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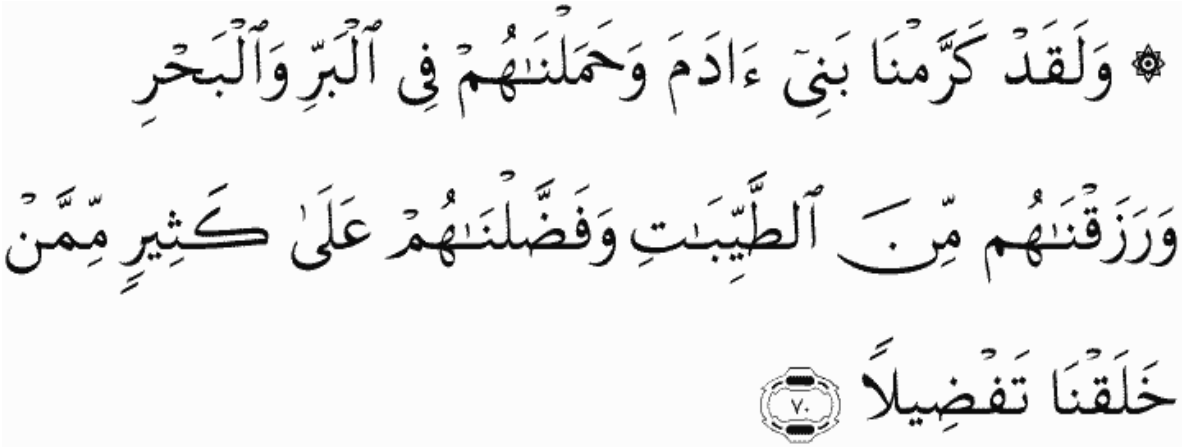

- **صدق الله العظيم**

سورة الإسراء(70)

DEDICATION

To our parents,

For their unstinting support;

To our familys,

Who always shared our failures and happiness;

To our colleagues.

ACKNOWLEDGEMENTS

In the name of Allah,Most Gracious,and Most Merciful.

Praise be to almighty Allah (Subhanahu Wa Ta'ala) who gave us the courage and patience to carry out this work. Peace and blessing of Allah be upon his last prophet Mohammed (sallulaho-Alaihe Wassalam) and all his companions (Sahaba), (Radi-Allaho-Anhum) who devoted their lives towards the prosperity and spread of islam.

Our deep appreciation and heartful gratitude goes to our supervisor Ust. Maha Mohammed Osman for her kindness, constant endeavor, guidance and numerous moments of attention she devoted throughout this work.

We sincerely appreciate the efforts that have been put by all the people above which truly cannot be described by words. We would like to thank (Sue-Gutter) Company And especielly Eng. Abu-bakr for thierhelp to understand the overall idea of this project.

Finally , Our sincere thankfulness goes to our family for their prayers and encouragement that always helped us to take the right step in life.

ABSTRACT

The project is designed to minimize penalty for industrial units using automatic power factor correction unit.

In this proposed system, two zero crossing detectors are used for detecting zero crossing of voltage and current. The time lag between the zero-voltage pulse and zero-current pulse is duly generated by suitable operational amplifier circuits in comparator mode is fed to two interrupt pins of a microcontroller. It displays time lag between the current and voltage on an LCD. The program takes over to select appropriate number of relays from its output to bring shunt capacitors into load circuit to get the power factor till it reaches near unity. The capacitor bank and relays are interfaced to the microcontroller using a relay driver. The microcontroller used in this project belongs to 8051 family.

Furthermore, the project can be enhanced by using thyristor control switches instead of relay control to avoid contact pitting often encountered by switching of capacitors due to high in rush current.

المستخلـــص

صمم هذا المشروع لتقليل التكاليف الإضافية الناتجة من القيم المنخفضة لمعامل القدرة في الوحدات الصناعية باستخدام التصحيح الآلي لمعامل القدرة.

في هذا النظام استخدم حساس لمنطقة عبور موجتي الجهد والتيار لتحسس التأخر في الزمن بين الموجتين، هذا الزمن يتم تكبيره وتغذيته للمتحكم الدقيق ، ويتم عرض هذا التأخر في شاشة العرض.

يقوم المتحكم الدقيق باستخدام البرنامج المخزن بداخله لإختيار عدد المكثفات الموصلة بالتوازي المناسب لجعل معامل القدرة أقرب ما يكون إلى الواحد.

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LIST OF ABBREVIATIONS

APFC	Automatic Power Factor Compensation
LCD	Liquid Crystal Display
LED	Light Emit Diode
AC	Alternating Current
DC	Direct Current
CMOS	Complementary Metal-Oxide Semi-Conductor
CPU	Central Processing Unit
RAM	Random Access Memory
NPN	Negative-Positive-Negative Transistor Type
TTL	Transistor-Transistor Logic
EN	Enable
RS	Registor Select
RW	Read/Write
DB	Data Bus
MOS	Metal-Oxide Semi-Conductor
CT	Current Transformer
VT	Voltage Transformer
PT	Potential Transformer
JEDEC	Joint Electron Device Engineering Council
COM	Common
ZVS	Zero Voltage Sensor
ZCS	Zero Current Sensor
VAR	Voltage-Ampere Reactive
VA	Voltage-Ampere

LIST OF SYMBOLS

S	Apperant Power, VA
P	Real Power, Watt
Q	Reactive Power, VAR
Vp	Primary Voltage, V
Vs	Secondary Voltage, V
Np	Primary Turns, Turn
Ns	Secondary Turns, Turn
V	Voltage (RMS), V
I	Current(RMS), A
R	Resistance, Ohm