SMART House: Utilizing Embedded Electronics for Efficient Living

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This project attempts to create a more energy efficient heating/cooling solution when compared to the traditional method of utilizing a whole house thermostat to maintain temperature. A typical home thermostat utilizes one temperature sensor centrally located to maintain the entire house, which is less than optimal. The goal was to have a system that measures the temperature of each room, and determines when and how to minimize stratification. The system software was written and set up to monitor three temperature sensors and control two fans within a two-room model. Room 1 has temperature sensors #1 and #2 installed. Room 2 has temperature sensor #3 installed. If temperature sensor #1 is warmer than sensors #2 and #3, room 1 fan turns on. If temperature sensor #3 is warmer than sensor 2, then room 2 fan turns on. Additionally, a photo resistor was programmed to control a stepper motor that opens and closes a shade to take advantage of solar radiation. As design criteria checks verified that the system was fully functioning on its own, it was concluded that a system could be designed with embedded hardware and software that determines how to minimize stratification. The system responses written in software work to remove stratification in the model house in an environmentally conscious manner. This is a new concept that will promote energy efficient living with an autonomous system for a relatively inexpensive cost. There are numerous features that may be added to this system that make it highly extensible. Future work includes adding motion, humidity, power, and water sensing, as well as mobile control, support for system optimization, and an optional LCD or local computer interface. In addition, a patent for this design will be pursued.

Awards Won: