Embedded Systems Lab Experiment 7

Analog to Digital Conversion using AtMega32

Program an AtMega32 to convert analogue voltage signal into its digital equivalent

Jitbitan Baroi
3-10-2024

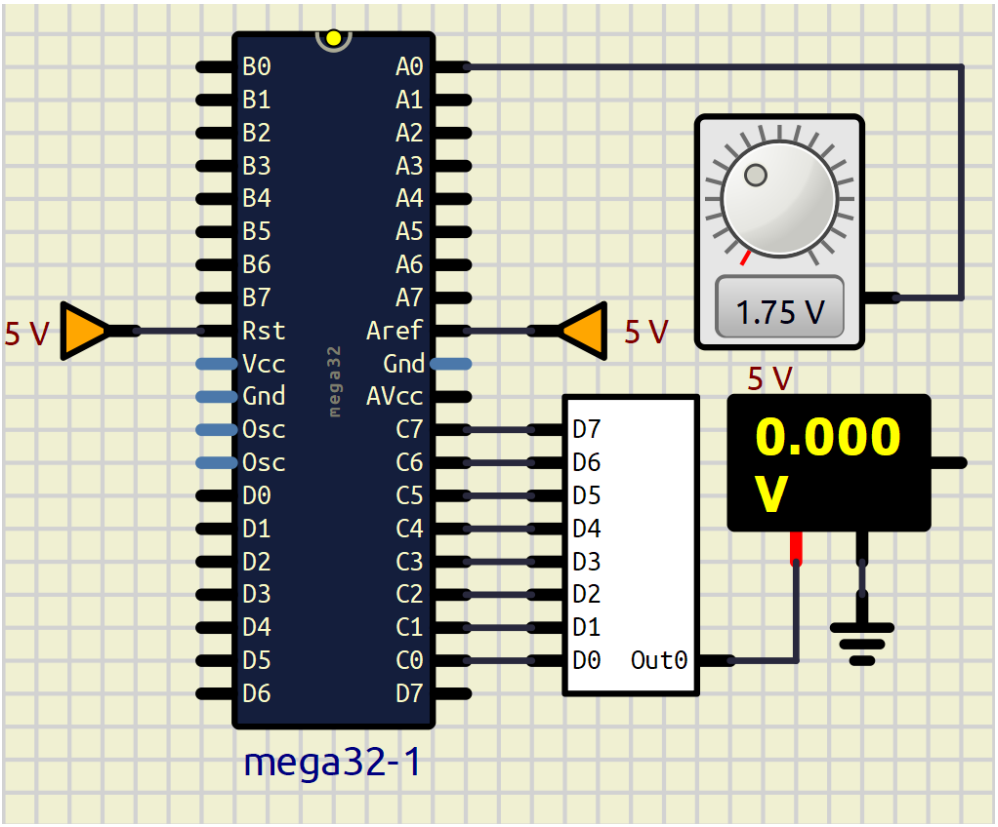
INDIAN INSTITUTE OF TECHNOLOGY

DATE | Expt: Analog to Digital Conversion using AT Mega 32 | SHEET NO. 1

•) Objective: To program at an AT Mega 32 to convert analog voltage signal into digital equivalent.

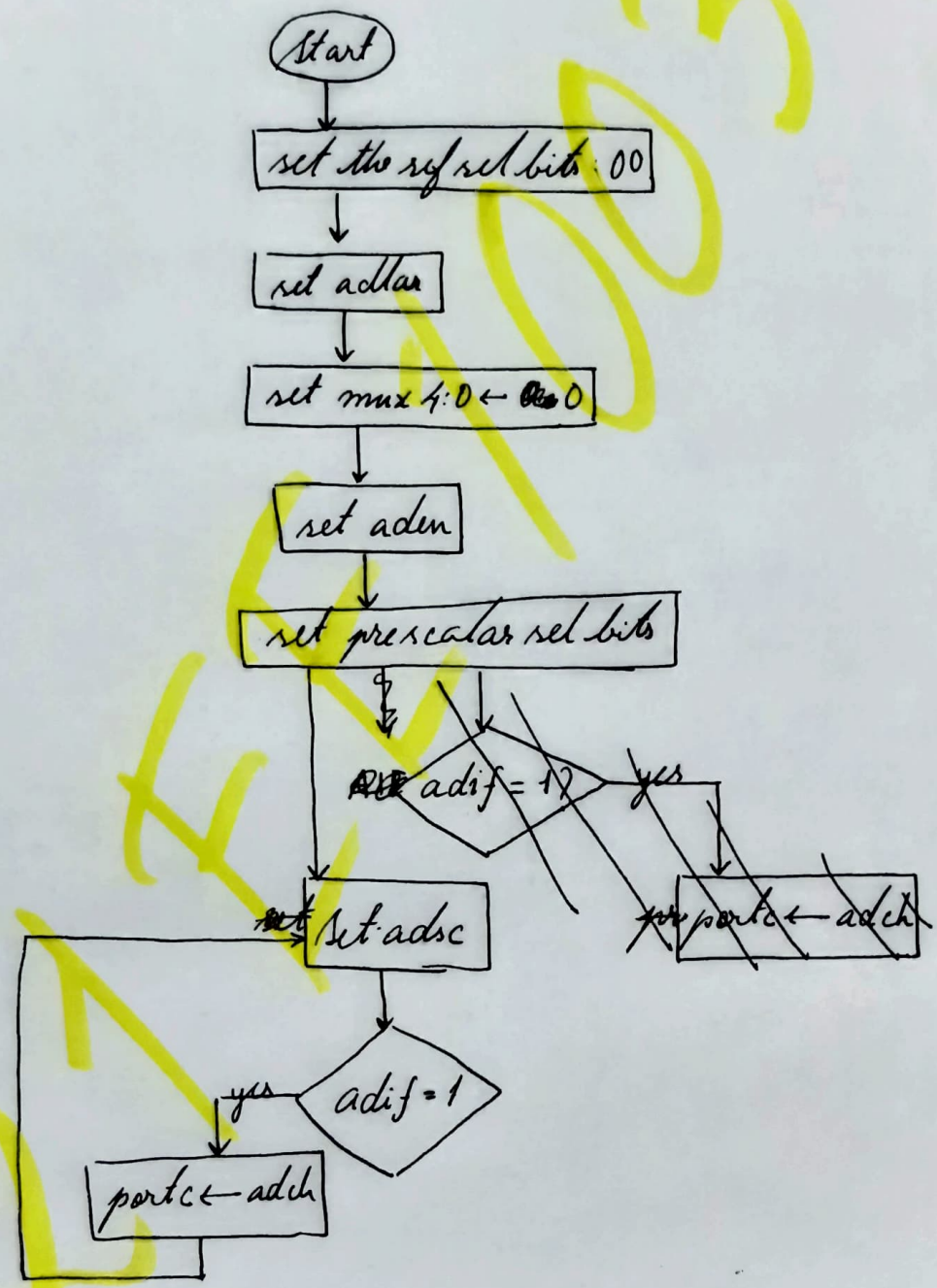
•) Apparatus reqd.

Name	Specification	Quantity
1. µC	AT Mega 32	1
2. power supply	5V	2
3. Variable voltage source	5V	1
4. DAC	—	1
5. Voltmeter	—	1



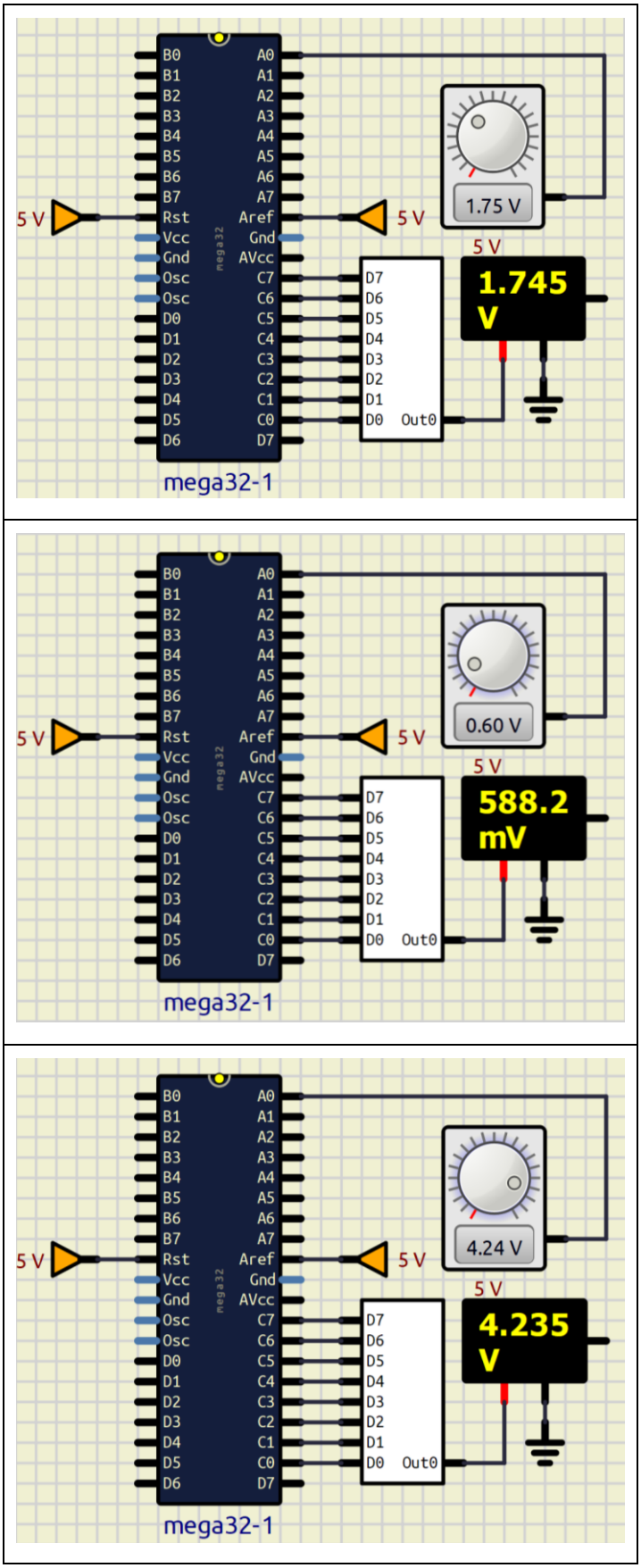
Schematic used for ADC conversion at pin A0 and displaying the digital equivalent through a DAC from PORTC

•> Flow of the program:



• Code:

```
// basic imports
ldi r16, 0x00          ] porta as input.
out ddra, r16          ]
ldi, r16, 0x20         ] admux ← 0x20
out admux, r16         ]
ldi r16, 0x87          ] adcsra ← 0x87
out adcsra, r16        ]
ldi r16, 0xff          ] portc as output
out ddrc, r16          ]
main: ldi r16, 0xc7    ] enabling the ADC start conversion
      out adcsra, r16  ]
l1:   in r16, adcsra   ] polling to check if ADIF is 1 i.e. finish
      andi r16, 0x10   ] conversion, using a mask.
      breq l1          ]
      in r17, adch     ] once conversion is complete, ip adch into
      out portc, r17   ] r17 and output to portc for DAC
      ldi r16, 0x97    ] flipping the ADIF for further conversion.
      out adcsra, r16  ]
      jmp main         → while loop.
```



Three different voltage signals are applied at pinA0 and the corresponding the conversion is shown in voltmeter (error is due to the discarding of the last two bits)