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Abstract:

All buildings have some form of mechanical and electrical services in order to provide the facilities necessary for maintaining a comfortable working environment. These services have to be controlled by some means to ensure, for example, that there is adequate hot water for sink, that the hot water in the radiators is sufficient to keep an occupied space warm.

Basic controls take the form of manual switching, time clocks or temperature switches that provide the on and off signals for enabling pumps,fans,or valves etc.

The purpose of a building management systems (BMS) is to automate and take control of these operations in the most efficient way possible for the occupies/business, within the constraints of the installed plant.

The BMS is “stand alone” computer system that can calculate the pre-set requirements of the building and control the connected plant to meet those needs. It’s inputs, such as temperature sensors and its outputs, such as on/off signals are connected into outstations around the building. Programs within these outstations use this information to decide the necessary level of applied control. The outstations are linked together and information can be passed from one to another.

The objective of this research is to build a circuit. The function of the circuit is as (hub). It accepts data from a multiple sensors and hand it over to the server, and at the same time it responds to the nature of the sensing values coming from the sensors. The hardware and software system represents a closed loop system to fulfill the requirement of the computer controlled building management system.

This circuit design can be considered as a model for the (BMS) system. The design is flexible in the sensors, that extra sensors devices can be added to the circuit.

المستخلص:

كل المباني لها شكل من الخدمات الكهربية و الميكانيكية لضرورة تسهيل الحفاظ علي بيئة عمل مريحة.هذه الخدمات يجب التحكم بها بطريقة ما للتأكد مثلا: هنالك ماء ساخن ملائم للتدفئة وكذالك المياه الموجودة في جهاد الراديتر كافية لتحفظ المكان دافئا.

المتحكمات الأساسية تأخذ شكل تستخدم فيه مفاتيح يدوية أو موقتات زمنية أو مفاتيح حرارية لتزويد إشارات فتح و غلق لتفعيل المضخات أو المراوح أو الصمامات أو....الخ.

الغرض من أنظمة إدارة المباني هو أتمتت و التحكم في هذه العمليات المذكورة أعلاه بكفاءة عالية بقدر المستطاع للاماكن التي تحتلها المؤسسات أو الأعمال مع الوضع في الاعتبار المحددات التي توجد في أماكن تنصيب النظام.

إن نظام إدارة المبني عبارة عن جهاز كمبيوتر يستطيع القيام بحساب احتياجات المبني و ضبط الأجهزة المتصلة معه بحيث تكون استجابة تلك الأجهزة ممكنة للوصول الي تلك الاحتياجات . تتمثل مدخلاته في الإشارات التي تأتي من المتحسسات ,مثل متحسسات الحرارة و مخرجاته تتمثل في إشارات الفتح و الغلق المتحكمة بالمحطات الخارجية حول المبني . هنالك برامج داخل هذه المحطات تستخدم هذه المعلومات (الإشارات) لتقرر ضرورة مستوي التحكم المطبق . وهذه المحطات متصلة مع بعضها و تستطيع المعلومات المرور من محطة الي أخرى

إن الهدف من هذا البحث هو بناء دائرة, وظيفتها إن تعمل كمجمع بحيث تقبل الإشارات من متحسسات متعددة و تسليمها إلى جهاز الكمبيوتر ليقوم بمعالجتها و في نفس الوقت تستجيب لطبيعة القيم المتحسسة عن طريق المتحسسات. عتاد وبرامج النظام تكون علي شكل دائرة مغلقة النظام لتلبية احتياجات جهاز الكمبيوتر المتحكم في نظام إدارة المبني.

يمكن اعتبار هذه الدائرة كنموذج لنظام إدارة المباني و التي يمتاز تصميمها بمرونة المتحسسات و إمكانية إضافة متحسسات أخرى له.

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Chapter1: Introduction

Chapter 2 : Building Management Systems (BMS)

Abbreviations

Name	Definition
AHU	Air handling Unit
ASHRAE	Association of heating refrigeration and air conditioning engineers
BACnet	Building Automation And Control Network
BAS	Building Automation system
BMS	Building Management system
BTS	BACnet Testing Laboratory
COP	Coefficient of performance
COM	The connectors and accompanying circuitry that allow serial devices - such as serial printers, modems, or mice - to be connected to PC. Communication ports are also called serial ports. To keep track of the devices, DOS assigns names that begin with the letters COM to communication ports (such as COM1 and COM2).
CMOS	Complementary Metal –Oxide Semiconductor
DC	Direct current
DDC	Direct digital controller
EIA	Electrical Industries Alliance
GUI	Graphical user interface
HVAC	Heating, Ventilation and air-conditioning
IC	Integrated circuit
IDE	Integrated Development environment
I/O	

	Input/output
IR	Infra Red
IRQ	Interrupt ReQuest: a signal generated by a device to request processing time from the CPU. Each time a keyboard button is pressed or a character is printed to a screen, an IRQ is generated by the requesting device. IRQ signals are transmitted along IRQ lines, which connect peripheral devices to a programmable interrupt controller, or PIC. A PC has 16 IRQs, and no two operational devices can share the same IRQ.
LAN	Local Area Network
LCD	Liquid crystal Display
LE	Latch Enable
LED	Light Emitting Diode
Lontalk	a protocol optimized for control created by Echelon Corporation for networking devices over media such as twisted pair, powerlines, fiber optics, and radio frequency. It is popular for the automation of various functions in industrial control, home automation, transportation, and buildings systems such as lighting and HVAC.
LPT	Line Printer Terminal
OE	Output Enable
OSI	Open System Interconnection
MS/TP	Master-Slave/token passing
PC	Personal Computer
PICS	Protocol Implementation conformance
PIRS	Passive Infra Red Sensors
PLC	Programmable Logic Control

RAM TTL VAV USB	Read Access Memory Transistor Transistor Logic Variable Air Volume Universal Serial Bus

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