Industrial Processes Automation

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

2nd Semester 2018/2019

3rd Assignment - Visiting a Company and Presenting an Industrial Process

This assignment aims at studying a real case of industrial processes. The assignment encompasses two main parts: **(i) visiting a company** and obtaining some information about an industrial process, and **(ii) doing a presentation** on the company visit, describing the observed industrial process.

General guidelines to choose a company and selecting an industrial process

Companies (factories) **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.

Typical steps for scheduling the visit to the company

Find one, two or three companies that can be interesting to visit. Contact the companies by **telephone or email**. In case an email is not answered in a number of days, is a good idea **resending** the email with a header like "please excuse sending once more this email, but something may have happened, and the previous email did not arrive to your mailbox". As soon as a positive answer comes, try to **schedule** date / time.
The various steps can, and in some cases must, be discussed with the professor. For example, the choice of the company to visit must be **accepted** by the professor. 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.

What "to do" and "not to do"

It is a good idea to send a **confirmation email** to the company in the day, or couple of days, before of the visit. The email can say something like "this email is just to confirm that as combined in the previous email the date of our visit to your company is tomorrow, XXth, about HH:MM".
While visiting the company, you **should not ask too many** details that may lead to suspect there is going to be a copy of the industrial process. For example, it is ok to ask the brand of the PLC, the main actuator and the main sensor (or a couple of them) used in the industrial process, but is not reasonable to ask the complete list of PLC inputs and outputs or the complete list of references of sensors / actuators. The person that walks you through the company must know that you are doing a work for a course in the university.

Problems

Almost all groups manage to do their visits and do the presentations. However, there may happen some minor problems. For example, may happen that in the scheduled day the person doing the reception in the company is not able to receive your visit. In this case **try to reschedule** within a reasonable timing and/or consider **visiting another company**.

In some cases, the amount of information gathered looks small. To understand if it just looks small, i.e. understand if there is already enough information, try to **assemble a table of contents** of your presentation and to do a powerpoint slide for each of the items of the table of contents. If the contents are truly short, then try to ask some more specific information to your contact in the company.

For the rare cases where the **visit fails** completely and there is no time to re-schedule, there are a number of alternative subjects for doing presentations. Please contact the professor to obtain an indication of further steps.

Presentation

Your visit to the company must be documented in a 20 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 characterization of the business.
- Select a sub-process. In many cases a single machine 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 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 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.

Final comment

Please enjoy your visit and take the chance to understand where your knowledge can be of value in the future. Wishing you a good visit to a company,

J. Gaspar