

PRIORITY BASED SUPPLY SELECTION

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Abstract— The primary aim of this project is to provide electricity to a load based on priority by picking from one of four accessible sources: mains, generator, inverter, or solar, in the event of a power outage. The demand for energy is rising daily, and recurrent power outages are creating several issues in sectors such as industry, healthcare, and residential regions. An alternate configuration for a power supply is thus advantageous. This project utilizes four switches to illustrate the failure of the power supply source. Pressing any switch indicates the corresponding supply source is accessible. The Arduino board interfaces with switches to receive input signals. The Arduino board's output is sent to the relay driver IC, which activates the corresponding relay to ensure priority-based power delivery to the load. LEDs powered by the mains initially display the output. Upon the failure of the mains supply, which is triggered without any pushing action on the switch, it will indicate that no supply is available. Activating switch 1, designated as the solar source, displays on the LCD that supply 1 is operational. The same procedure is repeated for the primary supply (i.e., 230 V), the inverter supply, and the generator, respectively. If both supply1 (solar) and supply3 (230 mains) are active simultaneously, precedence is given to supply1, the solar source. If both the solar and inverter supplies are operational simultaneously, precedence is given to the solar source. The 230V mains source takes precedence over the inverter supply when both are running at the same time. If any of the two supplies are operational simultaneously, precedence is always given to the first one. The project may be further improved by including more sources, such as wind power, and thereafter evaluating the most cost-effective power source based on the lowest tariff at any given time. We are using GSM. The GSM will transmit the SMS upon alterations to the supply.

Keywords—Led, Gsm, Transformer, Bridge Rectifier, Integrated Development Environment

I. INTRODUCTION

The main objective of this project is to ensure an uninterrupted power supply to a connected load by intelligently switching between four power sources—wind, mains, inverter, and solar—whenever one becomes unavailable. With electricity demand steadily increasing and power outages causing significant disruptions in various sectors such as hospitals, educational institutions, banks, homes, and industries, the need for a reliable backup system has become critical. This system can be implemented using an Arduino microcontroller and relays. When a power source, such as the mains, fails, the system automatically shifts to the next available source in a predefined priority sequence. LEDs can be incorporated to indicate which power source is currently active.

II. LITERATURE SURVEY:

Shahaji Dhudate (2016) indicates a need for an alternative power supply structure. When a primary source, such as the mains, is interrupted, the supply automatically transitions to the next prioritized source, such as a generator,

and continues in this manner. LEDs may indicate the source supplying the power.

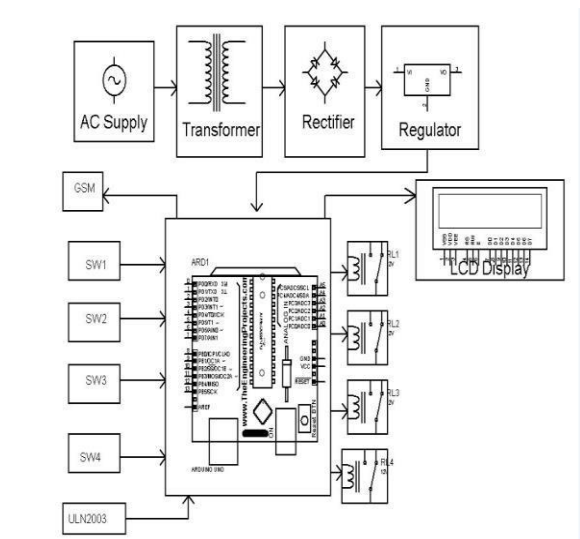
As stated in [1], we used GSM technology, which facilitates system operation from various locations. GSM technology represents a modern innovation used to collect real-time data from different power sources, providing status updates on whether switches and loads are turned ON or OFF. This system is built around the 89C52 microcontroller, which offers enhanced features and performance compared to the standard 8051 series. According to Amuzuvi and Addo (2015), a Microcontroller-Based Automated Transfer Switching System (MBATSS) effectively addresses the limitations of manual changeover mechanisms. The implementation using the 89C52 microcontroller includes components such as a voltage sensing circuit, Hall Effect current sensor, relays, LEDs, and an LCD display for monitoring purposes. We created a firmware system and programmed the microcontroller using Keil Micro Vision software.

This article [2] talks about creating a smart Automatic Transfer Switch (ATS) that uses relays, sensors for voltage and current, a display, and an alarm to use less power, work faster, have fewer parts, and cost much less. [2] In KESHINRO K. K1's (2016) paper, the author talks about creating an efficient Automatic Transfer Switch (ATS) that uses a microcontroller, relays, voltage and current sensors, a display, and an alarm to reduce power use, speed up operations, use fewer parts, and cut costs. [3]. Consequently, during the literature study, we consulted many of the aforementioned articles, which provided us with valuable insights. Certain references from other articles are quite beneficial and enhance our understanding. To achieve renewable energy smart-grid interconnectivity, IoT provides a foundation for diverse residential applications that enhance sustainable energy distribution. The Internet of Things (IoT) integrates cloud computing with Android smartphones for real-time energy monitoring and management. The difficulties in quantifying renewable energy production have lately prompted the establishment of a virtual power operations center to assist energy producers and decision-makers in the energy market. We have used adaptive models to enhance the reliability of predictive algorithms [3]. The administration of extensive data is becoming problematic in buildings, originating from smart metering systems, sensors, and other gadgets pertaining to the Internet of Things...

III. METHODOLOGY

The system employs four distinct power sources. One out of four sources will provide electricity to the load. When an existing source fails, another source assumes its role and continues the task. This phase is where the event occurs. The switching process is crucial since it must remain continuous. This discussion pertains to a frequently-used switching method. The primary rationale for choosing this job is the prevalence of industries and household appliances that operate on high-voltage supply and are very expensive. Certain electrical equipment needs a consistent and

uninterrupted power source to function well and extend its life. Numerous electrical systems exhibit extreme sensitivity and may be disrupted by even a little interruption in the power supply line. The power supply system is susceptible to various interruptions, such as power failures and problems. To prevent such issues, project systems that use power supplies from four distinct sources and rotate among them utilizing Arduino are optimal. The advantage of this job is its reliability and cost-effectiveness.

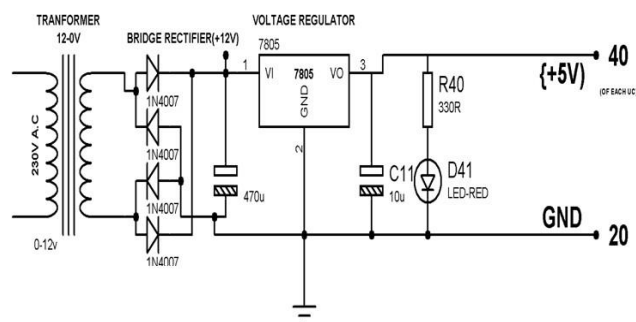


A. Working

- Arduino is the main brain of the project. For demonstration purpose we are using four switches as a four different power supply like solar, wind, battery and mains.
- This all supply input given to the arduino. Arduino sense this input and control the output pins which are connected to relays.
- As per program we define priority to first supply. If first supply is available then first relay on then by go to the message in the gsm. Here all remaining supply input are in don't care condition then gsm message from the no supply.
- If first is unavailable the supply is no from the message go to the GSM and second is on then load is working on second relay then go to the supply is on message on GSM. But when first would become then priority goes to first.
- Like this up to four supplies is available load gets uninterruptable power supply..

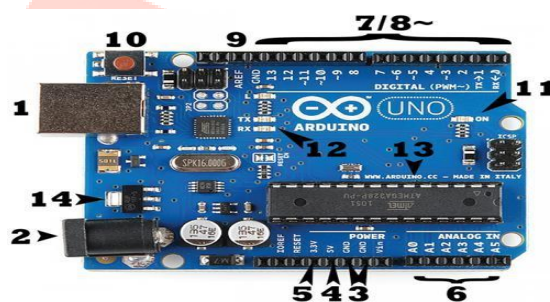
B. Hardware Description

Power Supply: The circuit operates using a conventional power source, where a step-down transformer reduces the input voltage from 230V AC to 12V AC. This AC output is then passed through a bridge rectifier composed of four diodes, converting it into a pulsating DC signal. To smooth out this pulsating voltage, an electrolytic capacitor ranging from 470 μ F to 100 μ F is used. The resulting unregulated DC, which can vary between 9V and 14V, is fed into an LM7805 voltage regulator. This regulator ensures a consistent 5V output at pin 3, regardless of input fluctuations. To further suppress electrical noise, a 10 μ F capacitor is connected at the output. An LED, wired in series with a resistor and connected to ground, is placed at the 5V output to serve as a visual indicator that the regulated voltage is present.



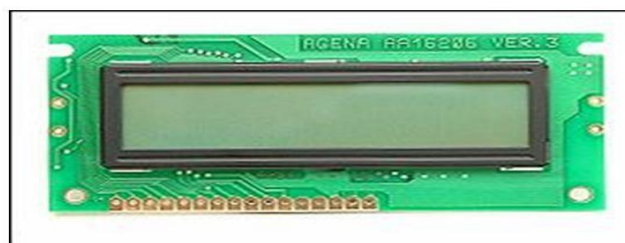
ARDUINO

The circuit employs a conventional power source featuring a step-down transformer that reduces the 230V AC input to 12V AC. This is followed by a bridge rectifier made up of four diodes, which converts the AC voltage into a pulsating DC signal. An electrolytic capacitor, with a value ranging from 470 μ F to 100 μ F, is then used to smooth out the ripples in the DC voltage. The resulting unregulated DC, typically between 9V and 14V, is fed into an LM7805 voltage regulator, which outputs a stable 5V at its third pin. To suppress any residual noise, a 10 μ F electrolytic capacitor is connected across the output. An LED, placed in series with a current-limiting resistor and connected to ground, is used at the 5V output terminal to visually indicate the presence of the regulated power supply.



LIQUID CRYSTAL DISPLAY (LCD)

The most commonly used LCD modules for interfacing with microcontrollers are the 16x2 and 20x2 displays. These labels refer to their character capacities—16 characters across two lines and 20 characters across two lines, respectively. These displays typically utilize the HD44780U controller, which receives data from an external device and communicates directly with the LCD to manage its display functions.



RELAY

A basic electromagnetic relay consists of a coil of wire wound around a soft iron core, an iron yoke that guides the magnetic flux, a movable iron armature, and one or more contact sets (the illustrated example shows two). The

armature is hinged to the yoke and linked to the movable contacts. A spring holds the armature in place, creating an air gap in the magnetic path when the relay is not powered. In this de-energized state, one contact set is in the closed position while the other remains open. Depending on the intended application, different relay types may include a varying number of contact sets..



Working of Potentiometers

The metallic wiper serves as a conductive pathway between lug 1 and lug 2. Consequently, the resistance recorded between the left lug and the center lug pertains to the segment of the carbon strip traversed by the metallic wiper. Rotating the shaft of the potentiometer changes the position of the metallic wiper, which in turn modifies the resistance. The pot functions as a variable resistor.



LED

Silicon is the foundation of light-emitting diodes, which are semiconductor devices. When current flows through the LED, it generates photons as a byproduct. Conventional light bulbs generate illumination by heating a metallic filament to a white-hot state. LEDs have several benefits compared to conventional light sources, such as reduced energy usage, extended lifespan, enhanced durability, compact size, and rapid switching capabilities.



IV. CONCLUSION

This project elucidates the power supply from four distinct sources: solar, inverter, main, and generator, together

with their respective characteristics and specifics. The importance of this research is evident in its many benefits and extensive applications across sectors such as industry, healthcare, and finance. It has been formed by the integration of universities, schools, and similar institutions. We created it by combining the characteristics of all the hardware.

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