

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى:

"فَمَنْ يُرِدِ اللَّهُ أَنْ يَهْدِيَهُ يَشْرَحْ صَدْرَهُ لِلْإِسْلَامِ وَمَنْ يُرِدْ أَنْ يُضِلَّهُ يَجْعَلْ صَدْرَهُ ضَيِّقًا حَرَجًا
كَأَنَّمَا يَصَّعَّدُ فِي السَّمَاءِ كَذَلِكَ يَجْعَلُ اللَّهُ الرِّجْسَ عَلَى الَّذِينَ لَا يُؤْمِنُونَ"

صدق الله العظيم

الأنعام الآية 125

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All praise and thanks is due to Almighty ***ALLAH***, the creator and sustainer of the worlds. I wish to thank Him for all that He has gifted us with, although, He can never be praised or thanked enough.

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Single out for thanks my parents, my family and friends. I also thank all those who have provided me assistance and guidance.

DEDICATION

I dedicate this effort

TO

My beloved mother

My great father

A gift to my brothers and sisters

To all people who helped me in this study.

ABSTRACT

Building automation is now very widespread in all the developed countries to ease the management of buildings like schools, hospitals, public edifices, private houses and so on.

In this project, a feasible Building Automation System based on very cheap distributed microcontroller architecture is designed. A power line communication network is established to link those microcontrollers; so there is no need to install proprietary cables or a wireless network.

The Power Line Communication (PLC) technology utilizes the power cables as a communication channel. A radio frequency signal of a few hundreds of Hz up to a few tens of MHz is transmitted through the power lines. The power line communication has distance and frequency limitations which depend on the type of power line used. The device performs the operation of data transfer through the power line and connects controllers to the power lines; is called the Power Line Modem (PLM).

This report presents the design and implementation of Building Automation over Power Line, this model contains a user interface, irrigation system and lighting system; those systems are connected through the power line network.

التجريد

عملية أتمتة المباني واسعة الانتشار في كثير من البلدان المتطورة بغرض تيسير ادارة المباني مثل:المدارس، المستشفيات، المرافق العامة والمنازل. في هذا المشروع تم تصميم نظام تحكم في المبنى مستنداً المتحكمات الدقيقة الموزعة ذات الأسعار الزهيدة، كما تم تأسيس شبكة تحكم عبر خطوط الكهرباء لربط تلك المتحكمات الشيء الذي يغنينا عن تثبيت كوابل خاصة أو شبكة تحكم لاسلكية.

إن تكنولوجيا الاتصال عبر خطوط الكهرباء تستخدم كوابل الكهرباء كقناة اتصال؛ فإشارة راديو بتردد يساوي مئات الهيرتزات حتى عشرات الميغاهيرتزات يتم نقلها من خلال خط الكهرباء. إن تقنية الاتصال عبر خطوط الكهرباء لها تقييدات للمسافة والتردد والتي تعتمد على نوع خط الكهرباء المستخدم. فالجهاز الذي يقوم بعملية نقل البيانات عبر خطوط الكهرباء ويربط المتحكمات بخط الكهرباء يسمى بمودم الاتصال عبر خطوط الكهرباء.

ويعرض هذا التقرير تصميم وتنفيذ نموذج مبسط لتوضيح فكرة التحكم في المباني من خلال خطوط الكهرباء، هذا النموذج يحتوي على: واجهة المستخدم، نظام ري و نظام الاضاءة، كل هذه الأنظمة موصلة عبر خط الكهرباء.

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List of abbreviations and Symbols

BAPOL	Beauty Art Products on Line
BAS	Building Automation System
HMI	Human Machine Interface
IDE	Integrated Development Environment
IP	Internet Protocol
LDE	Light Diode
MCU	Microcontroller Unit
OLE	Object Linking and Embedding
PIR	performance Infrared Radial Sensor
PLC	Power Line Communication
PLM	Power Line Modem
TCP	Transmission Control Protocol
SQL	Structured Query Language
VB	Visual Basic