Holonic hybrid supervised control of radiopharmaceutical production with service-oriented architecture

Abstract This doctoral reasearch paper is foccused on the development of a Holonic Hybrid Supervised control system for the optimal planning and automatic safe control of the production of radiopharmaceuticals in Service Oriented Arhcitecture (SOA) implementing solution. The research was performed in the area of supervised process control with the optimization of mixed batch planning and process execution scheduling. Using the holonic approach and agent-oriented implementation framework a distributed system was developed for the monitoring and control of the radiopharmaceuticals production environment for the entire plant facility. A production System Scheduler (SS) was implemented in the Staff Holon of the proposed Holonic Manufacturing Execution System using the software library IBM ILOG CPLEX Optimization Studio and its algorithm was validated in the experimental part. The research results let selecting the adequate information and computer-based control technologies and implementing solutions for the development of generic, global automatic process control with environmental conditioning, particularized and validated through experiments for a radiopharmaceuticals production plant.

Conducerea holonică hibridă supervizată a producţiei de substanţe radiofarmaceutice cu arhitectură orientată pe servicii

Abstract Obiectivul acestei teze de doctorat a fost axat pe dezvoltarea unui sistem Holonic Hibrid Supervizat de Conducere cu arhitectura orientata pe servicii (SOA) pentru optimizarea planificarii si controlul automatizat al productiei de radiofarmaceutice. Cercetarea a fost intreprinsa in domeniul proceselor de control supervizate cu scopul de a optimiza planificarea loturilor de fabricatie si executia proceselor. Folosind abordarea principiilor holonice si un cadru de lucru de tip multi-agent a fost proiectat un sistem distribuit pentru monitorizarea si controlul mediului de productie al intregii facilitati. Un planificator de productie a fost implementat in Holonul Expetiza al Sistemului de Fabricatie de tip Holonic propus folosind pachetul software IBM ILOG CPLEX Optimization Studio iar algoritmul sau a fost validat in partea experimentala a lucrarii. Rezultatele cercetarii au permis selectarea tehnologiilor adecvate pentru prelucrarea informatiilor si conducere automatizata pentru proiectarea si implementarea unui sistem generic, global pentru controlul proceselor de fabricatie cu conditionari de mediu, particularizat pentru o facilitate de productie a substantelor radiofarmaceutice si validat prin experimente.

Doctorand: Ing. Andrei Silişteanu

Conducător ştiinţific: Prof.dr.ing. Theodor Borangiu