

# RTC BASED WATER DISTRIBUTION THROUGH SOLENOID VALVE

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## ABSTRACT

*AGRICULTURE-is the main occupation for the people of India. More than 60 percentages of people of our country rely on agriculture for their livelihood. As, most of the equipment used in present day agriculture run on electricity, providing electricity reliably plays vital role in operation of agricultural industry. One such process is irrigation, requires electricity to drive pump to supply water to crops. But, due to lack of electrification and generation capacity in remote areas, lack of electricity has been a problem since years. It is difficult to manage schedule for water pumping system. Therefore, the purpose of our project is to employ a- RTC based water distribution system through pump', uses a microcontroller.*

**Keyword:** -, RTC, LCD display, Relay, Interfacing RTC ds1307 with 8051 microcontroller, Solenoid valve etc.

## 1. INTRODUCTION

Water distribution is required in order to manage the water utility in such shortage period. Day by day, the typical water distribution system is no full-filling the users wants, hence, the exact utility & distribution is necessary. The Water distribution is done in Manuel ways. The time schedule is made & accordingly the distribution control panels are operated as per the schedule in manually, operated systems, there may be many miss illegal pressure is there. In order to over- come such difficulties, an automated Water distribution system is adopted it will consists of  $\mu$ -controller based programmable system, to which the required, program can be done as per the schedule. A password is provided to operate the system & avoid the use.

### 1.1 BLOCK DIAGRAM

The block diagram of such an advanced & innovative system is shown as below. It consists of the  $\mu$ - controller 89C51 as the central processing unit. Matrix/simple keyboard is provided at the input port. The real time can be set from  $\mu$ -controller itself or even it is followed as per the RTC system. This real time setting can be observed on 16X2 LCD interfaced with controller four numbers of relays are used at the output port. These are operated as per the time schedule programmed inside the  $\mu$ - controller memory. Only one relay is operated at one time. This will provide the provision of the water distribution continue or die-continue for a particular area. The LCD display is used for the local display of the time. The  $\mu$ -controller requires the 12 Mhz crystal oscillator .it is provided. The RC oscillator is also provided for the purpose of besetting the system at power on it requires +5vdc regulated power source. A step down Ac transformer steps down the 230vac supply to 9v step down from. It is the rectified with the help of diode bride rectifier. The rectified dc voltage is filtered with capacitor filter. The pure dc voltage is regulated to +5v with the help of regulator. This Regulated 5V supply is given to the microcontroller and other DC components. Relay use 12V unregulated DC supply.

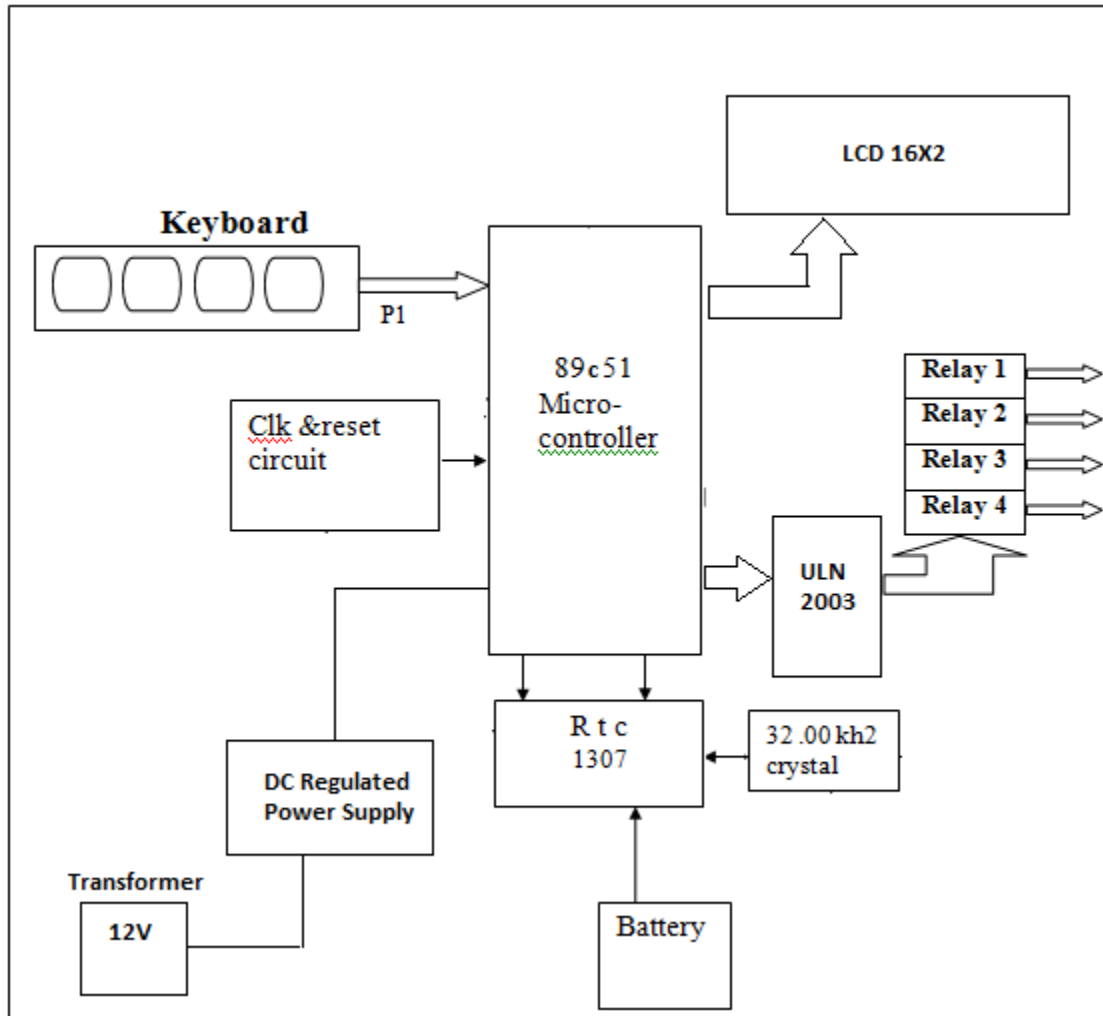


Fig -1 Block diagram of such an advanced & innovative system

## 1.2 WORKING PRINCIPLE

At power on the system will start and will display the message on LCD .the  $\mu$ -controller by default will set all its output to high logic level. Then the RTC time will be show on LCD .as per the time schedule programmed, if the first set time is reached the particular output relay corresponding to that time is on. This relay is supply thus, the time for which the relay is on, the Water supply is provided to that area using Pump 1 connected to output of relay. If the time is over first relay is switched off and the next relay is on the sequel once continues and the cycle repeats. They as per the time set, the distribution system works. The 89C51  $\mu$ -controller is used & programmed to display the current time and Relay status. In this way fully automated system provide sequential water supply to each area.

## 2. HARDWARE DESCRIPTION

The hardware part consists of the  $\mu$ -controller based system with it devices, electrical transducers, their signal conditioning, and the output relay board & at the o/p part, the pc interface is there. The detailed hardware description is given below.

The main decision making block of the system is micro-controller p89v51RD2. It does multitasks simultaneously it provides the key board data to RTC & time is shown on LCD display. It reads the memory time schedule and acceding  $\mu$ -controls the on/off actions of the output relays provided the data is transferred to LCD display.

The  $\mu$ -controller hardware CKT .is provide with  $\mu$ -controller basic circuitry i.e. VCD, GND, reset, CLK, ---- etc. at port 1dey board is provided. It may be a simple key board or matrix key-board. The real time & distribution schedule is programmed with this key-board RTC is interface with port-3 i2c protocol is used here. The SCL –serial clock & SDA serial data signals are use. The RTC ic 1307 is used. The RTC also requires the crystal of 32kh2. With this IC & crystal, the real time & data stored is available all the times. The on chip & PCB mounted 3.6v battery is provided with RTC. The LCD display is interfaced with port3 only. 4lines. Data communication is used. The R/s, RD/WR & enable control lines are provided .the intensity control of the LCD is done with a variable voltage potential divider. The back light LED is also provided with VCC .it 16x2 type of LCD .the SMD techno try is used for LCD & it is trough outside sourcing.

The port4 is provided with external pull-up resistors; being not pulled high internally .it can be used as address bus as well as data bus in case of external in emery interface. The relays, to switch the electricity. It consist of 7 Darlington pairs inside a single chip the open collector o/p are available to which relay will can be connected. Another end of relay coil is connected to VCC thus, if particular input of ULN goes high its corresponding collector goes low & the relay will is energized- contact change over takes place and the supply continues.

## 2.2 SOFTWARE SCHEME

As already stated the system requires the software base, the programmable  $\mu$ -controllers are used. These are the integrated circuits within built memory & they be have as per the instructions provide inside the prig here two software are required.

1. Programming Language: C
2. Compiler: Keil uVision-3
3. Programmer: uFlash

## 2.3 TECHNICAL SPECIFICATIONS

- Supply =230v ac.
- Logic= $\mu$ c based 89c51
- Lcd display =16x2 alphanumeric type.
- Relay =12v electromagnetic type
- RTC=1307
- ULN2003
- DC power supply 12V
- RTC battery 3V
- Pump 230V AC operated

## 2.4POWER SUPPLY

Power supply is the first and the most important part of our project. For our project we require +5v regulated power supply with maximum current rating 500 mA. Following basic building blocks are required to generate power supply.

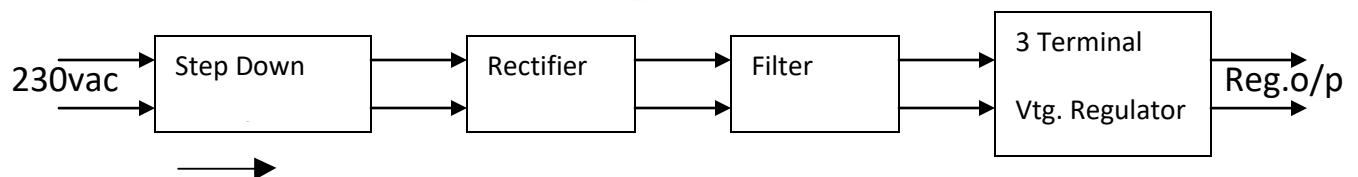


Fig -2 Power Supply

## 3. RTC

RTC is an electronic device which plays an essential role in real-time embedded system design. It provides a precise time and date in various applications such as system clock, student attendance system and alarm etc. that keep track

on current time and provides consistent result to the respective task. This article presents RTC interfacing with 8051 microcontroller and basic accessing of internal registers.

### 3.1 RTC DB1307 Configuration:

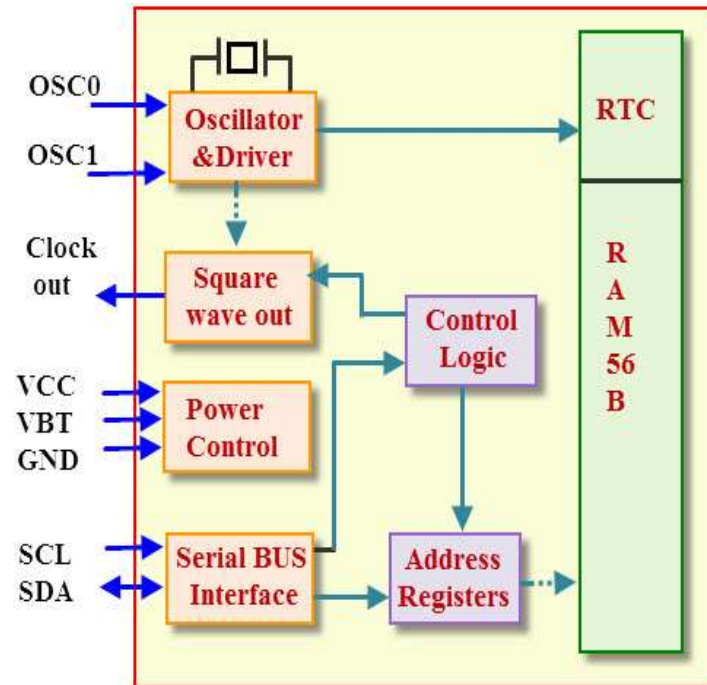


Fig -2 RTC Internal Block & Pin Diagram.

**A0, A1, A2:** are address pins of RTC DB1307 chip, which can be used to communicate with the master device. We can control eight devices with RTC interfacing with 8051 microcontroller by A0, A1, A2 bits using I2C protocol.  
**VCC and GND:** VCC and GND are power supply and ground pins respectively. This device operated with 1.8V to 5.5V range.

**VBT:** VBT is a battery power supply pin. Battery power source must be held between 2V to 3.5V.

**SCL:** SCL is a serial clock pin and it is used to synchronize data on serial interface.

**SDL:** It is a serial input and output pin. It is used to transmit and receive the data on serial interface.

**Clock Out:** It is an optional square wave output pin.

**OSC0 and OSC1:** These are crystal oscillator pins which are used to provide the clock signals to the RTC device. The standard quartz crystal frequency is 22.768KHz.

### 4. Interfacing RTC ds1307 with 8051

RTC can be interfaced to microcontroller by using different serial bus protocols such as I2C and SPI protocols that provide communication link between them. The figure shows, real time clock interfacing with 8051 microcontroller using I2C bus protocol. I2C is a bi-directional serial protocol, which consists of two wires such as SCL and SDA to transfer data between devices connected to bus. 8051 microcontroller has no inbuilt RTC device therefore we have connected externally through a serial communication for ensuring the consistent data. I2C devices have open drain outputs therefore; pull-up resistors must be connected to the I2C bus line with a voltage source. If the resistors are not connected to the SCL and SDA lines, the bus will not work.

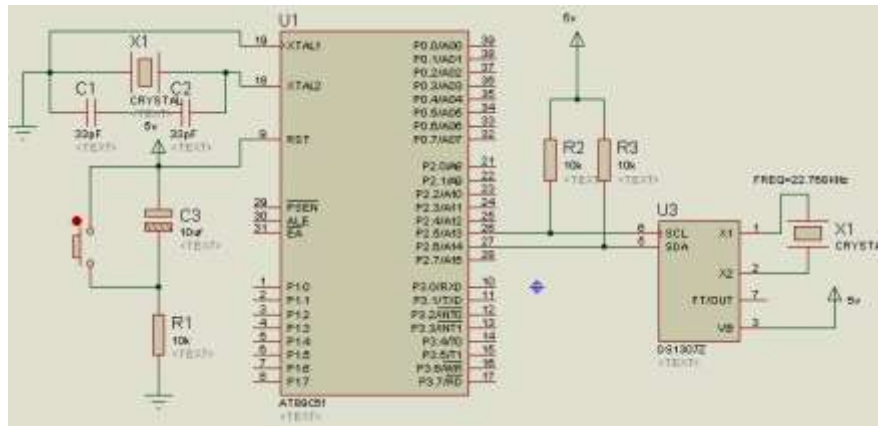


Fig -2 RTC Interfacing with 8051 Microcontroller

4.1 ULN2003

It is a high voltage and high current Darlington array IC. It contains seven open collector Darlington pairs with common emitters. A Darlington pair is an arrangement of two bipolar transistors. **ULN2003** belongs to the family of ULN200X series of ICs. Different versions of this family interface to different logic families. ULN2003 is for 5V TTL, CMOS logic devices. These ICs are used when driving a wide range of loads and are used as relay drivers, display drivers, line drivers etc. ULN2003 is also commonly used while driving Stepper Motors. Each channel or Darlington pair in **ULN2003** is rated at 500mA and can withstand peak current of 600mA. The inputs and outputs are provided opposite to each other in the pin layout. Each driver also contains a suppression diode to dissipate voltage spikes while driving inductive loads. The schematic for each driver is given below:

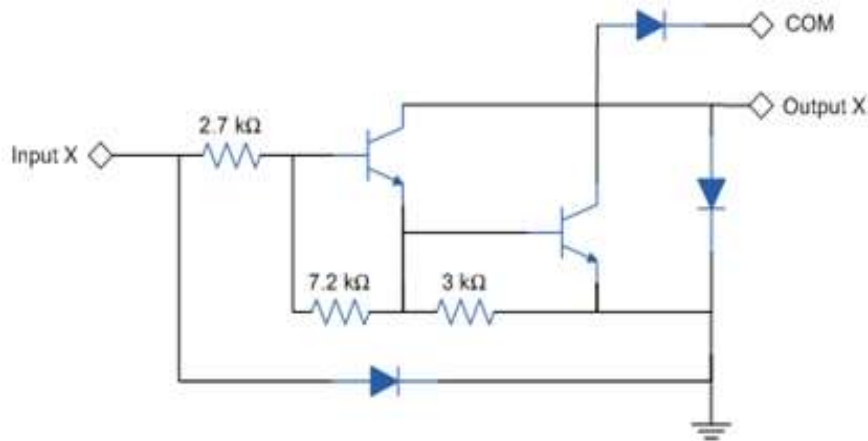


Fig -3 ULN2003

4. CONCLUSIONS

This report introduced a new; microcontroller based automatic control technology for water pumping & distribution. We presented information about microcontroller AT89C51, ULN2003, regulated power supply; relay etc. And developed a system to achieve our objectives. Hopefully, we will be able to develop a cost effective & highly efficient model to achieve our objective & overcome the shortcomings of present scenario.

## 5. ACKNOWLEDGEMENT

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## 6. REFERENCES

- [1]. D.Devasena, R.Ramya, Y.Dharshan, S.Vivek, T.Darshan “IoT based water distribution system” International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249-8958 (Online), Volume-8 Issue-6, August, 2019
- [2]. Anushree Math, Layak Ali, U Pruthviraj “Development of Smart Drip Irrigation System Using IoT” 2018 IEEE Distributed Computing, VLSI, Electrical Circuit & Robotics (DISCOVER) [doi](https://doi.org/10.1109/DISCOVER.2018.8674080) -10.1109/DISCOVER.2018.8674080
- [3]. Prof. S.R.Kinge, Nishant Nibhoria, Pranav Singh, Rahul Kumar “AUTOMATIC WATER DISTRIBUTION SYSTEM” JETIR (ISSN-2349-5162) May 2017, Volume 4, Issue 05.
- [4]. Soham Mancharkar, Kartikey More, Nikhil More, Sanket Badwaik, Rahul Patil, “AUTOMATIC WATER DISTRIBUTION FOR SMART CITIES” © 2021 JETIR July 2021, Volume 8, Issue 7 [www.jetir.org](http://www.jetir.org) (ISSN-2349-5162)

