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Automatic Source Selector with Real Time Battery Parameter Monitoring

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Abstract: Source selection is the problem of identifying a subset of available data sources that best meet a user's needs. In this paper we propose a user-driven approach to source selection that seeks to identify sources that are most fit for purpose. The monitoring board measure the battery parameter using the divider circuit and series resistor And this measured data send to blink app by esp8266 wifi module. The Source Selector circuit using monitoring board measured parameter's Collected data is Compared with permissible limits in ATmega328P. According to this data ATmega328p gives signgal to the relay to operate operate load.

I Introduction

For a very long time, power outages, power interrupts and also unexpected routine power line maintenance is one of the major problems faced in industries, hospitals, offices, and homes whole over the world. For that case, this project provides an automatic operation of electrical power distribution systems; the rapid and reliable transfer of the system from one power source to another during specific events such as power outages, power interrupts, routine power line maintenance, to achieve the reliability of such systems. Electrical power supply is one of the primary essential needs of human life today, that is to say, without electrical power supply, most human works become stand still, postponed and even cancelled since most human actions are dependent on the electrical power supply. Furthermore, the need for power supply through access to electricity by the masses of the population of any country, both developed and developing countries is very important to the development of the economy of that particular country.

In other words, the power sector plays an essential role in the social economic development of any country. Why Is Battery Monitoring Important? Battery monitoring is important because it helps to predict the state of health and inevitable failure. Depending on battery type and application, Lead Acid batteries have a design life that can range dramatically - from 5 to 20 years. That design life estimation is based on the battery being maintained in accordance with recommended practices, operating under ideal conditions and ensuring that any individual failing units are replaced before they impact the other units in the string. However, in most installations, those conditions are seldom met, and the actual life of a battery may be closer to half of the published design life. This potential for failure has been confirmed in a number of studies over the years. In fact, in one study into Data Center failures, the UPS Battery was responsible for over 50% of the reported outages. This data, and the uncertainty of most operating environments, confirms why battery monitoring is an essential part of maintaining. The project is designed to automatically supply continuous power to a load through one of the four sources of supply that are: solar, mains, generator, and inverter when any one of them is unavailable. Four switches are used for four respective sources. These are connected to a microcontroller of 8051 family that provides input signals to it. Whenever a switch is pressed it shows the absence of that particular source. A relay driver is used that receives microcontroller generated output and switches that particular relay to provide continuous power supply. A lamp is used as a load for demonstration purpose which draws power from main. When main fails to supply power, automatically next available source is used say inverter. If inverter fails then the next one is used and so on. An LCD is also used to display which source is being currently used for power supply. Therefore, this project provides an effective solution to provide an alternative power supply during frequent power cuts.

II Literature Survey

The unreliable public power supply has led many to the alternative power supply sources .manual changeover switch system still remains the oldest changeover switch box used by majority of the electricity consumers. Manual changeover switch box separates the source between a system

supply and solar supply. [3] Robert L. Boylestad and Louis Nashelsky Electronic devices and circuit theory Eight edition. Prentice Hall (Pearson Education Inc.) 2002 pp 875 Whenever there is power failure, changeover is done manually by an individual and the same happens when the solar power is restored. manual changeover is time wasting whenever there is power failure, it is strenuous to operate because a lot of energy is required, it causes device process or product damage. In fact there are several types of emergency power systems being used all over the world, one of the most used types is the UPS system, also known as an uninterruptible power supply which is an electrical apparatus that provides emergency power to load when input source, typically the main source power fails. It provides near-instantaneous protection from input power interruptions by supplying energy stored in batteries. [1] El-Ali, A., N. Moubayed, and R. Outbib. "Comparison between solar and wind energy in Lebanon." Electrical Power Quality and Utilisation, 2007. EPQU 2007. 9th International Conference. The difference between the circuit that we are about to design is that the UPS's main function is to protect critical loads against the different types of disturbance which may occurs with the power sources by shifting the supply to the backup rechargeable battery. So, the load will have an uninterruptable power supply of power. On the other hand, our project aims to have no interruption on power being supplied to the load by shifting the supply to the backup solar, wind and a generator sources as well as to reduce the financial cost of using such an emergency power system, and that by using the solar and wind power supplies as backup sources because they have low operating cost. Although, the circuit we are attempting to design will work effectively during faults and not in response to small disturbances of power source, but also it has a noticeable benefits. [2] Gagari Deb and Arijit Bardhan Roy, International Journal of Computer and Electrical Engineering, Vol.4, No.1, February 2012.

III Proposed system

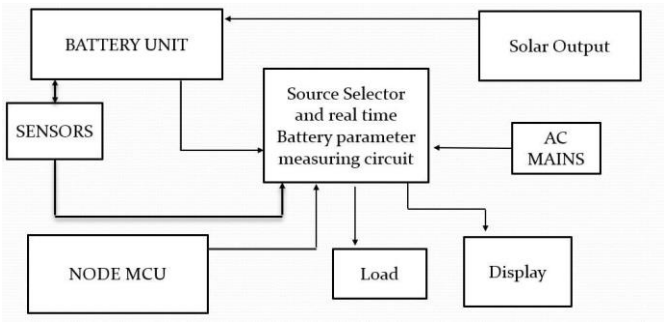

Fig1. Sequence Diagram

This auto power supply control system works on the principle of auto function for switch over the load to other available source without wasting any time or switch off the load. Here for the demonstration purposes we have used voltage divider network for measuring voltage for battery , if it is less than 50% than load is automatically shift to the main supply (MSEB). In this system, the ATMEGA328P microcontroller which is very essential component of this system always, keep sensing the whole available sources. When battery goes lower than permissible value ATMEGA328P shifted the load to the other supply source by giving the signal to the relay driver IC then the relay driver IC switched on the appropriate load relay. The whole function is done by the ATMEGA328P is micro seconds and this shifted time can be changed during the programming of Arduino microcontroller. The load relay consist of NORMALLY OPEN and close contacts and are operated through the relay driver IC. We have checked this system by connecting the Led lamp at output side as a load when any interruption is taking place during the shifted time then the lamp is blinking but here there is no any blinking take place during the shifted time means there is no any interruption in supplying the power at output side. And also we are measuring real time battery parameter like voltage, current, temperature by using voltage divider network, shunt resistance method, and LM35 All these measured parameters are send to android mobile app (BLINK), by using ESP8266.

Battery Parameter monitoring

Battery monitoring is important because it helps to predict the state of health and inevitable

failure. Depending on battery type and application, Lead Acid batteries have a design life that can range dramatically - from 5 to 20 years. That design life estimation is based on the battery being maintained in accordance with recommended practices, operating under ideal conditions and ensuring that any individual failing units are replaced before they impact the other units in the string. However, in most installations, those conditions are seldom met, and the actual life of a battery may be closer to half of the published design life. This potential for failure has been confirmed in a number of studies over the years. In fact, in one study into Data Center failures, the UPS Battery was responsible for over 50% of the reported outages. This data, and the uncertainty of most operating environments, confirms why battery monitoring is an essential part of maintaining. • **Voltage Measurement**

Passive Linear Circuit that produces output voltage that is a fraction of its input voltage. It scales down input voltage to a smaller voltage based on the ratio of the 2 resistors through distributing input voltage among components of the divider. Often used to supply a voltage different from an available battery or power supply. Output voltage of voltage divider is dependent on the resistance of the incoming load

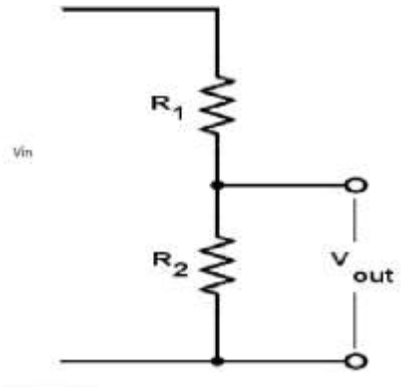

Fig2. Voltage measurement

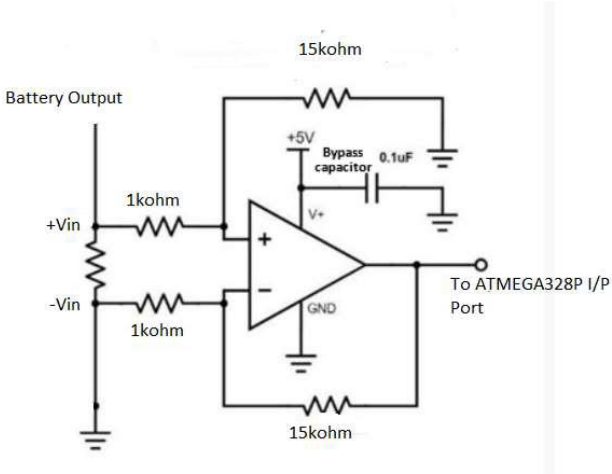

Fig. 3 Current measurement

In principal, a current detection circuit using a shunt resistor is a simple circuit that only measures voltage. However, since the voltage drop of the shunt resistor is small, it's necessary to make a circuit that can amplify the voltage with a high level of accuracy. Therefore, a differential amplifier circuit that uses an operational amplifier is used.

Temperature Measurement

LM35 is a precession Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C. It can easily be interfaced with any Microcontroller that has ADC function or any development platform like ATMEGA328P • **Source selector** The project is designed to automatically supply continuous power to a load through one of the four sources of supply that are: solar, mains, generator, and inverter when any one of them is unavailable. Two switches are used for four respective sources. These are connected to a microcontroller of 8051 family that provides input signals to it. Whenever a switch is pressed it shows the absence of that particular source. A relay driver is used that receives microcontroller generated output and switches that particular relay to provide continuous power supply. A lamp is used as a load for demonstration purpose which draws power from main. When main fails to supply power, automatically next available source is used say inverter. If inverter fails then the next one is used and so on. An LCD is also used to display which source is being currently used for power supply. Therefore, this project provides an effective

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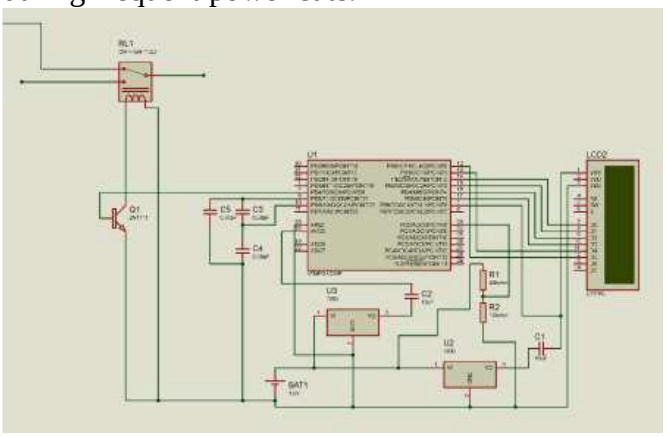

Fig.4 Source selector circuit diagram

IV Experimental results

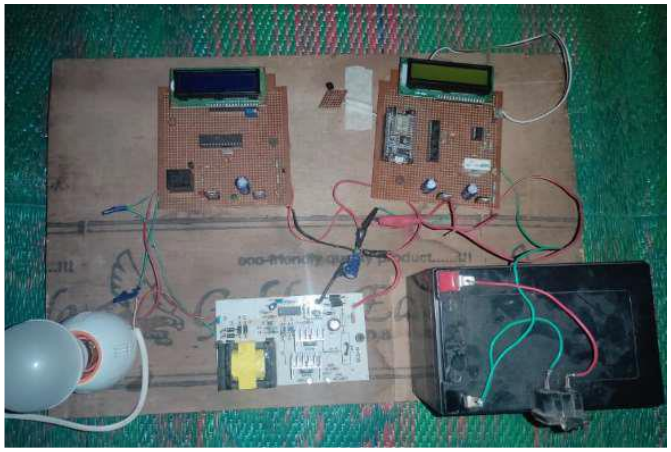

Fig.5 Experimental setup

Figure 5 shows experimental setup of proposed system.

Fig.6 Screen shot Blink App

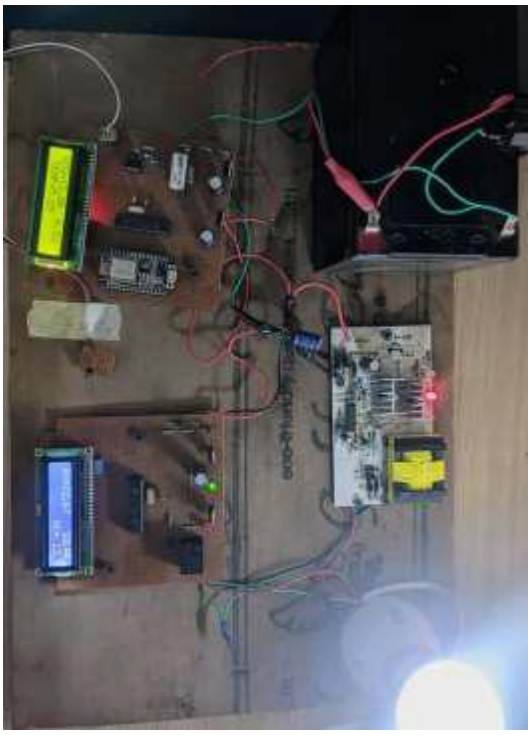

Fig 7. Running on Solar

Fig 7. Running on grid

This system runs on both solar as well as on grid as tested in figures 7 and 8 respectively

V Conclusion

This paper intended to design an auto power control of different sources circuit, the main scope of this project is to provide a continuous power supply to the load through any of the sources in the absence of any source. Taking in consideration the use of the source whose cost is the lowest then, the higher and so on. The first stage was to provide the four different sources, as it's not practicable to do so at the moment we connected two lines to a particular load which is a 220-V lamp line connected to a 5-V relay representing the two sources. The second stage was to control the circuit with the aid of ATMEGA328P microcontroller by burning a C language program into the ATMEGA328P. To sum up, the objectives which were stated in the first chapter were met successfully. The significance of this project lies in its various advantages and wide places of applications where this project can be used efficiently. Also we provided additional feature to this as Real Time battery parameter measuring and observe through.

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[3] Robert L. Boylestad and Louis Nashelsky Electronic devices and circuit theory Eight edition. Prentice Hall (Pearson Education Inc.) 2002 pp 875

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