EECE416: Microcomputer Fundamentals and Design

PIC Coding Practice - C

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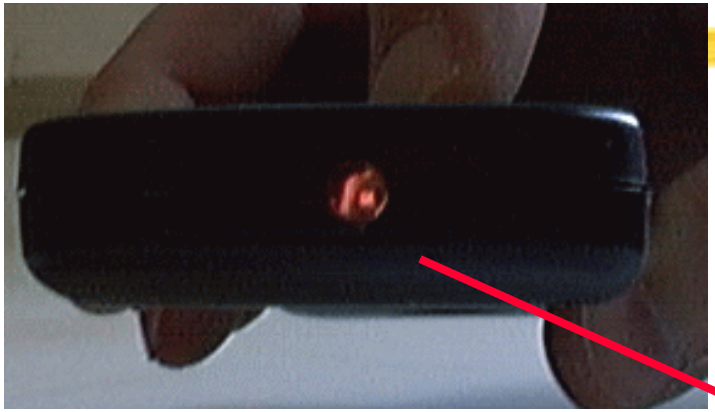
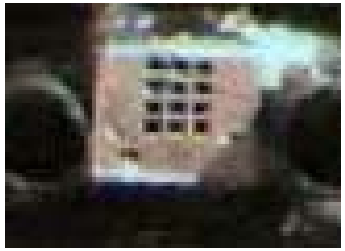
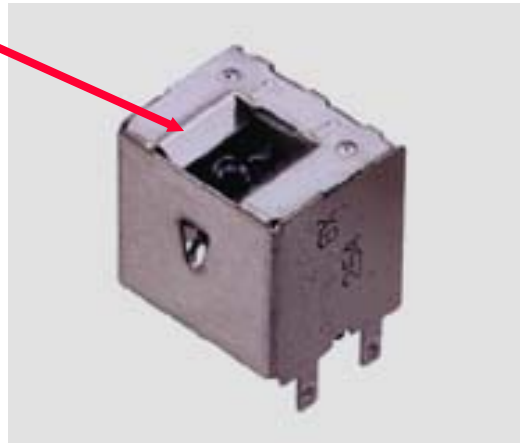
5: Infra Red Control – Sony Remote

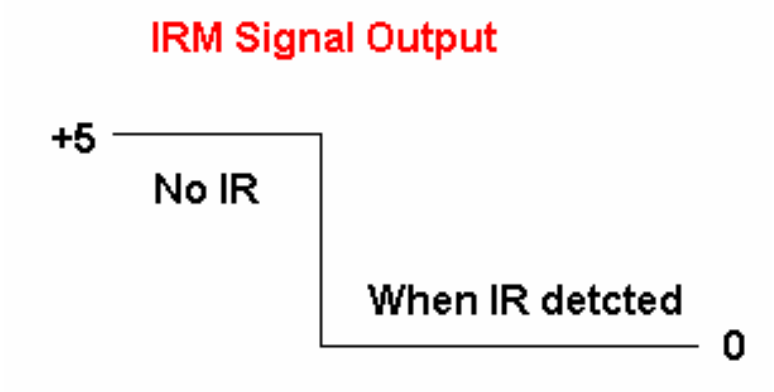


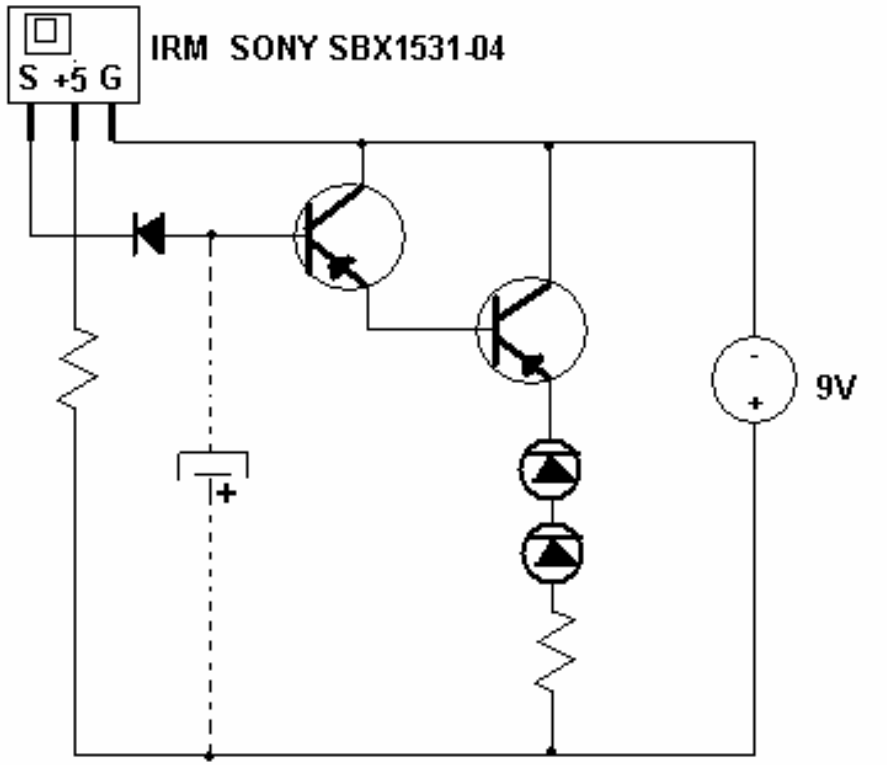




Simple IR Application

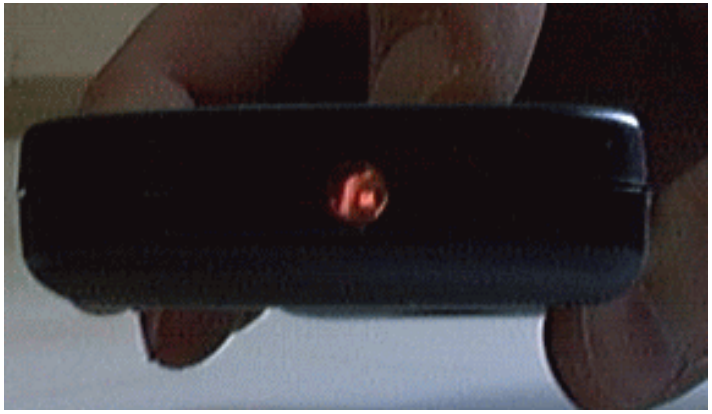
- IR Remote Control Night Light





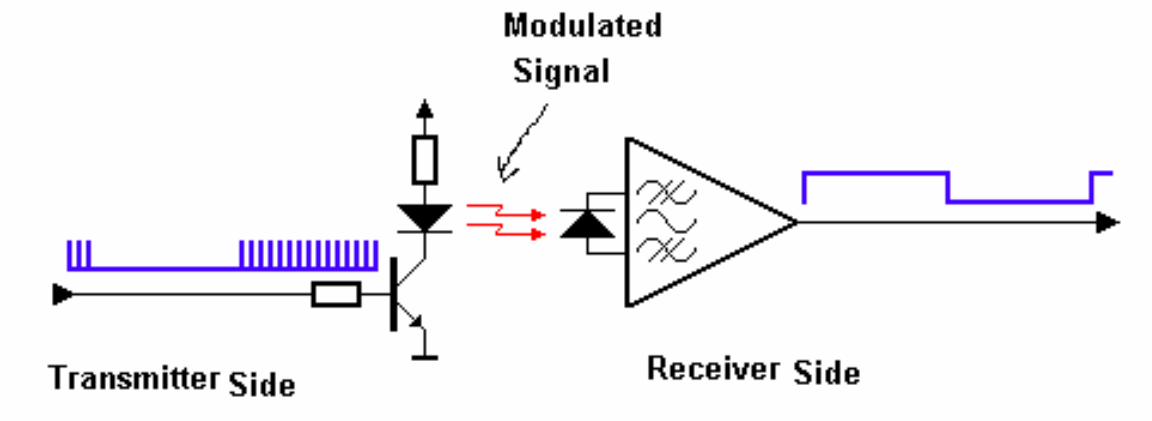
IR Control

- Infra-Red light: cheapest way to remotely control a device within a visible range
- Almost all audio and video equipment are now controlled by IR
- IR Protocols
  - Sony
  - Sharp
  - Philips



IR Modulation

- Modulation: To make signal stand out above the noise.
- With modulation we make the IR light source blink in a particular frequency. (30 – 60 KHz)
- The IR receiver will be tuned to that frequency, so it can ignore everything else.

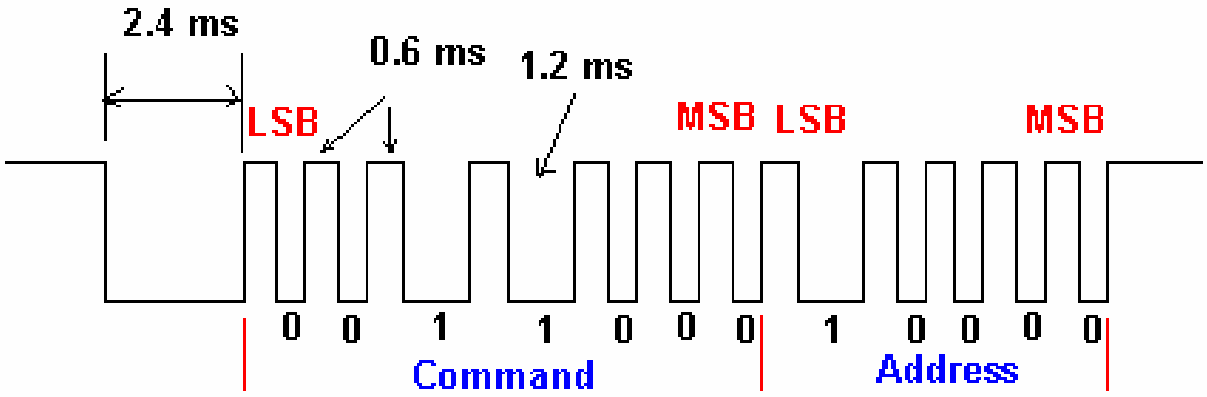


Sony Protocol –Addr/Com

- **Address**
  - **1: TV**
  - **2: VCR1**
  - **3: VCR2**
  - **6: Laser Disk Unit**
  - **12: Surround Sound**
  - **16: Cassette Deck/Tuner**
  - **17: CD Player**
  - **18: Equalizer**
- **Command:**
  - **0 – 9: Keys 1 – 0**
  - **16: Channel +**
  - **17: Channel –**

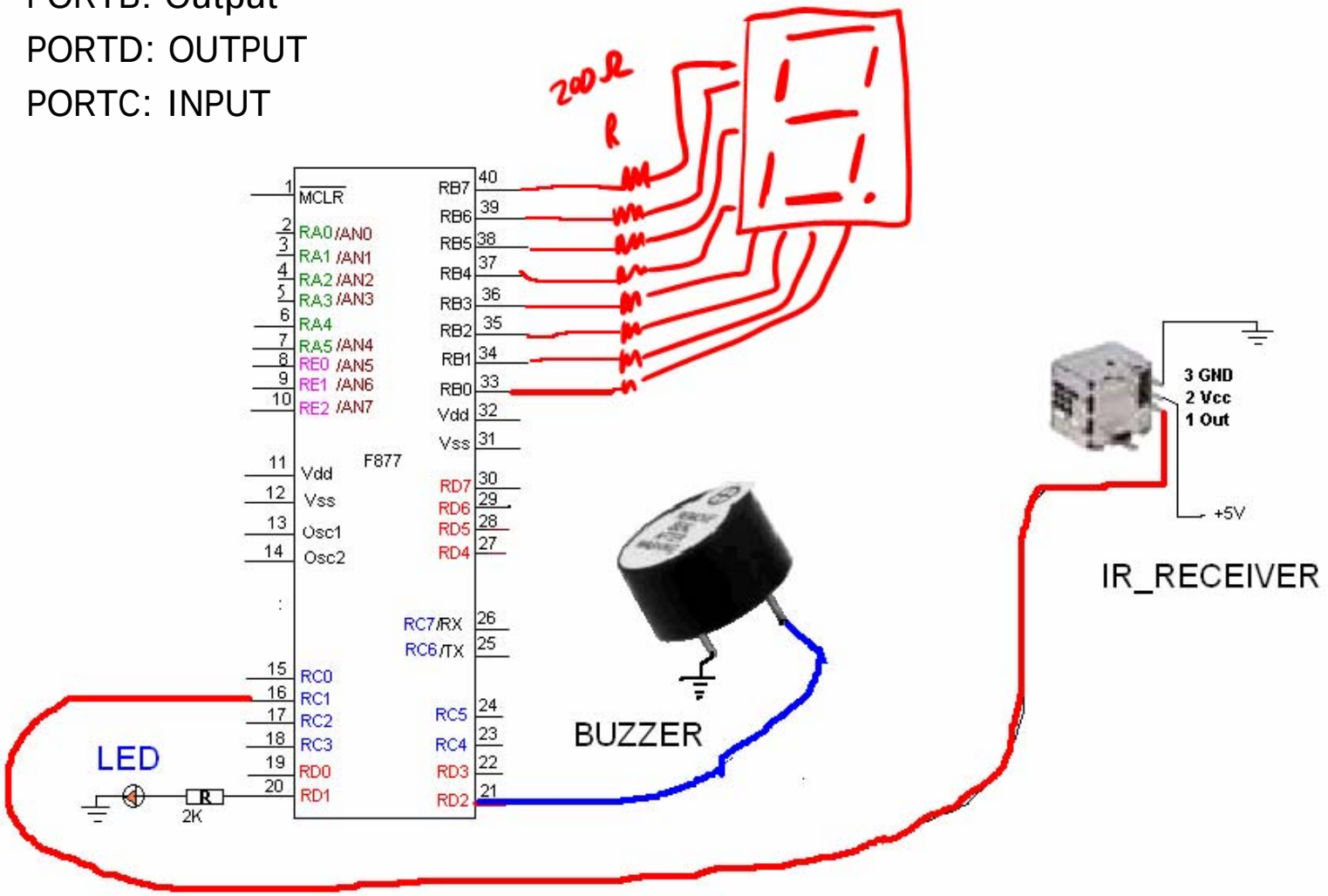
SONY Protocol

- 12-Bit of Information
- 5-Bit for Address and 7-Bit for Command
- Pulse Width Modulation
- Carrier Frequency 40 KHz
- Bit Time: 0.6 ms (0) or 1.2 ms(1)
- Commands are repeated every 45 ms as long as a key is held down.



IR connection Diagram

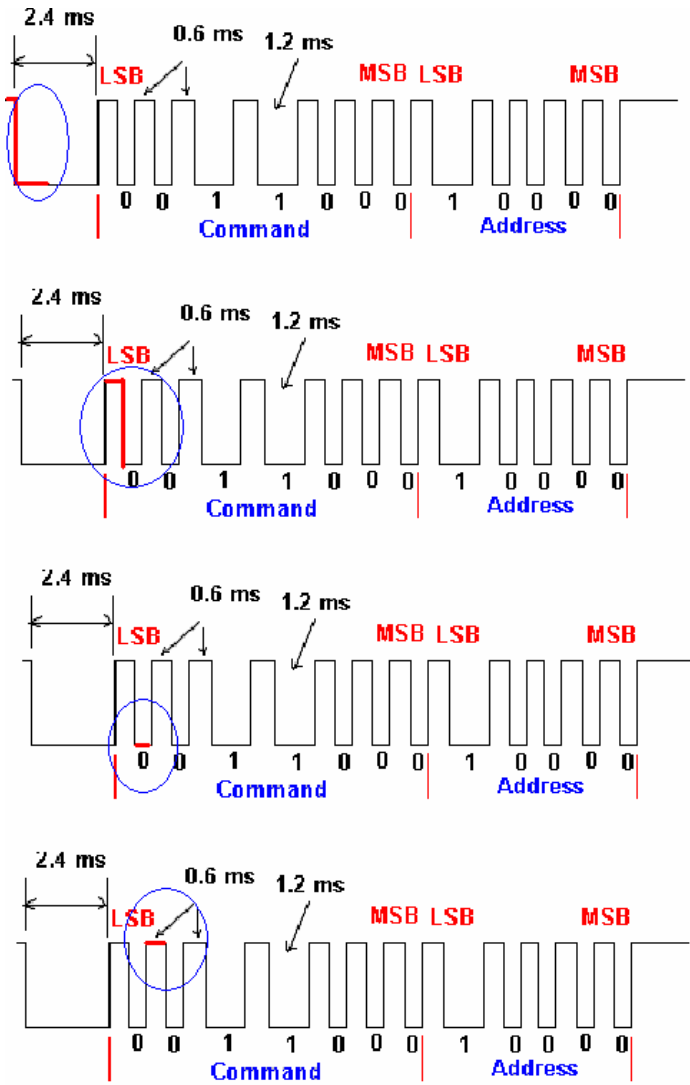
- PORTB: Output
- PORTD: OUTPUT
- PORTC: INPUT



Sony Protocol –Bit Reading Scheme

- "1" : 1200us
- "0": 600 us
- Sequence
  - 1. Detect IR for LOW (START)
  - 2. Wait until IR goes to HIGH (Separator)
  - 3. Wait until IT goes to LOW
  - 4. Wait for 120us
  - 5. Check IR if it goes to HIGH
    - If Not, Increase a counter by 1 and go to 4
    - If High
      - Count<8: "0"
      - Count>8: "1"
      - Go to 3 (to read next bit information)

Sony Protocol – Coding example for COMMAND reading




```
; START OF COMMAND READ
;1. Wait for START bit
JAM
        banksel PORTD
        btfsc   PORTD, IRX      ;IRX=2
        goto    JAM
;2. Once START is entered
        banksel CMcount
        movlw   0x07    ;Command has 7 bits
        movwf   CMcount
;3. Wait for separator (600us length)
WAIT    btfss   PORTD, IRX
        goto    WAIT
CMNEXT  clrf    Pcount  ;Number of 120us duration
        bcf     STATUS, CARRY
        rrf     COMreg          ;storage for COMMAND
                                ;MSB is 0 NOW
;4. WAIT for the end of separator
WAIT2   btfsc   PORTD, IRX
        goto    WAIT2

;5. Pcount update (count how many 120us Low duration)
DST     call    delay120us
WAIT3   btfsc   PORTD, IRX
        goto    Onezero         ;End of LOW duration
                                ;1 or 0 ?
        incf    Pcount
        goto    DST
;6. At the end of LOW duration
Onezero btfsc   Pcount, 0x03    ;What is this for?
        bsf     COMreg, MSB     ;the MSB is now 1
        decfsz  CMcount
        goto    CMNEXT
;7. Once all 7 bit inforation read
        bcf     STATUS, CARRY
        rrf     COMreg    ;rotate one more for 8-bit re

;END OF COMMAND READ
```

IR Coding Structure