/wiki/Mecanica_fluidelor#Generalit.C4.83.C5.A3i
[3]. https://ro.wikipedia.org/wiki/Mecanica_fluidelor
[4]. https://ro.wikipedia.org/wiki/Internetul_obiectelor
[5]. https://www.scritub.com/stiinta/fizica/Mecanica-fluidelor65689.php
[6]. https://ro.wikipedia.org/wiki/Internet#Web_3.0
[7]. Andrei, V, “Mecanica fluidelor”, vol. I, II, III, Editura Fundatia universitare „Dunarea de jos”, Galați, 2005.