LEBANESE UNIVERSITY
Faculty of Sciences–Section III

Automation of measurement of temperature data and automation of fluid flow of a biotechnological production plant

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- Objectives
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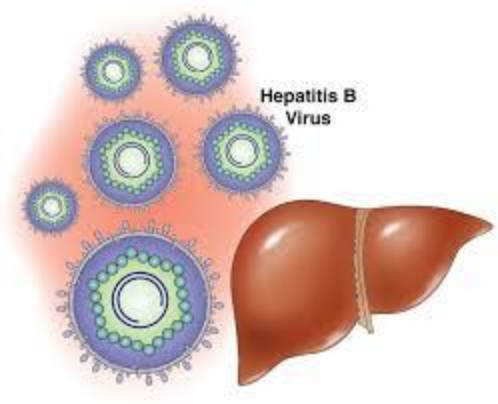
Introduction



Healthcare,2015

Hepatitis B is an infectious disease caused by the hepatitis B virus (HBV) which affects the liver.

The MEGBI Vaccine Pilot Production Plant (MEGBI-VPP) project aims to build a pilot plant in order to produce of the Hepatitis B Surface Antigen (HBSAg) to be able to produce this vaccine homemade.

Introduction

DNA vaccines are produced in three steps :

- Introducing the DNA coding of the vaccine
- Amplifying the amount of the expressed protein in the cell
- Harvesting the cells and purifying the wished protein

introduction

Still has to be done the produce of the vaccine two points should be working on it :

- The Mechanical devices development and the integration
- The Development of the automation system which shall be based on the automation system of a bioreactor

Problem statement

Controlling the fluid flow from one screen is a big challenge for engineer this day.

Can automation give a tremendous promise to resolve this problem?

Does the novel screen created for the Downstream processing and connected to USB Velleman Board help to control the actuators sensors?

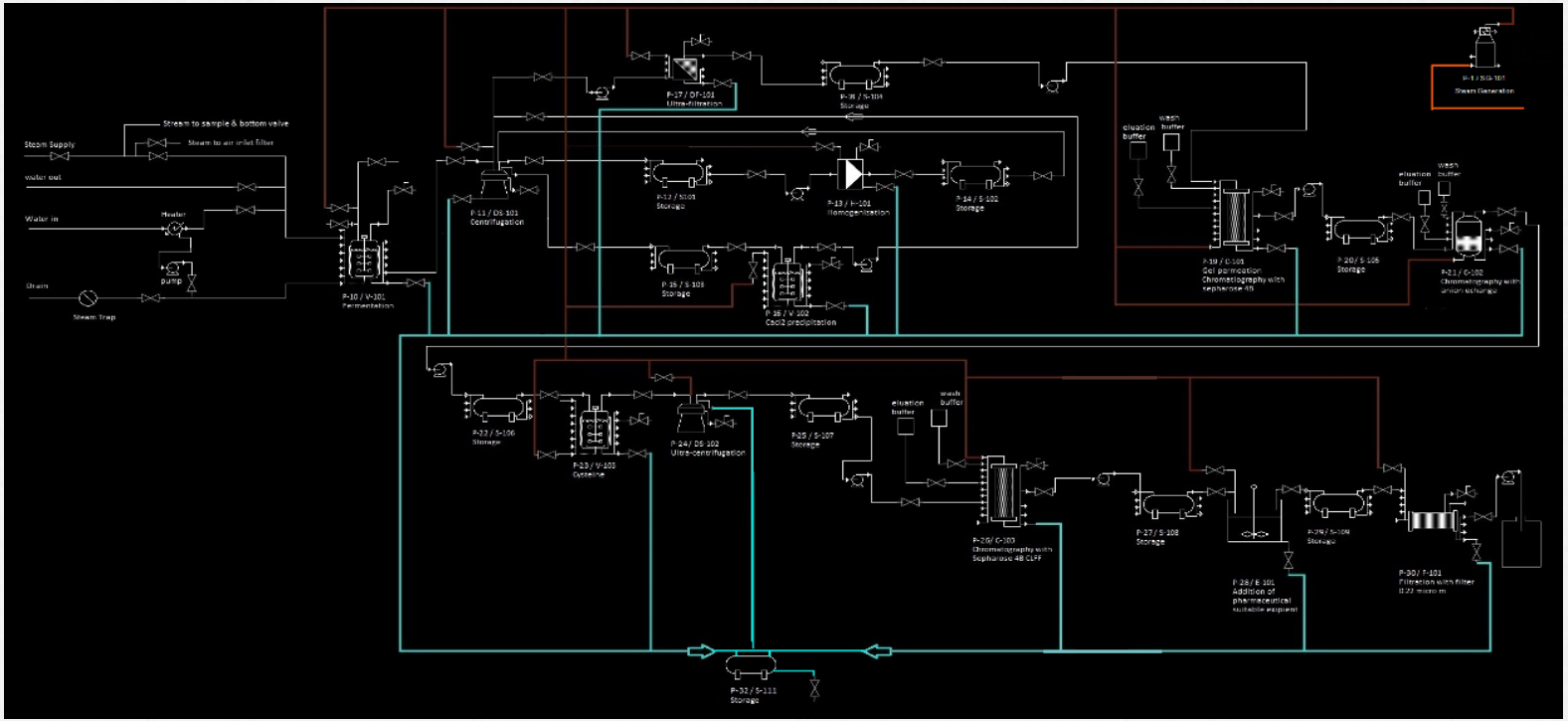
Objectives

During this project, we have the following specific aims:

- Creating a PI Diagram for the Downstream processing
- Using the Python to programming the control screen by using the PI diagram for the downstream processing
- Connecting the control screen to USB Velleman board
- Connecting the USB board to actuators and sensors
- Building the test stand (part of the Downstream Processing)
- Testing the test stand

Contribution

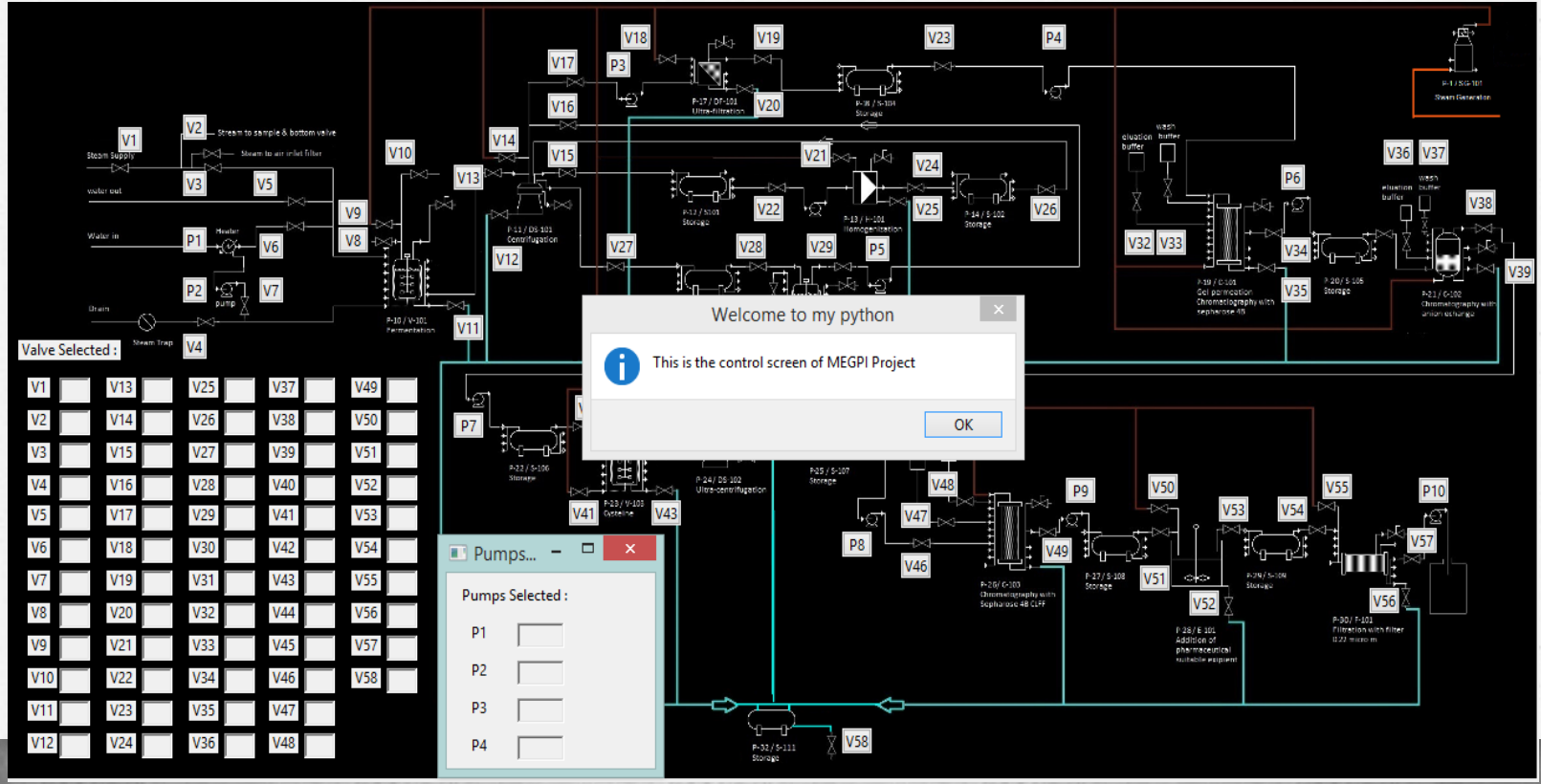
Create the PI Diagram:



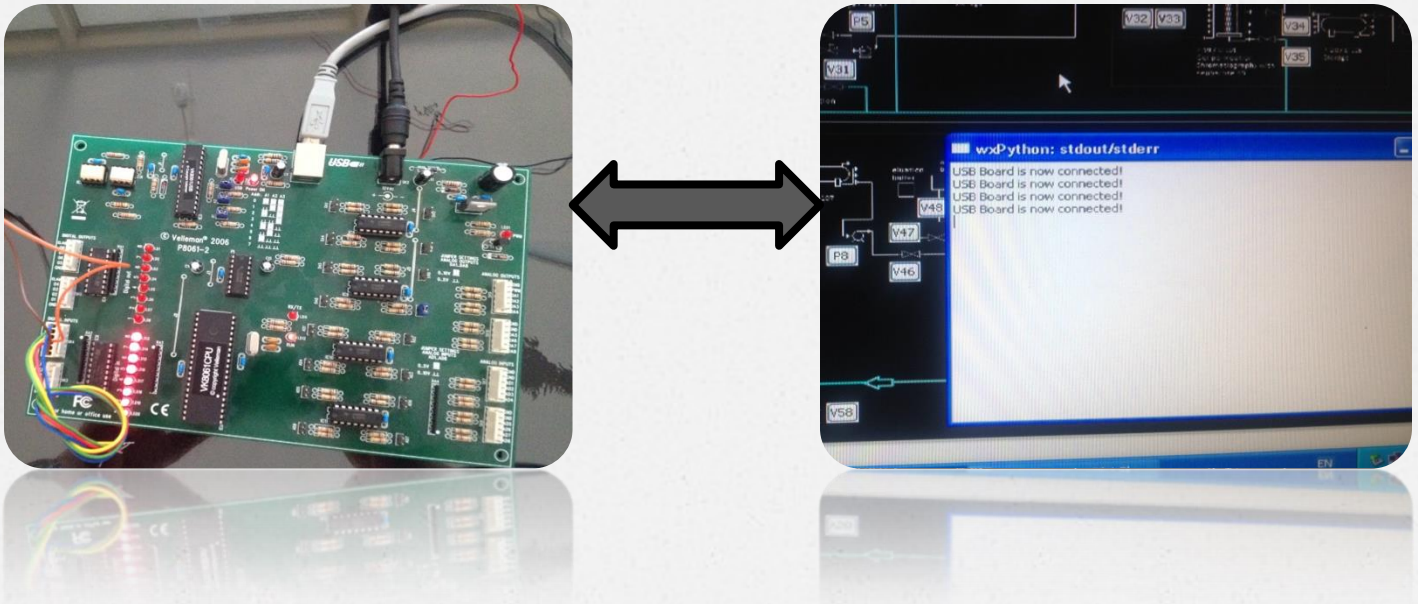
Create the control screen, by using the Python to programming ,with some steps :

- Creating the background and the Frame
- Creating the menu bar
- Creating buttons
- Creating list box, label
- Creating the main loop

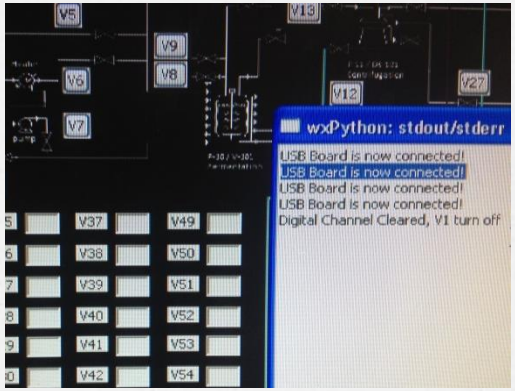
The Control Screen

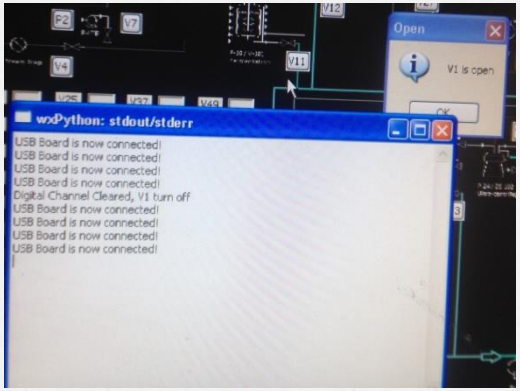


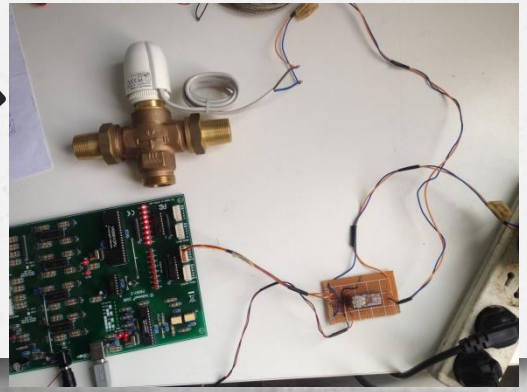
The connection between the Control Screen and the USB Velleman board



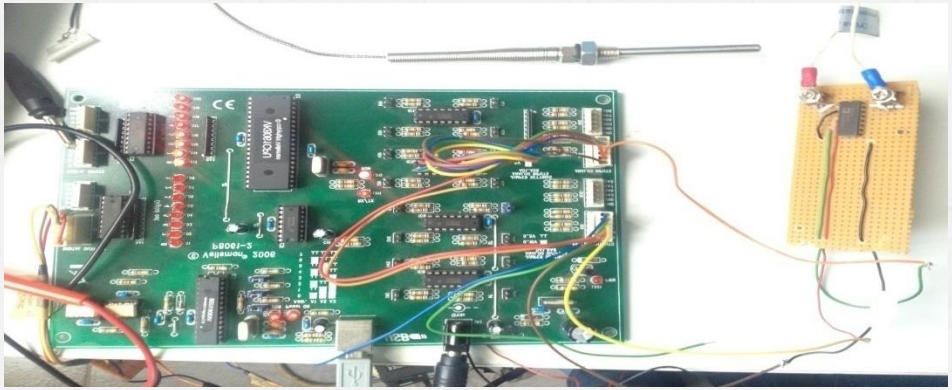
The connection between a actuators (valve V1) and the Control Screen

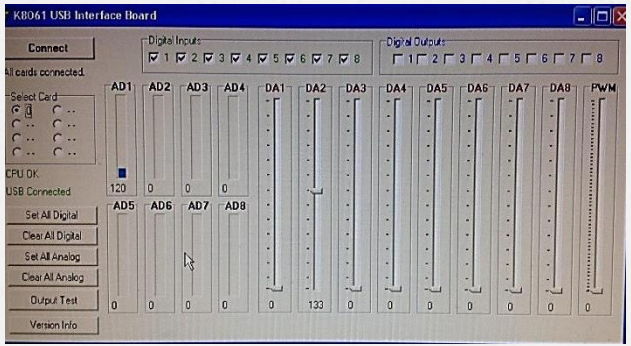


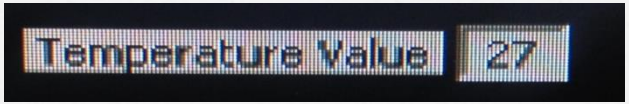




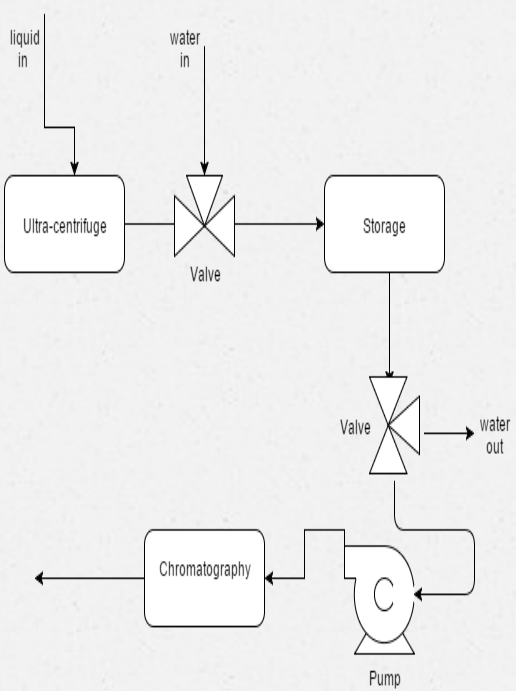
The connection between a temperature sensor and the Control Screen

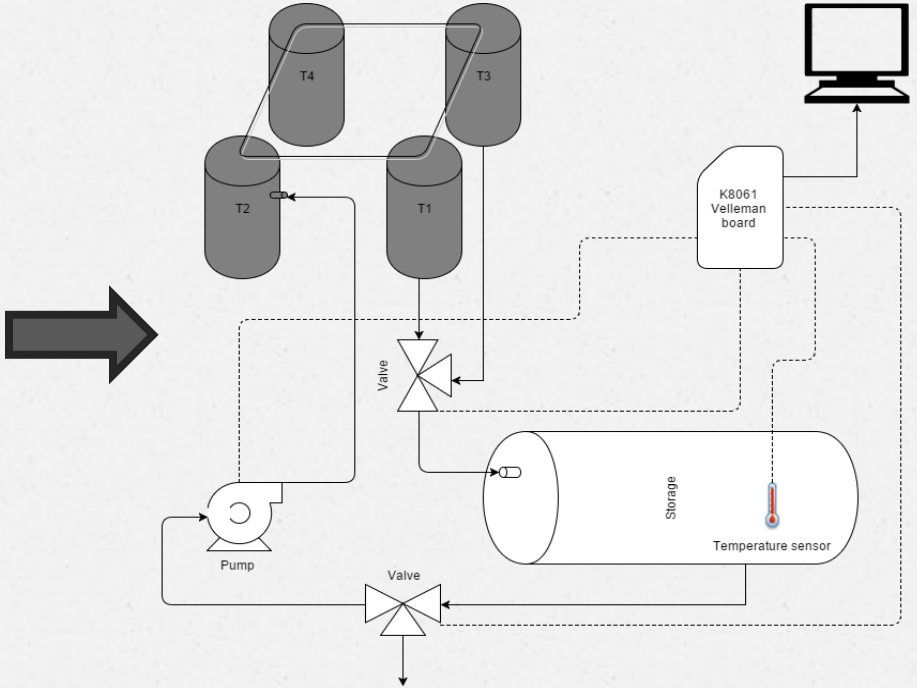


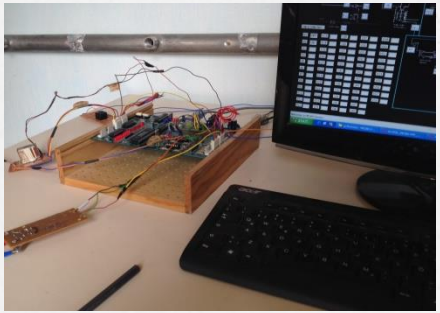




To build the Test Stand :







Results and discussion

- Test 1 :

  - Trying to open the valve from the control screen
  - Waiting for results and writhing a table

Precondition	Test activity	Post Condition	Test succeed/failed
Pipes without water	Opening and closing the valve.	First click valve open Other click valve close	Succeed

❖ Test 2

- ❑ Trying to open the valve and turn on the pump from the control screen
- ❑ Waiting for results and writhing a table

Precondition	Test activity	Post Condition	Test succeed/failed
Pipes without water	Opening and closing the valve with Turning on and off the pump.	First click valve open and pump turn on Other click valve close and pump turn off	Succeed

❖ Test 3

- ❑ Trying to open the valves(V1,V2) and turn on the pump from the control screen
- ❑ Waiting for results and writhing a table

Precondition	Test activity	Post Condition	Test succeed/failed
Pipes without water	Opening and closing the valve(V1) with Turning on and off the pump.	Valve1 open Pump turn on Valve 2 open	Succeed
	Opening and closing the valve (V2) at same time.	Valve 1 close Pump turn off Valve 2 close	Succeed

Conclusion

- The control screen of the Downstream processing is completed and ready to use
- The connection between the control screen and the Velleman board have activated
- The actuators have connected to board and activated
- The test stand was built and work it
- The automation system of the Downstream processing has developed

Future work :

- Adding some adjustments to the control screen to be more effectiveness and accuracy
- Trying to repair the malfunction on temperature sensors
- Adding the Pressure and PH sensors
- Building the Prototype

Video was recording ,when testing the test stand

Thanks for listen