

الآية

قال تعالى:

{ وَيَسْأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ مِنْ
أَمْرِ رَبِّي وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا
قَلِيلًا }

صدق الله

العظيم

(الإسراء : 85)

Dedication

I dedicate this work to my family
and to Sudan University of Science and
Technology
for their great help that giving to me in
fulfilling this research.

Acknowledgment

I am grateful to my supervisor Dr. Abd Elrasoul Jabar for this support and help through the different stage of this research.

My special thank is to my hasbund, kids, mother, father and sisters.

Abstract

The knowledge of R.P.M. of the aircraft engine propeller is very important to give the maximum help, during the various stages of aviation stage.

Each stage of phases flight (take-off , cruise and landing) need ascertain and accurate number of propeller revolution per minute . This study concerns in electronic monitoring to the RPM of an aircraft engine propeller during flight.

Control circuit was designed to connect a switch to the engine propeller which generates a pulse at a full round of propeller, then the pulse was passed from the switch to the computer in which the RPM is calculated using C++ program.

The Electronic Circuit was designed As Follows:-

Snap action was used as type of switch which produce a pulse by complete one cycle, then stored in SN74373, which was stored the pulse then pass it to the computer via a D-25 cable connected respectively with it's features so chosen as a link between the computer and the switch. And when the pulse reach the computer, the computer starts account the number of RPM using the C++ program. So the monitoring of the RPM will be very accurate using the computer for it's speed and accuracy.

ملخص الدراسة

تكمُن أهمية معرفة عدد دورات مروحة محرك الطائرة في الدقيقة للمساعدة القصوى في عملية الطيران أثناء مراحلهِ المختلفة .

فكل مرحلة من مراحل الطيران (الإقلاع، الاستقرار، الهبوط) تحتاج إلى عدد معين ودقيق من الدورات، لذا أُقيمت هذه الدراسة كمرقبة الكترونية لعدد دورات مروحة محرك الطائرة أثناء الطيران .

صممت دائرة المراقبة بتوصيل مفتاح على مروحة المحرك تتولد فيه نبضة باكتطال دورة كاملة من المروحة ويتم تمرير هذه النبضة من المفتاح إلى جهاز الحاسوب ويتم حساب عدد الدورات في الدقيقة ببرنامج ++C .

أما تصميم الدائرة الإلكترونية فيكون كالآتي:

يتم اختيار SNAP ACTION كنوع من أنواع المفاتيح؛ فتنتج نبضة باكتمال دورة واحدة؛ يتم تخزينها في SN74373؛ وهو عبارة عن قلاب؛ يتم تخزين النبضة فيه إلى حين إرسالها إلى الحاسوب؛ عن طريق وصلة نوع D-25 وهو توصيل على التوالي؛ وله مميزاتة لذا اختير كحلقة وصل بين الحاسوب والقلاب، وعند ما تطر النبضة إلى الحاسوب يقوم بحساب عدد الدورات في الدقيقة ببرنامج ++C، وبذا تكون مراقبة الدورات دقيقة باستخدام جهاز الحاسوب لسرعته ودقته.

Table of contents

Page

الآية.....

I

Dedication	II
Acknowledgement	III
Abstract English	IV
Abstract Arabic	V
Table of contents.....	VI
List of tables	XI
List of figures.....	XII
List of abbreviation.....	XIII

Chapter One

Introduction

1:1 Background	1
1:2 Problem Statement.....	4
1:3 Objectives.....	5
1:4 Methodology (or approval).....	6
1:5 Research plan.....	7

Chapter Two

Literature Review

2.1 Engine propeller	8
2.1.1 Propeller type.....	13
2.1.1.1 Fixed pitch propeller.....	13
2.1.1.2 Wooden propeller.....	13
2.1.1.3 Metal propeller.....	13

2.1.1.4 Variable pitch propeller.....	14
2.1.1.5 Two Position.....	14
2.1.1.6 Controllable pitch.....	14
2.1.1.7 Constant speed propeller.....	14
2.1.1.8 Beta control.....	15
2.1.2 Propeller theory.....	15
2.1.2.1 Blade angle and pitch.....	22
2.1.2.2 Pitch and velocity.....	23
2.1.2.3 The wind milling propeller.....	25
2.1.2.4 The runaway propeller.....	26
2.1.3 Basic control and Indi of engine propeller.....	26
2.1.3.1Tachometer.....	26
2.1.3.2 Propeller control.....	27
2.1.3.3 Fundamental Forces.....	28
2.1.3.4 Propeller Operation.....	28
2.1.3.5 Preflight Check	28
2.1.3.6 Engine start up.....	29
2.1.3.7 Pre-take off check.....	29
2.1.3.8 Cruise checks.....	29
2.1.3.9 Over square.....	29
2.1.3.10 Emergencies.....	30
2.1.3.11Constant speed propeller.....	30
2.1.3.12 Adjustable pitch propeller.....	32

2.1.3.13 Constant Speed Counter Weight Propeler	35
2.1.3.14 The counter Wight assembly.....	35
2.1.3.15 Controllable.....	35
2.1.3.16 Constant speed.....	35
2.1.3.17Governor operation.....	35
2.1.3.18 Principle of operation.....	36
2.2 Micro switch	37
2.3 C++ programming.....	39

Chapter three

Electronic Circuit Design

3.1 General view.....	40
3.2 Hard ware description.....	40
3.2.1 Octal transparent latches with 3 states output sn 74373.....	40
3.2.2 Micro switch	41
3.2.2.1 Applications.....	41
3.2.2.2 Push button-Microswitchs (snap Action).....	42
3.2.2.3 Installation Recommendations.....	44
3.2.2.4 Micro switch Installation Tips	45
3.2.3 The PC.....	46
3.3 Electronic circuit of monitoring rpm of an aircraft engine propeller.....	47
3.3.1 Parallel interfacing.....	47
3.3.1.1 Parallel port.....	47

3.3.1.2 Parallel port connectors types.....	49
3.3.1.3 Parallel port addresses.....	51
3.3.1.4 Type of parallel port mode.....	52
3.3.1.5 Parallel port registers types.....	55
3.3.1.6 Parallel port hard ware names.....	57
3.3.2 Parallel Port Uses.....	57
3.4 Advantage of parallel over serial.....	58

Chapter four

Software Design

4.1 The software.....	60
4.2 Types of soft ware.....	62
4.2.1 System soft ware	63
4.2.2 programming soft ware.....	63
4.2.3 Application soft ware.....	64
4.3 Design and implement.....	64
4.4 languages.....	65
4.4.1 Objects	68
4.5 The flow chart	68

Chapter five
Results and Discussion

5.1 Results' discussion.....	72
5.2 The pin diagram explanation.....	72

Chapter six
Conclusion and Recommendation

6.1 Conclusion.....	76
6.2 Recommendation.....	77
References.....	78

Appendices

Appendix (A).....	79
Appendix (A).....	80

List of tables

3.1 The series of micro switches and the mounting of features.....	40
3.2 25pin and 36 pin (centronics) for parallel port connectors.....	46
3.3 parallel port address (16).....	48
3.4 parallel port name.....	48
3.5 data status and control registers port pin and registers.....	52
3.6 The data registers	52
3.7 status registers port	53
3.8 control registers port	53

List of Figures

1.1 Block diagram of Electronic monitoring rpm of an aircraft engine propeller.....	6
2.1 The component of the lift acting in rotational plane	17
2.2 Engine Propeller	33
3.1 block diagram of monitoring rpm of A/c engine propeller.....	38
3.2 snap action microswitch	39
3.3 The type of snap action micro switch.....	40
3.4 The internal of micro switch.....	43
3.5 electronic circuit of monitoring rpm of A/c engine propeller	44
3.6 A female DB-25 connector used As parallel port (pin in).....	45
3.7 Amale DB-25 connector used As parallel port (pin out).....	45
4.1 soft ware flow chart of monitoring rpm of Alc engine propeller.....	67
6.1 Figure 6.1 block diagram of IR (Txr./Rxr).....	72

List of Abbreviations

A/C	Air craft.
Aoa	angle of attack .
API	application programming interface .
BHP	brake horse power .
BIOS	basic input output system .
CPU	center processor unit.
ECP	extended capability port .
EPP	extended parallel port .
FAA	federal aviation authority.
IDE	integrated development environments .
MAP	manifold air pressure .
OOP	object oriented programming .
PC	Personal computer.
RAM	Random Access Momory.
Rpm	revolution per minute.
SPP	standand parallel port .
THP	thrust horse power.
UART	universal asynchronons receiver\ transmitter .