

An Integrated Approach of Self Automated Fan with Speed Control System

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ABSTRACT: One of the challenges facing in human day to day life is manual control remains unchanged i.e., it requires the presence of human to operate everything. Manual control can be updated by adapting automatic control. Automatic plays a vital role in human life. In this paper, the concept of controlling the speed of the fan automatically using ATmega328 Microcontroller. PIR (Passive Infrared Sensor) senses the presence of human within the room and passes the signal to the Controller. LM35, a temperature sensor used to measure the temperature of the surroundings, where Arduino UNO is used as an interface to measure and control the system and is programmed using Embedded C.

KEYWORDS: Embedded C, Arduino UNO, PIR Sensor, LM35, ATmega 328

I. INTRODUCTION

In recent year, the home environment has seen a rapid development with the help of advanced technology. Here it controls the speed of an electric fan according to change in surrounding temperature. The system will provide reliability and advanced functions by choosing closed loop control with the embedded technology. In order to highlight the features additionally, a LCD display is used. Whenever there is a change in room temperature, it will automatically update the contents in the display and change the fan speed simultaneously. Micro controller is the main part of the circuit as it controls all the functions. All the components required in the circuit is easy to build. Relays present in the fan will be operated whenever the output from the microcontroller pin to relay is changed to high. Switching of various level of speeds is achieved solely with the assistance of human support and it's not maintained properly consistent with the temperature of the environment. This additionally includes unwanted participation of human in the regulation of speed. In order to overcome this situation we developed this method in which fan is controlled based on the temperature of the surroundings where it is used. Fan or air conditioner needn't to be used during cold days. Air regulations should be needed as per our wish. This can be done only through manual effort. To avoid this inconvenience, automatic control of the fan speed should be needed. Programs are developed using Embedded C and it is flashed into the microcontroller.

II. RELATED WORK

Power circuit consists of rectifier, voltage regulator, filters converts 220v ac to 5v dc and 12v dc. Arduino UNO is powered by 5v dc and 12v supply is connected to motor driver. PIR sensors have a 3-pin at the side or bottom. Out of three pin, one is grounded, other is signal and the last pin is power. Input is about 5V power is supplied. Once the sensor is warmed up the output will remain in low, whenever the output will swing high for a couple of seconds it will remain high, then returns to low. If the sensors line of sight is high to low, the output will be remaining in the same manner. LM35 is a temperature sensor with an output voltage linearly proportional to the Centigrade temperature. It doesn't need any external calibration or trimming to provide typical accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full -55°C to 150°C temperature range. A small cost is assured by trimming and calibration at the water level. The device is employed with single power supplies. PIR sensor detects users and fan starts working automatically in the presence of human and stops in their absence.

Temperature sensor senses room temperature and controls the speed of the fan automatically according to set temperature. Motor driver controls dc motor and speed, temperature is displayed in LCD.

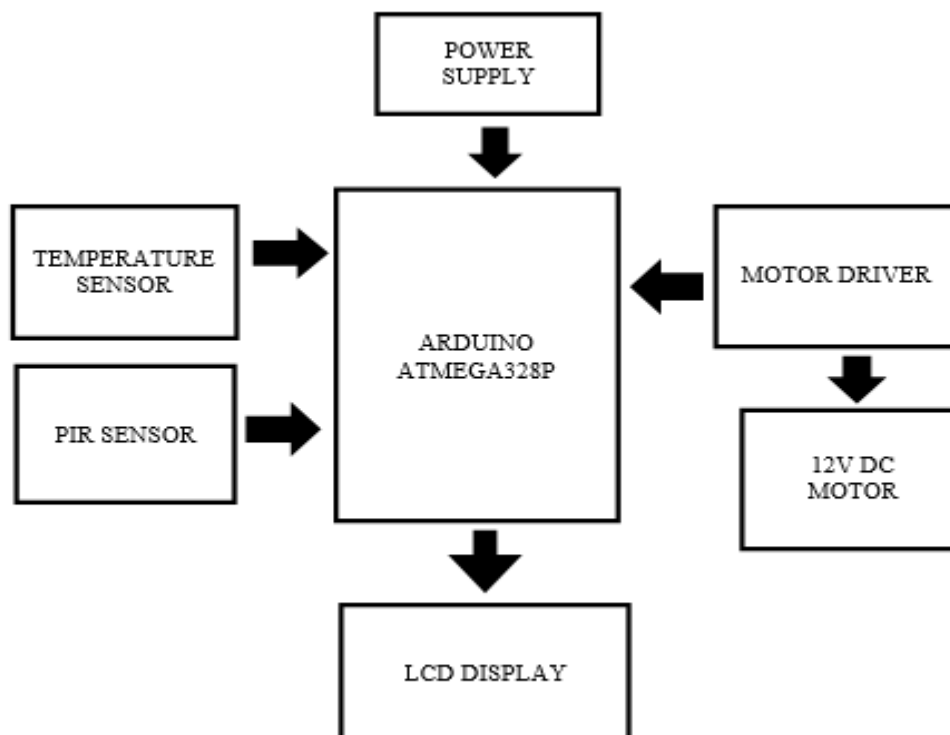
III. EXISTING METHOD

In the Existing system, the method is formed by heating the sensor to control the fan. To increase or decrease the fan speed, thermistor is used. Where speed of the fan is dependent and controlled. Since thermistor has high resistance and huge noise problems. It is not suitable for larger temperature ranges and is nonlinear. To overcome this issues, LM35 is used provides linear temperature values. ATmega328 is used as a microcontroller which has low power consumption with added merits to the circuit. One of the existing method describes that a threshold temperature is maintained. It is calculated in such a way that if the temperature falls below the minimum temperature threshold value, the fan will be in OFF state. If the temperature falls beyond the maximum threshold, the fan is said to be in ON state.

IV. PROPOSED METHOD

The concept of smart home are getting popular all around the world. However, this can be done manually. The smart fan controls its speed level according to the surrounding room temperature. This was suppose for the power usage monitoring, smart appliances that have a feature of automatic ON/OFF system will save electricity and time. Temperature sensor used to measure temperature and PIR sensor used to detect the movement and the motor driver is interfaced with Arduino as a user interface and processing units to make it automatic and LCD used to display speed and temperature. PIR (Passive Infrared Sensor) senses the presence of human within the room and passes the signal.

A. BLOCKDIAGRAM



B. HARDWARE DESCRIPTION

PIR SENSOR: PIR detector detects an individual being on the move around within approximately 10m from the detector. This is a mean worth because the actual detection ranges vary is between 5m and 12m. PIR units are basically made of a kind of infrared sensor, which may find various levels of infrared radiation. For numerous essential outcomes or things that required to find when an individual has left or entered the area.

TEMPERATURE SENSOR: LM35, a temperature sensor used to measure the temperature of the surroundings, where Arduino UNO is used as an interface to measure and control the system and is programmed using Embedded C. It covers a wider temperature range of about minus 55°C to plus 150°C. Lower value is assured by trimming and standardization. It provides lower output resistance, accurate output with precise in temperature calibration so that it will be easy to control the circuit in desired direction.

MOTOR DRIVER: Motor driver makes the dc motor to drive the current on clockwise as well as in anticlockwise direction. Thus the designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

LCD DISPLAY: The LCD display used in this project consists of 2 rows. Each row consists of maximum 16 characters. Here LCD display is used to display the fan's operating speed, ON/OFF status of the fan and temperature respectively.

C. SOFTWARE DESCRIPTION

ARDUINO UNO: It is a software platform (open-source) based on an easy-to-use hardware and software with a printed circuit board the key features are:

- One will panel control board functions by sending a collection of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- i. It does not need any other hardware part (called a programmer) in order to load a new code onto the board. It can be loaded by merely using a USB cable.
- ii. The Integrated Development Environment of Arduino uses a simplified version of C language, making it easier to learn to program.
- iii. It permits to have a standard that breaks the functions of the microcontroller into a more accessible packages.

V. EXPERIMENTAL RESULTS



(A)



(B)



(C)

FIG A depicts that initially the fan is in OFF state since there is absence of humans. It indicates when the fan is in off state that means there is no presence of human in that corresponding room or place where the smart fan is present.

FIG B depicts that the fan is turned ON according to the temperature changes, speed is also varied and the fan is ON which denotes the human presence correspondingly.

FIG C depicts that the fan remains turned ON due to the human presence and the speed is attained to its maximum value since it reaches the maximum temperature range.

VI. CONCLUSION

Thus the Arduino based smart fan system controls the regulation of fan speed based on the temperature of the room and automatic ON/OFF of fan system based on the presence and absence of the human inside the room. Its flexibility and reliable functioning controls the action of regulation without manual operation.

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