The air conditioning (AC) system, especially the central AC system, plays a vital important role in adjusting the indoor temperature and humidity in summer. In European market, it is noticed that nearly 1.6 million units of air conditioning system were sold in 1996 (Adnot et al, 1999) and the number rapidly increased to 3.5 million units in 2005 (Grignon-Massé et al, 2011). Compared to the conventional AC system, the central AC system have achieved more popularity because of the automatic control with thermostat adjusting the temperature and humidity. In addition, ENERGY.GOV(2015) pointed that the best central AC system is able to save 30%-50% less energy to produce the cooling load in summer since the mid 1970s.

Traditional central AC system is not able to satisfy people’s requirement in saving energy, especially to the commercial and industrial buildings. As Ahmed et al(2007) stated that the users can hardly to give any professional thoughts to find ways for energy saving after the installation.

### Methodology

- The James Watt building is chosen to be the experimental subject, where the sensor is used to collect the temperature and humidity in order to analyse the energy consumption for comparison.
- Two kinds of fuzzy logic algorithms are used to set up models in the chosen building for analysing the energy consumption.
- Compare the output of central AC system, which is considered to be the representative parameter of energy consumption.

- The data collected from data logger in James Watt.
- Use MATLAB STIMULATE to create model to analysis the energy consumption.

### Conclusion

- Neuro-fuzzy algorithm is definitely superior to fuzzy logic algorithm as it inherit adaptability and learning. It can be concluded from the simulations that neuro-fuzzy control makes the system adaptive to the room environment and weather.
- From this project, it can be seen that the fuzzy logic algorithm including the neuro one have a better performance in energy saving and the further study will mainly focus on developing more controlling method based on the complexity of central AC system.

### Discussion

Through the simulation analysis in MATLAB, it is clear to draw the conclusions(Fig.1, Fig.2 and Fig.3)

### Result

- The system based on Neuro fuzzy performed the best.
- The fuzzy logic control can save energy than the traditional method.
- More combinations with fuzzy logic control will have better performance.

### Advice

- More combinations with fuzzy logic control will have better performance.
- More rules in Neuro-fuzzy algorithm will have better performance.

### Further

- More combinations with fuzzy logic should be taken into consideration.
- Energy saving technologies requires more effort to be developing system.

### Limitations

- Precision of equipment
- External errors
- Internal errors
- Uncertainty

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### Reference

