Industrial Processes Automation

MSc in Electrical and Computer Engineering
Scientific Area of Systems, Decision, and Control

2ⁿᵈ Semester 2020/2021

3ʳᵈ Assignment - Presenting an Industrial Process

Since there are in effect the suspension of presence classes and restrictions on travelling, set to protect public health, this assignment will be based on compiling information from Internet sources, or using hardware available at home, and doing a public presentation by video conferencing.

More in detail, the traditional component of visiting a company will be replaced by the reading of a paper, creating a presentation and doing the presentation by video conference. Alternatively, two more options are available to be chosen by each group, namely choosing a specific subject (e.g. hardware component of software package) to study and present or to do experiments where an Arduino or a Raspberry-pi are used to run OpenPLC code.

- Sources to find papers can be found in:
  http://www.isr.tecnico.ulisboa.pt/~jag/courses/api20b/docs/API_LAB3_alt_papers.htm
- Alternative works to do or study can be found in:
  http://www.isr.tecnico.ulisboa.pt/~jag/courses/api20b/docs/API_LAB3_alt_works.htm
- Details on doing an experiment with OpenPLC can be found in:
  http://www.isr.tecnico.ulisboa.pt/~jag/courses/api20b/docs/API_LAB3_altx_openplc.htm

General guidelines to find a paper, i.e. selecting an industrial process

Papers **using one or multiple PLCs** are interesting in the sense that the industrial process(es) are easier to identify. Note however that it is **not mandatory** to choose an industrial process using PLCs.

Instead of an industrial process, may also be interesting to **document hardware devices**. For example, may be interesting to document a specific sensor type, an actuator, a novel model of controller, a powering device, etc.

Web-pages of the Industrial Processes courses, run in previous years, contain presentations that can help fine tuning your presentation.

Accordance about the chosen presentation topic

Various steps can, and in some cases are desirable to, be discussed with the professor. For example, the choice of the subject, e.g. paper, to be presented is important to be discussed with the professor so that the subject has enough content and allow doing an interesting presentation.

An updated state of selected subjects will be maintained in a shared Google spreadsheet:

https://docs.google.com/spreadsheets/d/1V8Pnn5iVCdSwMksyfmtf0Xwu4a0l4dXbR4FQJOtUlLU/edit?usp=sharing

The PowerPoint (or PDF) presentations need to be submitted to Fenix earlier than the date of the oral presentation, so that the professor can have a prior look.

Presentation

Your work, paper/subject study or OpenPLC experiment, will be completed with a 15 minutes public oral talk supported by a PowerPoint (or similar) presentation.

In order to describe the industrial process with some detail, it is expected that the group build a **State Machine** or a **Petri net**. The properties of the State Machine or of the Petri net must be briefly studied.

The suggested structure of the PowerPoint is the following:

- Create 1 or 2 slides for **general introduction** of the subject of the presentation.
- In case of a complex system/process, please select a sub-process. In many cases a single machine / sub-process has enough interest to build the complete presentation.
- Document (not exhaustively) **inputs and outputs (I/O)** of the sub-process. Whenever possible, reason whether I/O is best described as event based, continuous signals or other representation.
- Describe and analyze the sub-process (sequence or logic) using tools learnt in the course.
- Draw some conclusions regarding, for instance, the relationship of the contents of the course with the industrial process found.

Extra aspects likely to be interesting

The continuous drop of costs on image/video acquisition and processing, makes this type of data interesting for automation. Barcodes and QR-codes are ubiquitous, however, their use for automation is still under research and development. Assessing image/video usage by companies or research work is interesting to show in your presentation.

Having designed a state machine or a Petri net, allows to simulate a process. Process simulation is an interesting extra for the presentation.

Wishing you a good work,

J. Gaspar