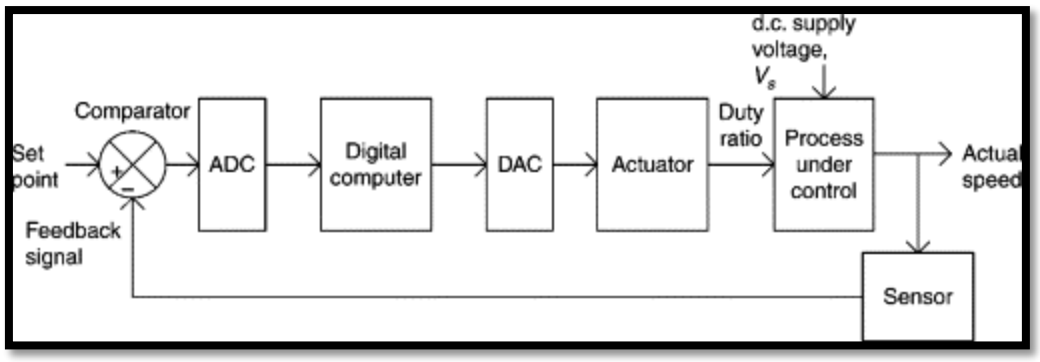
INSTITUTE OF INDUSTRIAL ELECTRONICS ENGINEERING, (PCSIR) KARACHI

COMPLEX ENGINEERING PROGRAM

MICROPROCESSOR

Third Year Fall Semester 2024



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OBJECTIVES:

The problem is to design a microprocessor-based digital control system that counts time delays in both upward and downward directions based on the status of a switch. Additionally, the system should have a pushbutton for resetting the display value. The display should have a range of two digits (0 to 99).

Assembly Language Program:

CODE:

```
DATA SEGMENT
    PORTA EQU 00H          ; Set label PORTA to the port address of port A
    PORTB EQU 02H          ; Set label PORTB to the port address of port B
    PORTC EQU 04H          ; Set label PORTC to the port address of port C
    PORT_CON EQU 06H       ; Set label PORT_CON to the port address of control register
DATA ENDS
CODE SEGMENT PUBLIC 'CODE'
    ASSUME CS:CODE
START:
    MOV AX, DATA           ; Temporarily moving Data Segment contents to a General-Purpose Register (AX)
    MOV DS, AX             ; Finally moving that to Data Segment Register (DS)
    MOV DX, PORT_CON       ; Moving Control Port address to DX
    MOV AL, 10000000B      ; Setting all ports of 8255A as OUTPUT ports
    OUT DX, AL
    MOV CX, 3FFFH          ; Loop counter for delay
    MOV BL, 0              ; Initialize digit counter
    display_digits:
    MOV DX, PORTA          ; Set PORTA address to DX
```

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    MOV CX, 3FFFH          ; Load delay counter
   Display the current digit on PORTA
    MOV AL, BL             ; Move the current digit (0 to 9) to AL
    ADD AL, '0'            ; Convert digit to ASCII character
    OUT DX, AL             ; Output the ASCII character to PORTA
     ; Display a delay
    CALL delay
    INC BL                 ; Move to the next digit
    CMP BL, 10             ; Check if all digits have been displayed
    JNE display_digits     ; If not, continue to display next digit
end_program:
    JMP end_program        ; Infinite loop to keep the program running
delay PROC
    ; Delay function
    ; Input: None
    ; Output: None
    ; Modifies: CX register
  DEC CX                   ; Decrement CX
    JNZ delay              ; Jump back if CX is not zero
    RET
delay END
CODE ENDS
END START
```

SIMULATION: