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Power Saving System based on Temperature Control Sensor

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Abstract:- **This paper gives an idea about the measurements of room temperature with the help of LM35 sensor. Also it is detect the presence of human beings inside the room with the help of PIR sensor while LDR is used to sense the intensity of environmental lights. These entire sensors are connected with the microcontroller AT mega 32. If the intensity of environmental lights falls below the set points, artificial lights inside the room will be turn on. Otherwise remain it will be turn off. Similarly is the temperature of the room fall below a particular set point, the heater will be turn on, if the temperature raise above a particular set point the heater will be turn on and fan will be automatically turn on, so as to maintain a desired temperature inside the room. it is work only in the presence of human being only. So, in the absence of human being the system will be turned off. Thus, there will be no wastage of electricity and hence the power. Resulting a saving in electricity bills .**

I. INTRODUCTION

The home automation or industrial automation is becoming more popular due the compactness and utility enable features. In the market, equipments for the industrial automation are available but they are too expensive to be implemented by a normal citizen .Although certain equipments are still available for domestic purpose, but neither they are not readily available in the market nor does it come under the economical range. At the same time the energy saving devices are very much required by the people to reduce the waste of power. Hence there are always remain a sustain demand for an integrated device that can be used for automation as well as power saving. the objective of this paper is to design and implement and integrated device that can be used for controlling the speed of a fan automatically as well as controlling a heater unit to switch on or off automatically, depending on the room temperature. The main features and objectives of the proposed design are: a) Temperature monitoring unit or system, b) Temperature control of fan speed, c) controlling the artificial lights depending on the intensity of environmental lights, d) Controlling the heater unit to maintain comfort level of air conditioning, e) Adjustable knob to set threshold value for auto activation of artificial lights, f) auto and manual mode selection of the operation.PIR sensor was used to detect the human being. In presence of human being inside the room, light and the fan inside is switched on. In absent of human being inside the room, the lights and the fan switched off. Thus this Scheme reduced both human effort and wastage of power. But the control action did not take place in this apart.LM35 temperature sensor was used to measure the temperature and L293D motor driver circuit was used to control the speed of a DC motor using PWM technique .But the saving of electrical power was not done earlier.

A. Components Used

B. Methodology

The scheme uses a12-0-12V, 750mA centre tap

Sl. No.	Components
1	Transformer (step down)
2	IN4007(Rectifier Diode)
3	Capacitor
4	LM7805(Voltage regulator)
5	Capacitor/Ceramic
6	ATMEGA32
7	40Pin IC base
8	Crystal
9	Capacitor
10	Power switch
11	Micro switch
12	PIR sensor
13	LDR
14	LM358(OP AMP)
15	20k POT (Bin)
16	10k POT (PCB mounter)
17	LCD (JHD 162A)
18	LM293D (motor driver)
19	Relay
20	2n222 (Transistor)
21	PCB
22	LM35 (Temperature sensor)

transformer. The output of the transformer is connected to a full wave rectifier circuit (using two diodes IN4007). Across the rectifier output a 25v, 100mfd electrolytic capacitor is connected, it is to use reduced the noise of the rectifier output voltage. An IC voltage regulator7805 (3pin) is used.pin-1 is connected to the positive plate of the electrolytic capacitor, pin-2 to grounded and pin -3 and pin-2 is connected to the 5v dc voltage regulator .Now two 2mfd ceramic capacitor are connected across pin-1, pin-2 and pin-3 of the IC regulator 7805. These capacitors are used to reduce the noise in Voltage. The microcontroller atmeha32 has 40 pin is used here where a 16 MHZ crystal is connected across pin-12 and 13.it is used to set the clock frequency for the micro controller. Across the crystal, two 22 pf ceramic capacitor is used to reduce the noise. Pin-10 of the microcontroller is connected to VCC and pin-11 is connected to ground. Now, the rest circuitry with a manual reset button is connected to the pin-9 of the microcontroller. For display purpose, LCD JHD162A is used. it consist of 16 pins. its pin-1 is grounded and pin-2 is connected to VCC. Its Pin-3 is for contrast control. For this purpose, a10K potentiometer is used. The two fixed point of potentiometer is connected to the Vic and the variable point is connected to the pin-3 of the LCD.Pin-4 of the LCD (RS) is connected to the pin-28 of the microcontroller (PC6).pin-5 of the LCD is connected to the pin -29(PC7).pin-6 of the LCD (EN) is connected to the pin 5(PB4) of the microcontroller. The LCD used in 4bit mode. Therefore, pin-7 to pin-10of the LCD (i.e. DB0-PB3) is not used. Pin-11 to pin-14 of the LCD (i.e. DB4-DB7) is connected to pin-1 to pin-4(i.e. PB0-PB3) of the microcontroller. Pin-15 of the LCD is connected to VCC and pin-16 of the LCD is connected to ground.LM-35 is used for the temperature measurement. It is an analog sensor. It is a 3pin IC. Its pin-1 is connected to Vcc, Pin-3 is connected to ground. Its pin-2 is output pin connected to pin-40 of the microcontroller. The Lm35 series of temperature sensors are rated to operate over a temperature range of -55°C to 150°C. The scale factor for temperature to voltage conversion is 10mV per °C. There is no negative voltage source is used, and therefore the use of sensor is limited for measuring temperature above 0°C(up to 100°C).The output voltage from the sensor is converted to a 10-Bit digital number using the internal ADC. The process of A/D conversion is carried out as follows. Since Vref is 5 V, and the ADC is 10-bit; hence, any input voltage from 0-5V will be mapped to a digital number between 0-1023.The revolution of ADC is 5/1024= 0.0048828 V/count. Therefore, the digital output corresponding to any input voltage Vin = Vin /0.0048828. Now the procedure to get the temperature back from this whole process of converting sensor's output to 10-bit digital number is explaining as follows. Suppose the surrounding temperature is 26.4°C. The sensor output will be 264 mV (0.264V). The output of ADC will be 0.264/0.0048828 = 54. If this process is reversed then 54, as is obtained from ADC hence the temperature can be calculated by using the sensor scale factor (10mV/°C) as

Temperature = 54 * 0.0048828(V/Count) /0.01(V/°C) =26.4°C

Neglecting the Floating point math in the program, the above Expression can be simplified as

Temperature = 54 * 48828 = 2636712

To this display, a decimal is to inserted at the fourth place from the left, so the calculated temperature comes out to be is 26.36712°C i.e. around 26.3°C.once temperature is divided in °C, it can be converted to °F using a simple equation, Temperature in °F = 9* temperature in °C/c + 32

As this case, the number for °C is scaled by 10(263 for 26.3), hence, the expression will be written as

Temperature in °F = 9* temperature in °C/5 + 320

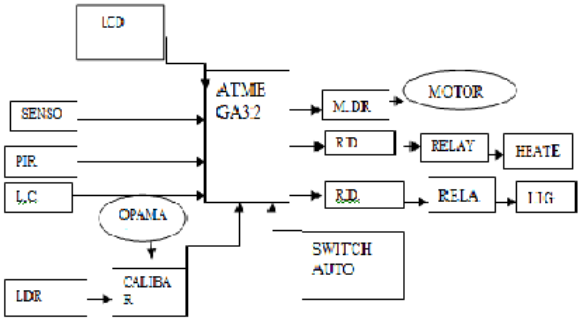
Since, the number for °C may not be exactly divisible by 5 (such as 263 is not), further elimination of the floating point is due by scaling it one more time by 10. So the new equation will become,

Temperature in °F = 9 x temperature in °C x 10/5 +3200

Or, Temperature in °f = 18 x temperature in °C x 10/5 +3200 = 18 x 263 +3200= 7934

A PIR sensor detects the human being. Its pin-1 connected to Vcc, pin-3 is grounded. Its output will be 0 V in the absence of human being and 3.2 V in the presence of human being. The voltage and output current is too low to trigger the microcontroller hence to increase the current, a switching transistor 2NC222 is used. It is an NPN transistor. Pin-2 of PIR sensor connected to the base transistor through a 120 Ω resistor. To control the speed of DC motor the IC L293D is used. The two terminal pf the motor connected to the pin-3 and pin-6 of the IC. All outputs are connected to the ground .The speed of the motor depends upon the temperature. Whole process will depend on the variation of temperature .A 8 pin IC is used it is a comparator IC .it is consist of two comparator A & B. when the light intensity increases, the resistance of the LDR decreases. When the enough lights in the surrounding resistance of the LDR is less. Hence, voltage across the 10k resistor will be large so that

potential of pin-3 will more than the potential of pin-2 of the comparator .hence the output of the comparator A will be high which in turn will make PC-0 high. Similarly, when there is less light surrounding, PC-0 will be low. then with the help of suitable program , PD-6 of the microcontroller will be low or high accordingly. PD-6 is connected to relay circuit. When PD-0is high, the relay coil will be excited and a light will be switch on at the relay output. When PD-0 is low, the relay coil will not be excited and the light will be switched off.



C. Recorded of temperature variation during a day

Time Of The day	Temperature Displayed by LM35(°C)	Thermometer Temperature (°C)
6 AM	18.3 approx.	17.9 approx.
8 AM	19.5 approx.	19.2 approx.
10 AM	21.2 approx.	21.4 approx.
12 PM	24.4 approx.	24.3 approx.
2 PM	25.1 approx.	25.5 approx.
4 PM	24.3 approx.	24.2 approx.
6 PM	21.1 approx.	21.0 approx.
8 PM	19.6 approx.	19.4 approx.
10 PM	19.1 approx.	18.7 approx.

D. Conclusion:

The waste of electrical energy is the major concern now days. Hence, it is required a perfect strategy to reduce this wastage. Although many electrical devices are available, but the easy availability and affordability to the common peoples is the major factor. Keeping in view on the above factor the scheme is implemented which is found to be satisfactory and defiantly .It is simple in nature and also low in cost.

But i got so many difficulties to get the accurate result .it might be for some instrumental error.

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