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Green Mobile Tower Network Communication

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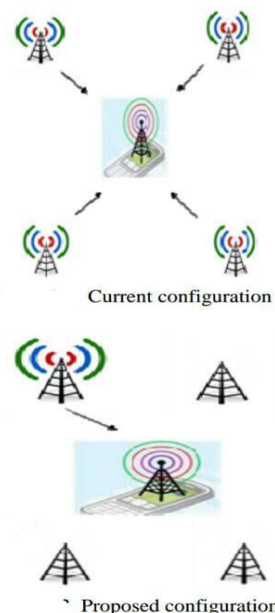
Abstract: Green radio technology prefers environment friendly approach towards the mobile communication. This is done for modification in mobile infrastructure for energy conservation and CO₂ reduction (carbon credit). The mobile towers are increasing in an extraordinary manner. The source for towers is based on the power requirement. Power requirement in developing countries are always greater than the generated. A critical mobile network consume ~40-50MW and a diesel generator consume ~1MG of diesel per day Energy saving is one of the key subjects for mobile operators because the base station accounts for most of the energy consumption by mobile operators. Our government is losing Rupees19.65/- per litre sale of diesel. The same cost is applicable for mobile tower. Directly and indirectly mobile operators are creating huge lose to the society by wasting power. Our objective is to reduce the energy consumption in base stations.

Keywords: Single Board Computer, wireless network, LCA

I. INTRODUCTION

Green communication is a new concept in the communication networks which studies the power consumption and their environment effects. In the proposed system power consumption rate is lowered by keeping only one mobile tower in working state to take up all communications while the remaining towers stay in idle mode. When the no of users of the current tower reaches a predetermined value say 80% the responder frequency is sent to the nearby efficient tower to take up the remaining load by means of wireless sensors networks. Thus by keeping all the towers in idle state and by keeping only one in working

state the power consumption rate is considerably decreased. More over with the help of ambient analyser maximum power saving is achieved by means of localized power controller where the lighting and cooling units are turned on as per the requirement. Fuel level monitoring unit is made available devoid of manpower. Thereby 1 KW power saved=2 KW power generated. This technology aims to achieve eco-balance in nature by reducing CO₂ emission and reducing operational costs for wireless network. Earlier all mobile towers are kept on in a particular locality irrespective of the number of users. As a result high power consumption occurs. When direct electricity connections are not readily available, these service providers use diesel to power their network.



Current and proposed configurations

II. COMPONENT DESCRIPTION

A. Resistors

Resistance is measured in ohms; the symbol for ohm is an omega Ω . 1 Ω is quite small so resistor values are often given in $k\Omega$ 1 $k\Omega$ = 1000 Ω 1 $M\Omega$ = 1000000 Ω . Resistor values are normally shown using colored bands. Each colour represents a number as shown in the table. Most resistors have 4 bands:

The first band gives the first digit.

The second band gives the second digit.

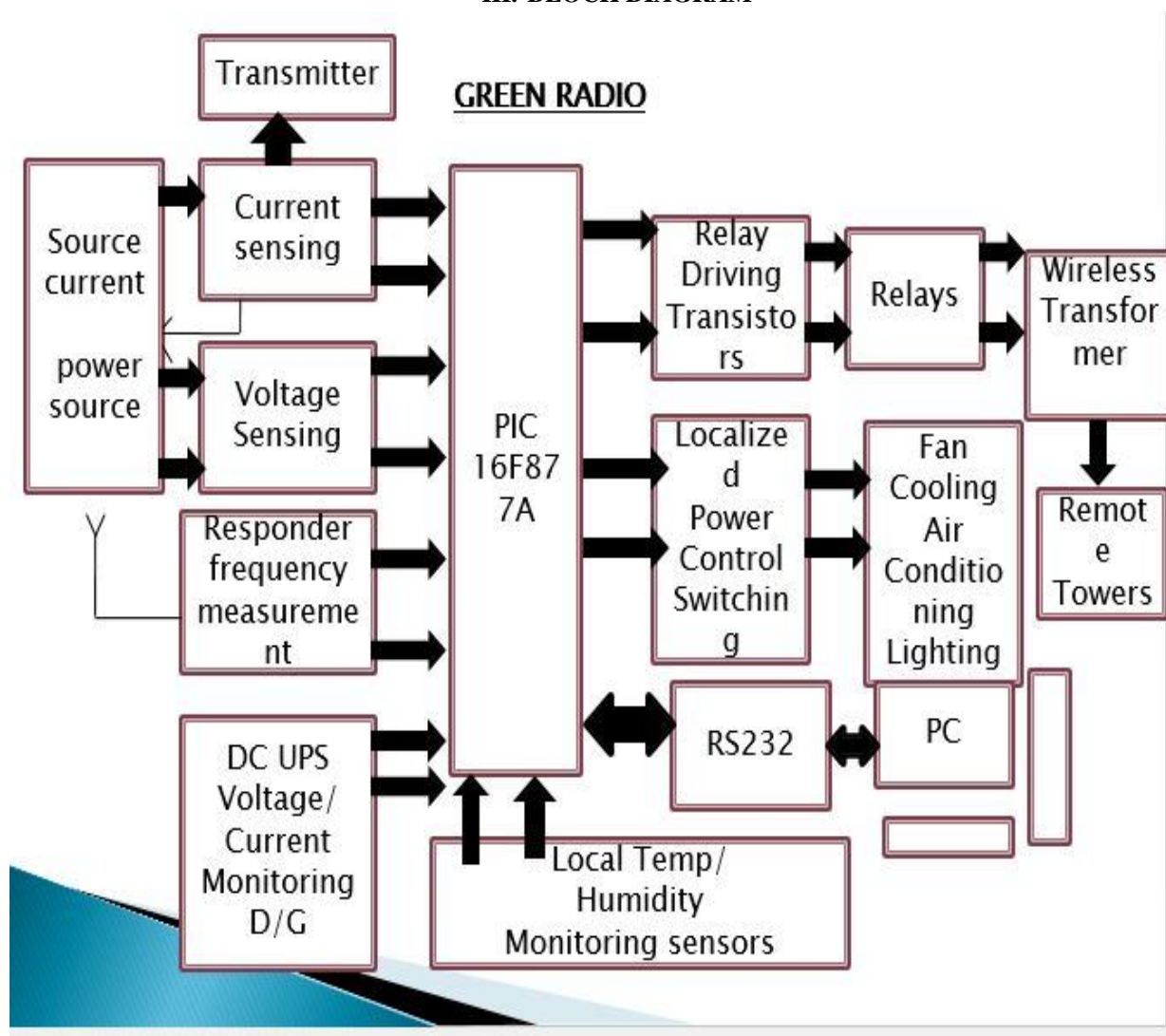
The third band indicates the number of zeros.

The fourth band is used to show the tolerance (precision) of the resistor, this may be ignored for almost all circuits. This resistor has red (2), violet (7), yellow (4 zeros) and gold bands. So its value is 270000 Ω = 270 $k\Omega$.

B. Capacitor

Capacitors store electric charge. They are used with resistors in timing circuits because it takes time for a capacitor to fill with charge. They are used to smooth varying DC supplies by acting as a reservoir of charge. They are also used in filter circuits because capacitors easily pass AC (changing) signals but they block DC (constant) signals.

III. BLOCK DIAGRAM



A. Responder Frequency Sensing Circuit

The input for responder frequency sensing circuit is given by FN or as table multi vibrator and BC107 is the transistor that is used to shape the wave, Schmitt trigger (CD4093). The conversion from frequency to voltage is done using the LM331.

B. Voltage & Current Sensing

A voltage and current sensor is a device that detects and converts current to an easily measured output voltage, which is proportional to the current through the measured path. Potential transformer is used to step down the input voltage. The sawtooth waveform is given as the output from integrative filter.

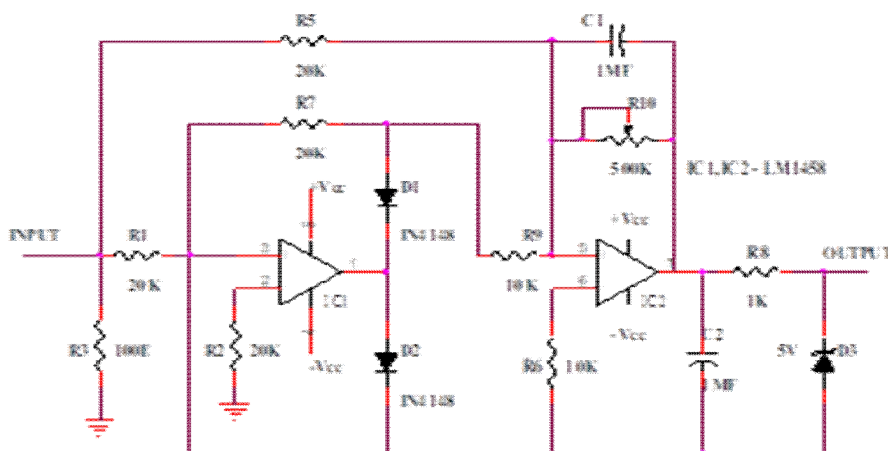


Fig 3.2 Voltage & Current Sensing

C. Relay Driving Circuit

4 relays are connected to each collector 4 of transistor relays driver is used to control AC loads or high voltage loads. Relays are used to provide isolation between microcontroller's circuits and high voltage operating loads. Microcontrollers are only used to provide on/off signals to relays. Microcontrollers don't have enough current sourcing ability to drive relays. Therefore relay driver circuits IC is used to drive relays properly. output is obtained from RB0-3 port of PIC and BC107 is used as relay driving.

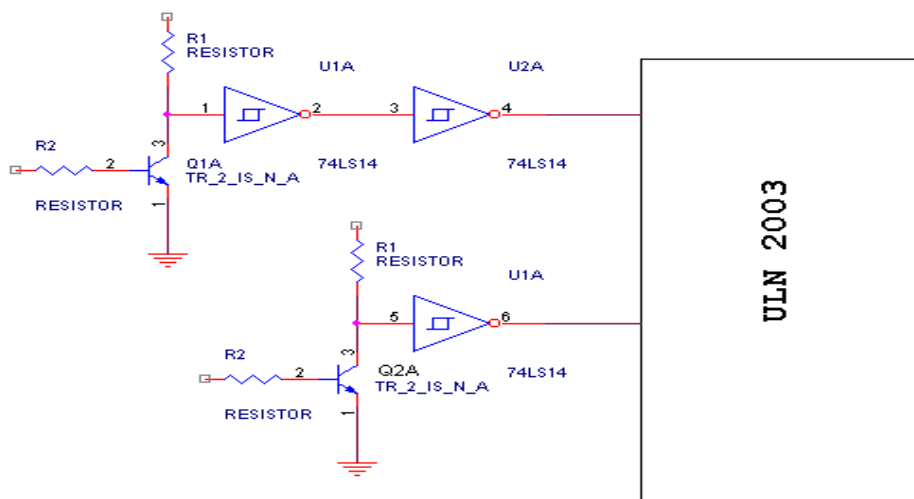


Fig 3.3 Relay Driving Circuit

D. Diodes

Diodes allow electricity to flow in only one direction. The arrow of the circuit symbol shows the direction in which the current can flow. Diodes are the electrical version of a valve and early diodes were actually called valves.

E. Power Supply

Most power supply circuits are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function.

For example a 5V regulated supply:

Transformer - steps down high voltage AC mains to low voltage AC.

Rectifier - converts AC to DC, but the DC output is varying.

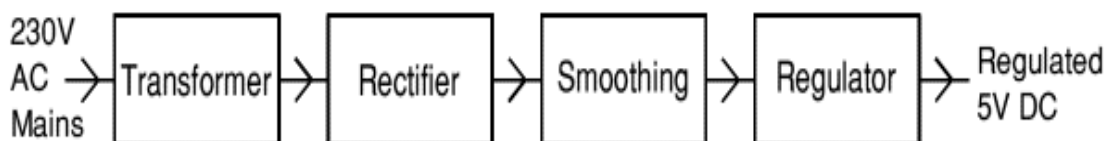


Fig 3.4 Power supply

F. Thermistor

A thermistor is an input transducer (sensor) which converts temperature (heat) to resistance. Almost all thermistors have a negative temperature coefficient (NTC) which means their resistance decreases as their temperature increases.

G. Power Amplifier

A power amplifier is an electronic device that receives an electronic signal and reprocesses it to amplify, or decrease, its power. The boost in power is achieved by significantly increasing the input signal's voltage. A power amplifier is used to power an output source, such as a stereo speaker, a relay or a motor.

H. RS232

Serial communication is basically the transmission or reception of data one bit at a time. Today's computers generally address data in bytes or some multiple thereof. A byte contains 8 bits. A bit is basically either a logical 1 or zero. Every character on this page is actually expressed internally as one byte. The serial port is used to convert each byte to a stream of ones and zeroes as well as to convert streams of ones and zeroes to bytes. The serial port contains a electronic chip called a Universal Asynchronous Receiver/Transmitter (UART) that actually does the conversion.

The most common communication interface for short distance is RS-232. RS-232 defines a serial communication for one device to one computer communication port, with speeds up to 19,200 baud. Typically 7 or 8 bits (on/off) signal are transmitted to represent a character or digit. The 9 pin connector is used.

I. Single Board Computer

Single board computers (SBC) offers a ready to use embedded platform to develop any product.. But here we are using an advanced development called customized SBC, which is an off-the-shelf embedded platform that consists of a computer on module (CoM) and a carrier board.

SBC is a complete computer built on a single control board with microprocessor(s) ,memory, input/output(I/O) and other features required of a functional computer. Single-board computers were made as demonstration or development systems, for educational systems, or for use as embedded computer controllers. Many types of home

computers or portable computers integrate all their functions onto a single printed circuit board. A desktop personal computer, single board computers often do not rely on expansion slots for peripheral functions or expansion. Single board computers have been built using a wide range of microprocessors. They've been to the ocean depths , into outer space and to every continent on the planet. Because of the very high levels of integration, reduced component counts and reduced connector counts, SBCs are often smaller, lighter, more power efficient and more reliable than comparable multi-board computers.

IV. PIC16F877A MICROCONTROLLER

Microcontroller is a software driven electronics device. It is a single chip monolithic IC, which is designed by VLSI design technology. It will perform the arithmetic and logical operation with help of software. It is used to control and communicate the external peripherals.

It has inbuilt A/D converter. The A/D converter is required to our project because the transducer output is in the form of analog voltage signal. But the inside operation of microcontroller is digital. So we require A/D converter. The operating frequency of PIC 16F877A is 20MHz.

The current images are compared with the reference images and corresponding output signal passed through serial port to MAX232. MAX232 IC converts it into TTL logic and then sends the signal to the microcontroller. The microcontroller is programmed using PIC Compiler with software Embedded C.

The microcontroller converts the signal to string format and compares with the standard strings and the output is given to the corresponding relays.

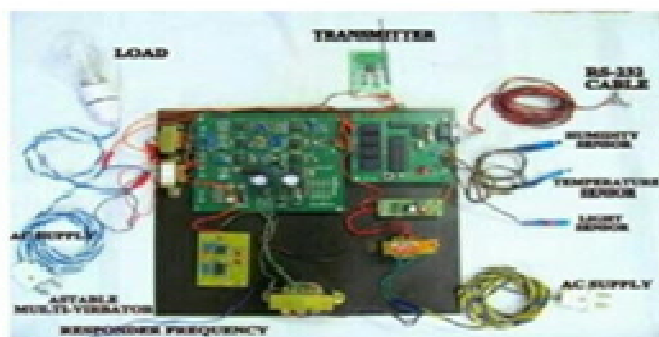
V. MERITS

- A. The main advantage of this technology is the Power saving
- B. It provides Pollution free and ecofriendly environment.
- C. High reliability and performance can be produced.
- D. Low cost and complexity

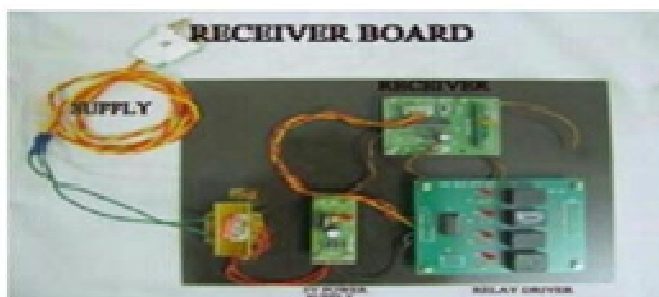
VI. SYSTEM SOFTWARE DESIGN

The VB programming system packages up the complexity of windows in a truly amazing way. It provides simplicity and ease of use without sacrificing performance or the graphical features that make window such a pleasant environment to work in Menus, fonts, dialog, boxes etc are easily

designed and these features require no more than a few lines of programming to control. It is one of the first languages to support event driven programming a style of program especially suited to graphical user interface. The aim in modern computer application is to have the user in charge.



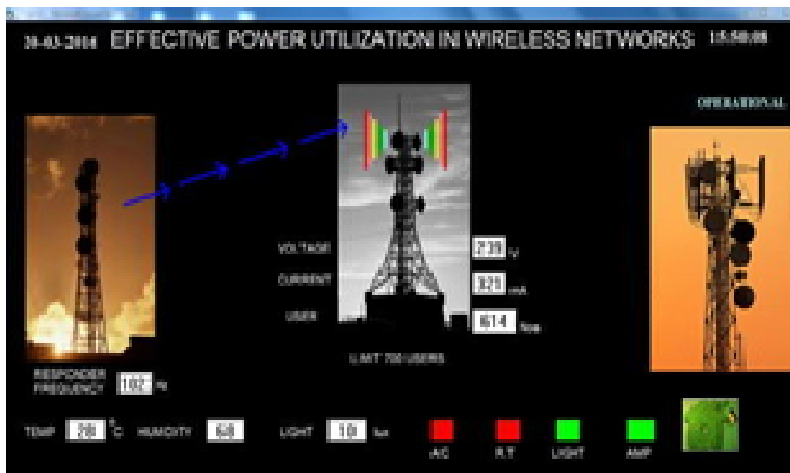
Transmitter model.



Receiver model.

Fig 6.1 Model

The output hardware consists of two modules, one is transmitter which is considered as a tower and a receiver which is considered as another tower. When the number of users exceeds certain value, the receiver tower turns ON and the signals are transferred from transmitter to the receiver. The output from the VB is as follows, which gives the effective way to reduce power consumption.



VII. CONCLUSION

Our project proposes a comprehensive approach towards an energy efficient operation of next generation mobile communication. Green Radio includes efficient hardware and software platforms and careful integration into self-organizing network functions. This technology is a key factor for operation expenditure reduction and endures an eco-friendly.

VIII. FUTURE WORK

A. Renewable sources such as solar power and wind power may be available where cell sites are placed. Hence, Base station will get adequate power from either wind power or solar power generator. So we can operate Base station independent of the electric power.

B. Because of power getting from either wind or solar generator, Base station is always working condition even electric power goes off.

IX. ACKNOWLEDGEMENT

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