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RESEARCH ARTICLE OPEN ACCESS

Smart Home Automation Based On 555 Timer

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ABSTRACT
Technology is growing rapidly and gone are the days when we had to wake up in the middle of the night to adjust our fan speed or times when we had to turn on the light each time we walk into a room and turn them off whenever we walk out. These works are no longer done by humans instead performed by machines through automation, which is one of the popular trends in the world of technology. Automation used for home appliances is referred as HOME AUTOMATION. This paper describes a system for efficient home automation without programming by using a 555 timer. It turns on electrical lights and fan whenever a person enters a room using PIR sensor and adjusts the speed of the fan according to room temperature.
Keywords: Home automation,555timer,PIR sensor ,thermistor, relay.

I INTRODUCTION

Electrical Lights and fans are some of the widely used devices in any household with electricity. But often these devices are operated manually. They have to be switched on whenever a person enters a room and speed of the fan is often adjusted manually in accordance with temperature requirement. Which usually becomes a tiresome task in places with rapidly changing climatic conditions. This raises the need for automation.

Such a system can be implemented using a microcontroller[1] or by using a temperature sensor[2].This paper provides an alternate approach which uses a 555 timer as heart of the system and doesn't require any programming.

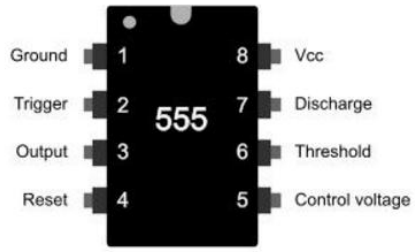
Advantages of having a 555 timer is its high operating voltage range of +5 to +18 volts, it's cost effectiveness and the fact that it doesn't require any programming.

This system uses a PIR sensor to detect a person while entering the room and to start the operation. Negative temperature coefficient thermistor is used to detect the temperature changes.555 timer is used in astable mode of operation.

II HARDWARE IMPLEMENTATION

2.1. 555 TIMER: IC 555 timer is a one of the most popular IC in electronics and is used in various electronic circuits for its stable properties.It is available in 8 DIP(Dual In-Line package).NE555 timer is used.

PIN DIAGRAM OF IC 555



2.1.1. Ground: This pin is connected to the common,sometimes to negative terminal of the power supply.

2.1.2.Trigger: This pin is connected to inverting terminal of COMPARATOR. The trigger input is compared with the 1/3 of Vcc. In general TRIGGER pin will be at Vcc in normal operating conditions.

2.1.3.Output: The output of SR flip flop will drive the inverter and the output of the inverter is taken as Output of 555 timer.

2.1.4.Reset: The RESET pin drives the PNP Transistor. Usually RESET pin will be at Vcc(Logic 1).If RESET(Logic 0) is given to pin 4 the output of 555 timer will go to zero independent of the trigger input.

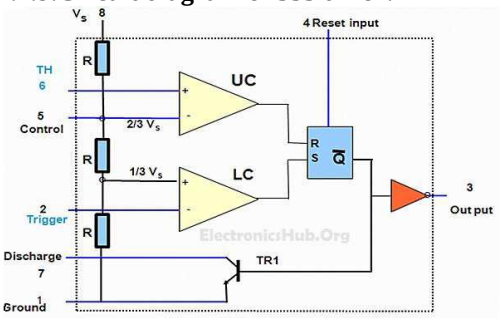
2.1.5.Control voltage: This pin is connected to the inverting terminal of Comparator 1.Generally the pin voltage is at 2/3 of Vcc and the pin is connected to ground through coupling capacitors(0.01uF) to suppress noise.

2.1.6.Threshold: This is the input to the non inverting terminal of the first Comparator.The voltage that can be applied at this pin is between Vcc and ground.

2.1.7.Discharge: This pin is connected to the capacitor of charging unit.A 100mVvoltage and a 5mA current is needed.

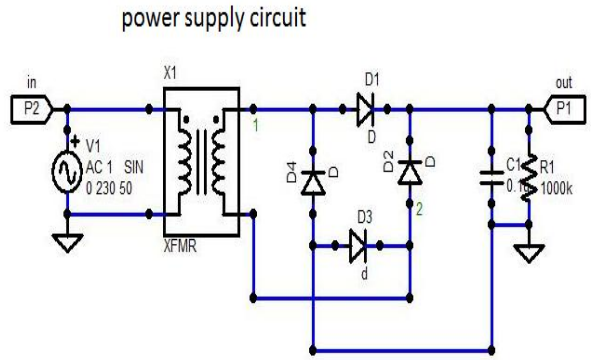
2.1.8.Vcc: The power supply can be from 5V to 18V.The power supply is connected to this pin.

2.1.9.Circuit diagram of 555 timer:



It employs 2 comparators and a SR flipflop[3].

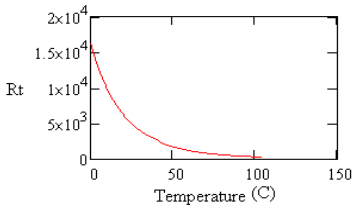
2.2.POWER SUPPLY: Power supply employed in India is 230v,50hz this is converted in 9v dc by using a step down transformer and full wave rectifier.



2.3 PIR SENSOR:

PIR sensors are used to sense the motion. It is used to detect whether a human has moved around the sensors range. PIR sensors are used to detect the IR wavelength when a human being is in its vicinity.
Sensitivity Range : Up to 20 feet(6 meters).
Power Supply : 3.3V to 5V.

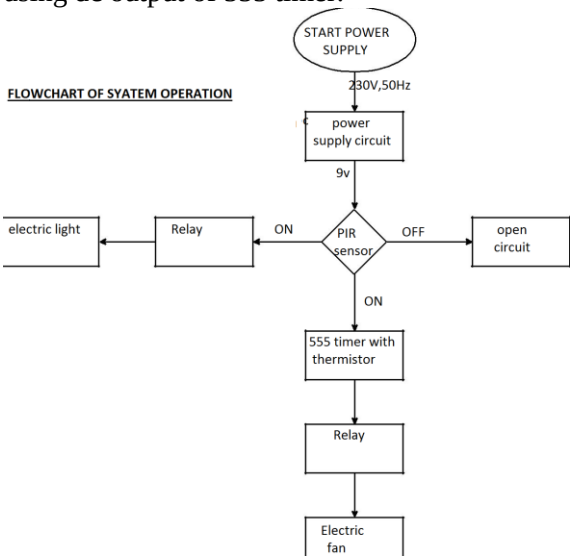
2.4thermistor:A Thermistor Is a type Of Resistor Whose Resistance Is Dependent On Temperature, More So Than In Standard Resistors. For A Thermistor Which Is Negative temperature coefficient type the resistance is inversely proportional to temperature.

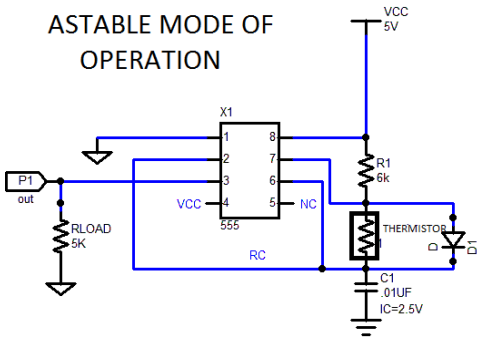


2.5 RELAY: Generally RELAY are used to provide an electrical connection. The most widely used type of Electrical relay is the Electro-mechanical Relay .Relays are used to switch smaller currents in a control unit. Relay control one circuit by opening and closing contacts in another circuit

III OPERATING PRINCIPLE

Initially 230v,50hz supply is given as input to the power supply circuit mentioned above. The 9v output is given as input to PIR sensor, if a person enters the room PIR sensor senses it and turns on the light. The 555 timer (NE555)functioning as astable multivibrator will start .It generates pulses with ON time=0.69(R_A*c) and OFF time =0.69(R_B*C) . As the temperature of the room falls the resistance of thermistor raises and therefore R_B increases thus the average voltage decreases and fan speed is reduced. If room temperature increases R_B decreases thus increasing the average voltage and therefore fan speed is increased. A relay is used to control the 230v ac using dc output of 555 timer.





IV SOFTWARE IMPLEMENTATION

4.1. Power Supply Circuit:

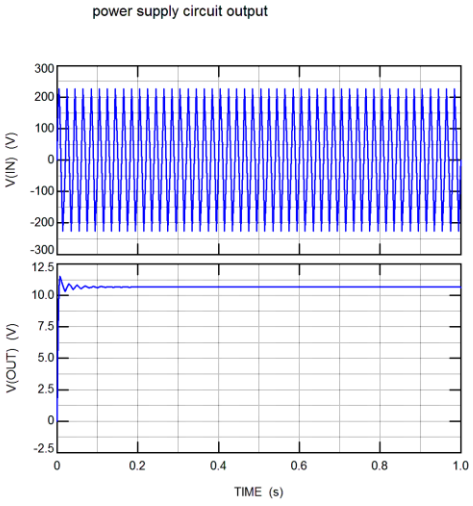


fig: 230v ac converted to 9v dc

4.2.Electric Fan Speed Control:

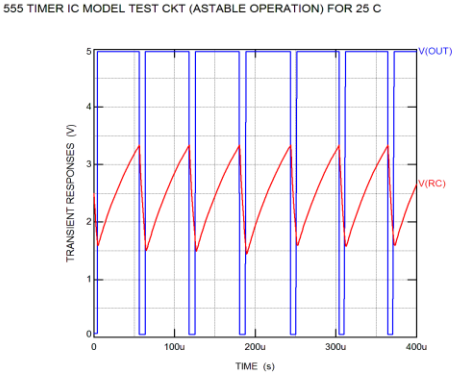


fig: output of 555 timer for 25 c

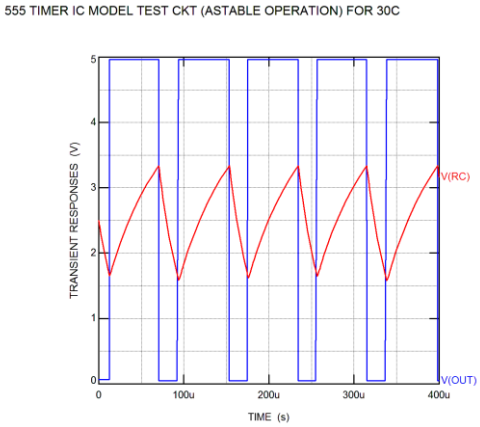
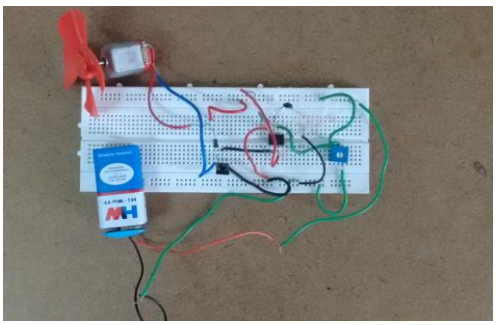


fig: output of 555 timer for 30c

V REAL TIME IMPLEMENTATION

5.1 FAN SPEED CONTROL:



VI FUTURE ADVANCEMENTS:

6.1.AIR CONDITIONING: If the numbers of persons are increasing in the room then "HOME AUTOMATION" makes the ceiling fan to run with greater celerity there by reducing the temperature.

6.2.LIGHT CONTROL: Adjustment of lighting in the room in accordance with lighting of the ambient lighting.

VII CONCLUSION

Automation system may be a creative management or it's going to be comprehensively automated wherever the appliances will be remotely controlled. The demonstrated project used infrared sensor to detect the person and based on that 555 timer controls light & speed of fan. This light & fan control system provides high potency, low noise and low power consumption. The system requires solely 9V dc voltage. The work includes knowledge relating to design of 555 timer. Hardware and software implementation provide the work additional acceptability as the price is a smaller amount . The work can be harmonious with

some other instrumentality to use just in case of bigger place such office and business.

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