Automatic Source Selection for Industries Using Arduino

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Abstract:

The main purpose of this project is offer to produce power supply to a load,by choosing the availability from any of the four sources specifically star, inverter, main and generator mechanically just in case if one the supply is absent. The need of electricity is increasing day by day and also the frequent power cuts of electricity square measure inflicting several issues in numerous areas like banks,colleges/schools, hospitals, homes and industries. Thus there's demand for AN alternate arrangement of power provide. This arrangement is often designed by exploitation Arduino UNO ATMEGA 328P and relays. When a supply, say mains fails the availability mechanically shifts to next priority supply generator and then on LEDs (Light emitting diodes) can be used to show that which source is used to provide the supply.

Keywords: Power supply block, Arduino, Relay, LCD, Resistors.

Introduction:

In India the requirement and availability of energy for power supply is 11,14408million units and 10,90850 million units for 2015-16 and we also know that the human activities is mostly dependent on electrical power supply. The above fact clearly shows that the supply is not meeting the demand. As a result frequent power-cut is done and interrupted power supply is provided. The alternative for this problem is to switch towards renewable energy resources.

Four different sources i.e., mains, generator, solar and wind power are used to provide uninterrupted power supply. Using the solar energy as one of the power source provides the solution for low energy resources since it is a non-renewable source of energy. The second objective of work is to provide automation which make the work faster, reliable, efficient, and reduce human efforts. Arduino (UNO ATmega 328P) is used to provide automation in the switching between four different sources. The automation system used for switching requires separate source toprovide an output signal which will operate the four different relays connected to sources respectively.

The main objective of this project is to provide uninterrupted power supply toa load, by selecting the supply source automatically from any available one outof 4 such as: mains, generator, wind power and solar in the absence of power supply. The demand for electricity is increasing every day and frequent power cutis causing many problems in various areas like industries, hospitals and houses. Analternative arrangement for power source is thus desirable.

An Arduino is used. The output of the Ardiino is given to the relay driver IC, which switches appropriate relay to maintain uninterrupted supply to the load. Output is observed using a lamp drawing

power from the mains initially. On the failure of the mains supply the load gets supply from the next available source i.e. an inverter. If the inverter also fails, it switches over to the next available source, and so on. The current status, like which source is supplying power to the load is also displayed on an LCD. As it is not feasible to provide all 4 different sources of supply, one source with an alternate parallel arrangement is provided to get the same function for demo purposes. However, 4 different sources if available they can be used.
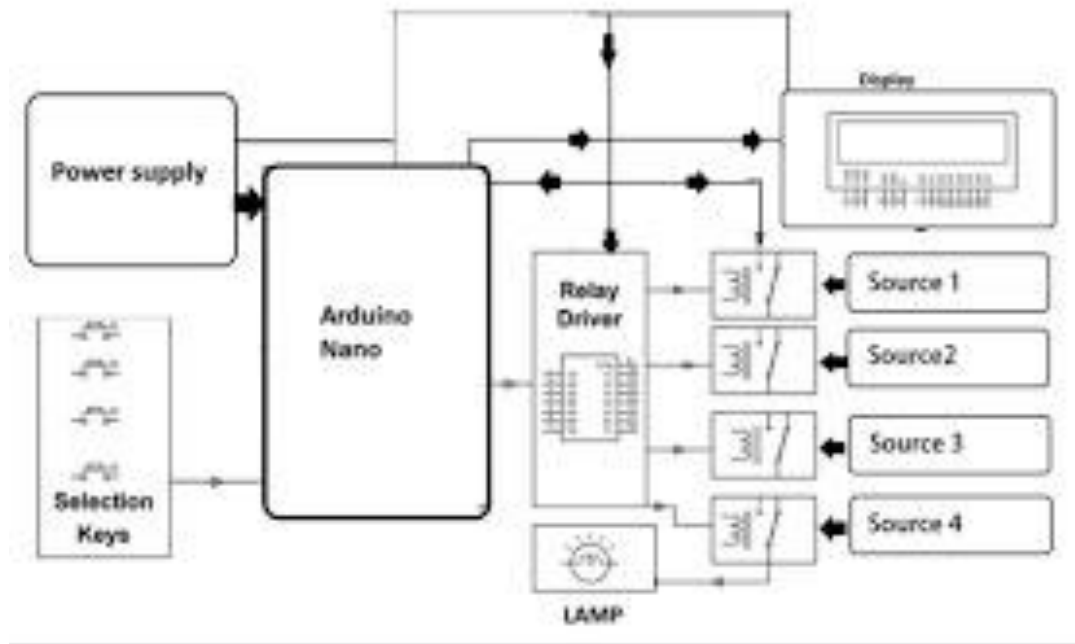
METHDOLOGY:

The main reason behind to selects this work is there are lot of industries and domestic appliances which work on high voltage supply and are high costly. And some electrical devices need regular or uninterrupted or continuous power supply to work well for longer life span. Many electrical systems are highly sensitive which can be affected by a minute interruption in the power supply line. In the power supply system there are many chances of interruption to take places at any times like power fail/cut off, faults etc. To avoid such types of problems these project systems are best which take power supply via four different sources and alternate between them using Arduino. The merit of this work is that they are reliable and economical.
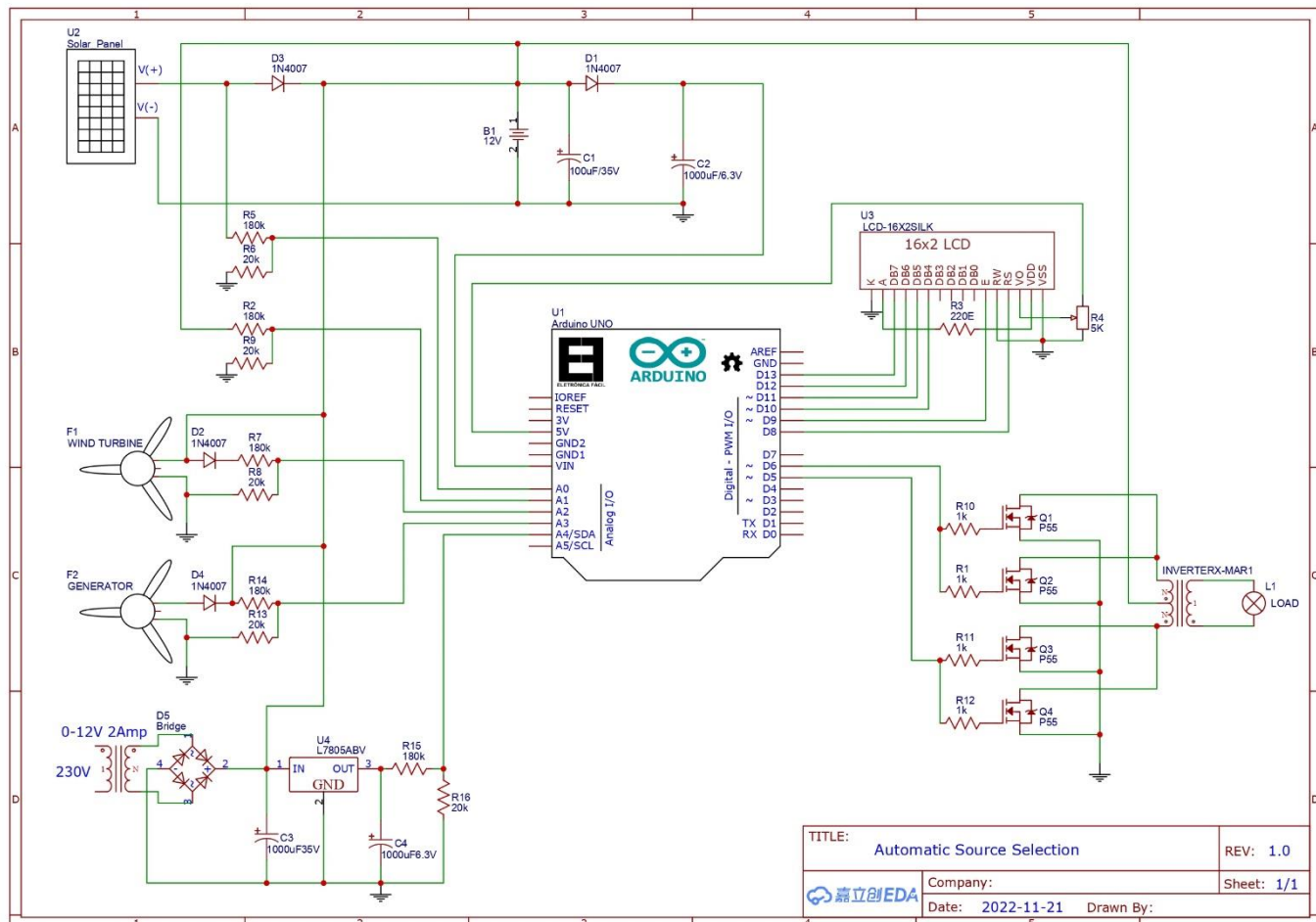
Hardware Requirements:

- Arduino.
- Relays.
- LCD.
- Lamp.
- Push Buttons.
- Transformer.
- Diodes.
- Voltage Regulator.
- Crystal.
- LEDS.
- Capacitors.

BLOCK DIAGRAM:

CIRCUIT DIAGRAM :-

Circuit Diagram Description

Auto supply switching is basically selection of supply from multiple available power sources automatically by using Arduino concept that is to check the availability of the source and switching to that available source to ensure uninterrupted power supply to load. In case of the electrical appliance control using automation causes more safety.

Auto supply switching is a prototype for the same which is auto change to other source when main supply fails without human interaction in this system we are designing an embedded circuit to control and ensure auto supply switching. In case all 4 phases are available, then the switching will be in the default phase. Four relays are there to control the switching. As it is not feasible to provide all 4 different sources of supply, one source with alternate switches is provided to get the same function.

In this project we are having 4 switches which we consider as 4 different source of supply. When we press any of the switches it shows the absence of that particular source which is connected to Arduino as input signals. Here we are using 8051 family Arduino. The output of Arduino is given to the ULN2803 this acts as a relay driver. The current phase working is displayed on LCD also.

This project uses an arrangement of 4 different sources of supply which are channelized to a load so as to have an uninterrupted operation of the load. As it is not practicable to get 4 sources of supply such as mains supply, generator supply, inverter supply and solar supply, we used one source and a set of relays. We have taken first source with mains supply and assumed as if being fed from 4 different sources by connecting all the 4 incoming sources in parallel. The ac source to the lamp is connected to four relays by making the entire normally open contacts parallel and all the common contacts in parallel. 4 push button switches are used which represent failure of corresponding supply respectively and are interfaced to the controller. Initially, we have given high input signal to the Arduino, so as a result the controller generates a low output to activate the first relay driver which will result in the relay being energized and the lamp glows.

While the push button for mains is pressed that represents failure of mains supply as a result the supply is provided from the next source and the Arduino receive high input and generates low output to activate the second relay driver which will result in the second relay being energized and the lamp glows. When we press the generator button, it indicates the generator fails to operate and the supply comes from the next source and the next source will supply high input to the controller and which will provide low signal to the third relay and the lamp switches ON and when we press the third push button the supply will choose next source now the fourth source will provide input to the Arduino 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.

Working of Auto Power Supply Control System from 4 Different Sources Using PIC Arduino:

When the supply from all the sources (Solar, Wind, Mains and Generator) are ready, the load will be driven by the solar power supply. If solar get failed, the supply automatically shifts to wind. To proceed further, if the wind get failed, the supply is provided from generator and so on. Priority is assigned to each power source in the order of Solar, Wind, Generator and Mains. In case the solar power fails, the supply should automatically shift to wind but if wind also fails at the moment then the supply will automatically shift to next priority source. Above figure explains the working and construction of the Auto power supply from four different sources. As shown in the diagram the four sources are Solar, Wind, Mains and Generator, four relays are used to provide

protection at each respective output. This output can be used to drive any load such as a lamp or motor. LEDs are used to display the source of supply. Other case is when the power switches from one source to another source, say wind fails and the supply shifts to a generator if the solar comes back then the supply will automatically reach back to solar power instead of switching to mains. At the output of Arduino, each output port is connected to positive dc voltage. Relays are used in contact with the output port to provide switching at the output.

The project uses an arrangement where 4 different sources of supply are provided to a load so as to have an uninterrupted operation of the load. The source of 12v supply is used from four different sources. The ac source to the fan is connected to relay 1 to relay 2 to relay 3 and relay 4 by making the entire "NO" (normally open) contacts parallel and all the common contacts in parallel.

Arduino:

CONCLUSION:

In the "Automatic Power Source selection offer from four totally different sources: Solar, wind, Main and Generator" has been explained during this project with all its features and details. The significance of this project lies in its varied blessings and wide places of applications like Industries, Hospitals, Banks; etc. It has been developed by integrating Colleges/Schools, etc. It has been developed by desegregation options of all the hardware elements used. Presence of every module has been reasoned out and placed strictly thus conducive to the simplest operating of the unit.

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[7] **Product Reference Manual**. **SKU**: **A000066**. Description. The Arduino UNO R3 is the perfect board to get familiar with electronics and coding.