

Intelligent Window Controlling System

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During the 21st century the global surface temperature has increased dramatically as a result of that, Air conditioners are often used to improve thermal comfort and indoor air quality. In both developed and developing countries, air conditioners increase the occupancy ratio of building areas. But air conditioners are expensive option for this issue. Because of that we need to optimize usage of air conditioners only in comfort zone.

This research is conducted due to the growing energy management interest in the air-conditioning industry. Most of the places outside air temperature and humidity drop down to human comfort levels during the night time. It may take considerable time to transfer these environmental conditions into the room. Insulated thermal envelope may be slowing this process furthermore. The objective of this research was to transfer the fresh outside air into the air conditioned room when the outside environment is in the comfort zone. Comfort zone is an area marked in the psychrometric chart which is comfortable for human being. The American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE's) publication on thermal environmental conditions for human occupancy has defined the comfort zone with suitable temperature and relative humidity (RH) ranges. The specified temperature and humidity ranges for the designed system are 22 Celsius & 40 RH to 27 Celsius & 60 RH respectively. The designed controller detects the outside temperature and relative humidity every 15 minutes and opens the windows of the room if the outside fall into comfort zone. When the windows are opened the air conditioner is switched off by the controller at the same time.

The designed system consists of three separate items such as outdoor unit, indoor unit and actuator driver. Relative humidity and temperature of the outside air are measured and transmitted to the room via radio frequency (RF) communication system by the outdoor unit. The indoor unit receives the transmitted signal from the outdoor unit, process it and produce appropriate signals to both actuator driver and air conditioner. Therefore, actuator driver is controlled the window according to the outside environmental conditions.

The designed system is commissioned in Thailand and it is proven that the device is significantly saving the energy in the residential sector.

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