

Soft sensing and fuzzy logic based control for industrial processes

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For the manufacturing industry, process monitoring is a key to observe the product quality, operational health, safety, and also for achieving good/satisfactory process control performance. For some industrial processes, the level of control of the process operational quality is vastly dependent upon the performance of the process monitoring techniques as it is quite difficult to observe the inside of the processing chambers during the process operation. Currently, a number of physical sensing devices/techniques are widely available for industrial applications for monitoring of parameters, such as temperature, pressure, speed, product dimensions, and so on, in real-time. However, there may be some limitations in using physical sensors in some of the practical process measurements due to several constraints such as their access requirements, disruptive effects to the process/product, fragility, complexity, and so on. Therefore, soft sensing techniques should be highly useful for improved process monitoring and modelling, and hence for advanced process control as well. In the context of current industrial process control, the majority of the industrial processes are equipped with PID controllers. However, these controllers may not be capable of gathering knowledge from the processes to make control decisions. Hence, artificial intelligence (AI) approaches such as fuzzy logic, neural networks and machine learning are becoming popular due to their ability of making control decisions incorporating real-time processing behaviour. Given the situation, soft sensing techniques and AI based control techniques should be really invaluable for the future development of the processing/manufacturing industry.