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LOAD SHADDING TIME MANGMENT WITH PROGRAMMABLE INTERFACE

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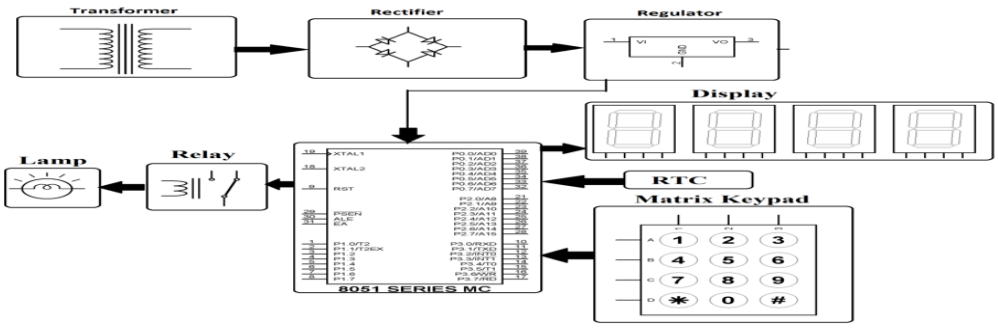
ABSTRACT
Electricity is one of the most important requirements of modern civilization. Without which various Indispensable applications will bind to bring to a standstill. As we know that demand of electricity is increasing now days. So electric utilities prefer load shedding when the demand exceeds the supply. Thus in a distribution system it needs to be precisely measured for specific period of time. Programmable load shedding time management system is a reliable & effective load shedding technique that takes over the manual task of switch ON/OFF the electrical supply with respect to time .It uses real time clock (RTC) interfaced to the 8051 family microcontroller. The paper "effective load shedding technique for utility department" will provide real & competent load shedding techniques such that distribution substation can be monitored & load shedding from one particular place.

I. INTRODUCTION

The project is an automatic load operation system that controls load operation, multiple numbers of times according to programmed instruction. The project eliminates the manual ON/OFF switching of load. A real time clock (RTC) is used to track the time and automatically switch ON/OFF the load.
This project is required for load shedding time management which is used when the electricity demand exceeds the supply and there comes a need for manually switching ON/OFF the electrical devices in time.
Hence this system eliminates the manual operation by automatically switching the load ON/OFF. A matrix keypad is interfaced with the microcontroller from where the specified time is input to the microcontroller
When this input time equals to the real time, based on the commands the microcontroller initiates that particular relay to switch ON/OFF the load. The time is displayed on a seven segment display.

II. BLOCK DIAGRAM



III. COMPONENTS

1.REGULATOR:

A **regulator** is a system used to maintain a steady voltage. The resistance of the regulator varies in accordance with the load resulting in a constant output voltage. The regulating device is made to act like a variable resistor, continuously adjusting a voltage divider network to maintain a constant output voltage, and continually dissipating the difference between the input and regulated voltages as waste heat. By contrast, a switching regulator uses an active device that switches on and off to maintain an average value of output. Because the regulated voltage of a linear regulator must always be lower than input voltage, efficiency is limited and the input voltage must be high enough to always allow the active device to drop some voltage.

2.RTC:

The module based on DS1307, The DS1307 serial real-time clock (RTC) is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I²C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power-sense circuit that detects power failures and automatically switches to the backup supply. Timekeeping operation continues while the part operates from the backup supply.

3.LCD:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

4.KEY PAD:

Matrix keyboards are common as an input device in microcontroller-based projects. A conventional way of connecting a matrix keyboard to a microcontroller is to use multiple I/O pins of the MCU. The MCU then uses a scanning algorithm to identify which keys are pressed. A drawback of this method is that it requires a large number of the MCU's I/O pins to connect the keyboard. For example, to connect a 4×3 keyboard requires seven digital I/O pins. It scans row and column to know what is the input

5. RELAY:

Relay is used to obtain the output. From the output of the relay, the control goes to the main power supply. The whole system acts as an automatic switch.

6. Arduino:

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution

Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

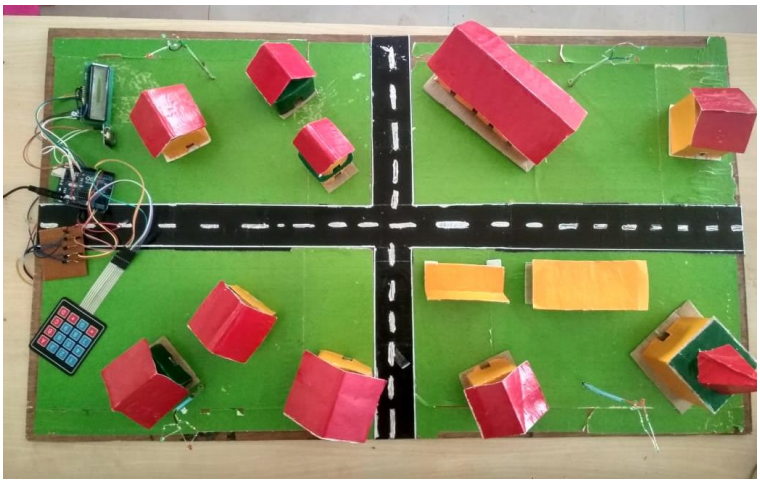
7. TRANSFORMER:

A transformer is a static electric that transfers energy by inactive coupling between its winding circuits. A varying current in the primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic flux through the secondary winding. This varying magnetic flux induces a varying electromotive force (emf).

8.LED:

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. This effect is called electroluminescence.

IV. PROJECT PHOTO:



V. CIRCUIT OPERATION:

A. The programmable load shedding time management for utility department circuit consists of an 8592 microcontroller ic,16*2 LCD module,7805 voltage regulator ic,4*3 keypad ,DS12887 RTC IC,relay,aCrystal oscillator.

B. The 7805 voltage regulator converts the input voltage to 5V and is given to the Vcc (pin: 40) of the 8952 microcontroller. This voltage is necessary to enable the microcontroller .A DS12887 RTC interfaces with port0 of the microcontroller ie.from pins 32 to 39.The rtc shows the real time at every instant. Once the RTC is programmed, it will work continuously even though the power goes off in between. The keypad is interfaced with port2 of the microcontroller i.e. from pins21 to28.The keypad is used to set the real time, the time for load shedding time and the time duration. The 16*2 LCD is interfaced to port1of the microcontroller i.e. from pins 1 to 8.The crystal oscillator helps to provide the working frequency 11.059MHz for the microcontroller.

C. The microcontroller programmed in such a way that we can set the actual time and load shedding time. Using the program we can monitor both real time and load shedding time. Program always check the equality and whenever it get matched output relay turn off. Then it began to check equality with target time and real time, whenever it get matched relay turns on

VI. Working:

The AC power supply from mains first gets converted into and unregulated DC and then into a constant regulated DC with the help of this circuit. The circuit is made up of transformer, bridge rectifier made up from diodes, linear voltage regulator 7805 and capacitors.

If you observe, the working of the circuit can be divided into two parts. In the first part, the AC Mains is converted into unregulated DC and in the second part, this unregulated DC is converted into regulated 5V DC. So, let us start discussing the working with this in mind.

Initially, a 230V to 12V Step down transformer is taken and its primary is connected to mains supply. The secondary of the transformer is connected to Bridge rectifier (either a dedicated IC or a combination of 4 1N4007 Diodes can be used).

A 1A fuse is placed between the transformer and the bridge rectifier. This will limit the current drawn by the circuit to 1A. The rectified DC from the bridge rectifier is smoothened out with the help of 1000µF Capacitor.

So, the output across the 1000µF Capacitor is unregulated 12V DC. This is given as an input to the 7805 Voltage Regulator IC. 7805 IC then converts this to a regulated 5V DC and the output can be obtained at its output terminals.

VII. ADVANTAGE

1 Automatic Load shedding is possible.
2 Differs from current system we can program the Load shedding process.
3 RTC provides the real time.
4 LCD provides the real time and Load shedding timings.
5 KEYPAD to set the time.
6 Easy to set up.
7 Economical and reliable
8 Manpower dependency is less.
9 Power can be saved.
10 Low cost.
11 Easy to use.
12 Accuracy in time
13 Effective distribution of power.
14 We can set the time in advance.

VIII.FUTURE SCOPE:

This project can be advanced in which the distribution point monitored by one central location. The relays are used to cut off supply of concerned geographical region through circuit breaker. In this system user can send commands to concerned DP to read the remote electrical parameters. This system can repeatedly send the real time electrical parameter data like active power, reactive power, voltage, current, frequency etc., periodically in the form of SMS to the user. It can be designed to send SMS alerts when relay trips. In this power system microcontroller are being used to effectively communicate with the sensors. The microcontroller has internal memory to hold the assembly code. .This internal memory is used to dump some set of assembly instructions into the controller. The operation of the micro-controller is completely dependent on these assembly instructions. The proposed system will overcome manual efforts for controlling the load shedding time break in a systematic way by sending SMS. Central unit can cut off power supply of specific zone by just sending an SMS to the concerned Distribution Point. These relay gets activated whenever the electrical parameters overdo the predefined values. The proposed system is designed to Load Monitoring.

IX. APPLICATION:

1. Power distribution companies to shade load automatically, reduce down time for critical load, reduce spinning reserve requirement etc.
2. Implemented in factories to manage the on off time of different generator sets.
3. Owner homes to switch on and off different generator set.

X. Software Implementation:

ALGORITHM:

STEP 01: Start.

STEP 02: Initialize RTC.

STEP 03: Initialize LCD.

STEP 04: Turn on relay.

STEP 05: Display time on LCD.

STEP 06: If pin P3.2=0 then go to step 7 else go to step8.

STEP 07: Read character ‘n’ from keypad.

STEP 08: If n=1 then go to step 10.

STEP 09: Update the current time and go to step13.

STEP 10: If n=2 then go to step11 else go to step12.

STEP 11: set the power off alarm time and power off interval, go to step13.

STEP 12: Display “try again” and go to step 13.

STEP 13: If current time matches the alarm time then go to step14 else go to step5.

STEP 14: Turn off the relay.

STEP 15: Set the new value of alarm time as the power on time.

STEP 16: display the current time and power on time on LCD.

STEP 17: If current time matches the alarm time go to step 16.

STEP 18: Turn on relay and go to step5.

STEP 19: END

XI. CONCLUSION:

According to our observations real time clocks (RTC) work more accurate than other time-keeping alternatives, it allows the main system to perform important tasks, and they do not consume much power. Functionality of Electronic devices can even increase by using real-time clocks (RTC). Certain electronic devices can rely on real time clocks when comparing the times of previous functions. If the functions have taken place within a selected period of time, device functions can be reduced drastically. Hence real time clocks interfaced with AT89S52 microcontrollers could be used extensively in load shedding time management system by utility departments.

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