Appendix "A"

Program: Rx

The function of the program is "publicity remote control"

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Specialisation - Electronic engineering

Batch

$regfile = "m32def.dat"
$crystal = 1000000

Config Lcdpin = Pin , Db4 = Portb.4 , Db5 = Portb.5 , Db6 = Portb.6 , Db7 = Portb.7 , E = Portb.3 , Rs = Portb.2

Config Lcd = 16x2

Cursor Off Noblink

Config Adc = Single , Prescaler = Auto

Dim W As Word

Dim V As Single

Dim Temp As Byte

Dim Ref As Byte

Ref = 25

Config Portd.4 = Output

Config Portd.5 = Output

Config Portd.6 = Output

Config Portd.7 = Output

Config Portb.0 = Input

Config Portb.1 = Input

Config Porta.1 = Input

Config Porta.7 = Output

Sw_1 Alias Pinb.0 : Portb.0 = 1
Sw_2 Alias Pinb.1 : Portb.1 = 1
Sw_3_show_state Alias Pina.1 : Porta.1 = 1
Dim Show_state As Bit
Dim Publicity As Byte
Dim Comand_state As Byte
Dim Comand As Byte
Publicity = 1
Show_state = 1
Do
    W = Getadc(0)
    V = W * 5
    V = V / 1024
    Temp = V * 100
    Porta.7 = Show_state
    If Show_state = 0 Then
        Locate 1, 1
        Lcd "REF"
        Lcd Ref
        Locate 2, 1
        Lcd "temp"
        Lcd Temp
    Else if Show_state = 1 Then
        If Publicity = 1 Then
            Locate 1, 1
            Lcd "PEPSI COLA"
            Else if Publicity = 2 Then
Locate 1, 1

Lcd "SEGA FLOWER"
End If
End If

If Temp = Ref Then
Portd.4 = 0
Portd.5 = 0
Portd.6 = 0
Portd.7 = 0
End If

If Temp > Ref Then
Portd.4 = 1                             "fan on"
Portd.5 = 1
Portd.6 = 0
Portd.7 = 0
End If
If Temp < Ref Then
Portd.4 = 0                             "heater on"
Portd.5 = 0
Portd.6 = 1
Portd.7 = 1
End If

Debounce Sw_1, 0, Ref_increment, Sub
Debounce Sw_2, 0, Ref_decriment, Sub
Debounce Sw_3_show_state, 0, Toggle_show_state, Sub
Inputbin Comand
If Comand = 1 Then
    Publicity = 1
Elseif Comand = 2 Then
    Publicity = 2
Elseif Comand = 3 Then
    Gosub Ref_increment
Elseif Comand = 4 Then
    Gosub Ref_decriment
End If

Printbin Temp
Waitms 100
Printbin Ref

Loop
Ref_increment:
Ref = Ref + 1
Return
Ref_decriment:
Ref = Ref - 1
Return
Toggle_show_state:
Cls
Toggle Show_state
Return
Program: Tx

`regfile = "m32def.dat"
$crystal = 1000000
Config Lcdpin = Pin, Db4 = Portb.4, Db5 = Portb.5, Db6 = Portb.6, Db7 = Portb.7, E = Portb.3, Rs = Portb.2
Config Lcd = 16x2
Cursor Off Noblink
Config Porta.0 = Input: Sw_1 Alias Pina.0: Porta.0 = 1
Config Porta.1 = Input: Sw_2 Alias Pina.1: Porta.1 = 1
Config Porta.2 = Input: Sw_3 Alias Pina.2: Porta.2 = 1
Config Porta.3 = Input: Sw_4 Alias Pina.3: Porta.3 = 1
Dim Ref As Byte
Dim Temp As Byte
Do

If Sw_1 = 0 Then
Printbin 1
Elseif Sw_2 = 0 Then
Printbin 2
End If

Debounce Sw_3, 0, Ref_increment, Sub
Debounce Sw_4, 0, Ref_decriment, Sub

Printbin 0
Waitms 100
Inputbin Temp
Waitms 70
Inputbin Ref
Locate 1, 1
Lcd "REF"=
Lcd Ref
Locate 2, 1
Lcd "temp"=
Lcd Temp

Loop

Ref_increment:
Printbin 3
'Incr Ref
Return

Ref_decriment:
Printbin 4
'Decr Ref
Return
APPENDIX (B):

Table (1)

<table>
<thead>
<tr>
<th>Character</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER</td>
<td>Terminates input of a line</td>
</tr>
<tr>
<td>Blank</td>
<td>( or space)</td>
</tr>
<tr>
<td>'</td>
<td>Single quotation mark (apostrophe)</td>
</tr>
<tr>
<td>*</td>
<td>Asterisks (multiplication symbol)</td>
</tr>
<tr>
<td>+</td>
<td>Plus sign</td>
</tr>
<tr>
<td>,</td>
<td>Comma</td>
</tr>
<tr>
<td>-</td>
<td>Minus sign</td>
</tr>
<tr>
<td>.</td>
<td>Period (decimal point)</td>
</tr>
<tr>
<td>/</td>
<td>Slash (division symbol) will be handled as\</td>
</tr>
<tr>
<td>:</td>
<td>Colon</td>
</tr>
<tr>
<td>&quot;</td>
<td>Double quotation mark</td>
</tr>
<tr>
<td>;</td>
<td>Semicolon</td>
</tr>
<tr>
<td>&lt;</td>
<td>Less than</td>
</tr>
<tr>
<td>=</td>
<td>Equal sign (assignment symbol or relational operator)</td>
</tr>
<tr>
<td>&gt;</td>
<td>Greater than</td>
</tr>
<tr>
<td>\</td>
<td>Backslash (integer/word division symbol)</td>
</tr>
<tr>
<td>^</td>
<td>Exponent</td>
</tr>
</tbody>
</table>

Table (2)

<table>
<thead>
<tr>
<th>Type</th>
<th>Bytes used</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit</td>
<td>1/8 Byte</td>
<td>0-1</td>
<td>A bit can hold only the value 0 or 1. A group of 8 bits is called a byte</td>
</tr>
<tr>
<td>Byte</td>
<td>1 Byte</td>
<td>0 to 255</td>
<td>Bytes are stores as unsigned 8-bit binary numbers</td>
</tr>
<tr>
<td>Integer</td>
<td>2 Bytes</td>
<td>-32,768 to +32,767</td>
<td>Integers are stored as signed sixteen-bit binary numbers</td>
</tr>
<tr>
<td>Word</td>
<td>2 Bytes</td>
<td>0 to 65535</td>
<td>Words are stored as unsigned sixteen-bit binary numbers</td>
</tr>
<tr>
<td>Dword</td>
<td>4 Bytes</td>
<td>0 to 4294967295</td>
<td>Dwords are stored as unsigned 32-bit unsigned numbers</td>
</tr>
<tr>
<td>Long</td>
<td>4 Bytes</td>
<td>-2147483648 to 2147483647</td>
<td>Longs are stored as signed 32-bit binary numbers</td>
</tr>
<tr>
<td>Single</td>
<td>4 Bytes</td>
<td>1.5 x 10^-45 to 3.4 x 10^38</td>
<td>Singles are stored as signed 32 bit binary numbers</td>
</tr>
<tr>
<td>Double</td>
<td>8 Bytes</td>
<td>5.0 x 10^-324 to 1.7 x 10^308</td>
<td>Doubles are stored as signed 64 bit binary numbers</td>
</tr>
<tr>
<td>String</td>
<td>up to 254 Bytes</td>
<td></td>
<td>Strings are stored as bytes and are terminated with a chr(0) byte. A string dimensioned with a length of 10 bytes will occupy 11 bytes</td>
</tr>
</tbody>
</table>
Fig (1) : Block Diagram Microcontroller Atmega32
Microcontroller:

The next figure below show the Microcontroller in control center.

Fig. (2) Microcontroller of the control center
Switches Control

For controlling the sequence of the publicity which it displayed, control and adjust the temperature degree. The next figures (3) shows the switches control.

Fig.(3) Switches control

Sw₁: Display "PEPSI COLA".
Sw₂: Display "SEGAFLOWER".
Sw₃: Increment temperature degree.
Sw₄: Decrement temperature degree.

The display Unit:

LCD is used for displaying temperature degree of the control unit. Figure (4) shows the LCD in the control center.
The wireless communications

The transmitter RF signal, to transmit the digital signal.

Fig. (4) LCD in the control centre

Fig. (5) Transmitter in the control centre
The wireless communications in control unit

The receiver RF signal, to receive the digital signal.

Fig. (6) Receiver in the control center.
**Microcontroller:**
Decodes the messages (SMS) and accordingly sends commands to read the signal, control the temperature & displayed the publicity then displayed in LCD.

Figure (7) shows the Microcontroller in the control unit.
The temperature sensor and switches for control

The lm35 read the temperature of the control unit and output signal. The switches control:

Sw₁: increment the reference value of temperature.
Sw₂: decrement the reference value of temperature.
Sw₃: first click to display the temperature & second click to display the Publicity.

Fig.(8) lm35 sensor and switches of control unit

The Fan Control System

The next figure shows the fan of the control system, receive signal from the microcontroller to minimize the temperature degree to reference value.
The Heater control system

Figure (9) shows the heater of the control system, receive signal from the microcontroller to adjust the temperature degree to reference value.
LED's indicators

When the fan is on the Blue LED is turn ON otherwise is OFF.
When the heater is on the Red LED is ON otherwise is OFF. Figure 10 LED’s indicator.

![LED's indicators](image1)

**Fig. (10) LED’s indicator**

The display Unit (LCD):

Display the advertisement, the temperature degree of the device.

Figure (11) shows the LCD in the control unit.

![The display Unit (LCD)](image2)

**Fig. (11) LCD of the control unit**