Energy-Conscious Home Automation

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The Energy-Conscious Home Automation design project not only provides an energy-conscious Home Automation System (HAS) as the name suggests, but also a reliable, well-integrated solution in which everyday activities are carried out in a home environment. The system is as easy to setup as plugging any appliance into an outlet. All these features are made possible at a very affordable cost.

The system provides an intuitive user interface through an iPhone application. As long as an internet connection can be established, this application will allow the user to control all connected appliances. The user will also be able to monitor energy usages of the appliances. All this can be done at any time of day from anywhere in the world. The aspects remotely controlled in the HAS include the blinds, brightness of lights, and outlet power to appliances. The system will also start adapting to the user, allowing the system to act with as little direct user input from the smartphone app as desired.

The motivation to create such a system initially came from the lack of an affordable integrated HAS that integrates blinds, lights, power, and HVAC systems together. The idea for our project also came from the desire to save energy in common daily scenarios. By saving energy everyday, however little it may be, the total energy saved in the long run will be substantial.

To create a comfortable and energy efficient HAS, sensors are used for temperature, motion, humidity and light. Control devices used in conjunction with these sensors include solid state relays, a dimming circuit, and a servo. Furthermore, database services are used in a cloud to provide accurate real-time data. This combination of devices and software allows for increased ambient sunlight with automatic blinds, a dimmable lamp allowing less energy to be used for lighting, and turning off lights/appliances remotely. By integrating the Energy-Conscious HAS into a 3 bedroom home, there was a noticeable 13% decrease in energy consumption. [1]

Furthermore, by implementing a learning algorithm, a prediction can be made as to what actions the user is likely to do. By integrating event driven pattern recognition with this learning algorithm, there is an increase in more than 20% accuracy of the predictions. [2]

Our system is reliable, affordable, and energy efficient. Using our system in every home around the world will provide a noteworthy step toward combating the energy crisis.