EDGE ARCHITECTURE FOR ROBOT DATA COLLECTING IN A DIGITAL TWIN

Lenţoiu IONUŢ[1], Borangiu THEODOR[2], Răileanu SILVIU[3]

Abstract. The paper describes a software system for data collecting in robot digital twins (DT); this system accesses information and data from the robot, the process automated by the robot and the devices connected to the robot (conveyor belt, ASRS, smart meter) via an edge processing structure that includes the robot controller and IoT gateways. The software system includes a data acquisition agent directly connected to the edge processing hard-ware, a database where the collected information is stored and a user interface with multiple data display options. The designed DT software collects robot data in two modes: continu-ously from the robot controller and the IoT gateways using specific software tools available from the robot manufacturer, and discretely from program instructions by messages. Experiments with the DT data collecting system are given for ABB IRC5 robot controllers.

DOI https://doi.org/10.56082/annalsarsciinfo.2023.1-2.21

Keywords: Digital manufacturing, digital twin, industrial robot, edge layer, data acquisition.

1. Introduction

The Factory of the Future (FoF) initiative assumes the digital transformation of manufacturing processes and the strong coupling of shop floor devices, systems and services by means of their digital counterparts interconnected horizontally in Cyber Physical Systems (CPS) frameworks [1, 2] and vertically at enterprise level [3]. In addition to the virtualization of manufacturing entities (resources, products, orders) and the strong coupling of their software complements, data collection and real time processing play an important role in CPS: data acquisition, information aggregation from multiple sources, data storage and analytics in the cloud allow for equipment status monitoring and detecting unexpected events, predicting failures and tailoring maintenance, optimal operations scheduling and assigning to working resources in process supervision and control or simulation with preconfigured device layout (e.g., industrial robots) in the design stage [4]. These monitoring, control, supervi-sion and design tasks are performed in the global perspective of aggregated context (device, process, workplace) by help of the Digital Twin (DT) technology [5].

[1]Ph.D. student, University Politehnica of Bucharest, ionut.lentoiu@stud.acs.upb.ro
[2]Professor, Ph.D., University Politehnica of Bucharest, Academy of Romanian Scientists, theodor.borangiu@upb.ro
[3]Associate Professor, University Politehnica of Bucharest, silviu.raileanu@upb.ro