Mad Scientist Mug Monitor

User Guide

It is often said that academic output is proportional to the amount of tea consumed. However, a true mad scientist is so absorbed in their work that they frequently leave beverages brewing, then forget about them. The Mad Scientist Mug Monitor is the perfect solution to this problem.

User Instructions

1. Attach temperature sensor around the girth of a mug of hot beverage using the Velcro strap.
2. Turn the Setpoint knob fully anticlockwise and the Volume knob fully clockwise (on subsequent usage these can be left in desired positions determined previously by experiment).
3. Provide power to the Mad Scientist Mug Monitor. It can be powered either via the mini USB socket, or from the internal 9 V PP3 battery. The device will be powered from the battery in preference to USB if a battery is installed, supplying at least 7.2 V and the Battery Power switch is on.
4. The display will show the temperature currently monitored at the mug (*Now °C*) and the selected setpoint temperature (*Setpoint °C*).
5. Increase the setpoint temperature to the desired value by rotating the knob clockwise, the value on the display will increase.
6. When the monitored mug temperature falls below the setpoint temperature (having first exceeded it) the alarm buzzer will sound and the alarm LED will flash.
7. After 30 seconds the alarm buzzer will turn off but the alarm LED will continue to flash.
8. If the setpoint is now reduced by more than 5°C and is less than the monitored mug temperature the alarm will be reset.
9. To reset the alarm at any time, press and release the Reset button.
10. Disconnect power after use (move the Battery Power switch to Off and disconnect the USB cable).

Disclaimer

No responsibility will be accepted for loss or damage arising from use of the Mug Monitor. The device is not suitable for use in safety-critical applications. The user should test the beverage temperature by normal methods before consuming. Particular care should be taken when attaching or removing the device on a receptacle containing hot liquid.

Technical Specifications

A true mad scientist may want to modify and improve their Mug Monitor, here are some technical details to assist with this.

Component Specifications

- Processor: Arduino Nano with ATmega328 chipset
- USB Interface: CH340G chip
- Temperature Sensor: LM35DZ (output: 10 mV per 1°C)
- Display: 128×32 pixel OLED with I²C interface (address 0x3C)
- Setpoint Potentiometer: 10 kΩ linear
- Volume Potentiometer: 220 kΩ logarithmic dual gang (paralleled)
- LED: with inbuilt flasher IC, 5 V supply voltage
- Sounder: 5 V magnetic buzzer
- Analogue Reference (AREF): 3.3 V

Input / Output Usage

- A0: Temperature sensor
- A1: Setpoint potentiometer
- A2: Volume potentiometer
- A4: I²C interface, Serial Data Line (SDA)
- A5: I²C interface, Serial Clock Line (SCL)
- D11: Buzzer output
- D12: LED output
- RST: Reset button
- AREF: Tied to 3.3 V (NB: do not read analogue inputs without first issuing analogReference(EXTERNAL) command)

Software

The Mad Scientist Mug Monitor software is downloadable from
http://www.ex.ac.uk/~tamitche/arduino/MugAlarm002.ino

Software libraries for the OLED display:
https://github.com/greiman/SSD1306Ascii/