Application: Digital Thermometer

INFRARED THERMOMETER

Infrared Thermometer

- An Infrared thermometer is a device which measures temperature from a portion of the thermal radiation, also known as blackbody radiation emitted by the object that is being measured.
- My design was to build a noncontact temperature monitoring device. That should operate on one 3.7v lithium battery. When the button is pressed the controller will continuously display and measure the temperature. When the button is released the last measurement will be displayed for 10 seconds. 10 seconds after the button is released the unit will turn off. The unit will turn on again when the button is pressed and the operation will continue.

Acquired Parts

- Parts were acquired through Digikey.com
- Digi-Key is one of the fastest growing distributors of electronic components in the world.

**Step to Code a reading temperate and displaying data at LCD**

1. When controller powers up, it would not do anything. It will wait for the push button to press.
2. When button is pressed which is connected to pin0. It will pull down this pin to ground level. This will cause controller to detect this change in pin 26 and will call the function that will execute the commands to read object temperature.
3. Communication between controller and sensor is carried through 12c protocol. There is a check-sum command to ensure that received data is valid.
4. First, Controller sends address signal to slave. After Acknowledgement from slave, controller send command to read object temperature.
5. Temperature is received in two bytes of data. First byte is Low data byte, Second byte is high data byte. By Using left shift command, Temperature is combined into Two byte data.
6. Temperature coefficient of sensor is 0.0210. After that temperature is converted in Celsius by using formula below.

\[ \text{Temperature} = \frac{\text{Byte data} \times 0.0210}{0.001} \]

7. This value is divided separated into three digits by using divide and modulus commands.
8. These three digits will be display at LCD for 10 sec. After 10 sec LCD is in sleep mode to save power consumption.

**Circuit Analogy**

- 1. LCD 100k Pull-Up Resistor
- 2. Voltage Regulator
- 3. Capacitors

**Design Methodology**

- 1. LCD 100k Pull-Up Resistor
- 2. Voltage Regulator
- 3. Capacitors

**Parts**

<table>
<thead>
<tr>
<th>Parts</th>
<th>Overview</th>
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<tbody>
<tr>
<td>LCD 3DIGIT</td>
<td>It is 7-Segment character format with reflective display mode, which requires 3 volts to work.</td>
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<tr>
<td>PIC18F45K80</td>
<td>IC MCU, 8bit,32KB Flash,40PBSP with speed of 64MHz</td>
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<td>Infrared Sensor</td>
<td>Manufactured by Melexis Technologies that needs between 2.6 to 3.6V. Output data using PWM or SMBus.</td>
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<tr>
<td>Voltage Regulator</td>
<td>Low Drop-out Regulator with 3V output that can provide Output Current up to 150mA</td>
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<tr>
<td>ICD 3</td>
<td>MPLAB/ICD Debugger/Programmer-Manufactured by Microchip Technology</td>
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</table>

**References**

3. “38x144ID, Texas Instruments Incorporated” and “1.24-3 Input Voltage, 350mA, Ultralow IQ Low-Dropout Regulators (Rev. D0) (n.d.) n. pag. Web.