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AE 790 Intelligent Buildings

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**Mechanical Intelligence**

The purpose of this paper is to discuss options, problems, and opportunities in the mechanical systems of the personified “intelligent building”. Global warming and ozone depletion are terrible effects on the atmosphere primarily as a result of heating and air conditioning systems in buildings. Changing the effects of these systems can have a worldwide impact. The discussion will elaborate on the comfort possibilities and sacrifices for a typical buildings’ occupants. It will discuss system options for those inhabitants willing to sacrifice to save money and the environment as well as how to integrate these changes into society.

Green practices within commercial buildings are the most effective way to attack the problem of global warming and ozone depletion. As suggested by Anthony Deese, society should take baby steps to branching into the unknown. This unknown incorporates the societal drivers that are slowly evolving to account for the environment within its decisions. Our country especially makes this hard to separate from the old ways.

“Who says you can’t have it all?” ([www.talesmag.com](http://www.talesmag.com)) This “*American thinking*” is not the mentality they should have. This popular quote says much about American mentality towards to the environment. Immigrants came to this land for its limitless resources, and that way of thinking has continued today. Other countries have taken more of a stance towards improving the environment. For example, since the Montreal Protocol, Germany has dropped pollutants in their air by 17%, while the United States has actually increased (\_\_\_). One nonrelated example is the law that they passed, disallowing them to warm up their cars in the morning. One can receive a citation and fine for allowing their car to idle for more than 30 seconds before pushing the accelerator. The government has taken a greater stance towards helping these worldwide impacts. Education should be the way to change this American mentality to improve upon the current environmental situation.

Societal drivers that also integrate into this massive change to improve the environment are money and time. It takes more time and money to produce a completely innovative design that may be LEED and Globe certified rather than create a initially cheap standard design. “America has an exaggerated estimate of the value of time and is always in a hurry.” (Micheal Chevalier) It is a simple fact that generally one wants to spend the least amount of money possible, and it is hard convincing a client that there will be a payback and that the payback is beneficial in many ways.

Robots within building to aid with mechanical systems will make a building mechanically intelligent. These robots can aid in cleaning, construction, sensing. There are many aspects that a robot can aid to an owner. Most importantly for an owner, these assistants can save them money by reducing employees. With this reduction of employees, it can decrease the cost of insurance as well. The robots can do the “dirty work” or the dangerous work reducing injury within the work place. The robots could be employed to monitor mechanical equipment, including routine maintenance like filters to less frequent maintenance such as lubricating the mechanics. Robots with sensors would be of great assistance to detect these typical maintenance items and confront and deal with the situation.

Robots with sensors can detect friction, temperature, humidity, and light. The robot can sense the opportunity of problem, deal with it, and then the beauty of the robot is that it may have the ability to apply its knowledge and anticipate when problems or opportunities may arise. This has potential to save the owner money if the mechanical equipment may preheat or recool when they know that for the last week the peak happened around 4 pm. Then the unit will also know to lower the cooling after this peak as well.

Building automation is not synonymous to intelligent buildings. An intelligent building is what is best for the owner based on automation that they can control, what they can monetarily afford, and what maximizes their inhabitants comfort and effectiveness of the space. The owner should be able to the maximum flexibility from the building, but maximum flexibility means less energy efficiency. Different spaces require difference energy. For example, an office building typically has 3 watts per square foot for lighting and equipment while a restaurant kitchen typically has 15 watts per square foot. Also an office building will have approximately 150 square feet per person, but a multipurpose room will have approximately 15 square feet per person. These are both examples of how mechanical systems need to be specifically designed for each unique space. The sensible and latent loads vary dramatically from space to space, so flexibility to change the purpose of a space mechanically is impractical. If an owner would like many uses for one space, this leads to sever over sizing of the equipment. The equipment would be oversized to accommodate the peak load of the most populated and active space.