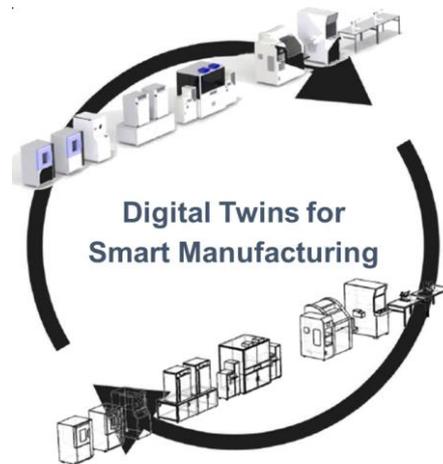


THESIS PROJECTS PROPOSAL



Main topics

Since the latest industrial revolution, several new technologies such as Industrial Internet-of-Things allow to collect and store data from shop-floors in a convenient way. Meanwhile, modern production systems are subject to frequent changes due to both external and internal factors. In this context, the development of data-driven models of manufacturing systems becomes essential to guarantee that a digital instance can correctly represent the real system at any time. Literature can provide with methods for the automated generation of discrete event simulation models.

The **automated development of digital twins** with an appropriate level of detail can avoid useless efforts and misguided predictions. Previous research shows that it is possible to generate simulation graph models exploiting process mining techniques. However, the conversion rules have been developed for general purposes and must be adapted for industrial applications.

Further, the **exploitation of digital twins** along a production life cycle is challenging. Several issues can be addressed by thesis projects: among others, (1) the synchronization of physical and digital environments, (2) the automated validation of the models, and (3) their exploitation for smart production planning and control approaches.

Typical Work Steps

1. *Literature review*: analysis and comparison of existing techniques.
2. *Problem description* and formalization;
3. *Development* of main approach/methodology.
4. *Test and Case Studies*
6. *Application* to real cases (i.e., gaining experience by interfacing with a manufacturing enterprise).

These thesis projects can use the **LEGO® LAB** for the testing and development of approaches.

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