SISTEME DE DIAGNOZA A ECHIPAMENTELOR ELECTRICE FOLOSIND TEHNICI DE INTELIGENTA ARTIFICIALA

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Obiectivul tezei a constat in realizarea unui sistem de monitorizare si diagnoza utilizand logica fuzzy, sisteme expert si sisteme de tip SCADA in cazul echipamentelor si sistemelor electrice, in scopul maririi performantelor, securitatii si sigurantei in exploatare.

In cadrul tezei sunt prezentate trei studii de caz care utilizeaza tehnici de inteligenta artificiala pentru monitorizare si diagnoza.

In primul studiu de caz se prezinta modernizarea si optimizarea unei linii industriale de formare a acumulatorilor cu Pb-Acid unde s-a utilizat logica fuzzy si un sistem de tip SCADA. Metoda de control a curentului de formare in functie de temperatura tancurilor de racire, bazata pe logica fuzzy a fost validata prin simulare utilizand mediul de programare MatLab2012;

In cel de-al doilea studiu de caz se prezinta un sistem de monitorizare si diagnoza a temperaturii si nivelelor bazinelor de combustibil uzat din cadrul unui complex energetic nuclear utilizand un sistem de tip SCADA si tehnici de inteligenta artificiala bazate pe logica fuzzy

In cel de-al treilea studiu de caz este prezentata utilizarea tehnicilor de tip sistem expert pentru monitorizare si diagnoza in cazul sistemului primar de transport al caldurii din cadrul unui complex energetic nuclear.

Prin realizarea sistemelor de monitorizare si diagnoza cu ajutorul tehnicilor de inteligenta artificiala, mai exact logica fuzzy si sisteme expert au adus numeroase avantaje care conduc la un controlul functional deplin al procesului monitorizat, cresterea sensibila a productivitatii, scaderea rebuturilor, cresterea calitatii, siguranta, robustete, eforturi si cheltuieli minime de exploatare.

SYSTEM DIAGNOSIS OF ELECTRICAL EQUIPMENT USING ARTIFICIAL INTELLIGENCE TECHNIQUES

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The main objective of this thesis has been to implement a monitoring and diagnosis system which employes fuzzy logic, expert and SCADA systems in order to check electrical systems and equipment, thus increasing performance, improving security and reducing hazardous events.

The main body includes 3 case studies which utilize artificial intelligence procedures in order to monitor and provide diagnostics.

The initial case study deals with updating and optimizing an industrial Pb-Acid accumulator production line, carried out via fuzzy logic in conjunction with a SCADA type system. The primary mechanism for controlling the build-up current as a function of the coolant tanks' temperature which is implemented using fuzzy logic was first validated by extended simulations by using the MathLab2012 programming environment.

The second study employes a monitoring and diagnosis system for temperature and gage levels for spent fuel storage bays in a nuclear energy power plant framework utilizing a SCADA and artificial intelligence algorithms based on fuzzy logic.

The third and final case study deals with exploiting expert systems for monitoring and diagnosis for a primary heat transport system in a nuclear energy power plant.

By testing and taking advantage of the different monitoring technologies and frameworks which use intelligent networks, namely fuzzy logic and specialist (expert) systems, we can establish the existence of multiple advantages which provide integrated functional control for the monitored agent, a noticeable development in productivity levels, the decrease in spoilage material, augmenting quality, reliability, robustness with minimal service investments and remote drive.