MONITORING AND REMOTE CONTROL, BY IOT, OF A PNEUMATIC PRESS

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ABSTRACT: This paper will focus on the development of software specially created for remote monitoring and control of a pneumatic press. At the same time, in the following chapters will be presented, both the components necessary for the development and the software behind the commands sent by a user.

KEYWORDS: LabVIEW, IoT, pneumatic press

1. Introduction

Pneumatics is used to pressurize the gas and give it different uses of energy. Therefore, it is interesting, because through this process different uses can be achieved, such as mechanical movements, energy implementation for large and small machines, etc. The pneumatic press uses compressed air as a medium to be able to combine it with other fluids. In addition, it is considered the least polluting compared to other gases and chemicals that cause great damage to the environment. Therefore, compressed air does no harm to humans, much less to nature. Hence the importance of its use in industrial processes. Consequently, it is a resource that is very easy to obtain and does not require any process to obtain the raw material. "Monitoring and remote control, by IoT, of a pneumatic press" is the title of the topic I chose to research for the diploma project. As the title suggests, a pneumatic press can be ordered and monitored by a remote user. A chapter of the licensing work will consist of the creation of a website (connected non-stop to the media acquisition board) through which a user will be able to control the actions of the press. Also, two pressure and temperature sensors will be added, which will transmit real-time data to the user.

2. The current stage

The current state of this application is at the level of testing and optimizing the use and functionality of the user. After the hardware components were connected and the software application was developed, the use of the remote press was made possible by accessing the created site. The site was also created from an html code created on w3schools and further introduced in the LabVIEW development application. User orders are first received by LabVIEW software and forwarded to the press.

Moving on, it will be described the principle of operation of the press and the site, which was created for users.

Figure 1 shows the connections for the Arduino UNO acquisition board, meaning two analog pins for the temperature sensor and the pressure transmitter and four digital pins for solenoid valves and microswitches.

Figure 2 shows the detailed wiring diagram of the connections for an optimal operation of the application.

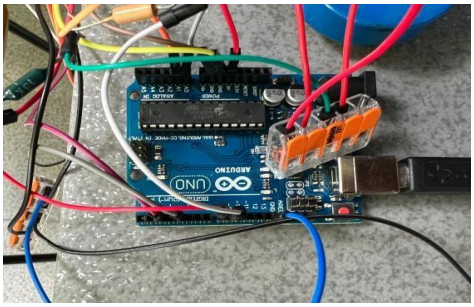

Fig 1. Connections to the Arduino UNO acquisition board

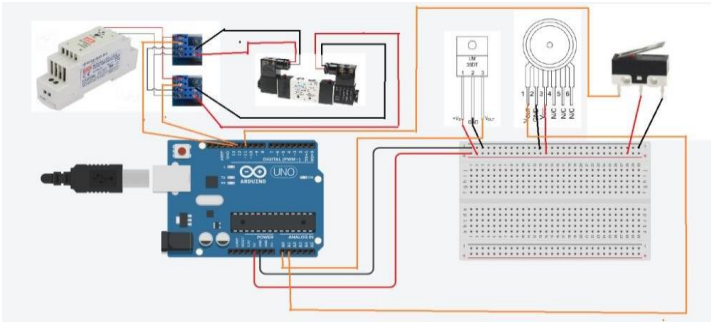

Fig 2. Detailed wiring diagram

• Wiring diagram legend

--------- Power supply +
--------- Power supply –
--------- Signal trasnfer/frequency

In order to receive and send orders to the pneumatic press it was necessary to connect a computer. Being connected to the acquisition board, it sends commands to the relays and these further to the solenoid valves, which deal with the movement of the pneumatic cylinder.

At the same time, the temperature and pressure sensor send information to the computer so that it can be displayed to the user.

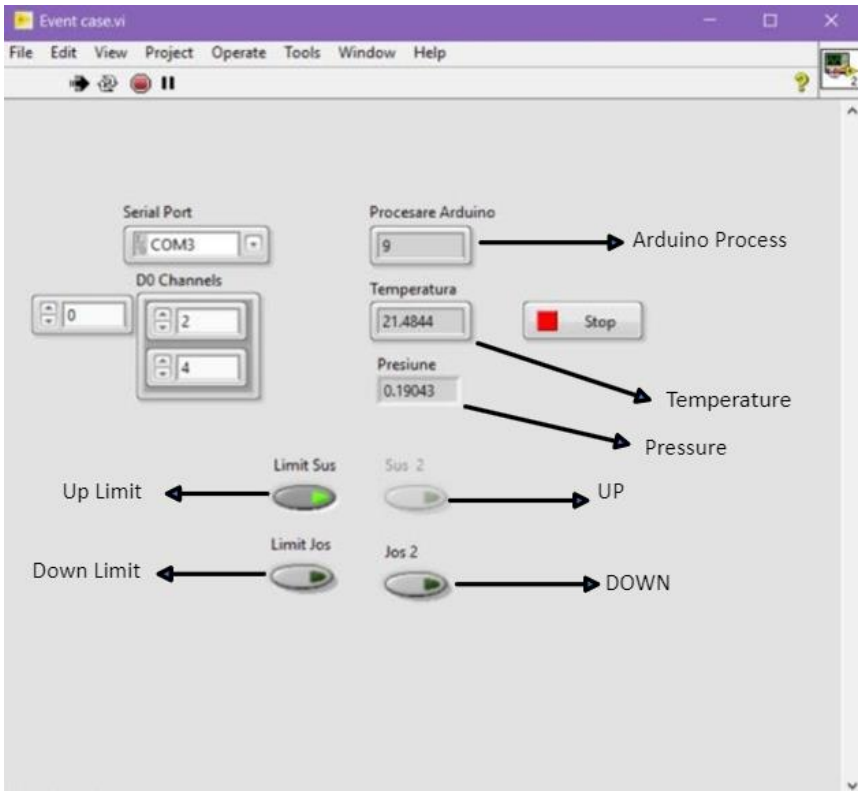

Fig 3. Program LabVIEW

Figure 3 shows the LabVIEW manual press control program. First the USB port of the Arduino board will be inserted and then when it will run, the values of temperature and pressure will be displayed on the screen. The two buttons "Sus 2" and "Jos 2" represent the commands given by a user to the press, at the same time the operation of the two buttons "Up Limit" and "Down Limit" represents the end of the stroke for each given order.

After testing and verifying the manual control program, it was necessary to develop the remote control website.

Figure 4 shows the first page of the site created, Authentication.

Fig. 4. Platform login portal

The first time it was necessary to create a login portal because several users could connect simultaneously and automatically the press would go into error and no more commands could be sent.

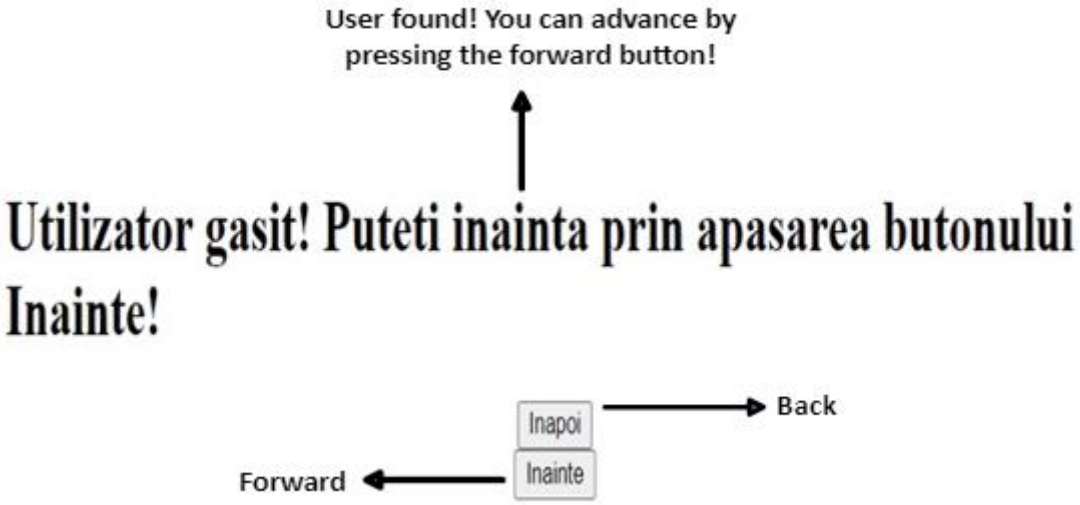

Fig. 5. User verification portal

Once the user has been found, the image above shows the user's instructions to proceed to the web page for remote control.

Figure 6 shows the remote control web page for any user.

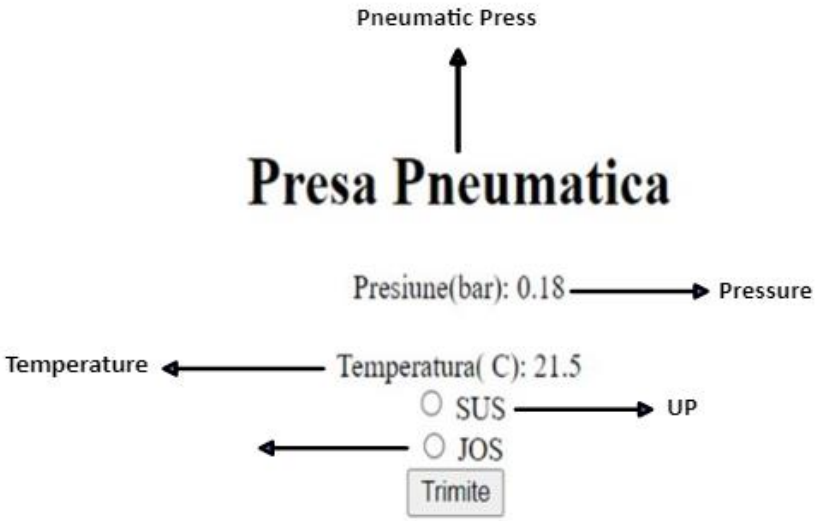

Fig. 6. Remote drive portal

3. Experimental stand

Figure 7 shows the experimental stand and its components.

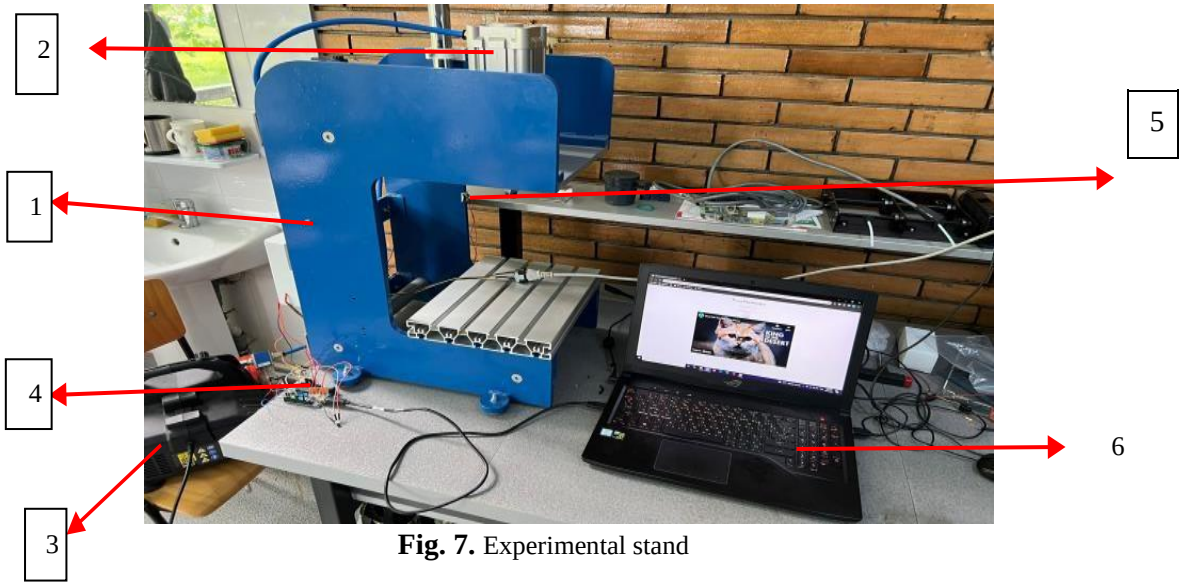

Fig. 7. Experimental stand

Component list:

1. Frame
2. Pneumatic cylinder + solenoid valve
3. Compressor

4. Arduino UNO purchasing board
5. Microswitches
6. Computer

The rearrangement of this experimental stand was possible because the press existed in physical format and I only had to make the connections between the hardware and software components.

4. Conclusions

In the industry, pneumatic presses are usually, manually controlled because certain factors can occur that can disrupt functionality. Due to the fact that the industry is constantly developing and the principle of having a "workforce" in a factory is declining, the systematization and remote monitoring of all possible devices will be pursued.

5. Bibliography

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