DIGITAL CLOCK WITH HOUR/ MINUTE/ SECOND DISPLAY , ALARM AND HOUR CHIME USING ARUDINO NANO

Materials used :

1. Arudino Nano
2. RTC module DS3231 1 No
3. 1 inch Common Anode 7 segment Display for Hour and Minute 4 Nos
4. 0.5 inch Common anode 7 segment diplay for Second 2 Nos
5. 3 mm LEDs for blinking dots display 2 Nos.
6. General Purpose PCB 10cm X 20 CM
7. SPDT slide Switch 1 no
8. Small Push button switch 1 no
9. 9 Resistor 220 Ohm 7 Nos
   10K 2 Nos

10 Connecting jumper wires

Construction:

First the display need to be constructed as shown in figure A . For this similar segments of all the displays has to be connected together and taken out . By this we get 7 wires out to connect to the Arudino (named **a, b, c, d, e ,f, g**). After this common anode of each of the 6 displays are to be taken out and get ready to connect to the Arudino (**CA1,CA2,CA3,CA4,CA5,CA6**). A resistor of 220 ohms each should also have to be connected serially with each of the common anode wires taken out as shown in diagrams . The 2 blinking LEDs are also need to be wired as shown in in the diagrams .The cathode pins 2 LEDs are to be connected together and connect to +5V through a 220 ohm resistor and its anodes taken together through a wire to connect to the Arudino. For Detailed construction please go through the diagrams

Working:

The DS3231 RTC is a very high precision clock module and it will keep the time for a long time (may be for years) once set. The working principle of the clock is that ,the program read the time from the RTC and displays it on the seven segment multiplexed displays. For this Arudino is instructed to display one segment at a time at a faster rate (multiplexing of Displays). Since the time need not be set again when set once, time setting keys are not provided. While uploading the sketch , the clock will be set with the computer's clock and it will remain indefinitely till the battery of the clock dies. Setting of clock time can easily be incorporated in the sketch , but the problem is the availability of extra pins of Arudino nano available for providing this . But with boards with more pins like Arudino mega the same can be included with out much difficulty. Here I think its not necessary since the clock module is highly accurate and long lasting.

The extra feature added here in this project is the addition of Alarm and Hour chime . The alarm can be set using the slide switch and push button switch. The alarm will shut of after a time set in the program (here I put it as 1 min but it can be increased if required). The Alarm time, once set will be written in the flash memory of the Arudino and it will remain even after a power failure or switch off/on .

Due to shortage of sufficient no of pins, the blinking dots are connected to D1 pin, and hour chime out put t0 D0 pin , both the pins are being used by the Arudino for serial communication thorough USB or other. So to work the blinking dots and Hour chime well, disable all serial communication lines in the program once finished.

For the Alarm circuits I wired a two stage oscillator with 555 IC and a speaker and connect its trigger to the Arudino alarm pin out as in the diagram . A Piezo buzzer beeper available in the market can also be used instead of this circuit .

The Hour chime can be easily made with a low cost 3 pin UM66 melody generator IC readily available in the market and a piezo speaker. Please refer the circuit for melody generator for details. The Hour chime will shut of after a time set in the program (here I put it as 30 seconds but it can be changed if required).

The Clock is programmed as 12 Hour clock, but can be modified as 24 hour if required with minor modification. The Alarm setting time is in kept in 24 hour mode to know whether the alarm is set to AM or PM.