

# FINAL PROJECT DOCUMENT

## **HARDWARE/SOFTWARE INTERFACING**

(CNTR8005)  
(Embedded Systems Development)  
(Winter-2021)

Submitted by:

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# H&T Monitor and Controlling in Food Storage Industries

## Introduction:

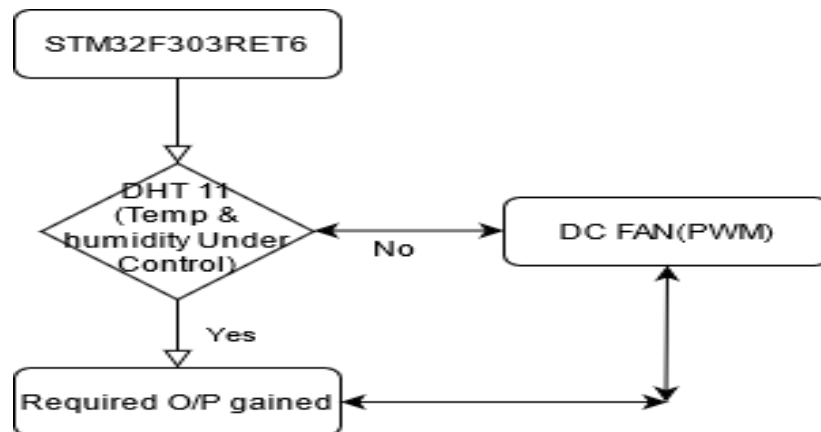
This project is to monitor and controlling of humidity and temperature in Food Storage Industries. When the food supplies are stored in Food storages it requires to maintain proper H&T conditions to keep the food fresh and usable. If these conditions are not maintained, then the food will be spoiled or rotten easily.

## Background:

In this project we are focusing on Food Storage Industries which are very sensitive to the Humidity and Temperature without proper maintenance of them it will be completely spoiled. So, by monitoring the H&T and observing the values and controlling the temperature using a DC Motor (which acts like fan or dehumidifier).

## Specification and Design:

STM32F303RET6, ULC2003, DHT 11, LED, MOTOR



## STM32F303RET6 Specifications:

ARM® Cortex®-M4 32b MCU+FPU, up to 512KB Flash, 80KB SRAM, FSMC, 4 ADCs, 2 DAC channel, 7 comp, 4 Op-Amp, 2.0-3.6 V

## DHT11 Specifications:

- Operating Voltage: 3.5V to 5.5V
- Temperature Range: 0°C to 50°C

- Humidity Range: 20% to 90%
- Accuracy:  $\pm 1^{\circ}\text{C}$  and  $\pm 1\%$

### Pin Assignment:

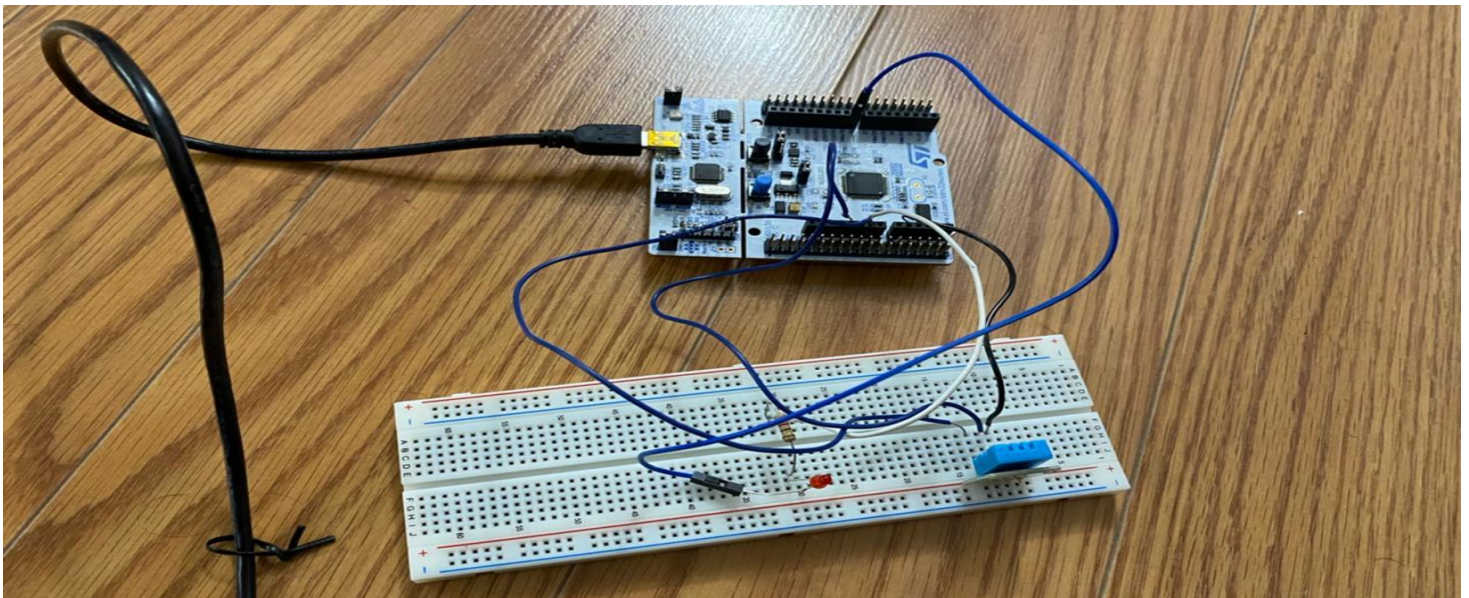
S. No	Description	Pin
1	Data Line	PA 1 (GPIOA)
2	5V	5V (DHT-11)
3	GND	GND (DHT-11)
4	PWM	PA- 9 (MOTOR)
5	GND	GND (MOTOR)

### PWM in STM32

So, value of 65535 gives FULL BRIGHTNESS of LED AND FULL SPEED of DC Fan (100% Duty Cycle)

- Likewise, value of 32767 gives HALF BRIGHTNESS of LED AND HALF SPEED of DC Fan (50% Duty Cycle)
- And value of 13107 gives (20%) BRIGHTNESS AND (20%) SPEED (20% Duty Cycle)

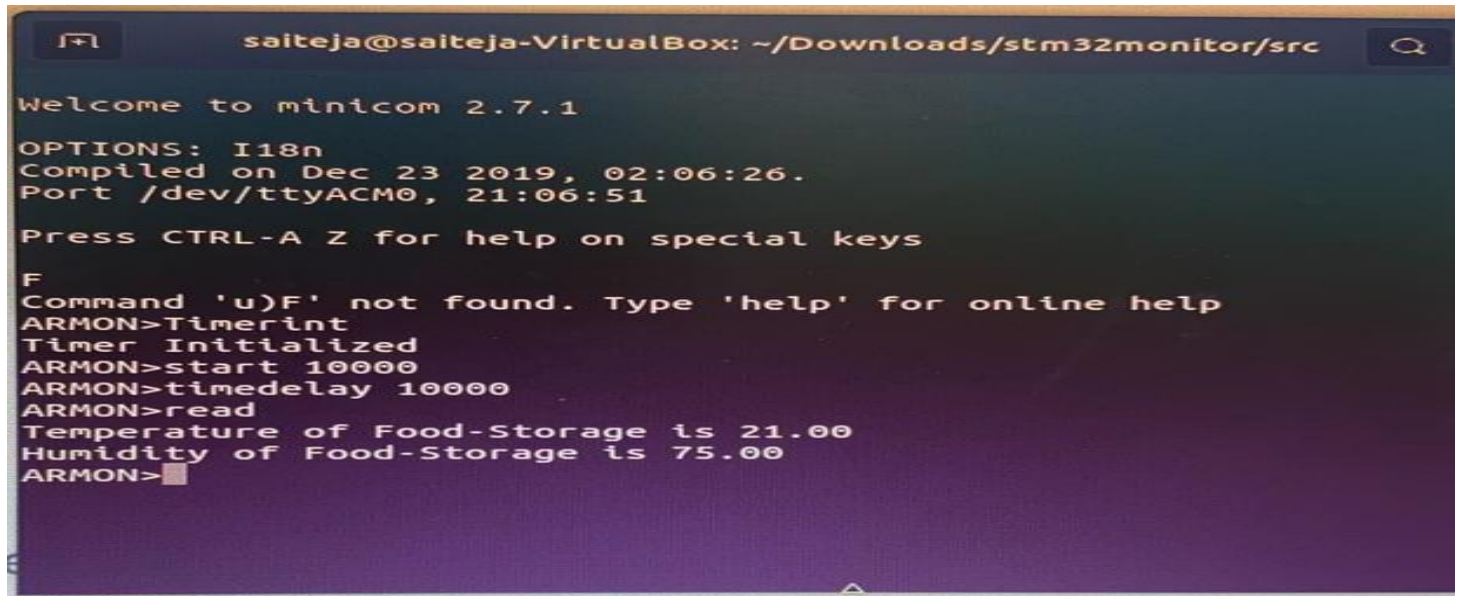
### 4 – Implementation(schematic): -



Here we use LED as a Motor which uses the PWM that we use for the Motor.



## 5 - Results:



```
saiteja@saiteja-VirtualBox: ~/Downloads/stm32monitor/src

Welcome to minicom 2.7.1

OPTIONS: I18n
Compiled on Dec 23 2019, 02:06:26.
Port /dev/ttyACM0, 21:06:51

Press CTRL-A Z for help on special keys

F
Command 'u)F' not found. Type 'help' for online help
ARMON>Timerint
Timer Initialized
ARMON>start 10000
ARMON>timedelay 10000
ARMON>read
Temperature of Food-Storage is 21.00
Humidity of Food-Storage is 75.00
ARMON>
```

## 5 - Evaluation:



I live in a basement so the temperature will be 3°C less than the Living Room temperature.

## 6 - Conclusion:

As we need mentioned in Introduction, we need to maintain the Temperature and Humidity in Food Industry to keep the food fresh and we were able to capture the temperatures in Food industry and able to maintain the required temperature through DC Motor with help of PWM.

## 7 - References

- <https://circuitdigest.com/microcontroller-projects/interfacing-dht11-sensor-with-stm32f103c8>
- <https://circuitdigest.com/microcontroller-projects/stm32f103c8t6-pwm-tutorial-fan-speed-control>
- <https://controllerstech.com/using-dht11-sensor-with-stm32/>