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ABSTRACT

A digital clock is a type of clock that displays the time digitally (i.e. in numerals or other symbols), as opposed to an analog clock, where the time is indicated by the positions of rotating hands.

Digital clock is made by ICS including 4026 decade counter, 7411 3 input AND gate, 555 timer. This clock is simple, first counter take input clock of 1 second which is produced from 555 timer IC and the output in seconds is shown in 7 segments. After 60 second it resets and adds 1 to minute section and after 60 minutes it resets and adds 1 to hour section. This digital clock is designed to work in 24 hour mode. The digital clock is also provided with push buttons in minute and hour section to set the desired time. Further there is a main slider switch to turn on-off the digital clock.

Because digital clocks can be very small and inexpensive devices that enhance the popularity of product designs, they are often incorporated into all kinds of devices such as cars, radios, televisions, microwave ovens, standard ovens, computers and cell phones.

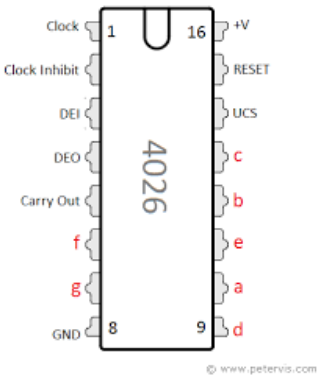
TABLE OF CONTENTS

AIM

To design and implement digital clock without using microcontroller and using 555 Timer IC to generate clock pulse.

DESIGN

SECD1, SECD2, MINT1, MINT2, HOUR1 and HOUR2 are 4026 decade counter ICs. They are connected with 7 segment displays each. The a,b,c,d,e,f,g pins of 7 segment are connected with the pins of 4026 as shown in figure.



The 555 timer IC is configured in astable mode as shown in figure. The 555 timer IC generates pulse of 1 second.

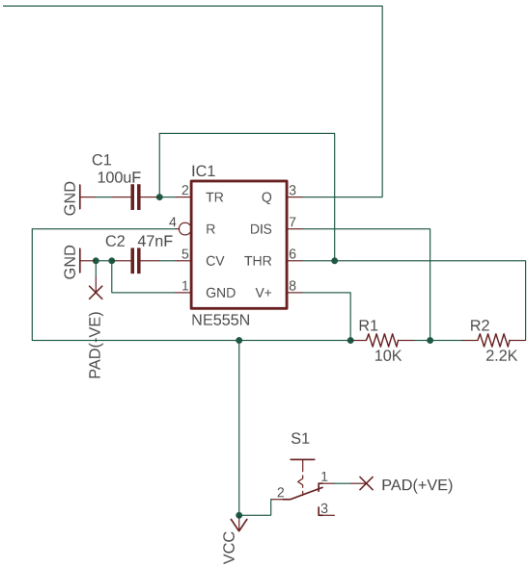
***Calculations:-**

T_H= 0.693*(R1+R2)*C1=0.693*(10+2.2)*100/1000=0.8455 sec

T_L=0.693*R2*C1=0.693*2.2*10*100/1000=0.1525 sec

T_{total}= T_H+ T_L=0.8455+0.1525=0.9980 sec ≈ 1 sec

F=1/ T_{total}= 1 Hz



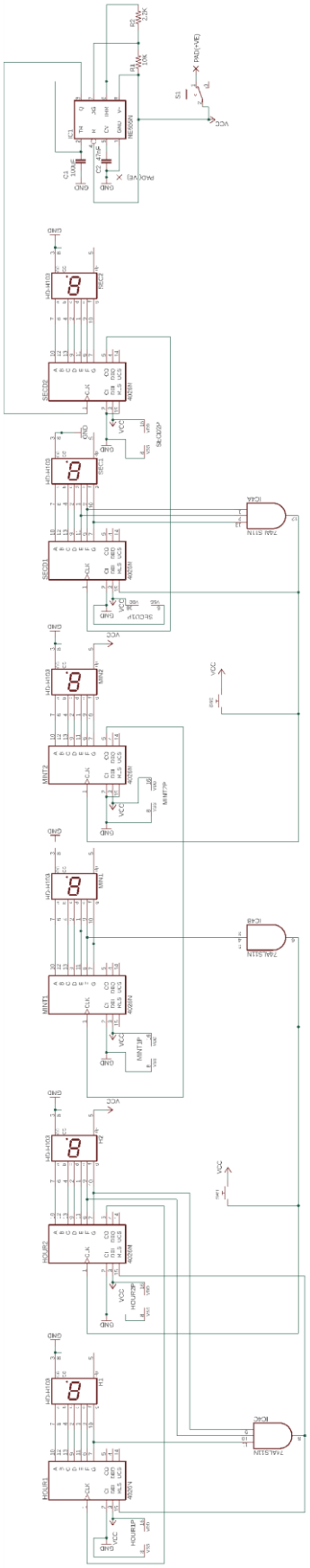
The output of 555 Timer IC is given to clock input (pin 1) of 4026 decade counter IC. Whenever pulse given to IC 4026, the 7 segment shows the counter value. The clock output (pin 5) of the SECD2 is connected to clock input (pin 1) of SECD1, so when 9 pulse completed (9 sec) SECD2 triggers SECD1 and thus the counter value is incremented and displayed on 7 segment. The e,f,g pins of 7 segment (SECD1) connected to 3 input AND Gate IC 7411 and its output is connected to reset pin 15 of SEC1 and clock pin 1 of MINT2. Thus, when 60 seconds are completed the SECD1 is reset and MINT2 is triggered so the 7 segment shows 1 min.

Similarly, the clock output (pin 5) of the MINT2 is connected to clock input (pin 1) of MINT1, so when 9 pulse completed (9 min) MINT2 triggers MINT1 and thus the counter value is incremented and displayed on 7 segment. The e,f,g pins of 7 segment (MINT1) connected to 3 input AND Gate IC 7411 and its output is connected to reset pin 15 of MINT1 and clock pin 1 of HOUR2. Thus, when 60 minutes are completed the MINT1 is reset and HOUR2 is triggered so the 7 segment shows 1 hour.

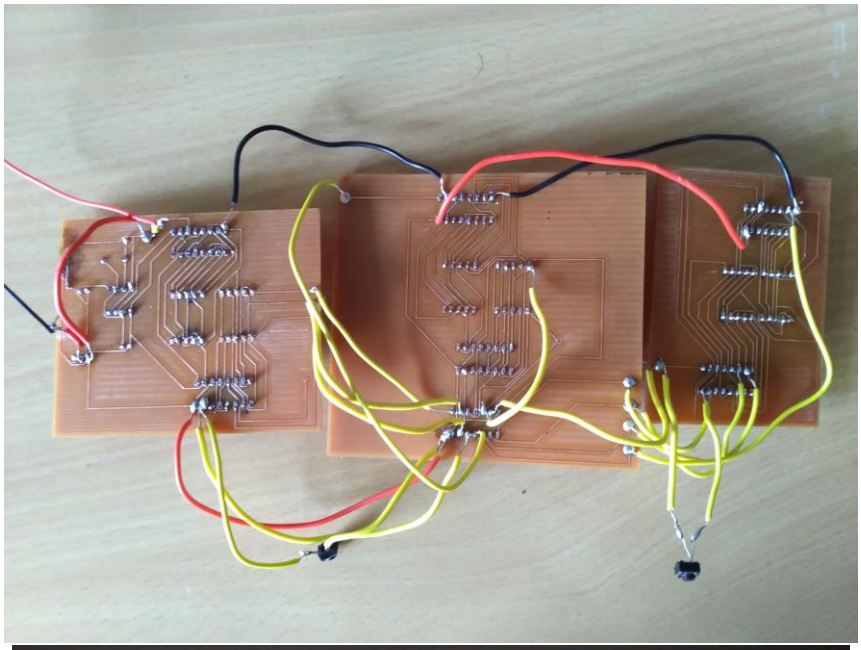
The clock output (pin 5) of the HOUR2 is connected to clock input (pin 1) of HOUR1, so when 9 pulse completed (9 hour) HOUR2 triggers HOUR1 and thus the counter value is incremented and displayed on 7 segment. The g,f pins of 7 segment (HOUR2) and g pin of 7 segment (HOUR1) and connected to the input of 3 input AND Gate and its output is connected to reset pin 15 of HOUR1 and HOUR2. Thus, when 24 hours are completed the HOUR1 and HOUR2 are reset and the 7 segments show 00:00:00 time.

Push buttons are connected to the clock input of MINT2 and HOUR2 which is connected to power supply. Thus by pressing the push button time can be adjusted in minute and hour section. There is a slider switch through which power supply is provided to the whole circuit. Thus, we can turn on-off the digital clock with the help of slider switch.

CIRCUIT DIAGRAM



RESULTS



CONCLUSION

Thus, we designed digital clock with the use of 555 Timer IC and 4026 decade counter without the help of microcontroller.