Continuous Power Supply Control from Different Electrical Power Sources

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***Abstract*—** In this paper, the main objective is to provide continuous power supply to a load, using electrical sources namely, solar power, inverter supply automatically in case of main source is absent. The need of electricity is increasing day by day and the frequent power cuts of electricity are causing many problems in different areas like banks, colleges/schools, hospitals, houses and industries. Thus there is requirement for an alternate arrangement of power supply. This arrangement can be designed by using ARM7 microcontroller and relays. When a source, say mains fails the supply automatically shifts to next priority source generator and so on. LEDs (Light emitting diodes) can be used to show that which source is used to provide the supply.

***Keywords*—**ARM7, GSM, Relay Driver IC, LCD.

I. INTRODUCTION

An important requirement of electric power distribution systems is the need for automatic operation. In particular, the rapid and reliable transfer of the system fromone power source to another during certain system events is important to achieving the reliability goals for such systems and the facility serves. In the existing system, they made four switches todemonstrate the corresponding failure of that power supply.By pressing any one of the switch, absence of that particular source can be found out. The switches are connected as inputmicrocontrollersignals to microcontroller. InIJSERthissystem8051is used. The relay driver IC collects output of microcontroller,which adjusts relay to maintain continuous supply to the load.In this proposed system, we made use of GSM technology,which helps in operating the system from the different places.This GSM technology is a latest technology, which is use tocollect the information about the different sources either theswitch is ON or OFF. In this system, we made use of ARM7Microcontroller which has many advance features than 8051microcontroller.

II. REVIEWS OF SYSTEM COMPONENTS

This section discusses the basic theory of components used for this work. Though, we will be more focused on the heart of the system design (Microcontrollers) and its peripherals while we leave other basic electronic components. But interested readers can see [2-6] for theory of other components used.

A. Relays

Relays are electromechanical devices or solid state deviceswhich operate in response to a signal which may be voltage, current, temperature etc. Electromagnetic relays operate dueto magnetic fields. They are composed basically of two parts *viz.* operating coil and magnetic switch.

When an input pulse is introduced into the coil, a magnetic field is produced in the core of the electromagnet. This action causes the switch to slide.Delays are either normally open or normally close. Delays are available for DC or AC excitationand coil voltages range from 5V to 230V.

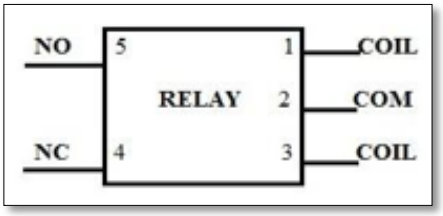

Fig.1: Pin Diagram

B. Microcontroller

A microcontroller (MCU) is a single computer chip or integrated circuit that has the ability to execute written user programs. The MCU is normally used for the purpose of controlling some devices – this actually gives it its name microcontroller. The user program can be stored within the MCU or on an external chip called an Erasable Programmable Read Only Memory (EPROM). MCU are normally integrated into small devices like the microwave ovens, keyboards and cell phones. The microprocessor that is universally accepted is not the same as a microcontroller. An MCU requires small based systems are far more reliable and cheaper, desirable for circuit designers. It possesses an internalcomparator that acts like an OP-AMP comparator. It also has aclock (crystal) that runs at a frequency of 12MHz – thisfrequency is chosen so as to make the MCU trigger faster. The MCU takes charge of sending pulses that enable the chargingcircuit for the battery, the software application interface andthe tracking of safe battery operational level.

C. Voltage Regulators

These two voltage regulators are used to give a constant DCvoltage of 15V (LM7815) and 5V LM78L05. They act asstabilizers due to the fact that the circuit components are to run on DC voltage that contains negligible or no pulsations atall. These regulators give an unvarying output. The LM7815uses a heat sink due to its nature to heat up. The LM78L05however does not need a heat sink. Both the two regulators have a maximum current drawn of 1A each. The LM7815gives an output of 15V that is fed into the comparator (LM741), though due to configurations it is not directly usedas a reference voltage. The two relays RLAI and RLA2 alsofeed from this terminal. The LM78L05 gives an output of 5Vthat is fed to the microcontroller unit. This terminal must at alltimes have an output of 5V either from the rectified power orthe battery terminal because the microcontroller oversees the general control of the whole circuit and must always be powered. This regulator is fed by a joint from two diodes (IN4001) which prevent a flow back of current and are the alternating sources of voltage to the regulator.

D. Relay Driver IC UNL2803

The Eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications. The ULN2803 is designed to be compatible with standard TTL families while the ULN2804 is optimized for 6 to 15 volt high level CMOS or PMOS.

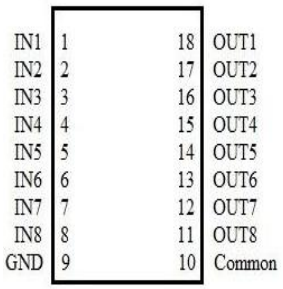

Fig.2: Pin Diagram (ULN2803)

III. BLOCK DIAGRAM AND CIRCUIT SCHEMATIC

A. Block Diagram

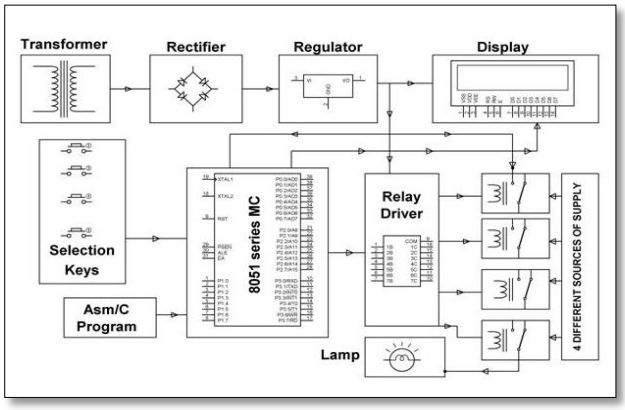

Fig.3: Auto Power Supply Control from Four Different Sources

B. Circuit Schematic

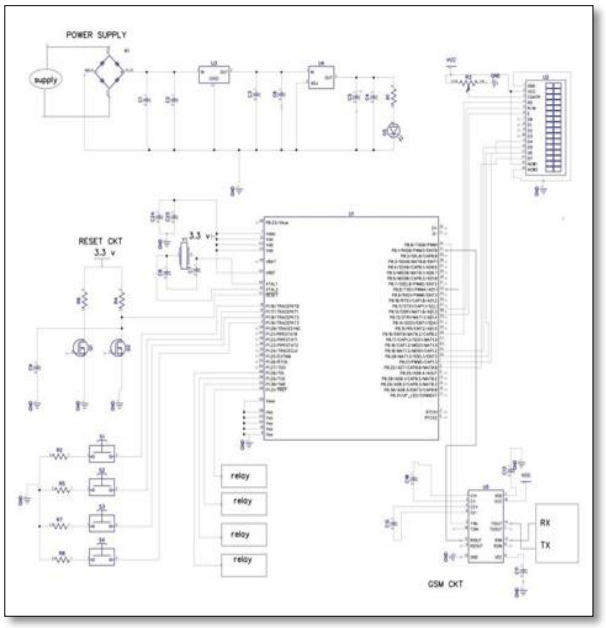

Fig.4: Circuit Schematic

III. WORKING PRINCIPLE

This paper discusses about four different sources of supply which are channelized to a load so as to have anuninterrupted operation of the load. As it is not practicable toget four sources of supply such as solar supply, invertersupply, main supply and generator supply, we used onesource and a set of relays. We have taken first source withsolar supply and assumed as if being fed from four different sources by connecting all the four incoming sources in parallel. The ac source to the lamp is connected to four relaysby making the entire normally open contacts parallel and allthe common contacts in parallel. Four push button switchesare used which represent failure of corresponding supplyrespectively and are interfaced to the controller.Initially we have given high input signal to themicrocontroller, so as a result the controller generates a lowoutput to activate the first relay driver which will result in therelay being energized and the lamp glows. While the pushbutton for solar is pressed that represents failure of solarsupply as a result the supply is provided from the next sourceand the microcontroller receive high input and generates lowoutput to activate the second relay driver which will result inthe second relay being energized and the lamp glows.

When we press the inverter button, it indicates the inverter or fails to operate and the supply comes from the next source and thenext source will supply high input to the controller and whichwill provide low signal to the third relay and the lamp switches ON and when we press the third push button the supply will chose next source now the fourth source will provide input to the microcontroller and controller activates the fourth relay and the load will get the supply and the lamp continues to glow. When all the relays are off leaving no supply to the lamp, the lamp is switched off. One 16 x 2 lines LCD is used to display the condition of the supply sources and the load on real time basis.

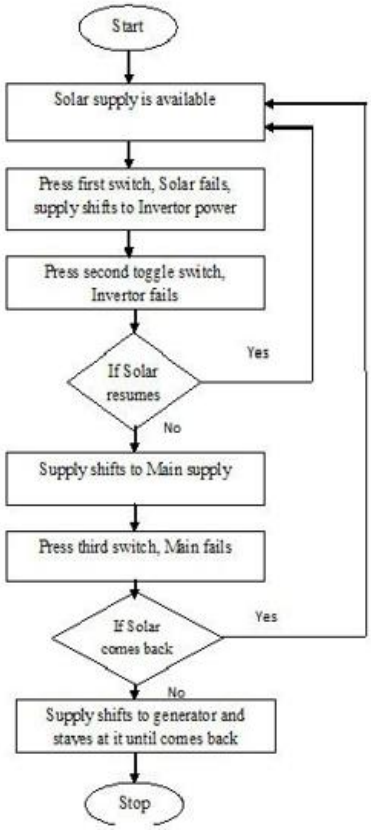

Fig.5. Flowchart of Power supply control

IV. CONCLUSION

In this paper, four different electrical power sources has been discussed for the continuous power supply to the connected load namely, solar power, inverter supply, mains supply and generator with all its features and details.

The significance of the work lies in its various advantages and wide places of applications such as industries, hospitals, banks etc. It has been developed by integrating Colleges/Schools, etc. It hasbeen developed by integrating features of all the hardwarecomponents used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit

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