Automatic power supply selection and supervisory predictive control

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Abstract: As we all are aware of the fact that the demand of electricity is increasing every day and India being the populated country the most commonly problem faced are frequent power cut and low energy resources. The main objective of the work is to solve both these problem by not relying on main supply source and switching into renewable source of energy i.e. solar energy. The work also provide additional advantage i.e. Automation which is done by using microcontroller (8051) family. This paper presents a supervisory model predictive control method for the optimal management of solar energy generation. This work present supervisory control system through model predictive control which calculates the power references for solar subsystems at each sampling time and prediction of the charging and discharge time of the solar battery in hours.

Keywords: Renewable energy source, microcontroller, solar energy, supervisory predictive control.

I. INTRODUCTION

In India the overall generation including from grid connected renewable sources as been increased from 1110.0458 BU to 1173.603 BU during 2016-17. We also know that the human activities is mostly dependent on electrical power supply. The main aim of electric power supply in the world is to provide uninterrupted power supply at all the times to all its consumers. The above fact clearly shows that the electric power generated to meet the demands of the growing consumers of electricity is insufficient, hence power instability & outage[1]. Power instability or outage in general does not come out development in the public & private sector[2]. The alternative for this problem is to switch towards renewable energy resources. Automatic transfer switches from the wide application scope whenever the reliability of the electric supply from the utilities is low & it is used in lightening motor circuits wherever continuity of supply is necessary, for switching to an alternative source from solar to main supply & vice-versa[3].

Hardware requirements
• Solar charge controller
• Batteries 12V 5Ah
• Microcontroller 8051
• Relays
• LCD display
• Solar panel 12V DC 5 Watt
• ADC 0809
• Inverter 12V DC to 230V AC
• Lamp load

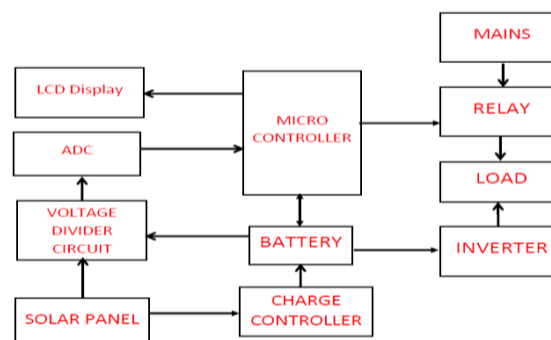Software requirements
• Keil
• Pspice Tool

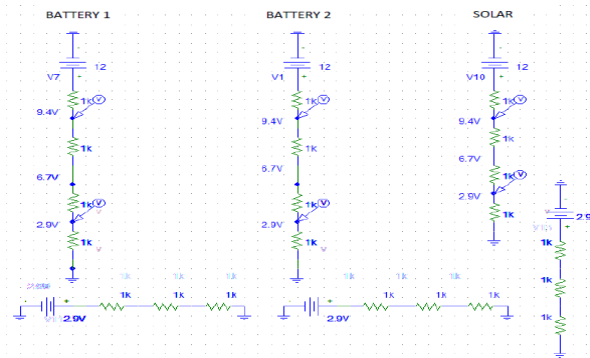## II.BLOCK DIAGRAM

Fig 1. Block diagram

Fig 2. Voltage divider simulated circuit diagram

III.WORKING

This project uses an arrangement of two different sources of supply which are channelized to a load so as to have an uninterrupted operation of the load. First priority is given to solar, if solar is not available it automatically shifts to inverter and so on. Solar panel is connected solar charge controller to avoid reverse power supply from that it is connected to relays. Relay output is connected to the microcontroller. As per programming instructions given to microcontroller current status like which source is supplying power to the load is displayed on the liquid crystal display. For demonstration purpose module is designed with a voltage divider circuit to show the battery charge level and discharging level. This circuit is connected to ADC, ADC output is connected to the microcontroller. Current status like battery charging level and time required for charging the battery is displayed on the liquid crystal display.

IV.ALGORITHM

Step 1: Start
Step 2: Take the input from charge controller
Step 3: If the obtained input is in the range go to   step 4 else step 5
Step 4: Display the amount of time required for charging
Step 5: Solar input is not available switch over to batteries
Step 6: Measure the voltage level of the battery and value is given to ADC
Step 7: If the obtained input is in the range go to step 8 or else step 9
Step 8: Display the amount of time required for discharging as per the voltage
Step 9: Switch the load to mains supply.
Step 10: Go to step 2.

V.CONCLUSION

This work is use to provide a continuous power to the load through the source which we are operating the device i.e. solar and mains. The complete operation is based on the microcontroller. This work is a low-cost, reliable, efficient system and The project can be further enhanced by using other sources like wind power also and then taking into consideration for using the best possible power whose tariff remains lowest at that moment. The solar tracking can be implemented to increase efficiency. We can implement GSM technology to inform the consumer from which source power supply is coming.

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