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A Study on Human Tracking Using Image Processing and Temperature Based Speed Controlled Fan

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***Abstract*— Due to a lot of temperature variations in our day to day life, especially during hot weather conditions, using a fan was the standard way of cooling down and still is for many people. Ordinary fans do not have very efficient or useful features when it is desirable to change the direction of air flow. This idea will reduce human efforts because the turn on/off of the fan is automatic. Using MATLAB we will track human motion without the need for any manual adjustments**

***Index Terms*— Temperature, Automatic, Speed Control**

I. INTRODUCTION

Most technologies intend to reduce human efforts, thus saving precious time. This idea aims to make its contribution to the purpose of diminishing human efforts in performing the task of switching on/off and shifting the position of fan in the direction of human. The idea intends to design an automatic temperature controlled fan. This will be achieved in two parts. First includes human tracking using MATLAB [1]. Here MATLAB will issue commands to the microcontroller and thus to the motor. The webcam will be used to detect the position and movement of human. In the second part the speed of the fan will be controlled according to ambient temperature. Considering the present day scenario we need to take into account conservation of energy. Also ways to reduce human efforts are needed as nowadays a person's life is becoming more and more hectic and tiring. Thus our project covers the points mentioned above. In case of human negligence a lot of energy is wasted, automatic turn on/off feature provided in our project will help in achieving the above objective. Also automatic rotation of fan in human direction will reduce human efforts.

A] TEMPERATURE SENSOR (DS18B20)

The DS18B20 digital thermometer provides 9-bit to 12-bit Celsius temperature measurements and has an alarm function with nonvolatile user-programmable upper and lower trigger points. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor. It has an operating temperature range of -55°C to +125°C and is accurate to ±0.5°C over the range of -10°C to +85°C. In addition, the DS18B20 can derive power directly from the data line ("parasite power"), eliminating the need for an external power supply. Each DS18B20 has a unique 64-bit serial code, which allows multiple DS18B20s to function on the same 1Wire bus. Thus, it is simple to use one microprocessor to control many DS18B20s distributed over a large area. Applications that can benefit from this feature include HVAC environmental controls, temperature monitoring systems inside buildings, equipment, or machinery, and process monitoring and control systems.

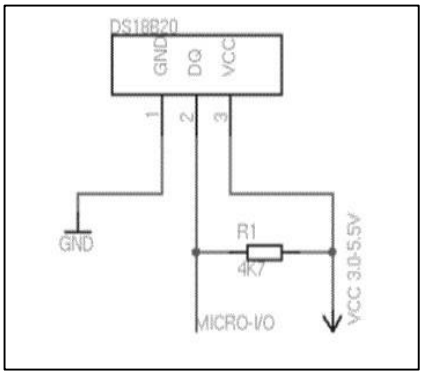

Fig 1 Pin Diagram of Temperature Sensor

B] LIQUID CRYSTAL DISPLAY (LCD)

The LCD panel is interfaced with microcontroller through the output port. The idea of using this display system is to display the temperature and speed of fan. This is a 16 character x 2Line LCD module, capable of display numbers, characters, and graphics. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user. Programmed RAM area (the

character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h is chosen.

The LCD panel contains 16 pins of which 8 are data pins and 3 are control pins. The LCD is interfaced to the Microcontroller using one of its ports. The following figure shows how the display unit is interfaced to the Microcontroller.

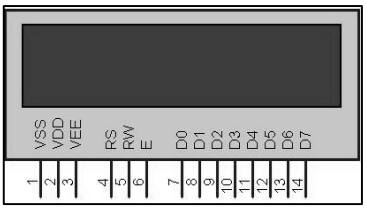

Fig 2 Pin Diagram of LCD

As seen from the above figure, Pins from 7 to 14 are data pins used for the selection of a particular character and pins 4 to 6 are Control signal pins used for performing Register bank selection, Read / Write and Enable pins respectively. By adjusting the voltage at pin number 3 we can change the contrast of the display. We are using 4 pins from D4 to D7 as data pins.

C] L293D

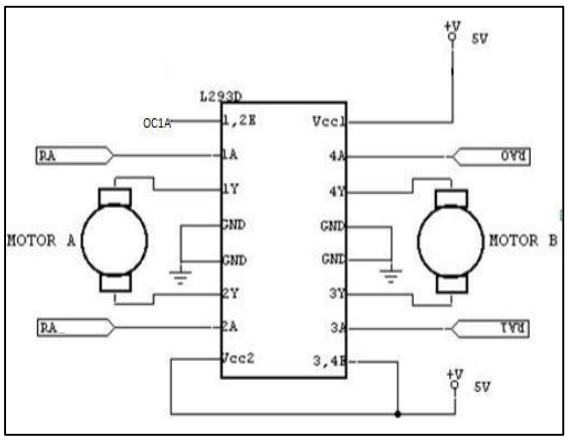

Fig 3 Pin Diagram of L293D

The L293D motor driver is available for providing User with ease and user friendly interfacing for embedded application. L293D motor driver is mounted on a good quality, single sided non-PTH PCB. The pins of L293D motor driver IC are connected to connectors for easy access to the driver IC's pin functions. The L293D is a Dual Full Bridge driver that can drive up to 1Amp per bridge with supply voltage up to 24V. It can drive two DC motors, relays, solenoids, etc. The device is TTL compatible. Two H bridges of L293D can be connected in parallel to increase its current capacity to 2 Amp.

D] USB TO SERIAL TLL/CMOS LOGIC MODULE

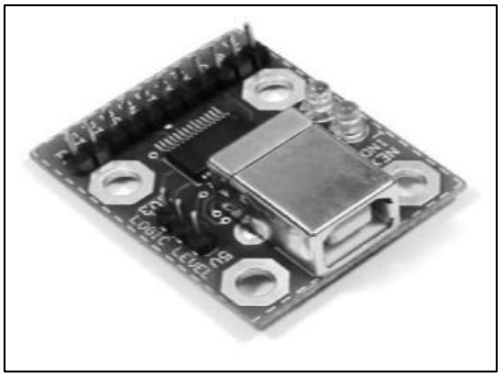

Fig 4 TTL/CMOS MODULE

This USB to serial converter is based on FT232 from FTDI. It gives out all 8 pins of the serial port at user selectable 3.3 or 5V logic levels. It has Transmit and Receive indicator data LEDs. It is most suitable for serial communication where data flow control is important. Since all the pins of the module are available at 5V / 3V3 and TTL / CMOS levels it can also be used for ISP (In System Programming) applications for microcontrollers such as NXP's ARM7 (LPC 2148, LPC2138), 8051 (P89V51RD2) etc. It has four mounting holes which makes it easy to integrate in your design. It can also provide 5V 400mA and 3.3V 30mA supply for powering external device. Board is made up of two layers PTH PCB for giving extra strength to the connectors.

II] AUTOMATIC SPEED CONTROL OF DC MOTOR WITH THE VARIATION OF AMBIENT TEMPERATURE

This part focuses on the automatic speed control with the variation of ambient room temperature. The temperature sensor used to measure the room temperature is DS18B20. DS18B20 is 1-wire digital output sensor. The output of DS18B20 will be used to control the speed of the motor using the concept of PWM. Our idea sets four different speeds of motor. These four speeds are for four different temperature ranges. For example speed 1 for the temperature range from $+20^{o}$ C to $+24^{o}$ C, speed 2 for the temperature range from $+25^{o}$C to $+28^{o}$C and so on. The temperature and speed is displayed on alpha numeric 16x2 LCD.

Pulse Width Modulation (PWM): PWM is a modulation technique that confirms the width of the pulse, formally the pulse duration, based on modulated signal information.

Although this modulation technique can be used to encode

information for transmission, its main use is to allow the control of the power supply to electrical devices, especially to inertial loads such as motor. We have use the concept of PWM to control the speed of DC motor.

III] HUMAN TRACKING USING MATLAB

MATLAB graphical user interface development environment, provides a set of tools for creating graphical user interface (GUI) [3]. These tool simplify the process of laying out and programming GUIs. GUI will take input from the webcam and display the real time video on the GUI screen in two frames. The first frame will display the normal real time video. Second frame will show the difference in position of the person from its previous position. Two consecutive images will be captured from the live video and will be subtracted to detect the position of person by thresholding and calculating centroid. This centroid value will then be given to the microcontroller using UART. Microcontroller will now know the position of the person, hence it will command the DC motor to rotate accordingly. This is how tracking of the person will be achieved.

The duty cycle of PWM waveform is given by:

$$\text{Duty cycle} = \frac{Ton}{\text{Ton} + \text{Toff}} \text{ x } 100;$$

IV] RESULTS AND DISCUSSION

The main purpose of designing an automatic fan is to conserve energy and also to reduce human efforts. Automatic switch on/off will help in conservation in energy in case of negligence. Since the speed of the fan is controlled automatically based on the ambient temperature, there is no need for manual adjustment.

REFERENCES

[1] By Jongwoo Lim and David Kriegman "Tracking Humans using prior and Learned Representations of Shape and Appearance"

[2] By Akhil D.Gotmare,M.Sambath, S.Ravi "Tracking and Recognizing the Moving Object In Real Time Using Frame Difference Method"

[3] By Sang-Hoon Lee, Yan-Fang Li, and Vikram Kapila "Development of a Matlab Based Graphical User Interface Environment for PIC Microcontroller Projects"

[4] Hamid A Toliyat, Gerald B Kliman, HANDBOOK OF ELECTRIC MOTORS, second edition revised and expand