

بسم الله الرحمن الرحيم

Sudan University of Science and Technology

College of post Graduate Studies

Department of Electronic Engineering

**Controlling Wireless Monitoring Camera Via Mobile
Network**

التحكم اللاسلكي في كاميرا مراقبة عن طريق شبكة الجوال

A dissertation submitted in partial fulfillment of the requirement of Master

Degree M.Sc In

TELECOMMUNICATION ENGINEERING

Prepared By:

Khalid Hussien Ahmed

Supervised By :

Dr. Abd Alrasol Jabar Alzubaidy

October 2013

قُلْ رَّبِّهِ زِدْ نِيْلَهُ

سورة طه الايه 114

This work is dedicated to:

To My Dear Parents,

To My Dear Wife,

To My Dear Girlie

To My Dear Brothers,

To My Dear Sisters,

To All My Friends,

To Who Like the Learning,

ACKNOWLEDGEMENT

Firstly, all praise and my great thanks to my Glory God, ALLAH, for everything in my life, and for giving me the power and assisting me to complete this work.

I am profoundly grateful to **Dr.Abd Alrasol Jabar Alzubaidy**, (my supervisor) whose detailed criticisms of earlier drafts, valuable suggestions and wise counsel, have proved most invaluable to me. It has been a most rewarding learning experience to work under his guidance.

I thank all individuals who sacrificed their time to speak to me during the work. I wish to acknowledge with great appreciation all the encouragement from my friends; your advice were soul searching.

ABSTRACT

Today everything is going to be digital and wireless, and the cell phone is the key player in wireless technology, the trends in wireless technology changing day-by-day and today the work is going on how to develop remote devices. Remote communication allows us to monitoring places by controlling wireless Camera without having to be near them.

There are two key components to the project design.

Remote unit:

This unit consists of cell phone which is present in the remote place.

Local unit:

This contains one cell phone and a Local Control Section, The Local Control Section consists of a DTMF Receiver (DTMF decoder), Computer, ULN2001 Darlington Driver and the Wireless Camera fixed in Stepper Motor .

The remote unit (mobile) remotely controlled the moving of the Wire- less successfully.

مستخلص

في ظل التقدم المتواصل في عالم الإتصالات و التقنيات الحديثه التي تتطور يوماً بعد يوم والتي أسهمت في تطور حياة الانسان يعد التطور في مجال التحكم عن بعد في الأجهزة الإلكترونية من أهم هذه التقنيات,حيث أن التحكم عن بعد يسمح لنا بمراقبة كل المواقع من دون الحاجة بأن نكون بالقرب منها .

الهدف من هذا المشروع هو تصميم نظاماً يقوم بمراقبة المناطق عن بعد وذلك بتشغيل وتحريك الكاميرا من خلال إستخدام نظام الهاتف الجوال .
يتكون هذا النظام من جزئين أساسيين وهما:-

وحدة التحكم عن بعد (Remote unit) هذه الوحدة تتكون من الهاتف الخليوي .
الوحدة المحلية (Local unit) و هذه الوحدة تتكون من الهاتف الخليوي ووحدة التحكم المحلية التي تحتوي علي مستقبل النغمة الثنائية متعددة الترددات (DTMF Receiver),
محرك الخطوه (Stepper Motor), (ULN2001 Darlington Driver), جهاز حاسوب و كاميرة المراقبه المراد التحكم بها.
تم التحكم في الكاميرا وذلك بتشغيلها بتحريكها عن طريق وحدة التحكم عن بعد من خلال شبكة الهاتف الخليوي (GSM) .

Table of Contents

Dedication	III
Acknowledgement.....	IV
Abstract.....	V
Arabic Abstract	VI
Table of Contents.....	VII
List of Tables.....	X
List of Figures.....	XI
List of abbreviation.....	XII

Chapter one:

1. Introduction.....	
1.1. Background.....	1
1.2. problem statement	2
1.3. objectives	2
1.4. methodologies	2
1.5. Research outline	3

Chapter Two:

2.Camera & stepper Motors	
1.6. Overview about Camera	4
1.7. Type of Wireless Camera	4
2.2.1 Spy Camera	4
2.2.2 Surveillance Cameras	5
2.2.3 Wireless Security Camera	5
2.2.4 Wireless pinhole Cameras	7

2.2.5 Wireless Internet Video Camera	8
2.3 Stepper Motor	9
2.4 Advantage of Stepper Motor	9
2.5 Stepper Motor Type	10
2.5.1 Variable reluctance (VR)	10
2.5.2 Permanent Magnet (PM)	11
2.5.3 Hybrid (HB)	12

Chapter Three:

3. Global System for Mobile Communication (GSM).....	
3.1 History of GSM.....	14
3.2 GSM Network Components.....	17
3.2.1 Switching System (SS) Components.....	18
3.2.1.1 Mobile services Switching Center (MSC)...	18
3.2.1.2 Home Location Register (HLR)	19
3.2.1.3 Visitor Location Register (VLR)	19
3.2.1.4 Authentication Center (AUC)	20
3.2.1.5 Equipment Identity Register (EIR)	20
3.2.2 Base Station Subsystem (BSS) Components	20
3.2.2.1 Base Station Controller (BSC)	20
3.2.2.2 Base Transceiver Station (BTS)	20
3.2.2.3 Mobile Station (MS)	21
3.2.3 Operation & Support System (OSS)	21
3.2.3.1 Operation and Maintenance Center (OMC) ...	21
3.3 GSM Frequency Band.....	22
3.3.1 GSM 900.....	22
3.3.2 GSM 1800	22
3.3.3 GSM 1900	23
3.4 Radio link aspects	23
3.5 Multiple access and channel structure	24

Chapter Four:

4.System design	
4.1 Remote Section	25
4.2 Local Section	25
4.2.1 Personal Computer	25
4.2.2 DTMF Receiver	25
4.2.3 Servo Motor	28
4.2.4 ULN2003 Darlington Pair	28
4.2.5 Wire Camera	29
4.3 Hardware Design circuit	29
4.3.1 Steps of Design	29
4.3.2 Diagram of the Design	31
4.4 Program flow chart	32

Chapter Five:

5.Results and Discussions	
5.1. Results.....	34
5.2. Discussions.....	35

Chapter Six:

6.Conclusion and Recommendation	
6.1. Conclusion.....	36
6.2. Recommendation	37

References.....	38
------------------------	-----------

Appendices	39
-------------------------	-----------

List of Tables

Table (4.1)	Connection of the DTMF receiver to Computer
Table (4.2)	Connection of the Computer to ULN2001
Table (4.3)	Connection of the ULN2001Darlington Driver to Servo -motor
Table (A.1)	Specification for DTMF Receiver
Table (A.2)	Electrical characteristics for ULN2001
Table (A.3)	Specification for stepper motor
Table (A.4)	Specification for Camera

List of Figures

Figure (2.1)	Cross-section of a variable reluctance (VR) motor
Figure (2.2)	Principle of a PM stepper motor
Figure (2.3)	Cross-section of a hybrid stepper motor
Figure (3.1)	System Model
Figure (3.2)	GSM frequency bands
Figure (4.1)	DTMF Receiver Functional Block Diagram
Figure (4.2)	DTMF Receiver Single-Ended Input Configuration
Figure (4.3)	step motor
Figure (4.4)	Block diagram of the design
Figure (5.1)	Show flow chart of the program
Figure (A.1)	Show the Circuit Connection
Figure (A.2)	Show the DTMF Receiver Connection

List of abbreviations

AMPS	Advance mobile phone System
ADC	Analog-to-digital converter
AUC	Authentication Center
BS	Base Station
USB	Universal Serial Bus
PDA	personal data assistant
VCA	Video cassette recorder
VR	Variable-reluctance
DC	Direct Current
PM	Permanent Magnet
BSC	Base Station Controller
BSS	Base Station Subsystem
DTMF	Dual-tone multi-frequency
BTS	Base Transceiver Station
HB	Hybrid
CEPT	Conference of European Posts and Telegraphs
CGI	Cell Global Identity
CI	Cell Identity
EDGE	Enhanced Data rates for GSM Evolution
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIR	Equipment Identity Register
FCC	Federal Communications Committee
FDMA	Frequency Division Multiple Access
GSM	Global System for Mobile Communication
HLR	Home Location Register
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union- Telecommunication sector
LA	Location Area
LAI	Location Area Identity

LCS	Location Services
LED	Light-emitting diode
MS	Mobile Station
MSC	Mobile services Switching Center
NMC	Network Management Center
NSS	Switching Sub-System
OMC	Operation and Maintenance Center
OSS	Operation & Support System
EMF	Electro-Magnetic Force
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
SIM	Subscriber Identity Module
SS	Switching System
TACS	Total Access Communication System
TDMA	Time Division Multiple Access
UMTS	Universal Mobile Telecommunication Services
VLR	Visitor Location Register