Group Report Template

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***Abstract*—**

***Index Terms*—Keyword1, Keyword2, Keyword3, Keyword4, Keyword5**

I. Introduction and Motivation

The structure of the paper is as follows. Section II outlines the research question and the research approach. Section III describes similar work in the field and how our contribution fits the field. Section IV presents a production reconfiguration use case. The use case serves as input to specify a reconfigurability QA requirement in Section V. Section **??** introduces the proposed reconfigurable middleware software architecture design. Section VIII evaluates the proposed middleware on realistic equipment in the I4.0 lab and analyzes the results against the stated QA requirement.

II. Problem and Approach

Problem. In todays society, there is a heavy focus on the automation and digitalization of complex systems. The complex systems are used in many areas, such as industry, healthcare, public transport and so on. These systems are described as complex, because of the many parts involved, the intricate ways in which those parts communicate, and the overall behavior of the system - how do all these parts work together to complete the systems' goals? To ensure the correctness and reliability of such systems, it is of outmost importance that thought is put into the design. After all, failure in a system can lead to negative consequences ranging from minor inconviniences to death[SOURCE].
The Industry 4.0 production (I4.0) domain [... need to define]. In this domain there exist many complex production systems, one of which is the production of cars. Cars are sold not only for their functionality as a vehicle of transport, but often offer the customers a range of options for customization. These range from functional (...example) to cosmetic (paintjob, materials and colors for the interior).

Research questions:

1) not sure wtf they're expecting here. Smth like, How can we design a industry 4.0 production system for cars?
2) ...smth how effective is our architecture in ensuring the desired quality attributes?

Approach. The following steps are taken to answer this paper's research questions:

1)

III. Related work

This Section addresses existing contributions by examining xxx in the I4.0 domain. In total, x papers are investigated.

In [1], experiences are elaborated on a three-layer architecture of a reconfigurable smart factory for drug packing in healthcare I4.0.

The paper [2] proposes an ontology agent-based architecture for inferring new configurations to adapt to changes in manufacturing requirements and/or environment.

In [3], [4] an architecture for a reconfigurable production system is specified. Two objectives for reconfiguration and how they can be reached are described.

Several papers [5]–[7] describe reconfigurable manufacturing systems that are cost-effective and responsive to market changes.

All contributions provide valuable knowledge about reconfiguration but lack a study of the software architecture perspective that specifies a quantifiable reconfigurability architectural requirement, a software architecture that adopts the architectural requirements, and evaluates the architectural requirement.

IV. Use Case

This Section introduces the use cases, of which there are XX.

A. Schedule Production Run

Actors: xxx
Preconditions: xxx
Steps:

- Production Scheduler fetches the order from the database
- Production Scheduler breaks down the order into a JSON production recipe, which is then stored in the database

V. Quality Attribute Scenario

This Section introduces the specified x QASes. The QASes are developed based on the use case.

VI. Design and Analysis Modelling

Design and analysis modelling.

VII. Formal verification and validation

Formal verification and validation of system(s).

VIII. Evaluation

This Section describes the evaluation of the proposed design. Section VIII-A introduces the design of the experiment to evaluate the system. Section VIII-B identifies the measurements in the system for the experiment. Section VIII-C describes the pilot test used to compute the number of replication in the actual evaluation. Section VIII-D presents the analysis of the results from the experiment.

A. Experiment design

B. Measurements

C. Pilot test

D. Analysis

IX. Conclusion

Conclusion of the report, discussion and relevant future work.

A. Discussion

B. Future work

References

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Contributions

Name	Contribution