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Author



لا نبالغ إذا قلنا أن الإلكترونيات الرقمية هي قلب الصناعة الحديثة , وانه من شبه المستحيل بالنسبة لكل المجالات الصناعية أن تستغني عن وجود بعض الأجزاء الرقمية في عملياتها المختلفة . المراقبة المستمرة للعمليات المختلفة شيء أساسي لكل المهندسين لضمان أن كل جزء من العملية يسير بالشكل الذي تم التخطيط له مسبقاً . ظهور المعالجات الدقيقة أضاف الكثير لقدرتنا علي تحليل البيانات الرقمية مما أدى بالتالي إلي تحسين كفاءة دوائر التحكم ومكننا من إعطاء نتائج دقيقة.

المعالجات الدقيقة القديمة كانت تحوى بضعة آلاف من الدوائر المنطقية بينما المعالجات الحديثة يمكن أن تحتوى على بضع عشرات من الملايين من هذه الدوائر المنطقية . هذا التطور الهائل والحديث في قدرة المعالجات مكنها من تطوير قدراتها بشكل كبير وأصبحت بذلك قادرة على التحليل والاستجابة السريعة لمتطلبات أي نظام . بعض التطبيقات الحساسة في مجال التحكم مثل نظام هبوط الطائرات ونظام التحكم في ارتفاع الأقمار الصناعية يتطلب استجابة سريعة ودقيقة من جانب نظام التحكم. وهذا لا يتأتى إلا بوجود نظام رقمي من نوع PID أو ما شابهه لإتمام المهام المطلوبة . هناك

إمكانية تفعيل نظامنا بواسطة الصوت وذلك باستخدام الدائرة المتكاملة Voicedirect 364 والتي هي عبارة عن دائرة متكاملة يمكنها التعرف على 15 عبارة مختلفة. وتعرف هذه الدائرة المتكاملة بدقتها بنسبة 99%. نظام الحديث المعاكس (aka SCADA) سيقوم بإرسال المعلومات مرة أخرى إلينا بواسطة موجة DTMF. ويمكن لموجة ال DTMF أن تقوم بإضاءة لمبات أو مؤشرات أو تزويد بعض الأجهزة مثل الكومبيوتر والطابعة والمسجل بالمعلومات.

من خلال صفحات هذه الرسالة نحاول أن نعطي توضيحاً شاملاً للجوانب الهندسية لنظام تحكم صناعي متعدد المهام يستطيع أن يقوم بعمليات تحكم محددة . دوائر التحكم المتناظر ودوائر التحكم الرقمي , وتوصيل هذه الدوائر بالحاسوب هي أهم الجوانب التي سيتم التطرق إليها . أساليب التحليل والتصميم التقليدية والحديثة سيتم التطرق إليها من خلال هذا البحث.

Abstract

We don't exaggerate if we say that digital electronics is the heart of the modern industry. It is almost indispensable for all fields of industry to have digital parts involved in their different processes. Continuous monitoring of different operations is essential for engineers to guarantee that every part of the operation goes as it is previously planned. Sophisticated feedback and control systems use digitized data to maintain the stability of the system. The evolution of microprocessors improved the power of analyzing digital data, which in turn helped the controllers give more accurate results. Early microprocessors contained few thousands of logic gates while the modern

ones might contain few tens of millions of logic gates. This huge and dramatic development in the microprocessors capabilities added much to their abilities to analyze and act promptly and accurately for any system requirement. Some sensitive control applications like the automatic craft landing system and the altitude control system of the satellite require fast and accurate response of the attached control system. This can not be attained without a digital PID control system. There is a possibility of activating our system by voice using an IC voicedirect 364 which is an IC which can recognize up to 15 phrases. It is claimed to be over 99% accurate. A talk back system (aka SCADA) sends information back to us via DTMF. This DTMF signal can light status maps, turn on indicators or supply information to computers, printers or recorders. Through the pages of this thesis we will try to give a comprehensive overview of the engineering aspects of general-purpose systems that can perform specific control functions. Analog controllers, digital controllers, and computer interface are the areas of most interest herein. Both classical and modern techniques of analysis and design are considered in this thesis

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