Remote Controlled Thermostat

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November 1, 2007
Introduction

My senior project will entail making a thermostat that is controlled by a user on a telephone. The thermostat system will allow the person to turn on the thermostat, check the temperature of the house, and also change the temperature of the room by setting the thermostat over the telephone. The thermostat will also be able to be controlled by a user interface built on the thermostat itself.

Description

The final product will include a microcontroller and the digital telephone circuit that was designed and implemented in Leo Wan and Justin Klumpp’s project two years ago for a home security system. The telephone interface includes a Data Access Arrangement (DAA), a Dual Tone Mult-Frequency (DTMF) Transceiver, and a multiple message voice recording playback device. The microcontroller will control the interface between the thermostat and heating, ventilation, and air-conditioning (HVAC) system using the basic HVAC outputs for purposes of the demonstration. The thermostat settings will be shown on an LCD display with the date, time, current temperature, and temperature that the thermostat is set to. A Preliminary-Block Diagram of the system is given below;

When the owner of the product dials the number for the thermostat the audio control interface will come up prompting the user for a password. The touchtone password is then sent through the DTMF circuit allowing only the user who has the password authorization access to the home control module. Once the password has been entered in by the touchtone and received, the user will then be able to listen to the prerecorded messages for what the temperature is. The user will then be able to make decisions for setting the house temperature over the telephone. If the user is home and wants to change the temperature, he or she will be able to go up to the thermostat and enter the settings he or she would like to have for the temperature for the house.
**Benefits**

When driving home after a hard day's work, it's nice to go home to a warm house in the winter and a cool house in the summer, at least in the northern hemisphere. Usually when a person gets home, he opens the door to the house and notices the temperature he walks into. He or she then says to themselves, it's chilly or it's as hot as an oven in here. They then walk to where the thermostat for the house is and set the temperature for the house to what they want. Thermostats are a popular easy to operate electronic device, but wouldn't it be nice to know what the temperature is before getting to your house and if you don't approve of the house's current temperature, set it from your cell phone. The convenience of this thermostat will allow the individual control over the atmosphere for the house even before the individual arrives home. Another example of using the remote controlled thermostat is, say the user has a house in the mountains; he or she could control the temperature in the house from anywhere as long as there was phone service to the house. This would save the person energy because when the person is not staying at the house in the mountains the user is saving energy. A feature along similar lines is the thermostat can be turned off remotely for pleasant days so the user can save on energy. A favorite reasoning for having the remote controlled thermostat is say there is a winter storm moving into the northwest and the user is in California, the user can turn the thermostat on before the pipes freeze and burst in the house.

**Global Societal Impact**

Many companies, countries, and their governments use thermostats to control the atmosphere in certain rooms to a specific temperature because of the object within the room is temperature sensitive. Many rooms in governmental facilities with specialized electronic equipment need the rooms to be cooled to a specific temperature so the equipment is not damaged. Some of these rooms are in remote areas of the world. Medical Pharmaceutical Companies use labs that use thermostats that control different chemical and/or physical properties and reactions. Security is crucial for these specific temperatures in the rooms. A password protected thermostat allows only authorized personnel the ability to control the temperatures in those applications. For the protection of society and the world this needs to be done and this remote thermostat can allow for the control of those applications. Saving the amount of non-renewable energy in the world will also benefit society. Many people across the world can use this telephone thermostat system to cut down on energy usage by only using the heating and cooling they need.

**Comparison of Competing Products**

The products currently on the market have many of the same features as the ones I am proposing to design. However, the target markets are for the wealthy. The features that they advertise include the telephone interface and the home user interface. The one that will be designed for the project will have the same attributes of a telephone interface but using a different home user interface. Most telephone controlled systems like the one I am proposing run from anywhere from two hundred to five hundred dollars with a very huge installation charge (http://www.thermostatshop.com/cem24-series.shtml). The user buying a regular
thermostat should have the choice of purchasing the extra features for less of a price because a basic digital thermostat is typically around fifty to a hundred dollars. The system should be easy to install using the connectors that are going to be used which saves the user on installations costs. The control system will be simplistic allowing most users the ability to easily use the system for their own purpose, which should allow the one I am making a higher profit.

Development

The project will be developed in the Electronics Engineering Computer Lab (ET340). I will be able to purchase some of the needed components on Digi-Key if the components are not currently available in the lab. Some of the components of Leo Wan and Justin Klumpp’s project is available also. Tools for debugging and testing will come from Western’s Electronics Engineering Department, in the Computer Lab (ET340). All components, except for unit, will be put in different containers or in my locker in the room 340. The project will be powered from a wall outlet. The project will need to be on the far station by the telephone so that the testing of the telephone system can be done. A paper board will have a picture of the unit and applications for the individual user on demonstration day. Description, directions, schematic and layout will also be available for each potential viewer to see on the day of project demonstration.