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Auto power supply control from four different sources

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Abstract: *Nowadays the supply of electricity is very important to the people. Intangible energy supplies are needed in almost every area of our lives for home applications, research centers, hospitals etc. Due to the increasing demand for energy and the widespread use of natural resources, which are naturally limited, there is a need. From conventional energy production methods to a better approach using hybrid systems to economically exploit conventional and unconventional resources. This project deals with the automatic switching between different sources in order to obtain uninterrupted power supply and to arrive at low cost savings. Many sources increase system reliability and the system is extremely resilient to power failures and errors. The project uses a circuit based on a small controller with transmitters to facilitate the automatic switching of the power supply from various available sources.*

Keywords: *Microcontroller, Relay, LCD, supply sources, Load etc.*

I. INTRODUCTION

This project is designed to automatically provide continuous power to the line with one of the four supply sources namely: solar, mains, generator, and inverter if one of them is not available. Four switches are used for four sources in a row. These are connected to a small Arduino Uno family controller that provides input signals. Whenever a switch is pressed it indicates the absence of that particular source. It uses a transmission driver that detects the output of the microcontroller and modifies that specific transmission to provide continuous power. The lamp is used as a load for the purpose of displaying power in the main. If the main fails to provide power, the next available automatic source is the inverter. If the inverter fails then the following and so on are used. The LCD is also used to indicate which source is currently used for power supply. Therefore, this project provides an effective solution to provide alternative power supply during regular power outages.

Problems such as power outages, unpredictable cable repairs, and power outages are increasing day by day. Therefore, in order to overcome these problems, this program provides continuous power supply. In this system renewable energy sources are used in conjunction with the system microcontroller Arduino Uno, The system also contains LCD display, which provides an updated status regarding system performance. The overall performance of the system is completely automatic. The plan aims to avoid personal interactions.

II. PROBLEM STATEMENT

Now solar power is generated by conventional sources such as coal, diesel, nuclear etc. and it will soon end and we will need other ways to generate electricity. But we can extend the life of fossil fuels by managing our needs and using other resources to meet our electricity needs. There are many supernatural sources of energy such as sun, wind etc. These rare energy sources are more expensive than conventional sources and therefore, to completely replace the use of conventional resources is not the best option. Not only do we need to use both sources of electricity, we also need to prioritize the selection of sources wisely. This work is based on the premise that electricity demands will continue to rise and that we need an uninterrupted supply of electricity. As all power sources have their limitations regarding their availability. Microprocessor-based system is used to switch between different power sources (solar, mains, inverter, wind etc).

III. OBJECTIVE

- Four different sources namely pipelines, generators, solar and inverter are used to provide uninterrupted power supply.
- Using solar energy as a source of energy provides a solution for low energy sources as it is a non-renewable energy source.
- The second purpose of the job is to provide automation that makes the job faster, more reliable, more efficient, and less human effort.
- Microcontroller (Atmega 328p) is used to provide automatic switching between four different sources.
- The automated system used for switching requires a different source to provide an output signal that will use four different relays connected to the sources respectively.

IV. LITERATURE SURVEY

- Aleksey et al. [1] Proposed way to design an independent mixed system with solar and diesel generators. The paper was about designing and analyzing complex elements in Russia's integrated electricity supply system. According to the proposed paper, the development of an over-the-counter power system requires independent power sources using fossil

fuels, which are very common and flexible which are power industries (DG). Analysis of wind maps and solar possibilities in Russia shows that the alternative to using the DG is renewable energy, by incorporating its own hydroelectric power station (PhG and WG) into the power supply system as a primary or auxiliary energy source. However, in order to maximize the efficiency of DG fuel between complex components, batteries and super-capacitors should be included.

- Manzar et al. [2] Presented model of solar microgrid, wind, inverter etc. For safety the main components of Microgrid are mini-hydro, solar cell, wind power, fuel cell and energy storage system. These are combined to generate electricity, energy conservation, and the load that normally works is connected to the main grid (large grid). Microgrid can work in two ways: one is connected to the grid and the other is stand-alone mode. The great advantage of Microgrid is that it can work in standalone mode or in the main grid termination mode. Microgrid can work automatically. Generation and loads on Microgrid are often connected at low voltage. But one Microgrid related issue is that the operator has to be very careful because the power system numbers are connected to the Microgrid. In the past, there was only one business to manage. Microgrid production sources may include fuel cells, wind, solar, or other energy sources. These different power generation devices have the ability to separate Microgrid from a large network and will provide the most reliable power.
- Hans-Peter et al. [3] proposed an invention that is consistent with the continuous supply of loads n + 1 inverter .In the case of these existing modular inverter structures the critical load is always connected to the power source with a stationary switch, off-line as in line mode. Therefore, if a stationary switch fails the power supply of the critical load is interrupted. This tendency to one point failure of a stationary switch causes a major setback or known architecture. Such one-point failure may be due to a number of factors such as microcontroller reset, quartz clock errors of the microcontroller or the microcontroller itself, circuit errors, which may be shortened by axillary supply delivery, service supply failure. or many other reasons. But if you use n + 1 inverters failure of one point is no longer an important issue.
- According to the author Thilagavathy et al. [4] The use of multiple resources to provide uninterrupted automatic power provides maximum system reliability. Multiple sources can be integrated and integrated with a small automatic switch control. Handshakes make a lot of noise and may be accompanied by sparks. Replacing hand-made overs requires higher repair costs. And manual switching wastes a lot of energy and time. The author has proposed a model of continuous electricity supply using a variety of sources.

V. BLOCK DIAGRAM

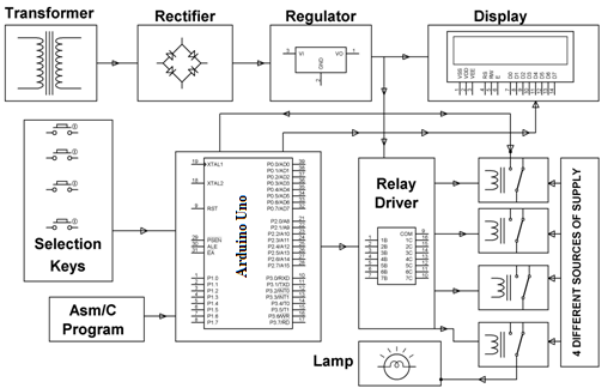


Fig. 1. Block Diagram

VI. WORKING

This uninterruptible power supply control system operates on the principle of automatic selection to switch over load to another available source without interruption or switch off. This project uses 4 different supply sources that drive the load and provide uninterrupted power supply. All four sources are connected in the same way as shown in the block diagram. Sequence of power sources by main pipelines, solar, inverter and generator respectively which means that the most important are supplied to the main pipelines and the least important to the generator.

The main reason for choosing this job is that there are many industries and household appliances that work to provide high quality and expensive electricity. And some appliances need regular or uninterrupted or continuous electricity in order to function properly for a longer life. Many electrical systems are very sensitive which may interfere with the moment of the power supply line. In a power supply system there is a high probability that it can be disrupted at any time such as death / power outage, faults etc. To avoid such problems these project plans are best to take electricity from four different sources and switch between them. using a microcontroller. The suitability of this work is that they are reliable and economical.

VII. LIST OF COMPONENTS

- Microcontroller 328P (9v-12v)
- Relay driver (12v)
- Resistors, capacitors, oscillators, diode.
- Power supply/Transformer (12v)
- LCD display 16*2 (5v)

- 4 Loads (220v AC)
- Voltage Regulator 7805 (5V)
- Others.

- ***Microcontroller Atmega 328P* :** In this auto power supply control system, the Atmega 328P microcontroller is used for the auto selection of the available source. It shifted the load to the other power supply source automatically without any interruption.

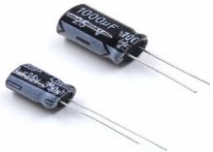
- ***Relay Driver*:** In this auto power supply control system, the relay driver ULN2003 is used for driving the load relays. This relay receives the signal from microcontroller for shifting the load on another supply source.

- ***Transformer*:** The transformer is used for connecting this system directly to 220V AC. It steps down 220V into 12V.

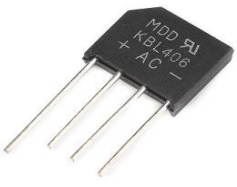
- ***Voltage Regulator*:** The voltage regulator is used for regulating 12V DC into 5V DC voltages for supplying the power to the LED, microcontroller and other components.

- ***LCD Display*:** LCD display is used for displaying the source of supply on which the whole system is working.

- **FILTERS:** Capacitive filters are used in this work. It removes the ripples from output of the rectifier.



- **RECTIFIER:** In this work bridge rectifier is used due to its merits like full wave rectification and high stability.



VIII. SOFTWARE

The software includes a control configuration connector called the MIKRO -C Compiler. MIKRO C Arduino Compiler is a powerful tool for enhancing the rich features of Atmel's 8051 sub-controls. It is designed to provide the user with the simplest solution to upgrade embedded system applications without disrupting performance. Highly developed integrated environmental development (IDE), a comprehensive set of library protocols, ready-to-use and complete documentation should be more than enough to make anyone a good start when developing Arduino applications.

IX. FLOW DIAGRAM

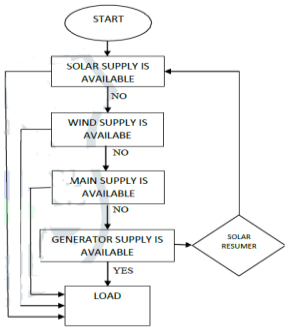


Fig. 2. Flow Diagram

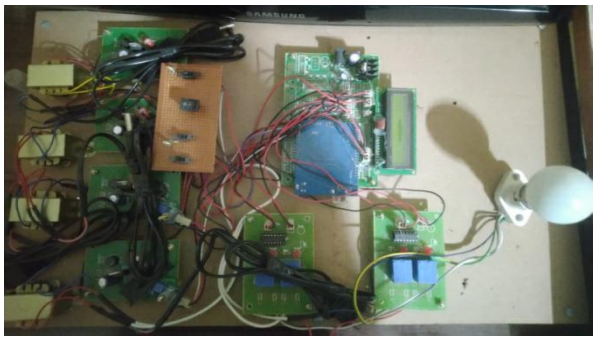
X. ADVANTAGES

- It is user-friendly.
- Safer to use.
- Reduces the time of switching due to automation.
- Requires least maintenance
- Risk of short circuiting between two phases is completely removed.

XI. DISADVANTAGES

- System is complex
- System is costly.

XII. PROJECT IMAGE



XIII. CONCLUSION

The global demand for energy is growing rapidly, as energy production is low but energy consumption is high. Electricity companies cannot meet the demand and have to use an unconventional power system. Renewable energy consumption and unconventional resources not only increase system reliability but also allow high energy demand to be consumed. Prioritizing the various resources available facilitates economic selection and use. Significance depends on the size of the reaction on the source, the cost of use, the effect on other equipment (noise due to generators, smoking, etc.). The selection algorithm can be encoded in a small controller that will automatically switch between different sources using a relay driver. This project includes four different sources with different parameters to allow the microcontroller to judge the selection of the best source you can use.

XIV. FUTURE SCOPE

The future work primarily focuses on increasing the number of sources to increase the reliability of the system and provide uninterrupted power supply to the load at all times. The new sources will be selected according to their cost of implementation and availability during a particular season. More automation via microcontroller can be provided to minimize noise issues and sparking in changeover from one source to another. The future scope of this paper is in large application like standalone hybrid micro grid systems.

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