goSmart Home Automation Software

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1. Introduction

In the recent year, wireless communication and home automation held commercial promise in both, the domestic and international market [1, 4]. Traditionally most academics are driven less by commercial promise than by the educational aspects of their accomplishment. However, creativity and technological innovation empowers its progress from the competition game and therefore affording any academic product its commercial promise is a necessity. Our proposed software, goSmart, carries with it both an academic accomplishment and commercial promise.

The X10 protocol is a communications protocol that utilizes ordinary household wiring. The protocol currently supports 16 house codes with each house code supporting 16 unit codes for a total of 256 devices that can be controlled via hardware. House codes are represented by letters (A-P) while unit codes are represented using numbers (1-16). Different combinations of each house code and unit code allow for the control of 256 total devices. Each X10 command, such as "Turn On", carries with it a unique hexadecimal byte value [3]. These hex values, as well as the house code/unit code combination, are then included into a packet with a universal X10 header and footer and transmitted out to all available receivers. When the correct receiver is contacted the packet is dissected and the corresponding command issued (Fig. 1).

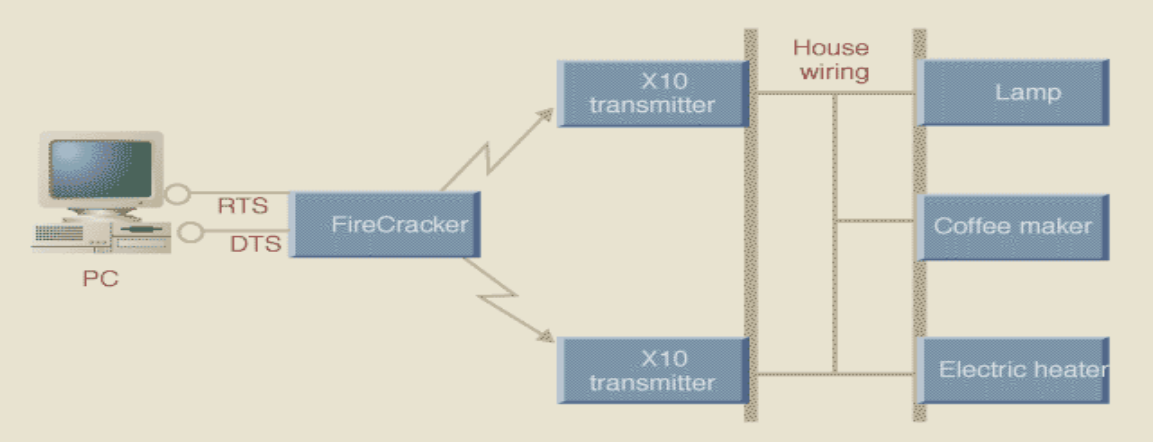

Figure 1: X10 Wireless Communication [2]

The goSmart software will utilize the X10 protocol to create a well balanced home automation system for consumers at a reasonable cost. Current development is being done with the X10 Firecracker module which allows for wireless transmission, however, given the universal nature of the X10 protocol additional transmitters are also anticipated to work.

2. Solution Details

There are many X10 devices on the market today and several solutions for controlling these devices. Solutions are very diverse and can range from hardware solutions to software solutions to combinations of both. One major problem we have noticed is that there is no single solution that offers comprehensive functionality. An ideal solution would incorporate multiple features for both the user and the system (Fig. 2).

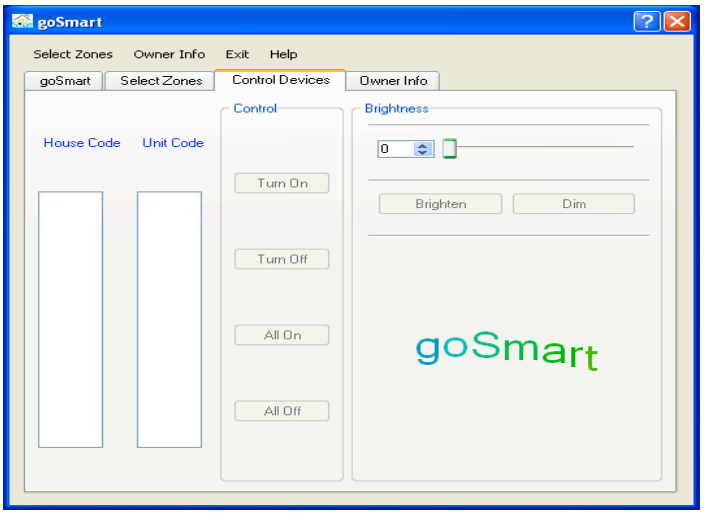

Figure 2: goSmart GUI

Our proposed solution (Fig. 3) entails creating C++ objects to control the X10 Firecracker and maintain a home automation system. Qt will be used to design the goSmart GUI. Our software will incorporate several features into one solution making it unique marketable software. These solutions, in addition to basic X10 functionality, include the following: (i) a multi-user system, (ii) security functions, (iii) saving/customizing devices, (iv) scheduling saved devices, (v), a notification system, (vi) an interactive help system, and (vii) modifications of the X10 protocol.

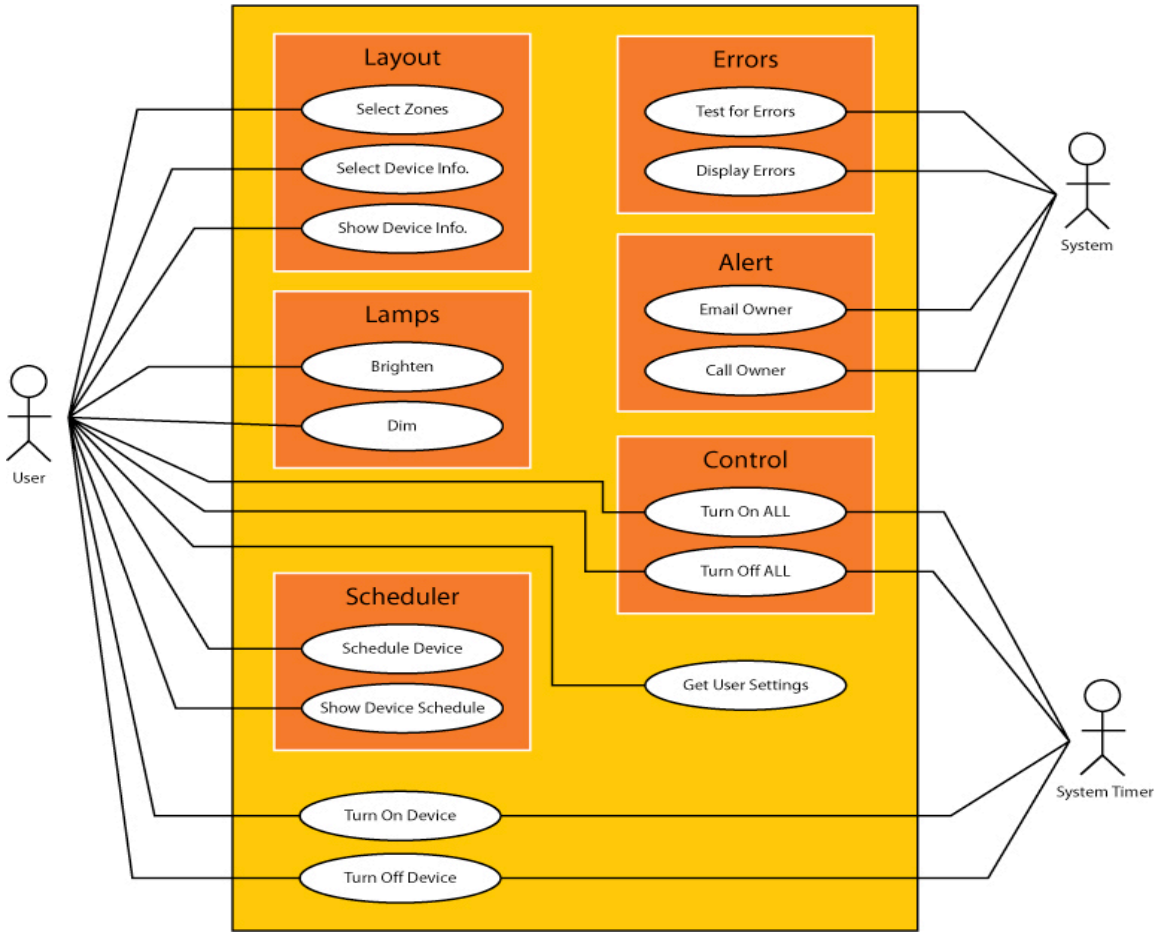

Figure 3: Use Case Diagram

This project has a very large potential. As an example, we would like to extend the architecture to include an SMS server that can accept text messages which will control the X10 devices. For instance, a user will be able to text message that they want a particular light in the house turned on/off. This project can also be extended into the full X10 home automation market to control devices for heating/cooling the house, webcams, audio/video equipment, and much more.

Ideally, we think that we can modularize the software so that packages can be included later on with minimal effort and cost. For instance, we can create a module that could control TV access/recording, or we could create a module that could control an audio/video system to be used for things like setting wake up alarms, etc. The home automation market is very large and diverse so the possibilities for the software can become quite large.

3. Related Work and Results

There are many systems for home automation in the market which is nothing but an indicator for user interest. Some of these systems are X10 based and others use different hardware technology like Z-Wave and INSTEON. Among them is HomeSeer control Software v2.0 (Z-Wave tech.) which controls and monitors lighting, appliances, security, HVAC, telephone and home theater all from one central point. Another home automation system is the mControl software which supports both the INSTEON and X10 protocols. Finally an example of the X10 technology is the Firecracker Fuse Timer Software which allows one to add the scheduling capability using the Firecracker [3]. However, this software requires the use of another piece of software in order to work. Our software, goSmart, adds all these functionalities into one solution as demonstrated in the prototype we are currently building. A snapshot of this prototype is shown in Fig. 4.

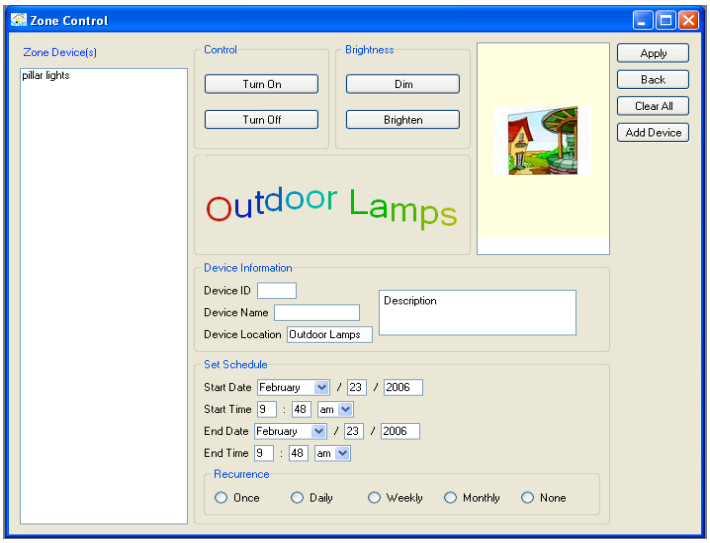

Figure 4: goSmart Scheduling Engine

4. Conclusion

The novelty of the goSmart solution resides in its system design and integration of multiple aspects that most other similar software applications do not offer. This will add to its market life and will support easier future software development. Project goSmart will simplify lifestyle and contribute in fulfilling the growing interest in Smarthomes. Going wireless and controlling devices within a house using the home computer will provide a sense of security and ease of home management.

References

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2 http://www.ftponline.com/javapro/2002_03/magazine/features/mnadelson/ Dec 31,2005

3 http:/www.geocities.com/ido_bartana/Firecracker_protocol.htm. Feb 03, 2006

4 James Gerhart, McGraw, **Home Automation & Wiring**. Hill-TAB Electronics. First edition. 1999.