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Mémoire

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Option : Ingénierie des Systèmes Informatiques (ISI)

Studying and Comparing the existing approaches for predictive maintenance in industry 4.0

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Acknolodgement

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- Fidma Mohamed Abdelillah

Abstract

In few recent years, there has been a significant global focus on the fourth industrial revolution, traditional manufacturing factories are transforming into so-called "smart factories", which apply high-tech sensing and computation technologies on different manufacturing processes and production systems. As today's manufacturing market is becoming more competitive, how to improve the availability, and quality of manufacturing services in smart factories is a crucial concern for manufactures.The current scenario has created a growing need for the implementation of predictive maintenance in production lines. Predictive maintenance involves proactive maintenance activities aimed at preventing failures and enhancing the availability and safety of the maintained system. This demand arises from the recognition of the importance of minimizing downtime, maximizing operational efficiency, and ensuring the reliability of industrial processes. There are several existing approaches for PdM in IR4.0, each with its own advantages and disadvantages.

This master thesis explores the predictive maintenance in Industry 4.0, with a focus on studying and comparing the existing approaches. it's complementary by surveying the existing contributions in this field, and applying the best selected strategy on a real industrial system.

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keyword: industry 4.0, industrial cyber-physical system, Predictive maintenance,

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resume

Ces dernières années, la quatrième révolution industrielle a attiré l'attention du monde entier. Les usines de fabrication traditionnelle se transforment en ce que l'on appelle des « usines intelligentes », qui appliquent des technologies de détection de haute technologie et de calcul sur différents procédés de fabrication et systèmes de production. Comme le marché de la fabrication devient de plus en plus compétitif, améliorer la disponibilité et la qualité des services de fabrication dans les usines intelligentes est devenu une préoccupation cruciale pour les fabricants. Cette situation a entraîné une demande croissante pour la mise en place de la maintenance prédictive sur les lignes de production, qui consiste à réaliser des activités de maintenance pour éviter les défaillances et améliorer la disponibilité et la sécurité du système maintenu. Il existe plusieurs approches existantes pour la maintenance prédictive dans IR4.0, chacune avec ses propres avantages et inconvénients.

Ce mémoire de master explore la maintenance prédictive dans l'industrie 4.0, en mettant l'accent sur l'étude et la comparaison des approches existantes. Il complète les contributions existantes dans ce domaine, et applique la meilleure stratégie choisie sur un système industriel réel.

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keyword: industrie 4.0,système cyber-physique industriel, la maintenance predective

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ملخص

في السنوات الأخيرة، لفتت الثورة الصناعية الرابعة انتباه العالم، حيث تحولت مصانع التصنيع التقليدية إلى ما يسمى المصانع الذكيةْ، التي تطبق تقنيات الكشف والحسابات ذات التقنية العالية على عمليات التصنيع وأنظمة الإنتاج المختلفة. وبما أن سوق التصنيع اليوم يصبح أكثر تنافسية، فإن تحسين الجودة هي مصدر قلق للصناع. وقد دفعت هذه الحالة الطلب على تطبيق الصيانة التنبؤية على خطوط الإنتاج، التي يتم تنفيذها لتجنب حدوث الأعطال وتحسين سلامة النظام المحافظ عليه، وهناك عدة نهج موجودة يستكشف هذا مشروع التخرج الصيانة التنبؤية في صناعة الحديثة، مع التركيز على دراسة ومقارنة النهج مراجعة المساهمات الموجودة في هذا المجال، وتطبيق أفضل استراتيجية مختارة على نظام صناعي حقيقي.

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keyword: الصناعة الرابعة ، النظام الفيزيائي السيبراني الصناعي ، الصيانة التنبؤية

List of Acronyms