Interfacing DS1307 with PIC18F4550 using I^2C

June 20, 2019

QIP: Hands-on sessions on Embedded Systems

Department of Electrical Engineering
IIT Bombay

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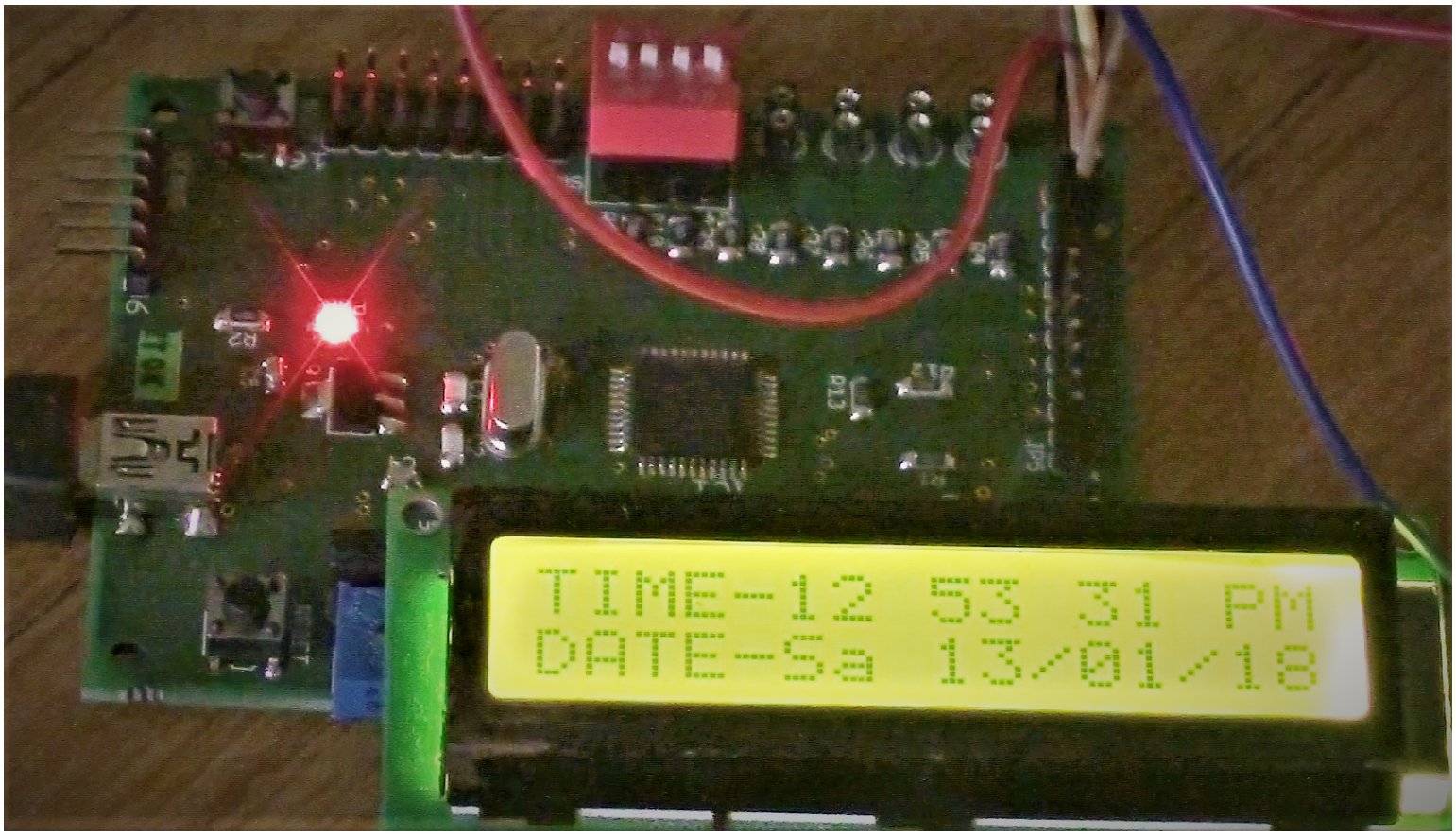
Problem Statement

Write Date and Time to RTC-IC DS1307, read from it continuously and display it on 16x2 LCD using PIC18F4450.



List Of Components

- PIC18F4550.
- DS1307 RTC-IC.
- 16x2 LCD.
- 32.768kHz Quartz Crystal-Oscillator.
- Standard 3V Lithium Cell or Other Energy Source for back-up.
- 10 kΩ Resistors.
- Jumper Wires.

PIC18F4550 I^2C Interfacing with DS1307

Refer Page 203 of PIC18F4550 Datasheet.

- Configure SDA and SCL pins as inputs.
- Initialize the following Registers:
  - SSPCON1 - Select Various modes for I^2C.
  - SSPCON2 - Ack/Nack, Start/Stop and Repeated Start signals.
  - SSPSTAT - Select Standard mode (100 kHz).
  - SSPBUF - Stores Received and Transmitted values.
  - SSPADD - Define the baud rate.
- Construct a function for BCD to ASCII conversion.
- Use *SQWE* of DS1307 in 1 Hz mode to generate external interrupt for PIC.
- Monitor SSPIF flag while Read/Write.
- Maintain adequate time gap between consecutive Read and Write Operations.

Refer the Skeleton Code fragment given along, and the Timing Diagrams from Datasheet to Understand the Sequence of events.

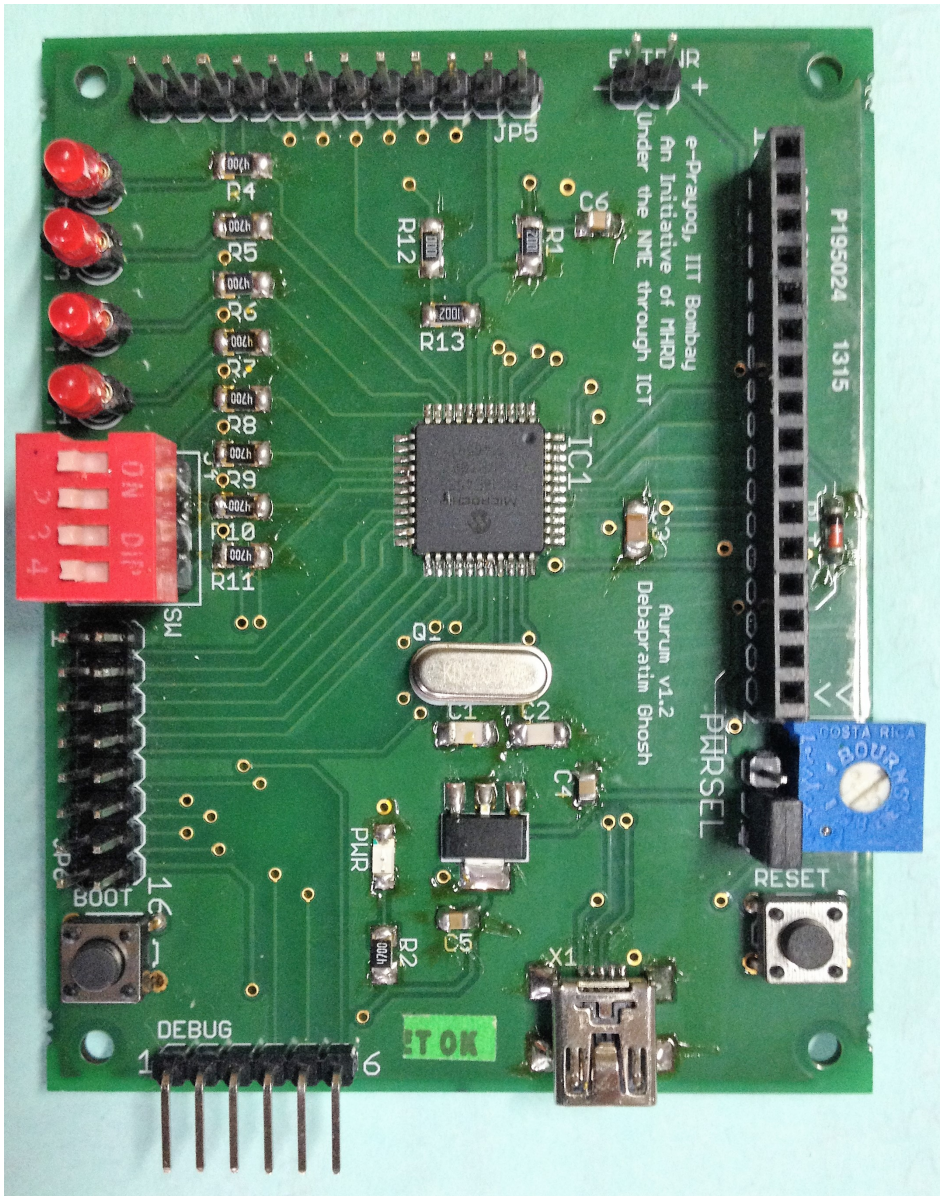
5V supply from Aurum Board

Two Versions of Aurum Board(v1.2 & v1.3) have been developed and distributed. Since it is important to have minimal number of Power supplies in a single project, We Intend to drive our entire circuit from the Aurum Board Itself !

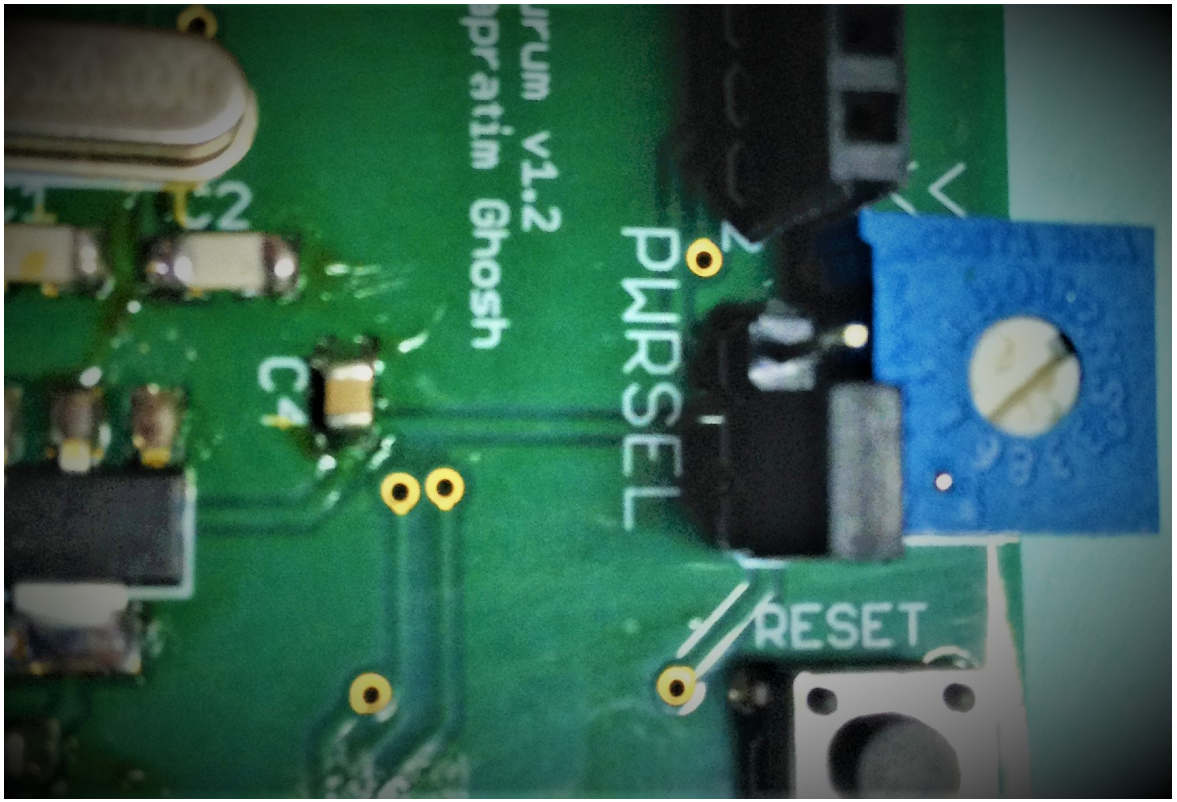
We need 5V supply voltage to drive DS1307 RTC IC. There is already a 5V point but it is connected to LCD. To get another 5V point **Short Circuit two Male Bug Strip points in PWRSEL corner**. You can see that they are already connected by Two-Pin Jumper, but you need to remove it and short-circuit those bug strip points by soldering from the reverse side of PCB.

Now both these electrically connected points act as a 5V source :)

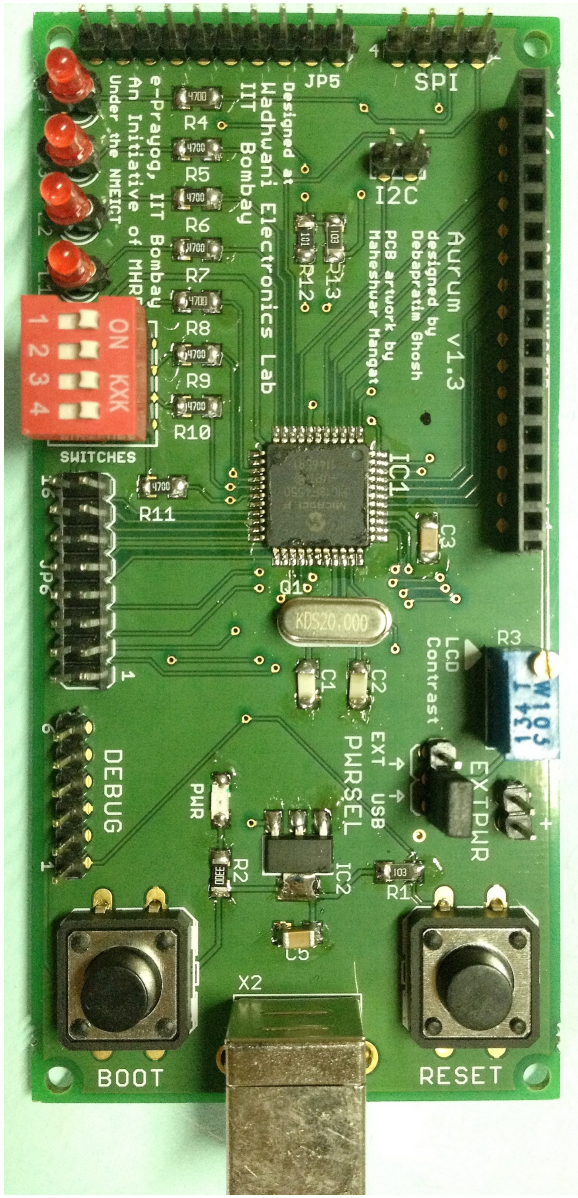
Aurum v1.2


JP5
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R1
C6
IC1
C3
Q1
C1
C2
C4
C5
R2
X1
PWR
PWRSEL
RESET
BOOT
DEBUG
SW
P195024 1315
e-Prayog, IIT Bombay
An Initiative of MHRD
Under the NME through ICT
Aurum v1.2
Debapratim Ghosh
COSTA RICA
BOURNS

PWRSEL corner in Aurum v1.2



Aurum v1.3



PWRSEL corner in Aurum v1.2

Shortcircuit on reverse side

Question/Comments

For any queries regarding I^2C feel free to contact us.

THANK YOU !