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Programing Relay Time Control Using ATMEGA 328 Microcontroller

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Abstract: Digital timer switches are used to control the operation of electrical devices based on a programmed schedule. This project describes a programmable digital timer based on the ATMEGA328 microcontroller that can be programmed to schedule the on and off operation of an electrical appliance.
The appliance is controlled through a relay switch. This timer switch allows you to set both on and off time. That means, you can program when do you want to turn the device on and for how long you want it to be remained on. The maximum time interval that you can set for on and off operation is 99 hours and 59 minutes. The project provides an interactive user interface using a 16×2 character LCD along with 4 push buttons
Keywords: Relay, LCD Display (16X2), Clock Unit (DS3231). ULN 2803, ATmega-328

I. INTRODUCTION

Digital timer switches are used to control the operation of electrical devices based on programed schedule. This project describe a Programmable digital times based on the ATMEGA328 microcontroller that can be programmed to schedule the on and off operation on electrical appliances. The appliances are controlled through a relay switch. This timer switch allows you to set both on and off time. That means you can program when do you want to turn the device on and for how long you want it to be remained on.
Hence of the 21st century will become more and more self control and automated simple device such as a timer to turn on once coffee maker in the morning have been around for many years but much more sophisticated mechanisms will soon be prevalent in homes around the world. Imagine walking into your home and being greeted at the door with light illuminating your path without you ever having to touch light switch with your favourite music streaming through the speakers in whichever room you enter because your home recognised that it was you and not some others household member all while having the Peace of Mind knowing that you are home automation system to care of activating your security system for other more such a system could allow the user to schedule events to occur at recurring intervals example turn on sprinkler system at 4:30 a.m. every Tuesday and Thursday. This report describes an approximation of such a home automation system that was designed and built at the final project. This system was designed to be flexible and generally Programmable extensible such that adding additional features is relative Li simple and modular and forward compatible so that new components can be added without redesigning the entire system to achieve this goal the system runs a user defined program on a special purpose processor using real-world sensor inputs as operands.

A. Overview Of The Project

Often overlooked. real time clock alarms can be used to switch power to external circuits at precise times. They can also be used to power external circuits for only as long as needed, making battery operation possible in many situations. This project shows how to construct and program a DS3231M RTC as a power cycle switch. The approach can also be extended to a variety of external circuits to control battery power.
A real time clock (RTC) is an electronic time keeping device commonly available as a single integrated circuit. Typically, these circuits include a power backup capability to retain the time while power is off to the main circuits. It is common to see these chips incorporated into computer motherboards or any appliance requiring access to the time. The low-price, availability and relative accuracy of these chips, however, make them a desirable addition to many microcontroller projects. While their major function is simple time and date keeping, some RTC chips also have programmable alarm functions. This project explores the use of these alarm functions to implement programmable, time-based, switches. The advantage of this method is that power to a device can be applied at precise times, and only for as long as needed, which is desirable for battery operation.

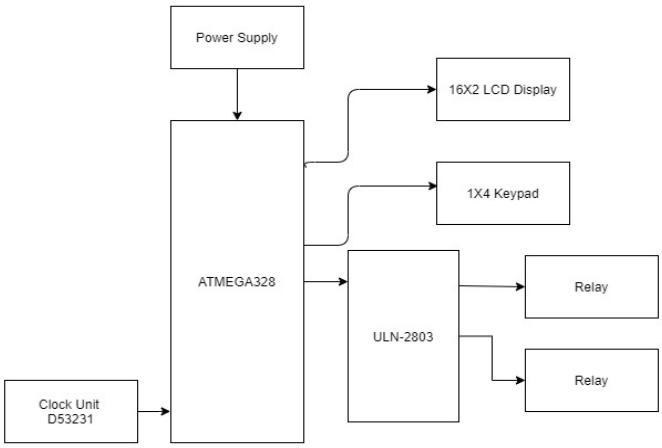
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The example presented also uses an Arduino UNO board with software written specifically to facilitate programming the alarms. The general concept, and the circuits presented, however, can be easily adapted for use with any microcontroller system using 12C communications.Not all RTC chips have alarm functions but a few that do are the DS3231 (Maxim Integrated), MCP79410 (Microchip) and ISL12026 (Intersil). Here, a DS3231M is used to construct a simple, but fully functional, RTC building block and further, to construct an example RTC-based switch. The DS3231M has a number of features that make it an attractive choice. These include; relatively high precision, 12€ communications, an integrated resonator and easy battery backup. The RTC also contains software trimming for specific temperature compensation and even an on chip temperature sensor.

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II. PROJECT DETAILS

A. Block Diagram



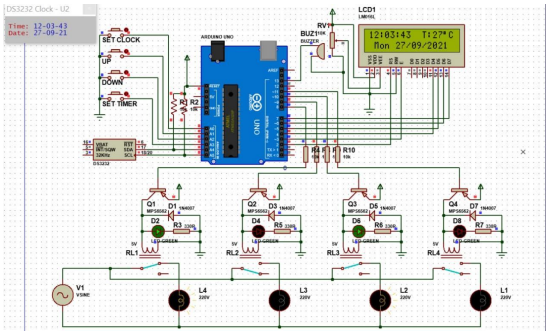
B. Construction

The intention behind the project is to explain how a microcontroller (in this case, an Arduino) can be used to control a high voltage and high current devices using a relay. The principle of working of the project lies in the functioning of the relay and is explained here.

When the system is powered on, the Arduino waits for the button to be pressed (as per the code written). The button terminal is pulled up internally. Hence, when the button is pushed, the Arduino detects a Logic 0 (LOW).

This will send a Logic 1 (HIGH) signal to Pin 7, which is connected to the base of the transistor. As a result, the transistor is switched ON. As one of the coil terminal of the relay is connected to the collector of the transistor (which is switched ON), a conduction path between the supply, coil and collector-emitter terminals of transistor is formed. Because of this, the coil in the relay gets energized and acts as an electromagnet. As a result, the moving contact of the coil, which was initially in the Normally Closed (NC) position, will be attracted towards the electromagnet and moves to the Normally Open (NO) position. This action will complete the motor circuit and hence, the motor starts rotating.

The motor keeps on rotating as long as the button is pushed. Once the button is released, the transistor is switched OFF and the coil in the relay is de energized. Hence, the contact goes back to the Normally Closed position and the motor is turned OFF.



C. Working

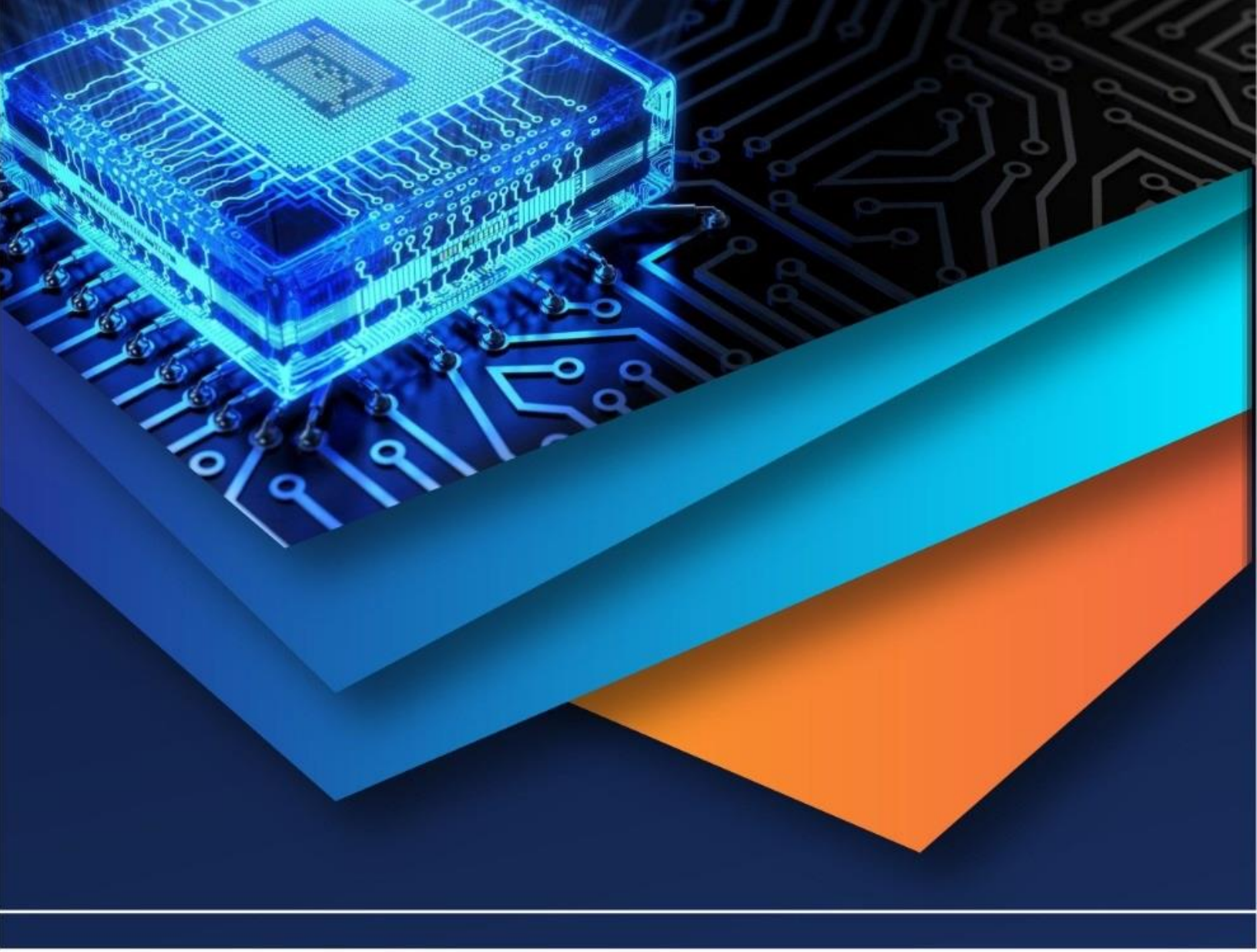
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III. CONCLUSIONS

In our project we designed and implemented an efficient relay time control using Atmega328.with an arduino board. Output was verified which is displayed on LCD. It was found that the LED turn On and Off when device crosses the set value. It is very useful for the people who are disabled. There is still too much room for future development that would enhance the system and increase its business value.

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