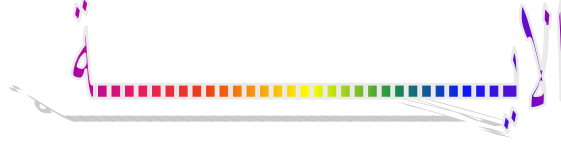


بسم الله الرحمن الرحيم



قال تعالى:

(لقد ارسلنا رسلنا بالبينات وانزلنا معهم
الكتاب والميزان ليقيموا الناس بالقسط وانزلنا
الحديد فيه باس شديد و منافع للناس وليعلم الله من
ينصره ورسله بالغيب ان الله قوى عزيز)

صدق الله العظيم

سورة الحديد الآية (25)

Dedication

To whom she dressed me the life,

Mother.

To whom he gave me beautiful pain,

Father

To whom I share with sorrow and sweet,

Friends.

Whenever commit a fault we will find forgiveness,

To brothers.

To whom I stop for them,

To all.

Acknowledgement

My thanks firstly go to almightily without whose help none of this could have been done.

True thanks to proff Saad Daoud for this effective contribution in success of this research.

Also we would like to extend my thanks to staff in electrical engineering bringing this thesis to success.

Also too thank to University of Nyala for financial support

Last but not least, I would like to thank Mr.Khalid Mohammed Elabbsy, for encouragement and understanding.

Ahmed Mohammed Ishag

Abstract:

The thesis describes the AC motor speed control and the implementation of motor control using ATMEGA8L microcontroller. The industrial and home application is growing complicated and use classical method in speed control can be complexity and costly. For that during the last few years AC speed control by microprocessor is increased significantly.

The Atmel AVR microcontroller is excellent for motor control application due to the some futures.

The research in first chapter explained the ac motor types and theory in brief and methods of speed control in details. In chapter two design of ac motor speed controls using V/F method and explain effect of increasing and decreasing V/F operation.

in chapter three and four design of hard ware and soft ware using c language, complied that by IAR work bench and AVR studio tool ,and implemented special circuit for that .last Chapter experimental result, conclusion and recommendation.

مستخلص

هذا البحث يتناول كيفية السيطرة محرك حثي ثلاثي الطور بواسطة المتحكم الدقيق ATMEGA8L. في السنوات القليلة الماضية زادت الحاجة للسيطرة علي سرعة المحركات الحثية لان معظم التطبيقات الصناعية والمنزلية تعتمد عليها، وللتقليل من التكاليف والتعقيدات من استخدام الطرق التقليدية في تحكم سرعة المحركات. المتحكمات AVR متحكمات ممتازة نسبة لبنيتها الفعالة، وخصائصها المتميزة لذلك وهو مهم جدا في تطبيقات التحكم المختلفة. البحث في أبوابه الأولى تم شرح المحركات الحثية وطريقة عملها وطرق التحكم المختلفة، أما في الباب الثاني استخدم طريقة الجهد على التردد وتم التصميم على هذه الطريقة، أيضا تم توضيح اثر الزيادة والنقصان في الجهد علي التردد في عمل المحرك. إما في الباب الثالث والرابع بناء الدائرة بمراحل التصميم بمساعدة برمجيات لغة C، وتم البناء على المتحكم ATMEGA8L لتأكيد النظري وتم استخراج النتائج وعرضها علي جهاز راسم الإشارة ونوقشت النتائج. وفي النهاية الخاتمة والتوصيات.

Content

الآية	I
Dedication	II
Acknowledgment	III
Abstract	IV
مستخلص	V
List of Contents	VI
List of Acronyms	IX
List of Figures	X

Chapter one

General concept

1:1 Introduction	1
1:2 The objective of research	2
1:3 Induction motors types.....	2
1:3:1 Squirrel Cage Motor.....	2
1:3:2 Slip Ring Motors.....	3
1:4 motor rotations.....	3
1:5 Speed Control of Induction Motor.....	4
1:6 Changing the number of stator poles.....	4
1:7 Injections an e.m.f in the rotor circuit.....	5
1:8 V/F control theory.....	5
1:9 Importance economics of variation of speed of induction motor.....	7

Chapter two

Design of motor speed control

2:1 Volt per hertz Control.....	9
2:2 V/F operation.....	10
2:3 Constant terminal V/F operation.....	10
2:4 Terminal V/F control.....	11

2:5 Low –frequency performance with increased V/F	12
2:6 Voltage-source inverter specifications.....	13
2:7 Air gap operation.....	14
2:8 Constant voltage operations.....	14
2:9 Closed- loop speed control	15
2:10 the Natural PWM Principle.....	17
2:11 Byte needed to store a sine table	17

Chapter three

Implementation of control using ATMEGA8L

3:1 Introduction	18
3:2 system concepts.....	18
3:3 hardware design.....	19
3:3:1 System Outline.....	19
3:4 the control process	20
3:5 Diode rectifiers.....	20
3:6 Design of Three- phase full wave bridge rectifier.....	20
3:7 Thyristors.....	21
3:8 Insulated Gates Bipolar Transistor (IGBT).....	22
3:9 Design of Three-Phase Full-Bridge VSI.....	23
3:10 Atmega8l microcontroller.....	23
3:11 Power Stage Board.....	23
3:12 motor specification.....	24
3:13 software design.....	25
3:13:1 code list.....	26
3:13:2 memory usage.....	26
3:13:3 program flow chart	27

Chapter four

Development tools and experimental results

4:1 Introduction.....	28
4:2 Creating a new project in IAR Embedded Workbench.....	28
4:3 Setting up targets in IAR Embedded Workbench.....	29
4:4 Using AVR Studio.....	31
4:5 Experimental results.....	32

Chapter five

Conclusion and Recommendations

5:1 Conclusion.....	35
5:2 Recommendations.....	35
References.....	36
Appendix A.....	37
Appendix B.....	53

List of abbreviation

NEMA	National electrical manufactures association
AFC	Adjustable frequency control
VVVF	Variable voltage variable frequency
EMF	Electromotive force
PWM	Pulse width modulation
IGBT	Insulated gate bipolar transistor
VSI	Voltage source inverter

List of figure

Figure (1.1) squirrel cage rotor	3
Figure (1.2) wound rotor.....	3
Figure (1.3) speed-torque characteristic with V/F control.....	6
Figure (2.1) voltage-frequency characteristic.....	9
Figure (2.2) Equivalent circuit of induction motor.....	13
Figure (2.3) show torque-speed characteristic.....	15
Figure (2.4) Conceptual block diagram of V/F control with velocity feed back.....	16
Figure (3.1) General block diagram.....	19
Figure (3.2) Three-phase full wave bridge rectifies.....	21
Figure (3.3) Insulated Gate Bipolar Transistor.....	22
Figure (3.4) Three-Phase Full-Bridge VSI.....	23
Figure (3.5) Program flow chart.....	27
Figure (4.1) Project with ledchase.c included.....	28
Figure (4.2) Selection of target.....	29
Figure (4.3) Atmega8l connections fuse.....	30
Figure (4.4) AVR Studio.....	32
Figure (4.5) Experimental result	33
Figure (4.6) .Instrumentation experimental	34

List of table

Table (3.1) General Requirements	24
Table (3.2) memory usages.....	26