GSM Base Electricity Theft Control System

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Certificate

We accept the work contained in this report as a confirmation to the required standard for the partial fulfillment of the degree of BS (ETM).

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Head of Department	Supervisor
_____	_____
Internal Examiner	External Examiner

Dedication

We dedicate this effort to our parents, friends and especially our honorable teachers, who always guided us in all respects of life and career, and made this endeavor possible for us.

They have always played an inspirational role and have given us the proper motivation to explore new horizons in our lives.

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Allah is very kind, merciful and compassionate. His benevolence and blessings enabled us to accomplish this task.

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We are also thankful to those individuals who have provided particularly useful assistance and guidance either technical or otherwise, during this project.

Abstract

The aim of this project is to design a GSM base electricity theft control system, which will detect the electricity theft and report the concerned authorities for timely control and necessary actions. Implementation of an efficient and intelligent theft control mechanism can help resolve this problem to great extent and save a huge amount of electrical energy. In this way our system will help increase the available electrical energy produced by the existing resources and will thus ensure efficient utilization. In this project we have focused on unlawful connection detection (Kundi System) and illegal earthling of the electricity connection for theft purposes. To detect the unlawful connection (Kundi system), amount of current leaving by the current transformer is compared with the amount of current entering towards the user end. If the amount of current at user end is less as compared to amount of transformer current at used end is less as compared to amount of transformer current that mean unlawful connection is on wire between current transformer and user end. To detect the meter earthling, amount of current leaving from transformer is compared with the amount of current leaving from users end. If amount of current is not equal that mean dubbing in meter of users.

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Chapter # 1

INTRODUCTION

1.1 Project Overview

Today is the age of "Global Energy Crisis". Energy Scientists and researcher around the world are exploring alternative solutions to overcome this crisis. Being a developing country, Pakistan is also lagging in the race of developing alternative solutions. One of the reasons for this lag with specific reference to Pakistan is electricity theft. Electricity theft is on the peak in Pakistan. About 20-30 percent of electricity is stolen (19th April 2011, Daily times). Implementation of an efficient and intelligent theft control mechanism can help resolve this problem to much extent and save a huge amount of electrical energy. The objective of our project is to develop, design and implement a system which will be detect the electricity theft and report the concerned authorities for timely control and necessary actions. In this way our system will help increase the available electrical energy produced by the existing resources and will thus ensure efficient utilization. In this project we will be focusing on unlawful connection detection (Kundi System) and illegal earthling of the electricity connection for theft purposes.

1.2 Project Scope

1.2.1Objectives

To develop GSM base electricity theft control system to minimize the electricity losses in Pakistan and to overcome the power shortage. The project will be completed by 15th April 2013. Total cost of project will be around 35000 Rs, including GSM modem & bridge rectifier & hardware components.

Sub Objectives

To Detect the Unlawful Connection (Kundi System)

To detect the unlawful connection (Kundi system), amount of current leaving by the current transformer is compared with the amount of current entering toward the user end. If the amount of current at used end is less as compared to amount of transformer current at used end is less as compared to amount of transformer current that mean unlawful connection is on wire between current transformer and user end..

Detect the Earthling in Electricity Meters

To detect the meter earthling, amount of current leaving from transformer is compared with the amount of current leaving from users end. If amount of current is not equal that mean dubbing in meter of users.

Chapter # 2

LITERATURE REVIEW

2.1 Literature Survey

There are various ways of electricity theft such as tempering in meter, meter tilting, meter by passing and taping from main power supply. Now a day's people are using new technological methods to use free electricity. A highly effective method of stealing electricity is by placing a strong magnet on a meter which stops the meter coil from turning and hence the units are not counting by the meters and user enjoys electricity without paying. In our case, we are going to detect the unlawful connection (Kundi system) and earthling in meters and inform the officials through GSM technology.

Meters can be bugged by consumer to use free electricity, which is dishonest and against the law. For the detection of meter bugging, meter readers are trained to identify the tempered meters and to report higher officials to act accordingly. One of the old method of meter bugging was by placing magnets to the meters which stops the coil the register the units but, latter on the meter were made up of plastics which terminated this thread. The second most common way of tempering the meter is by grounding the neutral phase which allows the consumer thoroughly run their load but there is no registry of consumed units. So they don't pay for this electricity that they have used. Consumer freely enjoys the electricity without paying and can stop tampering when they feel any type of danger from Supplier Company. For this purpose new meters were introduced having proper seals and if the seals were broken that means bugging in the meter has been introduced.

Chapter # 3

REQUIREMENT SPECFICATIONS

3.1 Existing System

In our country such type of project has not been introduced which can detect electricity theft and inform the concerned authority.

3.2 Proposed System

We are going to design a system which is currently not implemented in our country. Many talk shows and programs are being held in your country for the awareness of electricity theft and a complain handle department is also working but only when they receives complain about electricity theft. After the implementation of our project we will be able to control the electricity theft and power loses.

3.3 Specification

Hardware Specification

EQUIPMENT	**QUANTITY**
Diode	2
Junction	4
Printed Circuit board	2
Current Transformers	4
Adopter	2
Antenna	2
Bridge Rectifier	4
Operational Amplifier LM358.	2
Real Time Clock DS1302	2
LED	6
LCD LM016l	2
Capacitor	10(27Pf,1000Uf,1000Pf,1000Pf,27Pf)
Resistor	8(4.7k,4.7k,10k,4.7k)
Crystal Oscillator	2
GSM modem	2
Microprocessor PIC 16F877A	2

Table 3.1Hardware Specification

Software Specification

SOFTWARE
Proteus 7 Professional
Proton Development Suite
C Sharp

Table 3.2 Software Specification

Chapter # 4

SYSTEM DESIGN

4.1 System Architecture

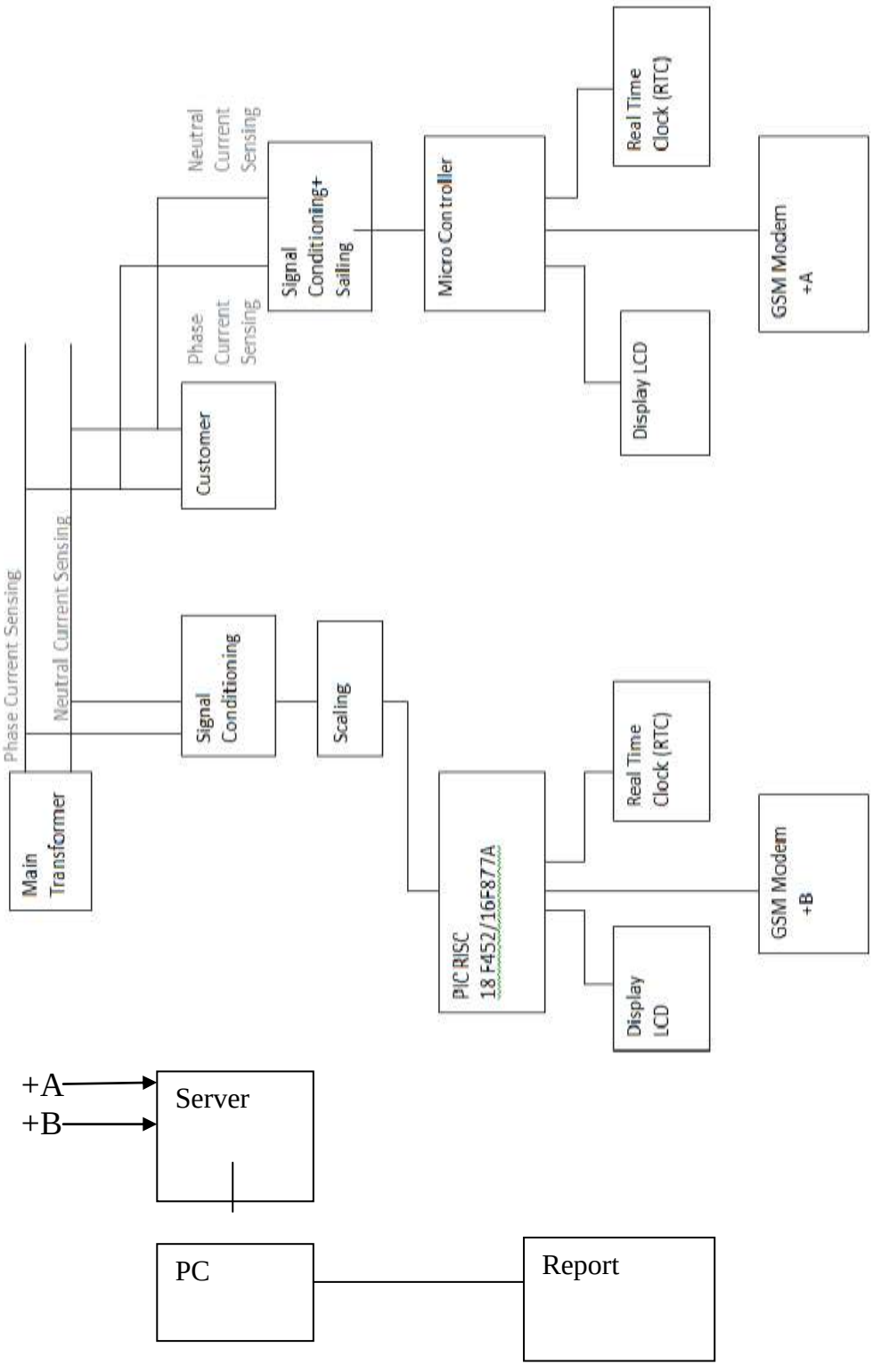

Figure 4.1 Main Block Diagram

Current transformers are connected with the main transformer wires. One current transformer is connected with the phase current wire while the other is connected with the neutral current wire. After sensing, the current signal conditioning process is performed and after signal conditioning, scaling process is performed for vary the value between 0 to 5v.controller performed ADC and send the information to GSM modem ,real time clock and LCD.GSM modem send the data to server and generate the report.

4.2 Hardware Design

4.2.1Current Transformer

For the measurement of electric current device used is called current transformer and when the voltage transformer, potential transformer is together with current transformer it is said to be instrument transformer. A current transformer is produced a reduced current accurately proportional in a circuit when a current in a circuit it too high to directly apply to measuring instruments. For electronic device like metering and protective relays we can use a current transformer. Principles of current sensing used in current transformer's electronic device which can detect and it can also converts current to an easily measure output voltage ,measured output voltage is directly proportional to the current passing through the path. Voltage drop is occurring when a current is passing through the circuit, due to voltage drop and current passing through the circuit magnetic field is generated and magnetic field can carry a conductor. Current sensor is measured because of these phenomena. Direct sensing and indirect sensing are two type of current sensing. One type of current sensing is based on Ohm's law and other type of current sensing is based on Faraday's and Ampere's law. Current transformer consists of two wires neutral and phase. Two sensors are attaching with the phase wire and neutral wire. One senses the phase current and other sensing the neutral current. If secondary winding is connected to load the current will flow and electricity will be shifted from primary circuit through the transformer to the load. If the current increases or decreases, the lines of force will move outwards or inwards respectively.

Figure 4.2 current Transformer

4.2.2 Signal Conditioning

Component used in signal conditioning are

Bridge Rectifier

A bridge rectifier consists of four diode and it is a type of full-wave rectifier that converts both the positive and negative of AC voltage into the DC voltage. In a bridge circuit a bridge rectifier or diode rectifier is an arrangement of four or more diode which can provided the same polarity of output for the same input polarity. For the conversion of an alternating current input into a direct current output in a common application, it can also be known as bridge rectifier. By using the two-wire AC input, bridge rectifier provided a full-wave rectification, by resulting provided a two-wires DC output. Bridge rectifier is used in our project to converts the AC voltage is converted to DC voltage. Rectifier is a device which converts Ac to DC and the process is known as rectification.

Figure 4.3[1] Bridge

Electric Capacitor

Electric capacitor is generally consisted of two metallic plates which can be insulated and separated from each other by a dielectric and electric capacitor used to stored a charge temporality and it can also used for condenser. Ripple can defined as due to small variation in a circuit provided a ripple. These ripples are not suitable for electronic circuit so we can use the electronic capacitor to remove these ripples, to reduced noise and used for filtering. It is a passive device also called as condenser. It is made up of two conductive plates which are separated by an insulator or by air known as dielectric.

When current is applied, one plate becomes positively charged while the other gets negatively charged. Value of voltage is directly depending on the value of capacitor. If you want to used the high input voltage then we can used the high value capacitor and it can smooth the signal more and it can also removed the ripple more.

Figure 4.4[2] Capacitor

4.2.3 Signal Scaling

Component used in scaling are

variable Resistor

For the adjusted and adjusting purpose type of resistor used is said to be variable resistor. A type of resistor is said to be varaible resistor which can be used for the adjust properties such as the volume on a stereo and speed of a motor.varaible resistor is used to vary the current and voltage in a circuit.A resistor instructed in such a way so that its resistance value may be changed without interrupting the circuit to which it is connected it is said to be a variable resistor.

Figure 4.5[3] Variable Resistor

Operational Amp

Integrated circuit(IC) that operate as a voltage amplifier is said to ba a operational amplifier.operational amplifier is also known as op-amp.input of operational amplifier has a differential and it always a single with a high gain.on the other hand it output is also a single.

Op-Amp LM 358

LM358 is a dual channel OP-AMP.it is a IC which handle a source up to 20MA per channel and it can handle a supply of 3-32VDC.LM358 also include transducer amplifier

Figure 4.6[4] OPM-AMP

4.2.4 PIC RISC

We use PIC 16F877A is in place of 8051 because built-in ADC of 10 bits present in PIC 16F877A, its programming is easy and it i s fast and more reliable than 8051.

Figure 4.7[5] PIC 16F877A

Specification

40 pin device

5v power supply needed

Operating frequency 20 MHz

Flash memory 8k

Data memory 368 bytes

Built in analog to digital converter

EEPROM memory 256 bytes

35 instruction set

Pins Configuration

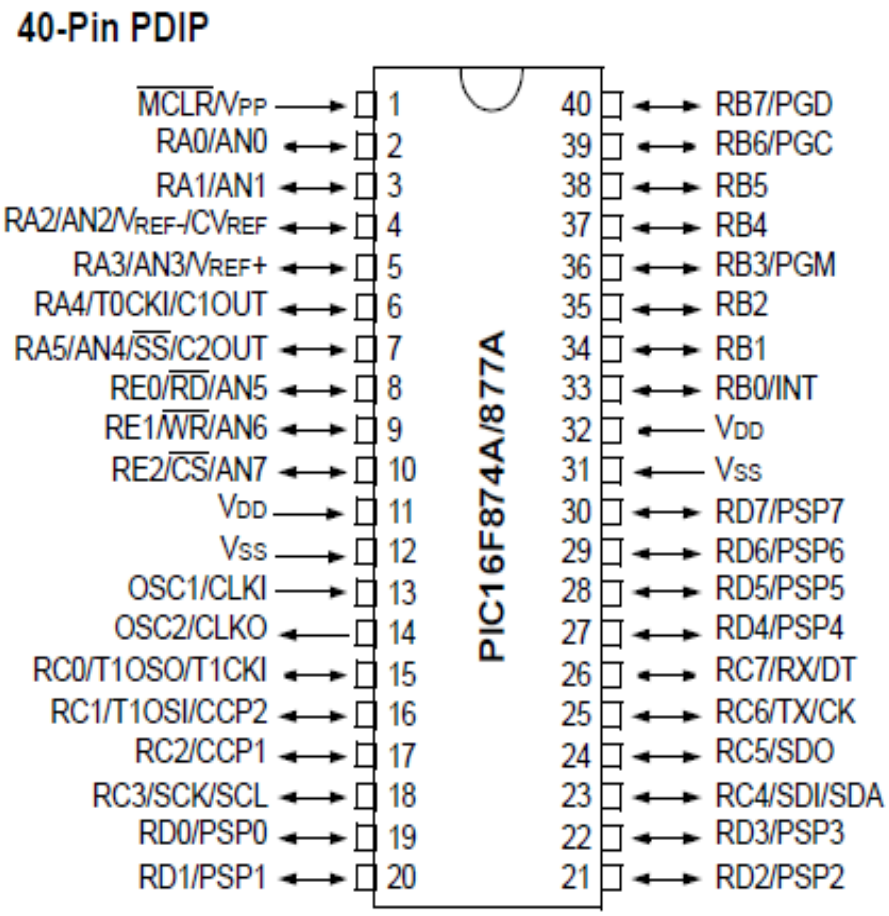

Figure 4.8[6] Pin Config

Pin out Description

Pin Name	DIP Pin#	PLCC Pin#	QFP Pin#	I/O/P Type	Buffer Type	Description
OSC1/CLKIN	13	14	30	I	ST/CMOS(4)	Oscillator crystal input/external clock source input.
OSC2/CLKOUT	14	15	31	O	—	Oscillator crystal output. Connects to crystal or resonator in crystal oscillator mode. In RC mode, OSC2 pin outputs CLKOUT which has 1/4 the frequency of OSC1, and denotes the instruction cycle rate.
$\overline{MCLR}$/VPP/THV	1	2	18	I/P	ST	Master clear (reset) input or programming voltage input or high voltage test mode control. This pin is an active low reset to the device.
						PORTA is a bi-directional I/O port.
RA0/AN0	2	3	19	I/O	TTL	RA0 can also be analog input0
RA1/AN1	3	4	20	I/O	TTL	RA1 can also be analog input1
RA2/AN2/VREF-	4	5	21	I/O	TTL	RA2 can also be analog input2 or negative analog reference voltage
RA3/AN3/VREF+	5	6	22	I/O	TTL	RA3 can also be analog input3 or positive analog reference voltage
RA4/T0CKI	6	7	23	I/O	ST	RA4 can also be the clock input to the Timer0 timer/counter. Output is open drain type.
RA5/$\overline{SS}$/AN4	7	8	24	I/O	TTL	RA5 can also be analog input4 or the slave select for the synchronous serial port.
						PORTB is a bi-directional I/O port. PORTB can be software programmed for internal weak pull-up on all inputs.
RB0/INT	33	36	8	I/O	TTL/ST(1)	RB0 can also be the external interrupt pin.
RB1	34	37	9	I/O	TTL	
RB2	35	38	10	I/O	TTL	
RB3/PGM	36	39	11	I/O	TTL	RB3 can also be the low voltage programming input
RB4	37	41	14	I/O	TTL	Interrupt on change pin.
RB5	38	42	15	I/O	TTL	Interrupt on change pin.
RB6/PGC	39	43	16	I/O	TTL/ST(2)	Interrupt on change pin or In-Circuit Debugger pin. Serial programming clock.
RB7/PGD	40	44	17	I/O	TTL/ST(2)	Interrupt on change pin or In-Circuit Debugger pin. Serial programming data.

Table 4.1[1] Description

Continued…

Pin Name	DIP Pin#	PLCC Pin#	QFP Pin#	I/O/P Type	Buffer Type	Description
Pin Name	DIP Pin#	PLCC Pin#	QFP Pin#	I/O/P Type	Buffer Type	Description
						PORTC is a bi-directional I/O port.
RC0/T1OSO/T1CKI	15	16	32	I/O	ST	RC0 can also be the Timer1 oscillator output or a Timer1 clock input.
RC1/T1OSI/CCP2	16	18	35	I/O	ST	RC1 can also be the Timer1 oscillator input or Capture2 input/Compare2 output/PWM2 output.
RC2/CCP1	17	19	36	I/O	ST	RC2 can also be the Capture1 input/Compare1 output/ PWM1 output.
RC3/SCK/SCL	18	20	37	I/O	ST	RC3 can also be the synchronous serial clock input/ output for both SPI and I^2C modes.
RC4/SDI/SDA	23	25	42	I/O	ST	RC4 can also be the SPI Data In (SPI mode) or data I/O (I^2C mode).
RC5/SDO	24	26	43	I/O	ST	RC5 can also be the SPI Data Out (SPI mode).
RC6/TX/CK	25	27	44	I/O	ST	RC6 can also be the USART Asynchronous Transmit or Synchronous Clock.
RC7/RX/DT	26	29	1	I/O	ST	RC7 can also be the USART Asynchronous Receive or Synchronous Data.
						PORTD is a bi-directional I/O port or parallel slave port when interfacing to a microprocessor bus.
RD0/PSP0	19	21	38	I/O	ST/TTL(3)	
RD1/PSP1	20	22	39	I/O	ST/TTL(3)	
RD2/PSP2	21	23	40	I/O	ST/TTL(3)	
RD3/PSP3	22	24	41	I/O	ST/TTL(3)	
RD4/PSP4	27	30	2	I/O	ST/TTL(3)	
RD5/PSP5	28	31	3	I/O	ST/TTL(3)	
RD6/PSP6	29	32	4	I/O	ST/TTL(3)	
RD7/PSP7	30	33	5	I/O	ST/TTL(3)	
						PORTE is a bi-directional I/O port.
RE0/$\overline{RD}$/AN5	8	9	25	I/O	ST/TTL(3)	RE0 can also be read control for the parallel slave port, or analog input5.
RE1/$\overline{WR}$/AN6	9	10	26	I/O	ST/TTL(3)	RE1 can also be write control for the parallel slave port, or analog input6.
RE2/$\overline{CS}$/AN7	10	11	27	I/O	ST/TTL(3)	RE2 can also be select control for the parallel slave port, or analog input7.
VSS	12,31	13,34	6,29	P	—	Ground reference for logic and I/O pins.
VDD	11,32	12,35	7,28	P	—	Positive supply for logic and I/O pins.

Table 4.2[2] Description

Program Memory Map

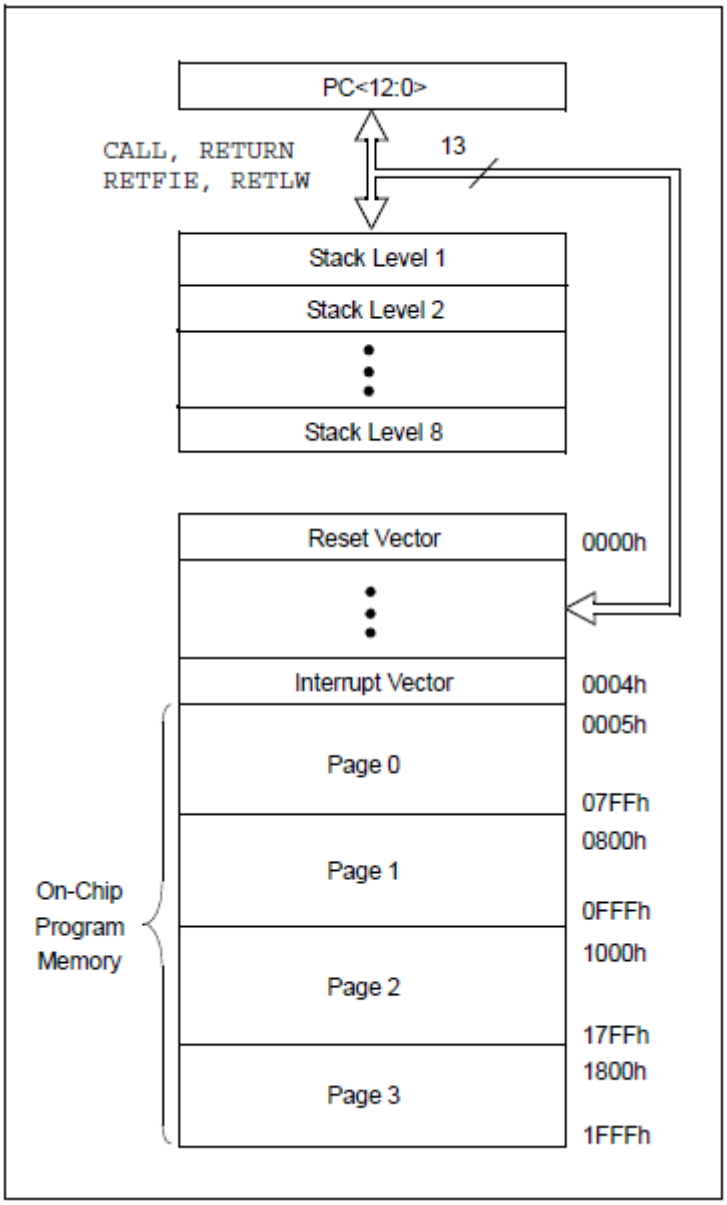

Figure 4.9[7] Program Memory Map

4.2.5 Real Time Clock

Real time clock is used to update complete information about time, date and all required thing. Because of real time clock real time detection is happen and occurs.

Keeping the record of the current time a computer clock mostly in the form of an integrated circuit is used is said to be a real time clock. For keeping the accurate time record RTC are already available in many electronic circuits.

Real Time Clock Module

Real time clock is a clock which is used in circuit for time and date .The minimum time of real time clock to run without external power is 9 years.

Figure 4.10[8] Real Time Clock

4.2.6 GSM Module

We are using GSM module in our project for sending message from sender to our main server.The GSM modem is a quad-band module which works on 850/900/1800/1900 MHZ which used for both GPRS and call purpose.the module is managaed ny processor called AMR 926E-JS,which control phone communication.The processor is also responsible for the SIM card.GSM 900 integrates analogue to digital converter and real time clock.During transmission continuous energy of 3.4 to 3.5V can be applied while it can absorb maximum of 0.8A.

Figure 4.11[9] GSM Module

Component Input Requirements

Power input requirements for each component is 4.3V.
We are using Female Headers as Connector.
Memory and/or storage space requirements are maximum 1 GB.
No Hard drive/floppy drive/CD-ROM required
Processor requirement is not specific and we can use any latest processor.

4.3 Design Constraints

We Design this project for the low value voltage and less amount of current ranging from maximum 1000V and 5A current because of less budget and designing on small scale. For the real time implementation we need a lot of change in our hardware like we used a current transformer in our project because current transformer supports a low voltage and current value. If we are going to implemented it on high voltage then we need a ring transformer instead of current transformer. We should also need to change the value of some other hardware component like bridge rectifier, capacitor, variable resistor and resistor value.

4.4 Graphical User Interface (GUI)

Our graphics user interference consists of many features such as receive message from mobile, Data included in message like date, time, user Id, neutral and phase current. A complete report is formed in the case of theft or without theft after every 10 minutes. If theft is occurring it will form report immediately.

Chapter # 5

SYSTEM IMPLEMENTATION

5.1 Implementation on Software

5.1.1 System Architecture

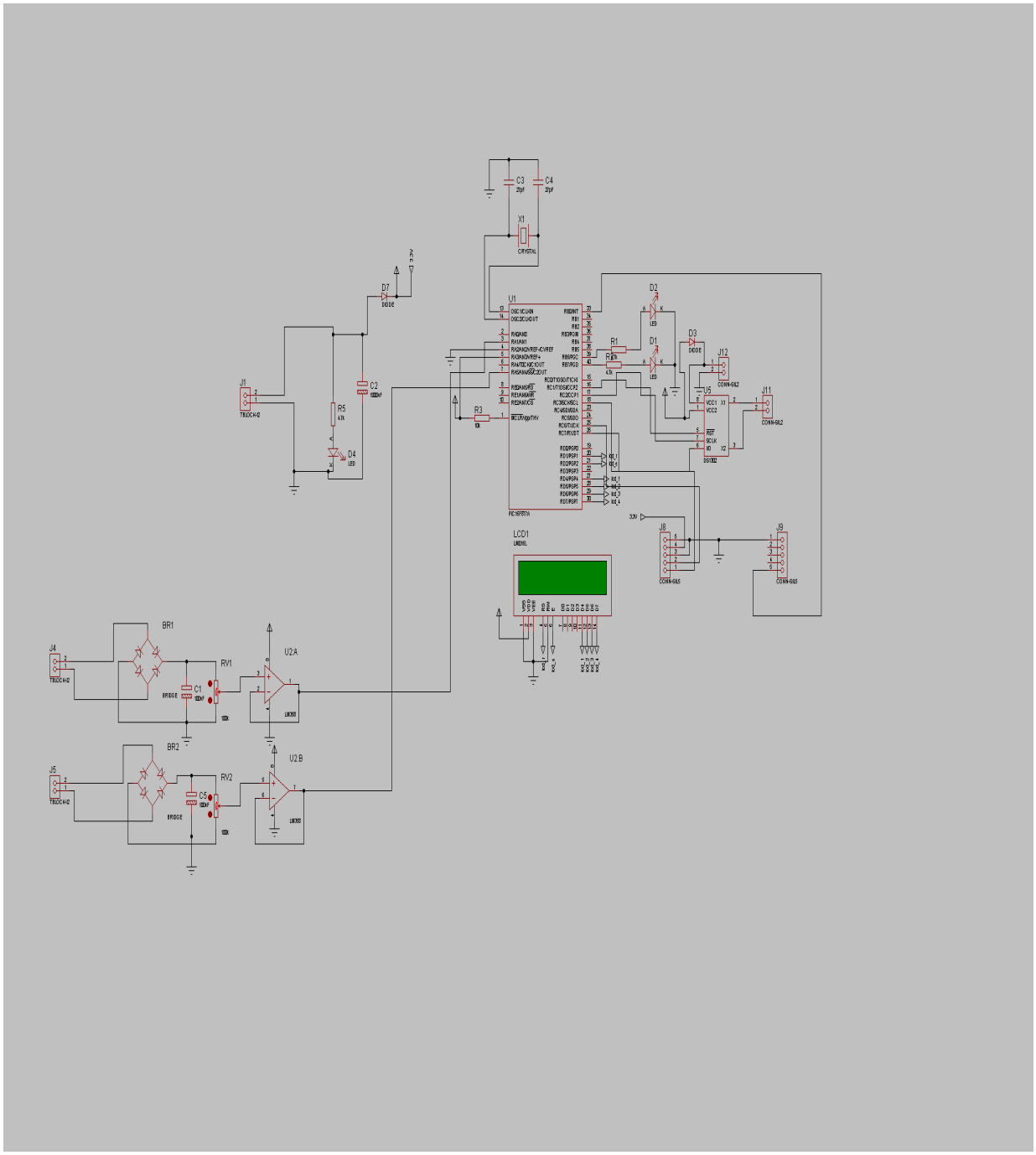

Figure 5.1 Circuit On Proteus

Current transformers are connected with the main transformer wires. One current transformer is connected with the phase current wire and second current transformer is connected with the neutral current wire. Output of current transformer in form of voltage is transfer to bridge rectifier. Bridge rectifier covert the AC voltage to DC voltage because AC voltage is not suitable for electronic circuits. Bridge rectifier provided a Varying DC which is not suitable for electronic circuit so we use a capacitor for provides smooth DC which is suitable for less-sensitive electronic circuit; variable resistor is used to vary the voltage between 0 to 5v.

5.1.2 Signal Conditioning on Proteus

In signal conditioning we have to perform different steps that are

Bridge rectifier is used to converts the AC voltage is converted to DC voltage. Bridge rectifier is provided varying DC which is unsuitable for electronic circuits.

Electric Capacitor is used for provided smooth DC which is suitable for less-sensitive electronic circuits. Smooth DC provides a small variation called ripple. Electric capacitor is also used for filtering.

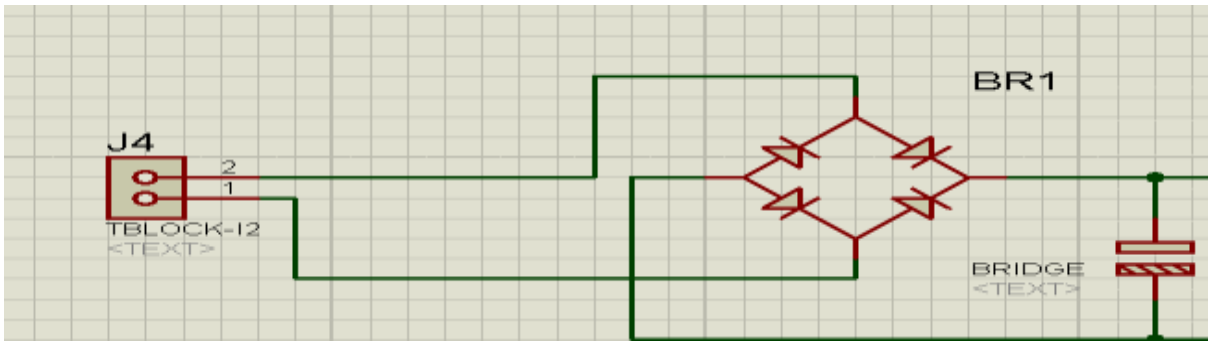

Figure 5.2 Signal Conditioning on Proteus

5.1.3 Signal Scaling on Proteus

In scaling we drop the voltage between 5 volts. We drop the dc voltage because PIC RISC needs a maximum voltage up to 5 volts.

In signal conditioning we have to perform different steps that are

Variable resistor can vary the voltage between 0 to 5V.

OPM operation amplifier is used for the buffering and it also used for controlling high value voltage.

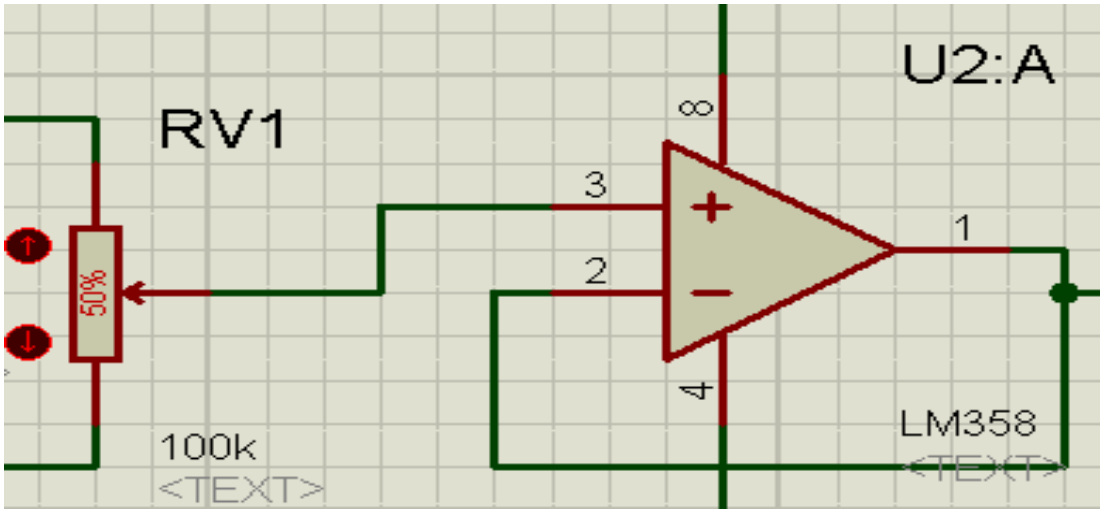

Figure 5.3 Signal Scaling On Proteus

5.1.3 Routing

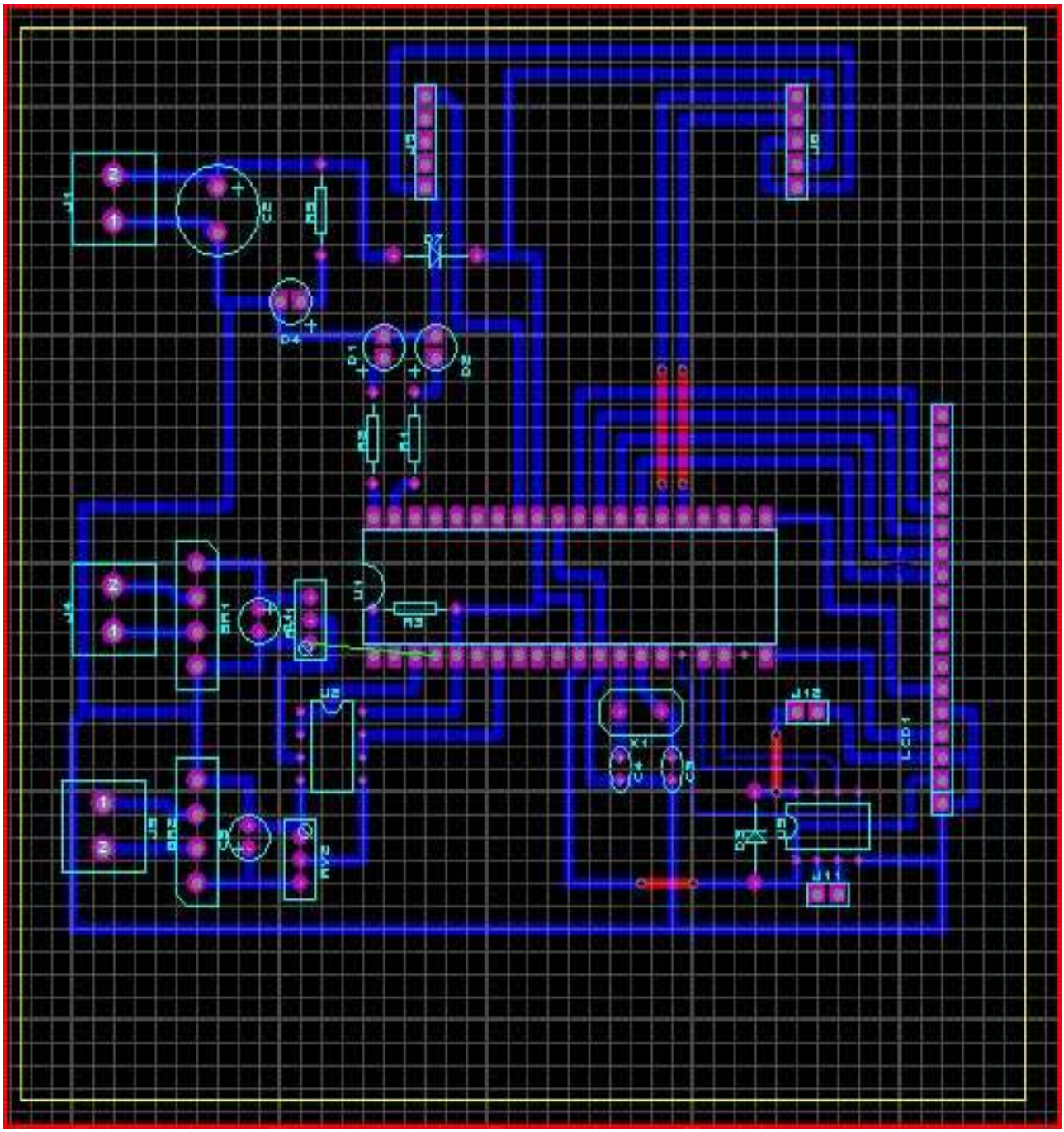

Figure 5.4 PCB Layout

5.1.3 3D visualization

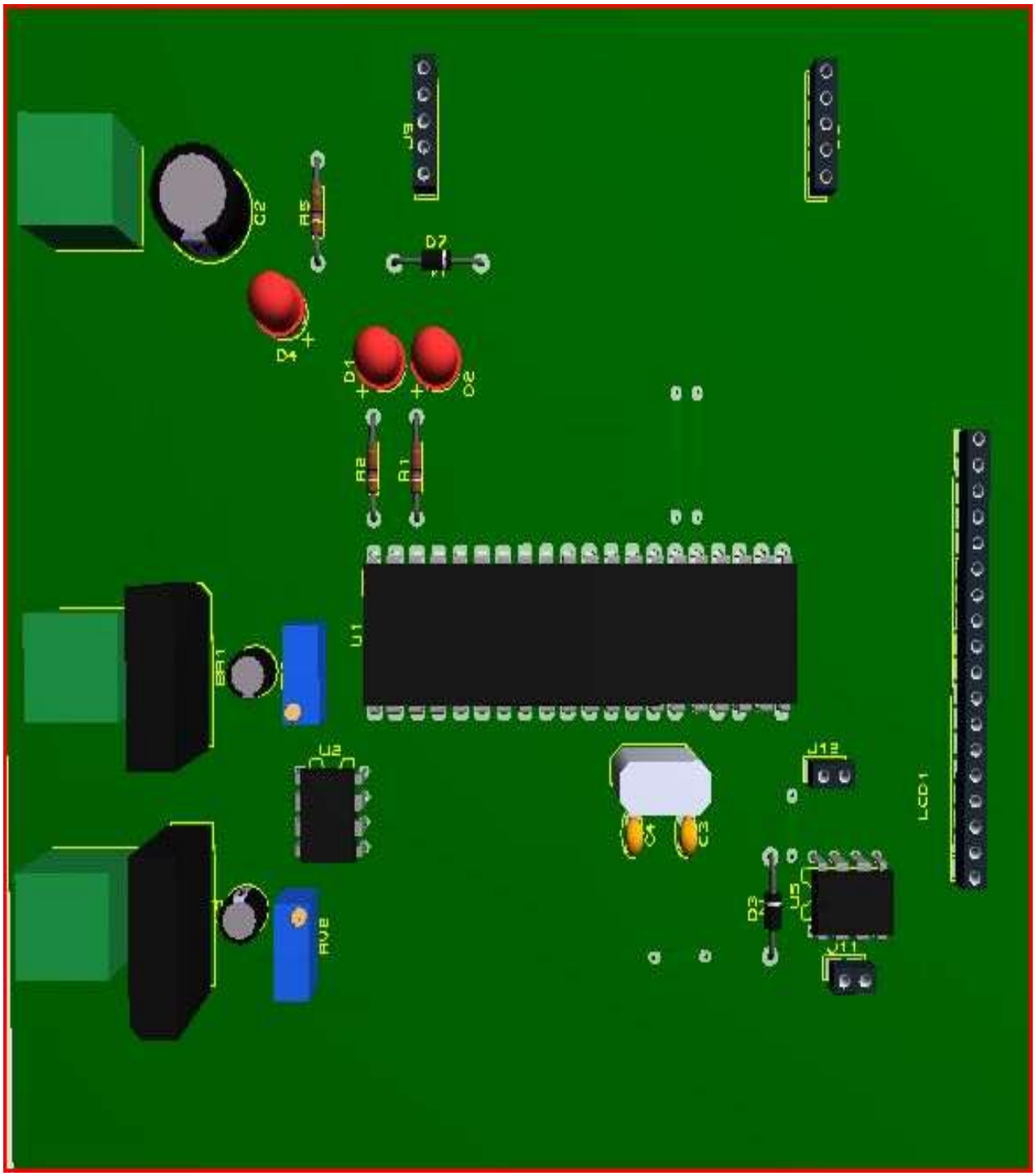

Figure 5.5 3D visualization

5.2 Hardware Implementation

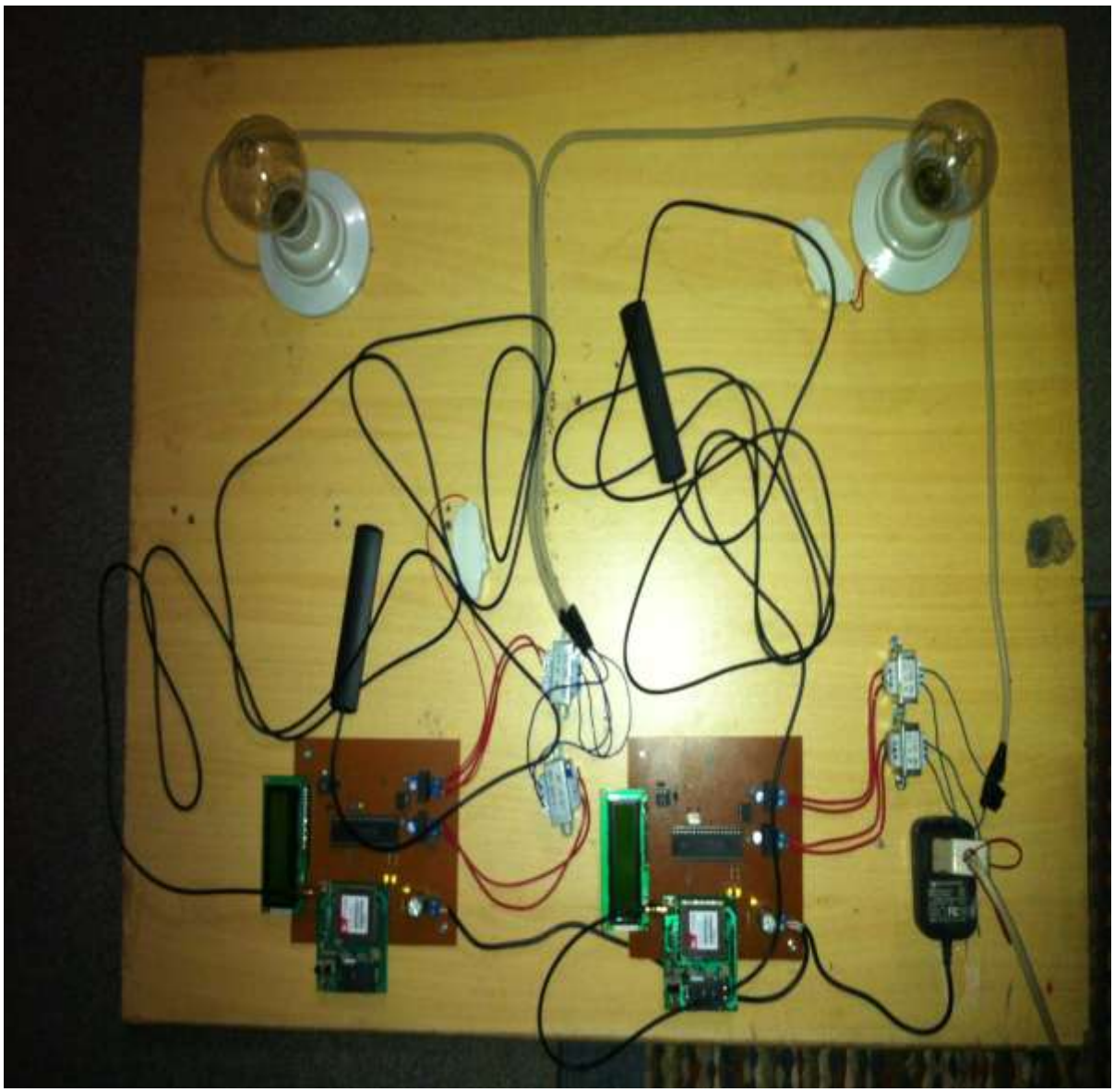

Figure 5.6 Circuit On Board

Chapter # 6

SYSTEM TESTING AND EVALUATION

6.1 Simulation Diagram

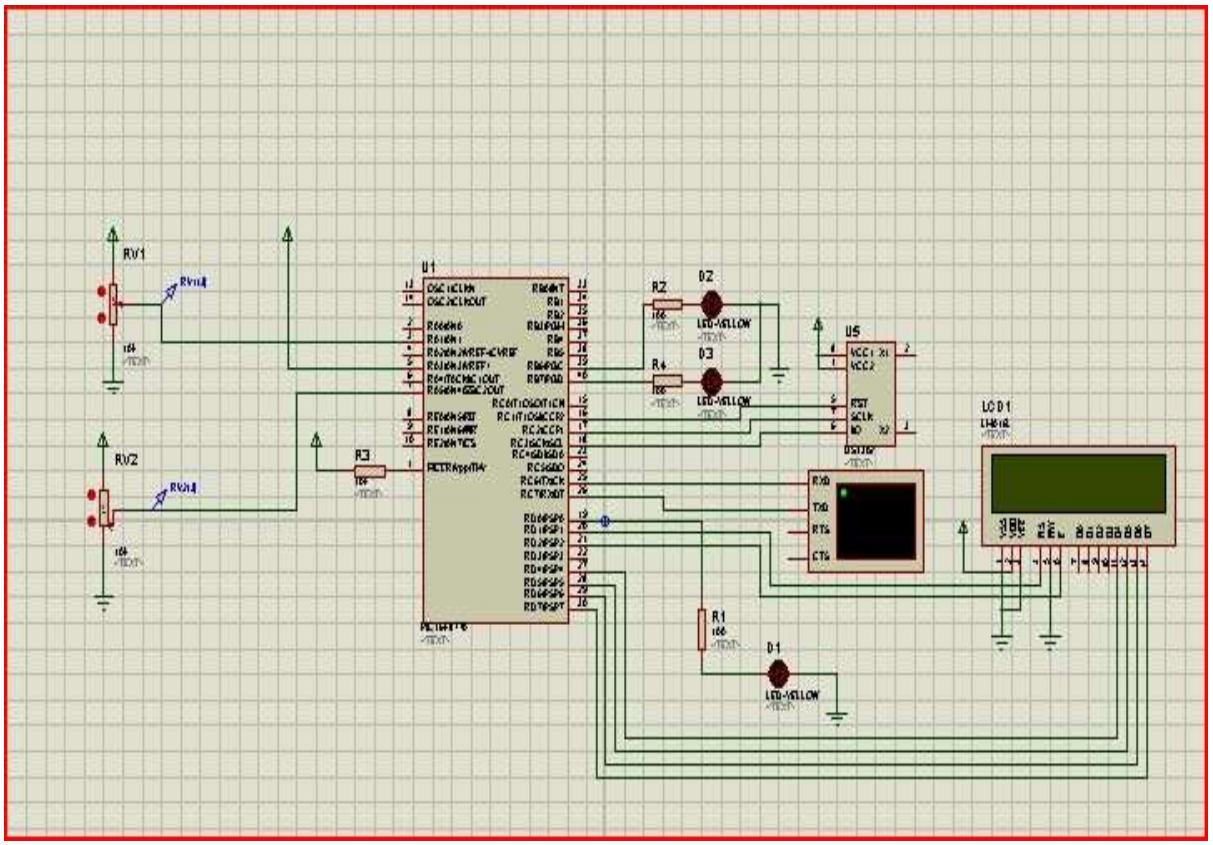

Figure 6.1 Simulation Circuit

When we run the simulation on Proteus software first of all real time clock is displayed having time and date which is continuously updating. Then LCD appears on the screen which coordinates with the real time clock and get the time and date. After the time E.T.D.S will appear on the LCD. After 40 to 45 seconds virtual terminal will appear on the screen and certain commands run in the terminal. LCD will show us the phase and neutral current with time and date. In the last step the terminal will again open and execute the commands in the terminal.

6.2 Simulation Output

Real Time Clock

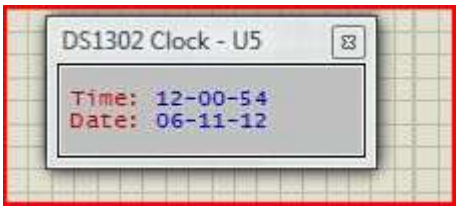

Figure 6.2 RTC

LCD Output 1

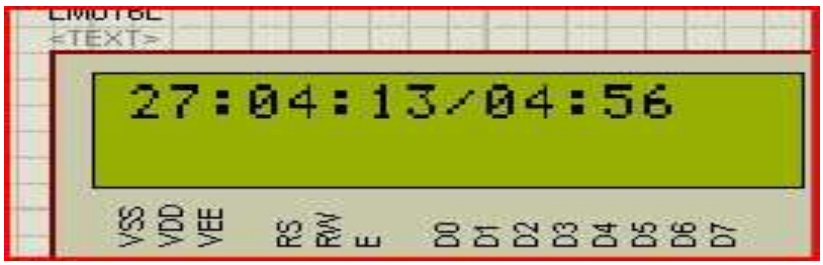

Figure 6.3 LCD Output 1

Figure 6.4 LCD Output 2

Virtual Terminal Output 1

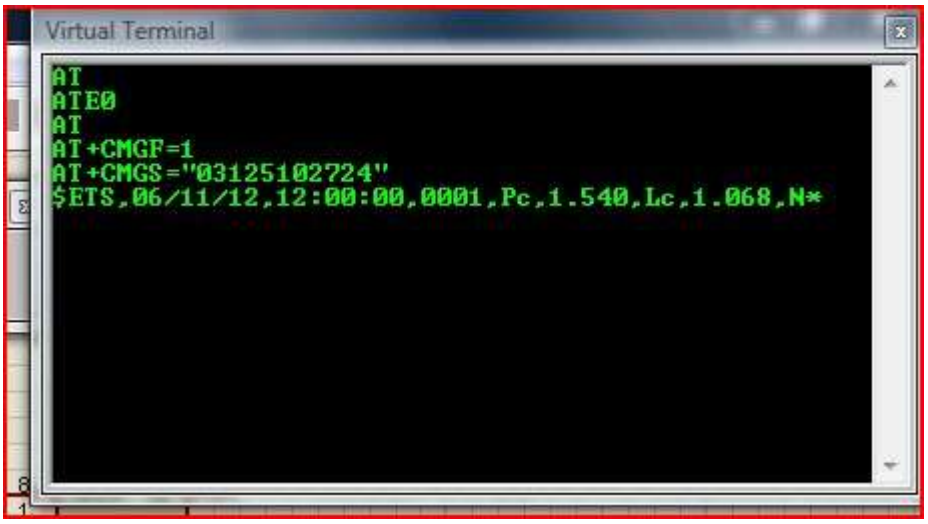

Figure 6.5 Virtual Terminal Output 1

LCD Output 2

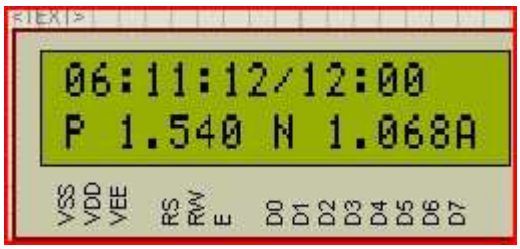

Figure 6.6 LCD Output 3

Virtual Terminal Output 2

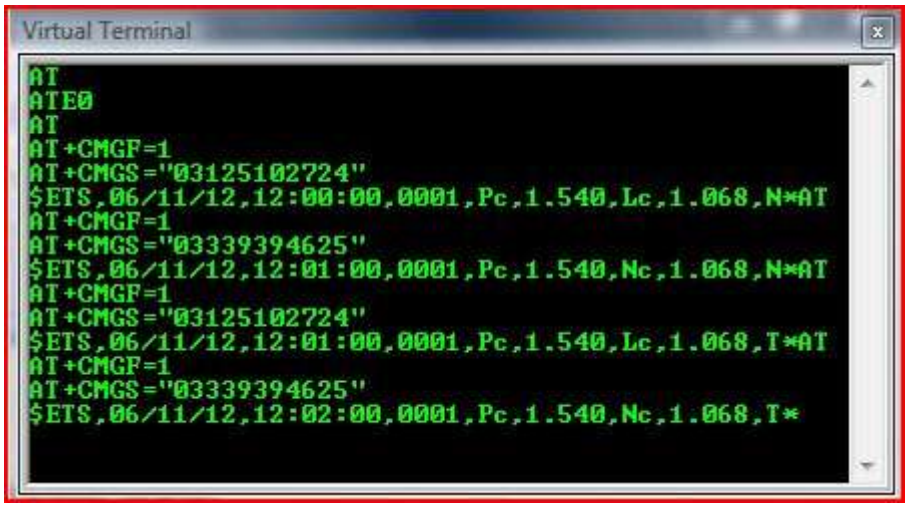

Figure 6.7 Virtual Terminal Output 2

6.3 performance Testing

In performance testing first we test the simulation on Proteus software and then we implement it on the hardware.

6.4 Load Testing

We have test the load by 220 volts and 1 ampere but it is capable up to 1000 volts and 5 ampere.

6.5 Installation Testing

This project is just a demo but it can be installed on any system.

Chapter # 7

CONCLUSION

The conclusion of this project lies behind the fact that this project is of high scope for WAPDA & power industries. It can detect electricity theft if neutral is grounded or bypassed, while through GSM a message of theft is sent to the main WAPDA server. The message will have the consumer id, date and time stamping of data, and the status that whether theft exists at the specified time or not. This project is making the system reliable and reduces theft throughout the system.

At the WAPDA server software is installed on the server which will read the messages that are sent from the GSM modem. It's a best way of detecting theft easily. This also in another way is saving of electricity. If theft is reduced electricity can be saved, As in Pakistan these days there is energy crisis which has led to heavy load shedding which has adverse effects not only on the daily life of the citizens but also the industry and hence economy of Pakistan. Through this project electricity short fall and its loss can be minimized. This project is basically a step towards telegraphy as there is no telegraphy in the system of WAPDA throughout. Making the system reliable and easily to handle with detection of theft, reducing electricity loss and unwanted (Kundi) on the distribution line.

The system will have high authenticity and chances of theft and unwanted (Kundi) will minimize. The circuit cost is not very high except GSM module and all other equipments are easily available in the market. If this system is installed on every consumer terminal after the energy meter, it will detect the theft with the help of CT's (current transformers).

A onetime investment can bring huge change in the electricity theft. Hence the system is reliable and chances towards theft and unwanted connection (Kundi) can be minimized. This system is fast responding and all the data will be recorded with consumer ID, time and date.

References

Figure

&tbm=isch&sa=1&q=variable+resistor&oq=variable+resis&gs_l=img.3.0.0l10.255442.259670.7.260901.16.15.1.0.0.0.484.3761.2j4j4j3j2.15.0...0.0...1c.1.11.img.QUsyMJuGfLA&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&fp=d787d5466809cab1&biw=1024&bih=675&imgrc=i4HzGeriDcqesM%3A%3BQ8Y0Wf8sETeYhM%3Bhttp%253A%252F%252Fimg.weiku.com%252Fwaterpicture%252F2011%252F10%252F20%252F0%252FBourns_variable_Resistor_3266W_1_203LF_634592079446625171_2.jpg%3Bhttp%253A%252F%252Fwww.weiku.com%252Fproducts%252F9909402%252FBourns_variable_Resistor_3266W_1_203LF.html%3B640%3B640] Date 28.4 .2013

Figure 4.6[4] OPM [http://www.google.com.pk/search?hl=en&gs_rn=11&gs_ri=psy-ab&cp=9&gs_id=7t&xhr=t&q=bridge+rectifier&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&biw=1024&bih=675&um=1&ie=UTF-8&tbm=isch&source=og&sa=N&tab=wi&ei=K8Z7UfaPH877rAeykYDwBQ#um=1&hl=en&tbm=isch&sa=1&q=operational+amplifier+lm358&oq=operational+amplifier+lm358&gs_l=img.3..0i24.1536.11856.11.12312.29.23.0.6.6.0.492.4617.6j9j2j2j4.23.0...0.0...1c.1.11.img.5oBOyLYXXtg&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&fp=d787d5466809cab1&biw=1024&bih=675&imgrc=UafFykO8OIvuWM%3A%3BPhfyyYFjsiX-mM%3Bhttp%253A%252F%252Fwww.ti.com%252Fgraphics%252Ffolders%252Fpartimages%252FLM358.jpg%3Bhttp%253A%252F%252Fwww.ti.com%252Fproduct%252Flm358%3B182%3B144] Date 28.4 .2013

Fig 4.7 [5] PIC 16F877A

[http://www.google.com.pk/search?q=PIC+16877A+MICROCONTROLLER&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&biw=1024&bih=675&um=1&ie=UTF-8&hl=en&tbm=isch&source=og&sa=N&tab=wi&ei=irJ7UYDKIIfsrAevmoDQBQ#imgrc=oSWnyNGMorV01M%3A%3BOZL8bGPBaevO1M%3Bhttp%253A%252F%252Frobocave.pk%252Fmedia%252Fcatalog%252Fproduct%252Fcache%252F1%252Fimage%252F9df78eab33525d08d6e5fb8d27136e95%252Fp%252Fi%252Fpic_16f877a_microcontroller.jpg%3Bhttp%253A%252F%252Frobocave.pk%252Findex.php%252Fnavbot%252Fmicrocontrollers%252Fpic-18f-series%252Fpic-16f877a-microcontroller.html%3B500%3B500] Date 28.4 .2013

Figure 4.8[6] Pin Config

[http://www.google.com.pk/search?q=PIC+16877A+MICROCONTROLLER&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&biw=1024&bih=675&um=1&ie=UTF-8&hl=en&tbm=isch&source=og&sa=N&tab=wi&ei=irJ7UYDKIIfsrAevmoDQBQ#imgrc=FTdz29lO8-RNRM%3A%3Bk8nZq8PsFWKd7M%3Bhttp%253A%252F%252Froboticslab.files.wordpress.com%252F2011%252F05%252F1.jpg%253Fw%253D502%2526h%253D441%3Bhttp%253A%252F%252Froboticslab.wordpress.com%252F2011%252F05%252F17%252Ftutorial-microcontroller-pic-16f877a%252F%3B502%3B441] Date 28.4 .2013

Figure 4.9[7] Program Memory Map

[http://www.google.com.pk/search?hl=en&q=PROGRAM+MEMORY+MAP&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&biw=1024&bih=675&um=1&ie=UTF-8&tbm=isch&source=og&sa=N&tab=wi&ei=Fbd7UdPoNI3krAfqk4EQ#imgrc=cBIA6QtdHlJk9M%3A%3BegQTD6Wjfq-zBM%3Bhttp%253A%252F%252Fwww.microcontrollerboard.com%252Fimages%252Fpic_program_memory_map.jpg%3Bhttp%253A%252F%252Fwww.microcontrollerboard.com%252Fpic_memory_organization.html%3B301%3B500] Date 28.4 .2013

Figure 4.10[8] Real Time Clock

[http://www.google.com.pk/search?hl=en&q=real+time+clock+ds1302&bav=on.2,or.r_qf.&bvm=bv.45645796,d.bmk&biw=1024&bih=675&um=1&ie=UTF-8&tbm=isch&source=og&sa=N&tab=wi&ei=-uF7UcezA8yHrAfpgoGIBQ#imgrc=wOAiouViwVnHeM%3A%3BRfFCaru2DOOxzM%3Bhttp%253A%252F%252Fwww.comfiletech.com%252FProductImages%252Fproducts%252Fds1302-l.jpg%3Bhttp%253A%252F%252Fwww.comfiletech.com%252Fbrowseproducts%252FDS1302.html%3B250%3B200] Date 28.4 .2013

Figure 4.11[9] GSM Module [http://www.open-electronics.org/gsm-remote-control-part-4-sim900/] Date 28.4 .2013

Table:

APPENDICES

User Manual

The Main purpose of this project is electricity theft control through GSM. Before turning on the system make sure you are not in contact with any wire or any conductor in the system. Before plugging on the switch, put two active SIMs in the GSM modems. Now plug on the switch, the GSM modem will start searching the network, while searching the network green color led in the GSM modem will start blinking quickly and after finding network within 3 minutes, the blinking will get slow. As we plug on the main supply switch, bulb on the load side will glow. There is another white switch which is for earthling. When that switch is on, it means earthling in the meter, the GSM modem will send a message to server for theft.

When unlawful connection (Kundi) is plug on the second bulb present on the system will glow and the GSM modem will send a message for theft. On the receiver side mobile phone is connected with the PC which will generate the report and the report will be shown on screen.