

Smart videos and sensors systems for industrial processes –

Survey of manufacturing process based on composite measurements
dedicated to hybrid dynamical and stochastic models.

The proposed research aims to monitor and ensure a precise process for manufacturing lines with smart video systems and augmented reality performed in real time.

In order to provide enriched video information, the proposed approach consists of merging geometric, kinematic, physical and logistic models with real-time video data observations and other smart sensors information. This approach, based on hybrid dynamical model and stochastic methods, will allow introducing an augmented reality to the video sequences, an extension of the domains of observation (beyond the conventional vision tools), a capacity for monitoring and a real-time prognosis of industrial process and its possible deviations from nominal objectives. The contributions of this enriched information are part of agile predictive maintenance, product and process control in complex situations and in reconfigurable environments. We will also study the observability and left invertibility of hybrid dynamical system and merge this concept with fault detection and identification. These, will lead to propose active fault tolerant control. The productivity gains brought by this approach will therefore focus on early detection and enriched information on production drifts, sources of non-quality and discrepancies in logistics flows. These applications will lead to a visualization of the product, process and flow, in augmented reality and subsequently to decision-making tools to anticipate and reduce non-production times and non-quality rates.

This research is financially supported by the FUI (AAP23) and has been labelled by the competitive cluster “Cosmetic Valley”. The project will be held between 2 academic places (ENSEA and SUPMECA) close to Paris and few applications will held in Chartres (100 km from Paris) in a company specialized in perfume conditioning.

The candidate will demonstrate an interest in video processing, stochastic processes, control system theory and applied mathematics. Technological knowledge in mechanics and automation will be appreciated and will allow a better understanding of the models developed.

Gross salary: close to 2200€/month

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