Temperature + Humidity Meter with 2.4" TFT Display, GPIO & RS232 Output

Technical Specification

Circuit design, **PCB layout** and **Embedded Firmware** for a microcontroller based circuit designed to :

- Monitor 4 sets of sensors, each set comprising of :
  - Temperature +Humidity Sensor (T+H)
  - 1 Positive triggered digital input (+)
  - 1 Negative triggered digital input (-)
  - 1 digital output to drive 2A 12VDC load (O)
- Communicate the value of T+H & IO over RS232 to an external device GPT<14Byte for set1>,<14Byte for set2>,<14Byte for set3>,<14Byte for set4>
- The information distribution in the 14 bytes shall be as under

Byte Number	Information
1	Set ID
2-3	Current Temperature
4-5	Current Humidity
6	IO status
7-8	MinT
9-10	MaxT
11-12	MinRH
13-14	MaxRH

**You can suggest alternate data format as well. Above is for reference only*

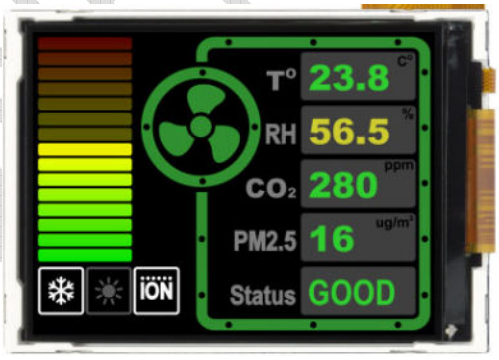
- Receive from the external device, over RS232:
  - Frequency of communication of T+H, IO values over RS232 (1-65k seconds)
  - The permissible range for Temperature and Humidity for each set (MinT/MaxT, MinH/MaxH)
  - The duration for which Output is to be activated in case of breach in range of T or H : A,BBB,CC,DDD
    - A:0/1 Output Off/ON
    - BBB:001 to 999 (Duration in seconds Output should be ON. 999=Always ON)
    - CCC:001 to 999 (Duration in seconds Output should be OFF.)
    - DDD: 001 to 999 (Number of times the AAA:BBB cycle should repeat)
- Integrate a 2.4" Industrial grade TFT display to display the values of T+H for each set, the permissible Min/Max values and current status, whether in range or out

of range. Values for each set shall be displayed in a round robin manner (Set1, Set2, Set3, Set4)

- If the actual T or RH fall out of range for any set, then the respective 12VDC output shall be activated.
- Unit for Temperature shall be Centigrade. RH in %.
- The following information shall be displayed on the TFT display

Room1		
T	**6.5°C** **IN RANGE**	MinT:4°C MaxT:8°C
RH	**25.3%** **IN RANGE**	MinRH:17% MaxRH:33%
AC ON	**DOOR CLOSED**	

  - The value that is in Range shall be displayed in Green
  - The Value that is below range shall be displayed in Yellow
  - The value that is above range shall be displayed in Red
  - The display needs to be designed using suitable graphics with pleasing UI
  - The image below is an example of a 2.4" TFT display with a pleasing look



Environment Conditions

- The circuit board shall be housed in a sealed ABS enclosure with clear polycarbonate lid housed in ambient conditions that can range from temperature of 1C to +45C and RH of 30-95%.
- The Temperature, Humidity, Input Sensors, Output load shall be connected outside the ABS enclosure, with cable lengths that can be upto 25 mtrs long

- Choice of sensors needs to be made accordingly.
- Input power shall be 12VDC or as suggested by you.

Project Deliverable

- You shall be responsible for sourcing all development boards, components etc required to develop and assemble the working prototype.
- The BOM shall comprise of judiciously selected components that shall result in a high quality, highly reliable, robust and long life product. **Slight over specification is preferred in the selection, so that part failure can be avoided**. BOM should comprise easily available parts.
- PCB shall be assembled at an EMS facility. Package size of components may be selected accordingly.
- You shall deliver the PCB layout files, Gerber etc and co-ordinate with the PCB fabrication facility for the development of the PCB.
- You shall deliver schematics, layouts, circuit design etc and co-ordinate end to end with the EMS contractor for the assembly of the PCB and the board bring up.
- You may suggest a PCB and EMS contractor if you have worked with one before that you find reliable and suitable to the project, whether in India or China.
- The firmware shall be delivered in both HEX as well as the original source code in C. You shall guide us online, how to write the FW to the micro controller and train us through the initial use of the product.
- Project specifications can be modified based on mutual discussion during the course of the development.
- Our technical team shall co-ordinate with you during the course of the development, to discuss data formats and protocols for the RS232 interface.