System vision

In this project, we are going to develop monitoring and supervisory control system of the cellphone production line in Tampere University of Technology, FAST-Lab. In the process of monitoring the product and production line, we limit our system vision to FAST-lab simulator firstly and then extends to the whole production line which should be managed for following months in the inception phase of our project. First, the planning of project should be divided into several parts which could help us to have more clear idea about what we are going to do. In this system vision, there are four sub-branches: project management, business analysis, environment and requirement and design as well.

In the project management, we should know the objectives of the project and make some assumptions and assign group-members for different sub-tasks. The schedule should be carried out precisely to finish the project on time. This is the initial part but also the most important part in this project as it is the direction of where we should go.

For the business analysis, we need to evaluate costs for initializing the project such as the costs for the equipment, salary for the operator and manager, maintenance for robots and conveyor, and profits for the shareholders. We have to consider some issues like our possible costs, limited budget maybe and prospective profits. As the business model is interwoven with requirements, defining a good business model can cover all our needs and requirements of the project.

For the environment model, we should execute our project in the production line of TUT and configuration of production line must be well organized to ensure the assembly line running efficiently. The User interface should be well designed which is helpful to present useful information to the customers.

When designing the system which is an iterative task, we create the process outline that shows the feasibility of the project. Of course, we also need to consider the potential risks as well. The principle of design is to make full use of each object and reach our goal best and try to lower the risk. The main costs may come from those aspects such as wage for the crew and waste of scrap and maintenance. Therefore, our priority is to control the budget and fully use our material which lowering our costs.

To better initialize our project, the first thing we should do is that we must get familiar with the surrounding of production line and avoid causing some unnecessary mistakes or maybe don’t break any equipment in case of increasing our costs. What’s more, we must know the instructions of some machines like Robots and conveyor and so on. For instance, we need to calibrate the cellphone production line before we do the project. Our target is to master in the manipulation of all machinery and reduce the lifecycle of product. In order to finish the project perfectly, we would start to work with simulator. Once the coding is running is perfect on the simulator, we then apply it in production line.

In creating the system vision, we should focus on the assembly line and the main components of this system such as robot, convey and RTUs. The line consists of two conveyors; main and bypass. The main conveyor is used if the pallet requires service from the robot of each workstation. Meanwhile, the bypass is used if the work cell is in busy state to bypass the pallet to the next work cell. The factory line uses SONY SCARA robots for production. Each robot is represented as an RTU in the line. The robots are programed with specific tasks. The FASTory is equipped with INICO S1000 Remote Terminal Units (RTUs). INICO S1000 is a programmable RTU device which offers process control capabilities and all the data will be selected and transferred to here for final analysis and decision.

When running the assemble line in reality, the suitable components needs to be found respectively. For instance, when we are running the conveyor, which speed is the best for transport of pallet and would not cause congestion on the line. The type and shape of the pallet is maximally flexible for all three products. Those doubts and question must be unveiled when executing the system and get the helpful data for project.

Providing all this architecture (SOA) is impossible without implementing a decent infrastructure for optimization, positioning using sensors and safety switches, resources for maintenance and staff for controlling the whole process (including quality control of the product going out from the manufacturing cell).

To fulfill the task of monitoring we should collect all the data and decide what data to use for running the production line. For instance, we use INICO S1000 to communicate through web services. It transfers all the data to a web server which can be accessed and processed on the WebStorm, so the needed information is derived for monitoring the work cell. In our case we assume that the manager has access to local server for monitoring where the location of products is under processing. Also, we assume the product we mean to monitor in our working cell is a frame of a cell phone that comes in 3 different types of models. We need to closely monitor and assign operators for accomplishing this goal.