

Comfort Sensor Using Fuzzy Logic and Arduino

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Abstract : Automation has become an important part of our life. It has been used to control home entertainment systems, changing the ambience of rooms for different events etc. One of the main parameters to control in a smart home is the atmospheric comfort. Atmospheric comfort mainly includes temperature and relative humidity. In homes, the desired temperature of different rooms varies from 20 °C to 25 °C and relative humidity is around 50%. However, it varies widely. Hence, automated measurement of these parameters to ensure comfort assumes significance. To achieve this, a fuzzy logic controller using Arduino was developed using MATLAB. Arduino is an open source hardware consisting of a 24 pin ATMEGA chip (atmega328), 14 digital input /output pins and an inbuilt ADC. It runs on 5v and 3.3v power supported by a board voltage regulator. Some of the digital pins in Arduino provide PWM (pulse width modulation) signals, which can be used in different applications. The Arduino platform provides an integrated development environment, which includes support for c, c++ and java programming languages. In the present work, soft sensor was introduced in this system that can indirectly measure temperature and humidity and can be used for processing several measurements these to ensure comfort. The Sugeno method (output variables are functions or singleton/constant, more suitable for implementing on microcontrollers) was used in the soft sensor in MATLAB and then interfaced to the Arduino, which is again interfaced to the temperature and humidity sensor DHT11. The temperature-humidity sensor DHT11 acts as the sensing element in this system. Further, a capacitive humidity sensor and a thermistor were also used to support the measurement of temperature and relative humidity of the surrounding to provide a digital signal on the data pin. The comfort sensor developed was able to measure temperature and relative humidity correctly. The comfort percentage was calculated and accordingly the temperature in the room was controlled. This system was placed in different rooms of the house to ensure that it modifies the comfort values depending on temperature and relative humidity of the environment. Compared to the existing comfort control sensors, this system was found to provide an accurate comfort percentage. Depending on the comfort percentage, the air conditioners and the coolers in the room were controlled. The main highlight of the project is its cost efficiency.

Keywords : arduino, DHT11, soft sensor, sugeno

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