CONTROL AND AUTOMATION SOFTWARE FOR CHROMATOGRAPHIC PROCESSES

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ABSTRACT

Most commercial softwares, despite working well and being well optimized, lack a lot of flexibility when it comes to create more complex chromatographic separations. To overcome that, we developed a new software entirely made in *Julia* called *ChromatographyStudio.* It is more flexible, more versatile and easily modified according to the user's needs.

MOTIVATION

Commercial softwares, despite working quite well, are quite expensive, have few updates and prevent users from changing it. On top of that, if some new experimental protocol is created, it's very hard, and sometimes even impossible, to implement it in said softwares. With that in mind, plus the fact that our research group was already using *Julia* for data analysis of other projects. We decided to create our own control and automation software made entirely in *Julia*.

BACKGROUND

For automation and control, one must master the type of connections of each equipment used in the experimental set-up. In our case, we have 4 equipments using RS-232 connections (3 HPLC pumps, 1 electric valve), 1 equipment using a NI-6059 PCI card (pneumatic valve controller) and 2 equipments using USB plug-and-play interface (UV-Vis spectrometers).

After establishing connection with the equipments, communicating with all of them simultaneously is no easy task. All of these communications must be made asynchronously and we need to keep track of the state of every equipment in any point in time, since we want to collect all of those states for posterior analysis of the experimental results.

All of these achievements were reached with the help of two C libraries from two different projects [ref1, ref2], one for communicating with RS-232 and the other to communicate with the NI- 6059 PCI card.

RESULTS AND DISCUSSION

All the work that had to be done explained in short detail in the background section was condensed in 4 important macros:

Controlling an HPLC pump:

@pump F Q=1.0 plim=0,400

Controlling the UV-Vis spectrometer:

@uvc plot=all

Controlling the pneumatic valves:

@valves 1,2,3,-4,-5,-6

Setting predefined pathways:

@step F => COL1 => W

@step E => COL12 => P

@step G => COL312 => W

CONCLUSION & MAYBE FUTURE WORK

A fast and versatile software for control of chromatographic processes was developed. All equipments can be easily manipulated and tracked at any point in time by using only 4 macros (@pump, @uvc, @valves, @step).

For future work, we want to create a GUI, since we are still running everything in the command line.

ACKNOWLEDGEMENTS

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REFERENCES

https://gitlab.com/Teuniz/RS-232

http://www.comedi.org/